

Pilot/Escort Vehicle Operators

TRAINING MANUAL



U.S. Department of Transportation
Federal Highway Administration

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MODULE 1

Course Introduction and Industry Background

▶▶ LESSON 1: INTRODUCTION

Welcome to the pilot/escort vehicle operator (P/EVO) training course. This course is designed to prepare individuals to fulfill pilot/escort duties safely and effectively. It includes an overview of the pilot/escort industry, requirements for P/EVOs and their vehicles, procedures for escorting oversize loads, elements of route planning, issues of driver safety, and many important related topics.

The course promotes and facilitates understanding of the regulations, duties, and responsibilities of P/EVOs and provides practical information on such issues as safe maneuvering and vehicle positioning, typically required equipment and its uses, and examples of the substantial variance in rules governing P/EVOs from State to State.

The course also includes a large number of sources of information about State rules and regulations, best practices, guideline documents, and other relevant source materials. These sources are important for three reasons:

1. Learning how to be a P/EVO is similar to most other professions: individuals learn how to do the job primarily by doing it, but they must start with a basic understanding of the job. This is a primary purpose for certification courses: to learn the laws and rules that apply to pilot/escort vehicle operation in the certifying State. Once certified, P/EVOs are responsible for knowing the relevant laws and rules in all the States in which the P/EVOs will escort oversize loads.
2. While it is not possible to learn everything about being a P/EVO in a one-day course, it is possible to gain adequate knowledge about the sources of information needed to operate lawfully and safely from State to State.
3. These sources—and how to locate and use the information—enable the P/EVO to keep up-to-date with changes in the rules over time, which is one of the most onerous tasks the P/EVO must accomplish.

There are very few Federal rules that govern escort operations, so as a matter of public safety, P/EVO regulations are established by each individual State, and States have substantially different approaches to the permitting and regulation of oversize load movement. Variations exist among States in defining situations

in which escorts are required, determining how many escorts are required under certain conditions, and establishing the types of equipment and signs the P/EVO must have, among many others. It is the responsibility of the P/EVO to know the laws of each State through which the escorted load moves, just as it is for drivers with a commercial driver's license (CDL) or a basic driver's license.

▶▶ LESSON 2: PILOT ESCORT INDUSTRY BACKGROUND

Across the United States, Canada, and Mexico, and in many other countries, P/EVOs are required for the movement of oversize loads, and for all the differences among the States in the regulation of these loads, the purposes for P/EVOs are substantially consistent from place to place. P/EVOs are in place to enhance the safety of roadway users, to protect transportation infrastructure, the load driver, the load, as well as the P/EVOs themselves and law enforcement escorts when required.

The number of permits issued for oversize loads increases every year. It is apparent that more P/EVOs, including those with specialized skills such as height pole operation, will be needed for the foreseeable future.

Pilot/Escort Vehicle Operator Industry Safety Efforts

The P/EVO industry has difficulties similar to other transportation-related entities in terms of safety programs, such as a lack of funding to support education and enforcement efforts; a lack of coordination among groups, both public and private, that would benefit from working together; and a lack of standards in even the most basic operational processes and equipment requirements. Efforts at better State to State harmonization are being made by organizations including, among others:

- Federal Highway Administration (FHWA).
- American Association of State Highway and Transportation Officials and regional subsidiary groups: Western Association of State Highway and Transportation Officials, Northeast Association of State Transportation Officials, Southeastern Association of State Transportation Officials, Mid America Association of State Transportation Officials.
- Specialized Carriers & Rigging Association (SC&RA).
- Commercial Vehicle Safety Alliance (CVSA).
- Owner Operator Independent Drivers Association (OOIDA).
- Insurance industry representatives.

Standardizing the safety equipment requirements for P/EVOs and/or insurance and certification requirements, for example, would benefit highway users, States, P/EVOs, and carriers. One example of a current standardization effort is the voluntary adoption by many States of the temporary traffic control requirements for flagging and equipment found in the *Manual for Uniform Traffic Control*

Devices.¹ As a matter of safety, it is important that P/EVOs performing traffic control procedures have similar appearance and use the same equipment and methods regardless of where they may be controlling traffic. With the exception of driving in front of a very large heavy load (a load that cannot maneuver or stop quickly), flagging traffic is perhaps the most dangerous activity a P/EVO is required to perform. It is appropriate, therefore, that traffic control procedures and equipment be standardized in order for highway users to know and understand those procedures.

An important example of an area related to oversize load movement that needs to be better standardized is railroad crossings. Similar to P/EVO operations and requirements, railroad-highway crossings and the rules and standards applying to them vary from State to State. Better coordination among railroad companies, highway designers, maintenance personnel, and others could bring about joint warning signal inspections, integrated track and highway maintenance processes, and—highly relevant for P/EVOs and oversize/overweight load drivers and carriers—designating problematic crossings for special permit vehicles. In addition, coordination in setting standards, designing crossings, and reporting emergencies would benefit not only highway users and taxpayers but also the railroads and the States, carriers, load drivers, and P/EVOs.²

A general lack of information about the escort industry is a further impediment to developing and managing standards and, therefore, to harmonizing P/EVO requirements among the States. P/EVO duties and responsibilities, required equipment, insurance requirements, and other rules differ widely from State to State. No formal national certification process exists in the pilot/escort vehicle operator industry, unlike commercial driver certification (i.e., CDL holders).³ CDLs (as well as basic operator's licenses) are accepted in all States, in part because of the standardization of training and testing in these programs.⁴ The American Association of Motor Vehicle Administrators has developed a model CDL training manual that most States have adopted with a few adjustments to reflect specific State laws and rules.⁵ This training manual and related materials are designed to address this need to better standardize and enhance training for P/EVOs.

Escorting oversize loads requires skill and awareness similar to that of emergency vehicle operators, tow truck drivers, roadside mechanics, and others who perform dangerous roadside operations. P/EVOs are frequently required, for example, to control traffic during the movement of oversize loads—typically a planned procedure, but the need for controlling traffic is also required in unplanned

¹ Federal Highway Administration, *Manual on Uniform Traffic Control Devices*, Part 6. Available at: http://mutcd.fhwa.dot.gov/hm/2009r1r2/part6/part6_toc.htm. The FHWA has incorporated by reference the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD, pursuant to 23 CFR 655.601(d)(2)).

² U.S. Department of Transportation, "Accidents That Shouldn't Happen: A Report of the Grade Crossing Safety Task Force to Secretary Federico Pena," March 1, 1996, p. 9. Available at: <http://safety.fhwa.dot.gov/xings/docs/taskforcereport.pdf>.

³ Though many P/EVOs have a CDL, a CDL is not typically required for P/EVOs.

⁴ A driver seeking a CDL must pass both knowledge and skill tests.

⁵ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014). Available at: <http://www.aamva.org/CDL-Manual/>.

situations. Planned situations involve closing a narrow bridge or stopping traffic when the load vehicle is blocking lanes of traffic. Unplanned situations occur when the load vehicle becomes disabled or weather or traffic conditions prohibit the load from moving. In this latter situation, P/EVOs may be required to control traffic regardless of weather conditions or curfew restrictions; the P/EVO must be prepared to flag traffic in the unplanned situation; e.g., after dark, in inclement weather, with or without a shoulder or lighting present, or for an extended period of time.

Industry Evolution and the Lack of Uniformity

During the past few decades, various State and Federal agencies, professional associations, task forces, P/EVO operators, carriers, and others have made many recommendations about P/EVO regulations. A common recommendation among these groups is that States should develop consistent certification programs for escort vehicle drivers that include training exercises in railroad crossing safety, height pole operation, route surveys, traffic control, and in highway procedures across multiple contexts; e.g., various types of roadways and with loads of differing sizes and configurations.

Another common recommendation is that State permit offices should ensure that P/EVOs be certified and required to maintain adequate insurance coverage. To date, these recommendations have not been implemented.⁶

Rules related to railroad crossings remain an area of concern to those involved in the movement of oversize loads. In March 1994, an “On Guard” safety guidance document, published by the Federal Highway Administration, warned that truck-tractor and trailer rigs can become stalled on railroad tracks. The group cautioned oversize load drivers to approach tracks slowly enough to stop if a train is detected and urged drivers whose trucks have low ground clearances to refrain from taking chances at high-profile grade crossings. However, drivers are not only continuing to stall and become lodged at highway-rail crossings, they continue to be hit by trains.⁷

Purpose and Role of Escorts in Warning the Motoring Public

Many times passenger vehicles under-ride large trucks.⁸ This is one example of how escorts can improve safety: P/EVOs warn motorists approaching from the rear that these large and frequently slow-moving vehicles are on the road and do everything possible ensure highway users do not collide with the load, drive under the trailer, or become involved in a small-overlap collision when drivers try to steer around a big load when left with inadequate stopping distance.

⁶ The Federal Highway Administration maintains a list of all State permit offices (as well as Canadian provinces) that includes websites and telephone numbers. Available at: http://www.ops.fhwa.dot.gov/Freight/sw/permit_report/index.htm.

⁷ U.S. Department of Transportation, Office of Motor Carriers, Federal Highway Administration, *On Guard*, Vol. 25, No. 1, December 1995.

⁸ See Module 7, Lesson 5.

*“Large trucks
are involved
in about 1 in
10 highway
deaths”*

—Insurance Institute
for Highway Safety,
Large Trucks Fatality
Facts 2013

Deaths in Large Truck Crashes

The need for better standards and more training is clear given that the decreasing number of deaths in large truck crashes appears to be more closely related to the growing safety of passenger vehicles rather than to any changes in truck safety or truck driver behavior.⁹

In 2013, according to the Insurance Institute for Highway Safety’s (IIHS) Highway Loss Data Institute, a disturbing trend emerged: the number of people who died in large truck crashes was **14 percent higher** than in 2009, when it was lower than in any year since collection of fatal crash data began in 1975. The number of **truck occupants who died in 2013 was 31 percent higher than in 2009.**

IIHS reports 3,602 people died in crashes involving large trucks in 2013. Of these, 16 percent were truck occupants; 67 percent were passenger vehicle occupants; and 15 percent were pedestrians, bicyclists, or motorcyclists. Large trucks were involved in 11 percent of all motor vehicle crash deaths and 23 percent of passenger vehicle occupant deaths in multiple-vehicle crashes. In addition, 60 percent of deaths in large truck crashes in 2013 occurred on major roads other than interstates and freeways; 30 percent occurred on interstates and freeways, and 10 percent occurred on minor roads.

Data indicates that 51 percent of fatal collisions involving a truck occurred between 6 a.m. and 3 p.m., compared with 30 percent of crash deaths not involving large trucks. In collisions involving a passenger vehicle and a large truck, 97 percent of the deaths were occupants of the passenger vehicle.¹⁰

These and similar statistics contribute to the primary reason for escorts to be in place: to warn approaching motorists of the presence of large loads.

The transportation of oversize loads is growing, and the specialized individuals who handle moving these loads are central to successful and safe operations. It is vital that the people working to move these loads are well trained and capable of performing the job safely. Highly skilled P/EVOs are needed to assist carriers with the safe movement of oversize loads of all kinds, on all kinds of roadways, and in all kinds of conditions.

Regulation of Trucks and Drivers

Prior to 1992, according to the IIHS Highway Loss Data Institute, many States had weak training, testing and licensing standards for drivers of large trucks. Since 1992, Federal laws have been put in place establishing requirements and standards for testing, licensing, and health requirements for issuing all commercial driver’s licenses. In addition, a national database of all CDL holders is in place in order to monitor traffic convictions, insurance status, health check status, and other information to ensure CDL holders are qualified and physically capable of driving large trucks safely. Many, including P/EVOs themselves, have recommended P/EVOs should have similar systems in place.

⁹ Insurance Institute for Highway Safety (IIHS), Fatality Facts web page, “Large Trucks, 2013.” Available at: <http://www.iihs.org/iihs/topics/t/large-trucks/fatalityfacts/large-trucks/2013>.

¹⁰ Ibid.

Agencies in the Federal government that oversee regulation of large trucks, oversize loads, and escort operations include the US Department of Transportation (USDOT), especially the Federal Motor Carrier Safety Administration (FMCSA), the National Highway Traffic Safety Administration (NHTSA), and the FHWA. In addition to government agencies and the organizations already mentioned, several professional associations are involved in efforts to standardize P/EVO requirements and harmonize State rules. These organizations include the SC&RA, and the CVSA, and the OOIDA, among others. As mentioned, most aspects of pilot/escort operations are controlled by individual States, and the States vary widely in what they require of not only the P/EVO, but also the escort vehicle and required equipment.

Role of Pilot/Escort Vehicle Operators

The professional P/EVO provides protection for highway users, transportation infrastructure, and the load. P/EVOs perform a safety-sensitive function and are an integral component of many oversize vehicle movements. For these reasons, the P/EVO must be well trained and qualified.

As mentioned, States vary substantially in their approaches to P/EVO operation. Arizona, for example, considers the following criteria when deciding whether escort vehicles are required:

- Roadway dynamics, including surface condition, grade, width, and height limitations.
- Overall dimensions of the vehicle and load.
- Need for frequent stops.
- Concern for public safety.
- Time of transport.¹¹

Regardless of the State or the criteria used, when the job is done well, **P/EVOs assist not only in reducing fatalities and injuries, but also in preventing damage** to transportation infrastructure, including bridges, signs, and guardrails; and in preventing damage to the load, the load vehicle, the escort vehicle, and all other vehicles on the roadway.

¹¹ Arizona Administrative Code, "Title 17. Transportation, Chapter 6. Department of Transportation Overdimensional Permits Arizona, Article 3. Safety Requirements, section R17-6-305. Escort Vehicles." Available at: <https://www.transportpermits.com/images/provision/ARIZONA.PDF>.

Reasons for Pilot/Escort Vehicle Operator Certification

In order for P/EVOs to do the job well, they must be properly trained for their responsibilities. The five primary reasons for P/EVO training and certification are to:

- Enhance the safety of:
 - All roadway users.
 - The load driver.
 - The escort operator.
- Prevent damage to:
 - Transportation infrastructure.
 - The load being transported.
 - The load vehicle.
 - The escort vehicle.
- Prevent or minimize delays to normal flow of traffic.
- Reduce accident and loss rates.
 - To reduce public costs of replacing transportation infrastructure.
 - To reduce insurance costs.
 - To enhance the profession.
- Standardize the escort industry.

P/EVOs provide extra measures of safety and assist in preventing damage in many ways, including warning oncoming motorists of the presence of an oversize load, notifying the load driver of conditions that warrant special attention, and minimizing delays to normal traffic flow.

Warning oncoming motorists about the oversize load becomes increasingly important in the face of congested roadways, features of the terrain such as hills and curves, and distracted drivers, to name just a few potential hazards. In addition, notifying load drivers of hazards is an important P/EVO responsibility because minimizing deaths, injuries, and property damage are important goals for all road users.

Traffic tie-ups are rich environments for collisions with vehicles and infrastructure as well as contributing to aggressive—and unsafe—driver behaviors. As frustration grows, motorists increasingly engage in unsafe driving behaviors. Knowing how and when to react to the demands of traffic situations is critical to the safe movement of oversize loads.

Professionalism in the Industry

Perhaps more than rules and regulations, it is the values of carriers, professional organizations, or informal groups of P/EVOs that have more influence on the safety behaviors in a given profession. Professional P/EVOs are an internal culture operating within the broader commercial transportation culture. Enhancing a

culture of competence, service, safety, and pride within that culture provides substantial benefits not only to highway users generally but to the transportation industry in particular. The qualified P/EVO is an integral part of the oversize load movement team, and he or she is necessary to protect the traveling public.

P/EVOs must be prepared to execute their responsibilities with skill and competence. Internal organizational and individual influences can affect safety in a positive or negative direction. It is of vital importance that safe practices be displayed and adopted in the movement of oversize loads for the benefit of the general population and the transportation industry.

P/EVOs are ambassadors for their own industry and, by extension, the heavy haul industry in general. For this reason, P/EVOs must be courteous in their interactions with the public and enforcement officers as well as with load drivers and other escorts.

▶▶ **LESSON 3: COURSE AND TRAINING MANUAL STRUCTURE**

This manual is useful both as a training text and as a reference guide during oversize load movements. It provides practical and realistic guidance on a broad range of issues likely to arise in the movement of oversize loads.

The manual is divided into eight modules. First is this course overview and information in the next lesson about the history, origins, and current state of the escort industry. Module 2 includes typical State requirements for P/EVOs and the pilot/escort vehicle. The focus of Module 3 is route planning and conducting a route survey, along with information about enforcement and inspection activities.

Module 4 deals with pre-trip activities. Before starting the trip, it is important for the safe movement of the oversize load that a pre-trip safety meeting be conducted. Issues that should be discussed in the safety meeting, as well as elements of an effective pre-trip walk-around inspection, are presented. Module 5, by far the largest module, includes information about actual P/EVO operations during the trip, including the role of the P/EVO in various situations, the proper use of required and/or suggested equipment, the positioning of the escort vehicle during typical operations, elements of safe traffic control operations, issues involving railroad crossings, and a section about emergency and accident procedures.

Module 6 includes post-trip activities including equipment issues, reviewing the trip, and the benefits of producing and maintaining trip logs. Driver safety issues are presented in Module 7, including information about driver distractions, driver fatigue, aggressive driving, and safety technologies. Finally, Module 8 includes a comprehensive review of the material presented in the course, and brief instructions for submitting the course evaluation and other typical paperwork.

The Certification Examination

At the end of the course, participants must take and pass a 40-question multiple choice exam in order to become certified. All major points covered in the course will be mentioned multiple times during the day, as well during the comprehensive review mentioned above, conducted immediately prior to the exam. Typically, students are required by the various States to score at least 75 percent to pass the examination, though some States require a minimum grade of 80 percent. Students are not allowed to use books or notes during the exam.

If a student does not pass the exam on the first attempt, States have differing provisions for re-taking the exam. Some States allow students to retake the exam within a specified time frame at no charge. If the student does not earn a passing score on the retake, the student must attend the class again, in many States, and pay all or a portion of the regular course fee. If the second retake is unsuccessful, one final opportunity is extended to the student by some States. In order to take the third retake, the student is often required to attend the course again (for the third time), and pay all or some portion of the regular course fee. This third retake is the last opportunity to become a certified P/EVO in most States.

→TEST YOUR KNOWLEDGE

1. Is P/EVO certification valid in all 50 states?
2. What are the primary reasons for certifying P/EVOs?
3. What is the essential purpose for having P/EVOs in place?
4. Why do laws pertaining to escort drivers differ from State to State?
5. Who issues P/EVO certification cards?

MODULE 2

Pilot Escort Operator and Vehicle Equipment Requirements

For the pilot/escort vehicle operator (P/EVO) industry, rules are made overwhelmingly at the State level. Each State has requirements about both the P/EVO and the escort vehicle. And for nearly every load movement, each State along the route issues a permit for load movement within its borders. Many aspects of the load movement will be specified on the permit; for example, the route to be followed, the specific dates of travel and times of day movement is allowed, local jurisdictions and utilities that must be contacted, the number of escorts required, and many other requirements.

It is also important to know that States also differ when it comes to the agency that oversees P/EVOs and oversize load movement. For example, in Minnesota, the department of public safety regulates P/EVO operations for the most part, but flagging information is produced by the department of transportation.¹² In Oklahoma, on the other hand, routes for oversize loads are issued by the department of public safety, while overweight load routes are handled by the State department of transportation.¹³

These State to State differences are not only problematic for P/EVOs but also for carriers and even the States themselves. Efforts to better standardize P/EVO operators and permits have been in place for more than a decade and have met with some success. The American Association of State Highway and Transportation Officials (AASHTO) has established a truck oversize/overweight permit harmonization initiative, stating, “AASHTO member States are committed to harmonizing permit procedures and requirements between States, among States in regions, and on multi-state corridors.”¹⁴

AASHTO and others involved in the movement of oversize loads are focusing initially on P/EVO requirements, including certification requirements; flags, lights, and other equipment requirements; curfews; and other matters. (See also the *AASHTO Guide for Vehicle Weights and Dimensions*.¹⁵) The areas of focus for the harmonization effort include the number of days allowed on single-trip permits,

¹² Minnesota Administrative Rules, “Chapter 7455, Pilot Vehicle Escort for Overdimensional Load.” Available at: <https://www.revisor.mn.gov/rules/?id=7455>.

¹³ Oklahoma Administrative Code, Title 730, “Chapter 30-9-7(1). Overweight permits - specific conditions and restrictions.” Available at: <http://www.oar.state.ok.us/>.

¹⁴ AASHTO, Board of Directors: Policy Resolution PR-3-12: *Actions to Reduce Impediments to Interstate Commerce-Harmonizing Requirements for Truck Permits (Phase I)* and *PR-13-13 (Phase II)*, Available at: <http://www.aashtojournal.org/Documents/November2012/PR-3-12.pdf>.

¹⁵ AASHTO, *Guide for Vehicle Weights and Dimensions, 4th edition* (Washington, DC: AASHTO, 2004). Available for a fee at: https://bookstore.transportation.org/Item_details.aspx?id=1530.

the processes for amending permits, and the type and size of escort vehicles.¹⁶ AASHTO is coordinating with private sector shippers and carriers in these efforts.

This module is focused on the most common rules for P/EVOs and their vehicles among the States. It should be clear by now that P/EVOs must know the laws and rules in each State, including certification and equipment requirements. Lesson 1 includes pilot/escort driver requirements, and Lesson 2 describes the equipment that is recommended and typically required by States.¹⁷

▶▶ LESSON 1: PILOT ESCORT OPERATOR REQUIREMENTS

Pilot/Escort Vehicle Operator Certification and Reciprocity among States

Of the 50 States, about 12 currently require P/EVOs to be certified. Each of these States has different procedures for becoming a certified pilot/escort operator. However, many States have P/EVO certification reciprocity agreements; i.e., as with driver's licenses, States will accept the P/EVO certification from reciprocating States. However, these agreements are in place for certification only; reciprocating States do not have the same rules regarding vehicles or equipment. One example is the required age for escorts: many States require the P/EVO be 21, while several allow P/EVOs to be certified at age 18. Some States may require P/EVOs to complete a driver improvement/defensive driving course in addition to the P/EVO certification. Other States may require a certain amount of insurance coverage. Still other States reciprocate in terms of escort certification, but also require P/EVOs be certified flaggers. So, even when a reciprocity agreement is in place between two States, the P/EVO must still know the laws and rules of each State in which he or she operates.

Driver improvement courses are beneficial to drivers. Insurance rates are frequently lower to those who have taken such courses because they have been linked to lower rates of crashes and injuries. P/EVOs over the age of 55 might consider taking a driver improvement course offered by the American Association of Retired Persons or participating in the American Automobile Association's (AAA) *Roadwise*® program, both of which are widely accepted by insurance companies and permitting/certifying officials. These courses should be repeated every 3 years and are strongly recommended for all drivers.

Many States accept P/EVO certification from other States, similar to the way all States recognize driver's licenses and commercial driver's licenses from all other States. Many States enter into reciprocity agreements with States that have similar requirements for P/EVO certification. Most certifying States require students to attend a 1-day course, typically every 3 to 5 years, and require a passing grade on a written test. Each State designs its own class and tests, although many of the courses are similar.

¹⁶ AASHTO, Board of Directors: Policy Resolution PR-3-12: *Actions to Reduce Impediments to Interstate Commerce-Harmonizing Requirements for Truck Permits (Phase I) and PR-13-13 (Phase II)*, Available at: <http://www.aashtojournal.org/Documents/November2012/PR-3-12.pdf>

¹⁷ Not all of the equipment discussed in this module is required by all States, nor is the equipment included here an exhaustive list of what is required. Each State has rules about what must be carried in and displayed on escort vehicles.

General Skills

A successful P/EVO has excellent communication skills and is engaged and curious about all aspects of load movement. P/EVOs should have a professional appearance and manner, although they are prohibited from displaying any badge, shield, emblem, or uniform of color or design that may be mistaken for a law enforcement badge, emblem, or uniform.¹⁸

P/EVOs should be physically fit, mentally alert, and well rested before beginning any trip. Adequate hearing, vision, and physical mobility are especially important for safe traffic control operations.

Other Useful Credentials for Pilot/Escort Vehicle Operators

Transportation Worker Identification Credential (TWIC) Cards. TWIC cards have been required since 2009 for anyone entering a secure area of a maritime port. Without a TWIC card, the person must be accompanied at all times by someone who does have the card. For work around ports, TWIC is important.¹⁹

Cardio-Pulmonary Resuscitation (CPR) and First Aid. As a matter of general safety, and regardless of profession, all adults should have recurrent first aid and CPR training. Given the remote locations encountered during load movement, along with the prevalence of heart attack, the more people who are competent in first aid and CPR procedures, the better. All vehicles should have CPR equipment, including barrier devices and/or a rescue mask, on board.

Defensive Driving. Many major insurance companies offer discounts to drivers who participate in a 6- to 8-hour in-person course (not online), and who repeat the course every 3 years. In addition, some States are now requiring P/EVOs have a current defensive driving certificate to operate. Whether required by law or not, the benefits of lower insurance premiums and the importance of learning about and hearing reminders of safe driving practices is a good investment of time and money—an efficient way to mitigate risk.

→ TEST YOUR KNOWLEDGE

1. What determines the route to be followed and the dates and times of travel?
2. How old must P/EVOs be?
3. Certification typically lasts how long?
4. When is it appropriate for a P/EVO to wear or display uniforms, emblems, or vehicle decals that resemble those of a law enforcement officer?
5. What is a TWIC card?

¹⁸ U.S.C. § 912.

¹⁹ American Trucking Associations, “TWIC Compliance Goes Into Effect Nationwide; Coast Guard Grants ATA’S Request For Alternate Compliance,” 4/14/2009, Available at: <http://www.trucking.org/article/TWIC%20Compliance%20Goes%20Into-Effect-Nationwide;-Coast-Guard-Grants-ATA’S-Request-For-Alternate-Compliance>.

▶▶ LESSON 2: ESCORT VEHICLE EQUIPMENT REQUIREMENTS

The P/EVO performs critical tasks during every phase of oversize load movement. In order to perform these duties, certain vehicle types are recommended and specialized equipment is required. States vary in the vehicle requirements and in equipment required for P/EVOs. This lesson provides information about the most common equipment required. As with all other aspects of the job, P/EVOs are responsible for knowing the equipment that is required by every State in which they operate.²⁰

There are no consistent rules about the types of vehicles that are to be used as escort vehicles. In many States, passenger cars weighing at least 2,000 pounds or pickup trucks rated at least ¼ ton capacity are minimum, but no maximum size is specified. Other States focus on visibility, requiring escort vehicles that enable the driver to see 360 degrees from the driver's seat. In such cases, cargo vans or panel trucks are not allowed.

The Commercial Vehicle Safety Alliance (CVSA), the Specialized Carriers & Rigging Association (SC&RA), and the Federal Highway Administration (FHWA), among other groups suggest the following equipment be carried in or displayed on escort vehicles at a minimum:

- Signs.
- Flags (vehicle flags as well as a flag for emergency traffic control, described below).
- Warning lights.
- Full-size spare tire and tools for changing.
- Fire extinguisher.
- Mirrors.
- Hardhats & safety vests.
- STOP/SLOW paddle.
- Cones and reflectors.
- Flashlight and cone.
- First aid kit.
- Spare parts/fluids.
- Measuring pole.
- Radio.

Signs.²¹ Several signs are typically required by the States. The first is the Oversize Load sign. All States require Oversize Load signs for not only the escort vehicle but also the load vehicle, and these signs are to be the same color: black letters on

²⁰ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 10.

²¹ *Ibid*, p. 11.

yellow background. However, where the sign must be displayed and the size of the sign and letters vary. Most States allow for the sign to be mounted on top of the escort vehicle, and this is recommended placement because the sign is more visible when on top of the vehicle, and a longer term consideration is that a great deal of modern electronics technology is located in the bumpers of vehicles (both load vehicles and escort vehicles), including crash avoidance systems. P/EVOs must know the size the sign must be for each State; it is recommended the P/EVO obtain the largest sign required by the States in which the P/EVO operates.

Looking Ahead

The trend is for the Oversize Load sign to be on top of the escort vehicle. Using this method, visibility is improved for highway users, and safety technologies, including crash-prevention devices, are installed in the vehicle bumpers of both load vehicles and passenger vehicles used by P/EVOs.

In addition to the Oversize Load sign, signs on both sides of the escort vehicle are also required by many States. These signs typically require, at a minimum, the name of the P/EVO and/or the company name, and the city and State in which the P/EVO is based. Other States also require a telephone number, and States typically allow a company logo if desired. Requirements about the size of these signs, colors, and other requirements vary from State to State. These signs do not typically have to be removed or covered when the P/EVO is not escorting a load; these signs both act as a means of identifying a P/EVO and promote the P/EVO's business.

As with other equipment mentioned here, it is the responsibility of P/EVOs to meet the standards of each State. It is also the case that if the Oversize Load sign properly displayed on the escort vehicle is bigger than a given State requires, this is not a problem so long as the sign does not extend beyond the width of the vehicle. Therefore, P/EVOs should find the size requirement for each State in which they intend to work and make the Oversize Load sign conform to the State with the biggest size requirement. It is also important to have Oversize Load signs that are retroreflective for nighttime operations.

Flags.²² Many States require warning flags be displayed on the escort vehicle. That is where the similarity ends, however. Some States require two flags, while others require four. Some States require the flags to be 12 inches by 12 inches, but others require they be 18 inches by 18 inches. Further, where the flags are to be placed on the vehicle also varies. Some States require the flags be mounted from the top of the cab, while others require flags at the vehicle extremities.

It is frequently the case that if P/EVOs meet a higher standard in one State, there are no problems in States that require a lower standard. For example, if a State requires 12-inch flags but the P/EVO uses 18-inch flags, this is typically acceptable among States requiring smaller ones.

²² Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 11, and see Title 49, Section 393.95 (k) for regulations about emergency flags for commercial vehicles.

As mentioned, the P/EVO is responsible to know how many flags, the size of the flags required, and the placement of those flags in each State in which they operate. Finally, it is important to check flags for fading or fraying and to replace them when needed.²³

Warning Lights.²⁴ In addition to fully functioning headlights, taillights, brake lights, and emergency flashers, at least one amber warning light is required for the escort vehicle. Most States require the warning light be visible from 500 feet, and the light should rotate, oscillate, and/or flash through 360 degrees, consistent with the minimum requirements stated in Part 6 of the *Manual on Uniform Traffic Control Devices*.

No warning lights or flags should be displayed unless the P/EVO is actively engaged in load movement or is conducting a route survey. Several States fine P/EVOs for having the warning light on and/or Oversize Load sign(s) displayed when not involved in escort activities. Extra bulbs for not only the warning light, but also headlights, taillights, etc. should be carried by the P/EVO at all times.

Unlike the Oversize Load sign and the warning lights, the signs on the sides of the escort vehicle may be displayed at all times, whether the P/EVO is performing escort duties or not. (See Module 6 for more information about post-trip responsibilities.)

Spare Tire. Being equipped with full-size spare tires is advisable and is even required by many States. In addition, a lug wrench, jack, or any other tools needed to change the tire are also required in States that require a full-size spare. This is another piece of equipment that should be carried by the P/EVO whether laws require it or not. It is not helpful for load movement to be delayed due to a lack of a road-worthy spare tire.

Fire Extinguisher(s).²⁵ Fire extinguisher standards for commercial vehicles are found in 49 Code of Federal Regulations Part 393.95.²⁶ Most States require P/EVOs carry fire extinguisher(s). If no hazardous materials are being transported, the FMCSA requires fire extinguishers have an Underwriters' Laboratories rating of 5 B:C or more, or two fire extinguishers, each with a rating of 4 B:C or more. Each fire extinguisher must be labeled or marked by the manufacturer with its Underwriters' Laboratories rating and must be designed, constructed, and maintained so that visual determination of whether the extinguisher is fully charged or not is possible.

The fire extinguisher(s) must be filled and located so they are readily accessible. Many States require the extinguisher(s) must be securely mounted to prevent sliding, rolling, or vertical movement relative to the motor vehicle. Finally, fire extinguishers must use an extinguishing agent that does not need protection from freezing, and extinguishing agents must comply with the toxicity provisions

²³ See Title 49 CFR, Section 393.95 (k) for regulations about emergency flags for commercial vehicles.

²⁴ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 10.

²⁵ *Ibid.*, p. 13.

²⁶ Federal Motor Carrier Safety Regulations: <https://www.fmcsa.dot.gov/regulations/title49/section/393.95>.

of the Environmental Protection Agency's Significant New Alternatives Policy regulations under 40 CFR Part 82, Subpart G. It is also recommended the extinguishers be shaken frequently to avoid settling and packing of the extinguishing agent, which occurs due to normal vehicle vibration while driving.

Mirrors.²⁷ Outside rear-view mirrors on both sides of the escort vehicle are needed. Curved mirrors (convex, fisheye, for example) are often helpful. Experiment with what produces the best field of vision for your particular vehicle. Remember that convex mirrors produce a wider field of vision, but it also makes objects seem farther away than they actually are. AAA suggests adjusting the seat by extending arm to the front and adjust seat until palm of hand is in line with top of steering wheel.²⁸

To get the most from side mirrors, AAA recommends that, when setting the left mirror, the driver should put his or her head against the driver's side window and set the mirror where only a very small sliver of the vehicle can be seen in the mirror. Similarly, when setting the right hand mirror, the driver should lean over his or her head is in line with the rear view mirror; the right mirror should be set the same way as the left; that is, swing the mirror out until only a tiny amount of the vehicle is seen in the mirror. This creates much better visibility in traditional blind spots for all highway users, including the P/EVO and load driver.²⁹ When driving, the driver should scan the mirrors without focusing on any particular mirror for too long.

Hardhats and Safety Vests.³⁰ Hardhats must comply with the American National Standards Institute (ANSI) Z 89.1-2009 requirements. ANSI has divided impact protection into two categories, Type I and Type II. Type I hardhats are designed to mitigate blows to the top of the head; for example, a tool falling from above. Type II hardhats are more versatile and, therefore, are recommended for P/EVOs. Type II hardhats reduce the force of impact that may be off-center, from the side, or the top of the head. This form of impact, for example, may result from contact with any protruding part of a load. The hardhat for the P/EVO is also used to increase visibility when flagging traffic.

Safety vests are required for flaggers and others involved in roadside operations, according to the *Manual on Uniform Traffic Control Devices* high-visibility safety apparel standard³¹ and must meet the ANSI Performance Class 2 or 3 requirements for daytime and nighttime activity. According to the standard, "the apparel background (outer) material color shall be fluorescent orange-red, fluorescent yellow-green, or a combination of the two. The retro-reflective material shall be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. The retro-reflective safety apparel shall be designed to clearly identify the wearer as a person."

²⁷ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.4. Available at: <http://www.aamva.org/CDL-Manual/>.

²⁸ American Automobile Association, *How to Drive: the Beginning Student Manual*, 2004, p. 33.

²⁹ American Automobile Association, *AAA Driver Improvement Program Student Guide*, (n.d.), p. 8.

³⁰ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 12.

³¹ Federal Highway Administration, *Manual on Uniform Traffic Control Devices*, Part 6, Section 6E-02. Also, see ANSI, *Standard for High-Visibility Apparel and Headwear*, Sec. 1A.11.

STOP/SLOW Paddle.³² Most States require P/EVOs to carry at least one 18-inch *STOP/SLOW* paddle. The paddle should have a reflective surface and be standard in shape (i.e., octagonal) and color (i.e., the STOP side must be red with white letters, while the SLOW side must be orange with black letters). The minimum size is 18-inches with 6-inch letters; however, when controlling traffic at highway speeds, a 24-inch paddle is recommended. Some States require P/EVOs carry two paddles in a crash situation; for example, when the load driver may need to help with traffic control. (Load drivers are not currently required to carry a STOP/SLOW paddle.)

The P/EVO should have a pole about 7-feet tall for mounting the STOP/SLOW paddle when traffic control will be needed for more than a few minutes. Standard traffic signs are installed so that the bottom of the sign is 7 feet from the ground. By having a pole this length, the *STOP/SLOW* paddle will be in the area drivers commonly see stop signs. This also places the *STOP/SLOW* paddle well above the flagger's head in nearly all situations.

The *STOP/SLOW* paddle may be modified to improve conspicuity by incorporating either white or red flashing lights on the STOP face and either white or yellow flashing lights on the SLOW face. The flashing lights may be arranged in any of the several patterns. (Refer to the Manual on Uniform Traffic Control Devices (MUTCD) Section 6E.03 for details on light placement and other specifications.)

In addition to the *STOP/SLOW* paddle(s), many States also require P/EVOs carry a 24-inch by 24-inch red flag (or red-orange or fluorescent versions of those colors) for controlling traffic in an emergency when no STOP/SLOW paddle is available. At no time is the flag (or a *STOP/SLOW* paddle) to be held outside the window of a moving vehicle in an effort to stop traffic.

Reflective Cones and/or Triangles.³³ Most States require warning devices for stopped vehicles. Typically 3 bi-directional emergency reflective triangles³⁴ are required; however, some States require traffic cones of various sizes, and others require the P/EVO to carry flares. The FMCSA allows other warning devices to be used in addition to the triangles, but not in lieu of them, and provided that any additional warning devices do not decrease the effectiveness of the required warning devices.

Flashlight/Traffic Wand.³⁵ P/EVOs should carry at least one operating traffic wand flashlight equipped with a safety nose cone. The light should be LED and visible for 500 feet. The wand should be impact- and water-resistant and have a non-slip handle. The on-off switch should be visible night or day.

³² Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 12; see also MUTCD Section 6E.

³³ *Ibid.*, p. 14; See also 49 CFR 393.95.

³⁴ See Federal Motor Vehicle Safety Standard No. 125, § 571.125.

³⁵ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 16.

First-Aid Kit.³⁶ According to the American Red Cross, a first-aid kit should contain the following: personal items and medication, emergency numbers, compress dressings and adhesive bandages, gauze and tape, antibiotic and hydrocortisone ointment, and antiseptic wipes, aspirin, non-latex gloves, breathing barriers, cold compress, emergency blankets, thermometer, tweezers, and scissors.

Be sure to check the contents of the first aid kit from time to time to make sure none of the contents have expired. Replace any used or expired contents and keep the first aid kit out of the reach of children. Be sure to have extra batteries for flashlights, hearing aids, or other medical equipment. P/EVOs may be exposed to blood or other infectious materials when using first aid supplies in emergencies. P/EVOs should be familiar with the “Occupational Exposure to Blood Borne Pathogens” standard.³⁷ Personal protective equipment including gloves, masks, and eye protection should be included in the first aid kit.

P/EVOs who work with hazardous materials loads may need to supplement the basic first-aid kit with items related to the particular substances involved.³⁸ The American Red Cross publishes several booklets that are useful, especially the “Emergency First Aid Guide.”³⁹

Spare/Replacement Equipment.⁴⁰ As mentioned in Module 2, P/EVOs should carry spare bulbs, batteries for flashlights and radios, fuses, as well as hoses, belts, and fluids like oil, coolant, and windshield washer fluid. Tools needed to make minor roadside repairs must also be in the escort vehicle.

Height Pole.⁴¹ A device to measure vertical clearance, known as a height pole, is needed when escorting loads greater than 14 feet 6 inches tall (though this too varies by State) and when conducting route surveys for tall loads. States vary, however, in terms of when a height pole is required, and this requirement is typically stated on the permit.

The height pole must be made of non-conductive, non-destructive flexible material and must be retractable, telescopic, or removable when not in use. The height pole must be securely attached to the escort vehicle and must be designed and operated in a way that avoids causing any damage to overhead structures (e.g., signs, utility lines, and bridges). The height pole should be installed in a way that allows the P/EVO unobstructed visibility of the height pole, and it should be operated in a way that does not interfere with the P/EVO’s ability to safely operate the vehicle and the communication equipment. (See also Module 5, Lesson 2)

³⁶ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 16.

³⁷ Occupational Safety and Health Administration, “Occupational Exposure to Blood Borne Pathogens.” Available at: <https://www.osha.gov/Publications/osh3186.pdf>.

³⁸ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 14.

³⁹ American Red Cross, “Emergency First Aid Guide.” Available at: <http://www.redcrossstore.org>.

⁴⁰ Ibid.

⁴¹ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 15.

Radio/Communication Equipment.⁴² The ability to easily and safely communicate with the load driver and other escorts is vital to successful oversize load movement. Nowhere is this more relevant than with height pole operation, discussed in Module 5. Communicating accurate information in time for the load driver to respond to hazards is central to safe operations.

Two-way radios or other communication devices, compatible with the load driver and other P/EVOs on the team and capable of transmitting and receiving signals for at least ½ mile, are required by most States. In spite of leaps in sophistication and capabilities of personal communication devices, including smart phones, **CB radios remain the best equipment for the load movement team.**⁴³ FMCSA has banned the use of cell phones for load drivers.⁴⁴ Individuals talking on cell phones are 400 percent more likely to be involved in a crash,⁴⁵ and interacting with the device by scanning contacts lists, dialing, looking at email messages, etc., increases the likelihood of a crash by 2300 percent.⁴⁶

The CB Radio Service, regulated by the Federal Communications Commission, is a private, two-way voice communication service and is the most reliable device for facilitating quality communication. CB radio range is from 1 to 5 miles, and P/EVOs must have the best equipment possible.

Although distracting, many load drivers (as those with oversize/overweight loads and escorts) must be in constant communication with P/EVOs. The best method of communicating remains the CB radio.

Benefits of CBs over Cell Phones

- Using a CB does not require the driver to dial or scan contacts lists, therefore the driver experiences substantially less visual distraction than using a cell phone, for example.
- CBs reduce the temptation use text messaging or email available on cell phones. The cell phone need not be where the driver can see or hear it.
- The carrier and P/EVOs reduce risks and liabilities by requiring drivers communicate via CB radio rather than with cell phones, whether hands free or hand-held.
- Many jurisdictions have banned all mobile devices for commercial drivers.
- Special consideration must be given to communication in flagging situations.

⁴² Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 15.

⁴³ 49 CFR Parts 383, 384, 390, 391, and 392, Federal Register, Vol. 75, No. 244, December 21, 2010. Available at: <http://www.gpo.gov/fdsys/pkg/FR-2010-12-21/html/2010-31736.htm>.

⁴⁴ 49 CFR Part 177, Federal Register, Vol. 76, No. 232 (December 2, 2011). Available at: <http://www.gpo.gov/fdsys/pkg/FR-2011-12-02/html/2011-30749.htm>.

⁴⁵ David Kidd, Ph.D. "Searching for answers to the problem of distracted driving," presentation to the Joint meeting of Drive Smart Virginia and the ASSE Colonial Virginia Chapter, April 21, 2015, slide 5. Available at: http://www.ijhs.org/media/d5958a09-77ab-4417-99ff-781b78c36f77/1734298945/Presentations/Kidd_2015%20VA%20DriveSmart.pdf.

⁴⁶ Virginia Tech Transportation Institute, "New data from Virginia Tech Transportation Institute provides insight into cell phone use and driving distraction," July 29, 2009. Available at: <http://www.vtnews.vt.edu/articles/2009/07/2009-571.html>.

- CB users can reach anyone in the area tuned to the same channel, which has several benefits:
 - Drivers can learn about crashes, fires, weather conditions, and other traffic situations and can get updated information continually from other drivers in the area. Drivers familiar with a geographic area can provide information to drivers who are not.
 - Law enforcement personnel also monitor CB communications to learn about incidents, road conditions, etc.
 - Many P/EVOs install and monitor two CBs: on one they monitor road conditions and on the second they communicate with the load team. This practice also creates redundancy in communication equipment.

Even though each State specifies the requirements for P/EVO certification as well as the equipment required for escort vehicles, the requirements and equipment described in this module provide commonly required certification programs and equipment. The training and safety equipment discussed in this module are important whether a particular type of training or equipment is required or not.

→ TEST YOUR KNOWLEDGE

1. Are cargo vans or panel truck recommended as escort vehicles?
Why or why not?
2. What are the advantages of putting the Oversize Load sign on the top of the vehicle rather than on the bumpers?
3. What is the minimum size for the *STOP/SLOW* paddle?
What is the recommended size for controlling traffic at highway speeds of 60 mph or more?
4. How tall should the pole be for the *STOP/SLOW* paddle? Why?
5. Why are CB radios recommended for P/EVOs?

MODULE 3

Route Planning

▶▶ LESSON 1: ROUTE SELECTION AND REVIEW

The route for moving the oversize load is frequently set out in the permits issued by each State, but when the route is not specified by the State, the final decision about the route falls to the permit holder (i.e., the carrier or the load driver). In certain situations, a route survey may be required in order for a permit to be issued, and in many cases, the entities that own the load or the carriers who are transporting it require the route survey.

Although the responsibility for the permit and meeting any of its conditions, including a route survey requirement, lies with the carrier, many pilot/escort vehicle operators (P/EVO) conduct those route surveys. In fact, many individuals in the P/EVO industry agree that the route survey should be done by the lead P/EVO who will actually run the height pole during load movement. This provides an extra measure of safety because having seen the restrictions along the route while doing the route survey greatly enhances the lead P/EVO's ability to notify the load driver of hazards in time to avoid problems.

The purpose of the route survey is to document, turn-by-turn, the roadways for the load movement and to identify the difficulties and restrictions along the route. The focus is on risk identification and contingency planning for successfully managing risks. Notifying the permit office of problems is important; that information can provide more accurate information about clearances for transportation databases, for example, thereby benefiting many oversize load moments and enhancing safety of the industry at large.

Specific routes are selected to provide extra measures of safety for highway users. Because safety, rather than the shortest route, is the priority, the selected route may involve increased distance and roads with lower speed limits. Carriers must follow the route specified on a permit. Load movement in areas not on the specified route constitutes a violation of the permit that in most States renders the permit invalid.⁴⁷

Railroad crossings are extremely hazardous. Simply *knowing* about hazardous crossings does not reduce their potential negative impact on load movement.

⁴⁷ Federal Highway Administration, *Pilot Car Escort Best Practices* (Washington, DC: FHWA, 2004), p. 36-37. Available at: http://ops.fhwa.dot.gov/freight/documents/pilotcar_bpguideline/pilot_car.pdf.

Many individuals are capable of documenting the roadways, turns, and directions of travel for a specified route. As discussed here, a route survey involves much more than turn-by-turn instructions. The route survey must identify all potential hazards and be highly detailed and accurate. A properly performed route survey that is shared among all the load movement team members is critical to the safe movement of the load. Potential hazards and contingency plans for addressing them combine to reduce the likelihood of collisions, making wrong turns, or failing to alert load drivers in time to respond to a hazard safely.⁴⁸

The information provided by a comprehensive and accurate route survey can facilitate updates and error corrections in transportation databases. It is obvious that these kinds of updates should come from a thorough route survey rather than from an oversize load striking a bridge or becoming lodged on a railroad crossing. In fact, these are two reasons why route surveys are conducted in the first place: bridge strikes with tall loads and truck/train collisions with low-ground-clearance loads becoming lodged at a highway-rail crossing. Specific information about the destination should also be covered on the day the load is to be delivered.

→ TEST YOUR KNOWLEDGE

1. Why is it recommended that the route survey be conducted by the person who will be the lead P/EVO during the load movement?

▶▶ LESSON 2: ROUTE SURVEY

Route Survey Tools

P/EVOs need several pieces of equipment to conduct route surveys. These include current, up-to-date maps, measuring devices, a height pole, dashboard camera, digital voice recorder, a camera that shoots both still frames and video, and safety equipment adequate for roadside operations.

Maps, On-Board Navigation Systems, and GPS Devices.⁴⁹ P/EVOs should have top-quality and up-to-date maps, especially State-issued maps that indicate weight-restricted bridges, bridge clearance data, and width-restriction maps for the permitted route. As part of the pre-trip planning, maps should be requested for every State on the route.

When the route is established, on-board and other navigation devices can be programmed to provide turn-by-turn instructions and alerts. Navigation devices, as well as GPS units, must be updated frequently and the P/EVO, in particular the lead P/EVO, must be familiar with the route and operation of any navigation

⁴⁸ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 7.

⁴⁹ Ibid.

devices long before the load movement begins.⁵⁰ It is vital to remember, however, that **no device can replace a meticulously developed route survey** when it comes to the movement of oversize loads.

Height Pole.⁵¹ When doing a route survey for tall loads, the P/EVO should (or as required by the State) have the height pole installed. (See information about height pole installation and operation in Module 5, Lesson 2.)

Other Useful Equipment

Dashboard cameras, digital voice recorders, and still cameras are useful to record information and quickly and safely capture details about the route to add to the official route survey. Photographs can be added to the route survey to better inform the carrier and load driver of hazards and obstacles. It is important to acknowledge that manual measurements will still be required. Images, still or video, should never replace accurate measurements.

Route Survey banner, *STOP/SLOW* paddle, safety vest, hardhat, amber light on vehicle, flashlight with cone, triangles/cones for protecting surveyor when measuring overpasses, etc. are strongly recommended.

Route Survey Procedures

Route surveys should be conducted as close to the time of the load movement as possible. Even fog patterns can be predicted, as well as the resulting delays in load movement. It is also important to remember the time of year. A plan that may have previously worked for a summer trip may not work during the winter, for example.

The P/EVO should get as much information as possible about the load: height, length, width, weight, and any overhangs, as well as the configuration of the vehicle. Find out about the origination point, the target departure and arrival dates, the route, and destination. This information can be used to identify risks and the need for any special equipment and personnel. This information must be gathered before starting the route survey.

No warning lights or flags should be displayed unless the escort vehicle is actively engaged in conducting a route survey (or in load movement, of course). Several States fine P/EVOs for having the warning light on and/or Oversize Load sign(s) displayed when not involved in escort activities, although conducting a route survey is certainly a P/EVO activity. As with all other aspects of pilot/escort vehicle operations, States vary in what they allow and require.

Height Pole Setting. The route survey must include the height pole setting used to perform the survey, as well as the actual lanes measured. The height pole should be checked at every opportunity: anytime the surveyor stops, including food and fuel stops, breaks, etc. (See Module 5, Lesson 2 regarding height pole calibration.)

⁵⁰ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004).

⁵¹ *Ibid.*, p. 15.

Route Survey Contents

What a route survey must include is based on who is requesting it—at least in part. Most route surveys address the following questions:

- Basic information:
 - Name of person conducting route survey.
 - Date of route survey.
 - The exact points of origin and destination.
 - Route survey start and stop times.
 - Ambient temperature and start time.
 - Weather and traffic conditions during the route survey AND predicted weather and traffic conditions during permit dates. Include average temperature range, average precipitation, and forecasts for permitted dates.
- Permit number, if known, carrier trip/project identification number.
- Notations of time and duration between stops, especially on multi-day movements.
- Contact information/emergency numbers:
 - P/EVO name, phone number, certification information (State, dates, CDL, endorsements, etc.).
 - Carrier name/contact information.
 - Law enforcement escort contact information: officer name (not dispatch).
 - Local jurisdiction contact information, alternate numbers for each jurisdiction.
 - List of county sheriffs and/or enforcement and/or permitting officials for each jurisdiction on the route.
 - Contact information for law enforcement and weather warnings.
- Load information:
 - Description of the load vehicle: license plate #/State, vehicle identification number, year, make, model.
 - Description of the load: weight, height, width, overall length, front/rear overhang, air suspension (can trailer be raised or lowered, for example), vehicle configuration, number of pivot points, number of axles, steerable axles.
- Transportation infrastructure/roadway conditions/facilities:
 - Route survey should indicate each of the following, description, and the exact location of each:
 - Bridges, overhead wires, traffic lights, overhead signs, delineators, guardrails, road side signs, signs that need to be removed/replaced (and who will do that).

- Adverse road surface conditions (indicate by use of mile markers).
- Features of the terrain; i.e., sharp curves, steep grades, heavy traffic zones in municipalities or industrial areas, school zones.
- Seasonal road closures or construction restrictions.
- Stopping/parking locations:
 - Safe “turn-out” areas for emergency parking or allowing traffic to pass the load.
 - Safe overnight parking areas.
 - Fuel stops with adequate turning radius and pull-through parking.
 - Rest areas.
- Ports-of-entry and inspection stations.

The route survey should include city, county, and State streets and highways, as well as U.S. and Interstate highways on the route. Every intersection and roadway should be listed, along with any obstructions (e.g., overhead obstructions if the load is tall, wires, signs, traffic lights, tree limbs, bridges, or changes in roadway elevation and railroad crossings for loads with low ground clearance). In addition, weight-restricted bridges should be identified.

Every intersection should be surveyed for turn difficulties and the load must be able to make a safe turn. Of course, where the load is will determine where the P/EVOs will need to be, and the situation will dictate when traffic control operations are needed.

The exact locations of all obstructions should be identified, including mile markers, distance from previous turn or last intersection, prominent landmarks or signs, etc. Escape ramp locations along the route should be noted as should information about shoulder width or a lack of shoulders.⁵² The route survey should also include estimated miles between major intersections and turns on the route.

For narrow roads, the P/EVO or other route surveyor should measure guardrail to guardrail, across bridge abutments, the distance to masonry mailboxes, or other obstructions on the roadside. This is most important for wide loads. The height of the guardrails should also be noted.

If low overhead lines or other overhead obstacles do NOT clear the height pole, the P/EVO (or other individual conducting the route survey) should safely park and manually measure the overhead obstruction. Measure at the lowest and highest points, and indicate the specific lane measurement.

The distance to road signs and signs that will have to be removed should be noted on the route survey. Shoulder width is another important measurement that should be included.

⁵² Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 8.

Railroad Crossings

When assessing railroad crossings, the individual conducting the route survey must know the ground clearance of the load. Information about each railroad crossing should be outlined in the route survey, including the rail company that maintains the crossing and the contact information for reporting emergencies at each crossing on the route. According to USDOT's Grade Crossing Safety Task Force,

Maps used to define special vehicle routes typically do not identify rail crossings, nor do they contain notations of crossings with high profiles or limited widths, storage space, or signal phasing times that could be problematic for vehicles that are extra wide, high, long, low or heavy. These crossing characteristics are usually not captured in State transportation agency inventories of physical infrastructure and even when they are, they are generally not provided to or used by the agencies that issue special permits. Updating and maintaining this database, when it exists, constitute additional problems.⁵³

When performing a route survey, time the lights and watch the intersection and the traffic flow coming from nearby intersections. To avoid trapping long vehicles on the tracks, it is important to know that highway traffic signal timing isn't "geared" for long loads.

Of course, the goal is to plan a route that doesn't put the oversize load on railroad tracks, especially loads with low clearance or very long loads. The best way to prevent a rail-highway crossing collision is to plan the route where there are underpasses or overpasses at each point the highway crosses a railroad track.

Identify and include safe pull-out areas near each crossing, and measure the distance between rails and stop signs or traffic lights. It is vital the load be able to get across the tracks and through any controlled intersections near the rails to avoid the load being trapped on the rails by a stop sign or traffic light.⁵⁴

Every P/EVO and load driver should know who maintains tracks at crossings along the route. And, the route survey should include information about who maintains tracks at places where the load must cross them. Railroad companies provide information at each intersection of rail and road about the company that maintains the crossing, emergency contact numbers, crossing numbers, and other information. This information should be included in the route survey.

⁵³ U.S. Department of Transportation, *Accidents That Shouldn't Happen: A Report of the Grade Crossing Safety Task Force*, (Washington, DC: March 2001), p. 21.

⁵⁴ *Ibid.*, p. 7.

Observe signals near tracks to make sure they are performing properly. Is there adequate green time and physical space between the tracks for long loads to cross them all? Is there enough space between the tracks to allow the load to stop there with plenty of space between the load and the tracks (at least 6 feet from tracks, for example)? In addition, it's important to know how to contact entity responsible for each crossing in case of emergency, or to answer questions.⁵⁵ Module 5, Lesson 5 includes more detailed information about railroad crossings.

Special Operations Needed

- Traffic control/flagging in counterflow and other situations.
- Law enforcement escorts.

Paperwork

- Letters from utilities and railroads.
- Copies of permits.
- Copies of previous route surveys for the area.

Terminology Issues

The lead P/EVO should announce to the team, "Cleared bridge in lane X." And the load driver should respond "copy" or "clear."

Use the lane terminology agreed to by team: Lanes 1, 2, 3; or, outside, middle, inside; or left, center, right, etc. Regardless of the terminology used, be sure that all team members know and understand it.

Route Survey Report Formats

As with other P/EVO practices and procedures, no standard format exists for oversize load route surveys. Route surveys range from hand-written notes to more formal approaches.

When possible, escorts should check any numbers provided on permits to make certain the numbers are correct. If mistakes are found, the permit offices should be notified of the error.

Once the data is gathered, the route survey "package" should include an accurate oversize transport map, turn-by-turn descriptions, photos of potential problem areas, and other items discussed in this section. As mentioned, each load, the route, the conditions, and the load movement team is unique. It is reasonable to acknowledge, therefore, that each route survey will also be unique and the surveyor must adjust the survey to the load being moved.

⁵⁵ U.S. Department of Transportation, *Accidents That Shouldn't Happen: A Report of the Grade Crossing Safety Task Force*, (Washington, DC: March 2001), p. 12.

Route Survey Evaluation

All aspects of the route survey should be discussed, including the scope of the information and the accuracy of it. The following questions should be addressed: Was the route survey complete? What additional information was needed? What other information would have been useful in this context? Was the route survey accurate? If not, what effects did the inaccuracies or lack of information have on the load movement? What suggestions do team members have that might improve future route surveys? See Module 6 for other post-trip activities.

→ TEST YOUR KNOWLEDGE

1. What equipment/materials are needed to conduct a route survey?
2. What safety equipment should be used when conducting a route survey?
3. Under what two conditions do railroad crossings become most hazardous?

MODULE 4

Pre-Trip Activities

The goal of pre-trip planning, meetings, and inspections is to avoid unpleasant surprises after load movement starts. Vehicle repairs and towing, time lost to a disabled vehicle, a lack of appropriate paperwork, and/or costs of downtime and fines for noncompliance are all more difficult and expensive to fix from the side of the road than before a trip begins. But perhaps the biggest risks are those inherent in roadside operations generally. Repairing, towing, even parking an oversize load vehicle on the side of a roadway enhances risk to the load, to any person operating in the roadside activity area, and to highway users. These enhanced risks can frequently be avoided by a proactive mindset and properly targeted planning activities.

Lesson 1 in this module provides information about pre-trip planning—those activities that should be performed in advance of the pre-trip meeting, which is the subject of Lesson 2.

Lesson 3 provides detailed information about vehicle inspections.

▶▶ LESSON 1: PRE-TRIP PLANNING AND PROCEDURES

Assignment Confirmation

To facilitate the movement of the oversize load, it is critical that the pilot/escort vehicle operator (P/EVO) get as much information about the load, the vehicle configuration, the route, the load driver, the carrier, and all aspects of the job as far in advance as possible. Trip details should be confirmed and the date and source of confirmed information should be documented and included as part of the trip log.

It is important to point out that sharing information is a matter of safety—good decisions are not likely to come from inadequate or inaccurate information. **The P/EVO can initiate and maintain critical communication exchanges among the load movement team.** The key to safe oversize load movement is that each team member understands the needs of and plans for the move, is clear about his or her own specific responsibilities, and understands the specific situations that require vigilance for hazards related to the movement of a specific oversize load. It is critically important to **cultivate a climate of cooperation** in which any member of the team can safely raise any question, issue, or concern at any time, about any

“When in
doubt, shout
it out!”

aspect of the project. The importance of a well-informed movement team and an open climate of cooperation among team members must not be underestimated.

When confirming an assignment, the P/EVO should get as much information as possible about the load: height, length, width, weight, and any overhangs, as well as the configuration of the vehicle. Find out about the origination point, the target departure and arrival dates, the route, and destination. This information can be used to identify risks and the need for any special equipment and personnel. As soon as possible, contact other P/EVOs involved in the move. P/EVOs should introduce themselves to each other, at least by phone, and when possible, the load driver(s), too, in order to make it easier to identify voices later on the radio, for example. Direct communication among team members has many benefits, including more efficient and safer operations.

Getting information about these aspects of the move prior to departing also increases the time available for developing contingency plans, contacting local jurisdictions, or pre-running portions of a route, for example. Advance notifications can be made, and emergency numbers and other contact information can be verified in advance. Another advantage of confirming assignments in advance is that it establishes open and active information exchange networks among team members, including law enforcement escorts when required, and develops a pattern of information sharing and the free exchange of ideas and suggestions. Again, information sharing is a matter of safety.

Contingency Planning

Preparing for the unexpected involves a critical assessment of the risks involved in a particular project and putting into place a method for deciding how to address a situation in which a risk becomes a reality. Contingency planning is also another opportunity to involve all members of the load movement team and support staff in assessing risk and developing appropriate and adequate responses, further strengthening the relationships among team members. Effective contingency plans address realistic possibilities and are known and understood by all personnel involved in the project.

Contingency plans are not useful unless everyone on the team knows and understands the plan. Producing contingency plans has at least four benefits:

1. They assist in identifying risks and potential risks.
2. They assist in identifying the measures that should be in place to protect lives and property.
3. They help identify individual, group, and organizational roles and responsibilities.
4. They establish and promote interpersonal networks among team members and support staff.⁵⁶

⁵⁶ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 19.

Emergencies require fast response in order to reduce or eliminate a threat to health, safety, or property. An effective contingency plan is one that includes the “5 W’s and an H” model used in journalism schools for decades; in this context, we are talking about the who, what, when, where, why, and how of the response to a given emergency or heightened threat.

As part of pre-trip planning, P/EVOs should ask about emergency policies and request any written documents outlining emergency procedures. Any documents related to emergencies should be kept with copies of the permit and route survey.

It is important for P/EVOs themselves to have a clear policy for dealing with emergencies. At least three or four times a year, all P/EVOs should review their own emergency procedures, including finding incident report forms, ensuring copies are in each vehicle, and reminding drivers about the location of the forms and policy documents. Another activity includes conducting tailgate safety talks about emergencies and making sure all new drivers are fully informed about emergency procedures.

Contingency planning involves discussions that address “what if” scenarios based on:

- a) Hypothetical incidents involving high damage potential but low likelihood.
- b) Potential incidents that are more likely to occur and involve lower negative impacts.
- c) Situations in between.

Obviously, contingencies developed to address risks to highway users, team members, or other people involved in load movement must be prioritized over other risks such as damage to the load or other property.

Again, the most important part of contingency planning is ensuring everyone involved in the load movement knows what his or her responsibilities are if certain situations arise. Drivers and others do not have time to find and read a plan once an emergency develops. It is this kind of proactive thinking that also suggests wearing a safety vest at all times to avoid being on the side of the road looking for the vest with traffic zooming by.

Working out contingency plans in the team context, as mentioned, strengthens relationships, produces high-quality ideas, engages team members in discussions about safe load movement, and provides “practice” at managing emergencies in a general sense. Even if the team doesn’t experience the specific emergency for which the contingency plan was made, it drills the team in dealing with emergencies generally.

When discussing contingencies, start with such questions and scenarios as:

- What if an escort vehicle breaks down? Explore various breakdown scenarios. Conduct an inventory of spare parts, bulbs, belts, fluids, basic tools, owner’s manual or shop manual, etc.

- What if the load strikes a bridge or other overhead obstruction? Check to make sure emergency numbers are available to all team members along with numbers for each permit office along the route, for local jurisdictions, railroads and utilities, carrier dispatcher, emergency contact information for each driver, etc.
- What if the load becomes lodged on a railroad crossing? Ensure that emergency contact numbers for railroads, local officials, emergency responders, etc., are available to all team members.
- What if the load movement requires a non-stationary transfer of P/EVO responsibilities? When will a meeting be possible? How much information can be gathered prior to the transfer of responsibility?
- What if there is a wildfire? A vehicle fire?
- What substances or dangerous cargo are involved with the load? Hazardous materials? What are the specific rules about transporting the cargo?
- What if the load shifts, or spills? What if a container leaks or tie-downs fail?
- What if weather conditions make the road impassible? Where can the load be safely parked? Will flaggers be needed to remain with the load? What if emergency flashers do not work or are ineffective in the conditions?

Emergency preparedness is part of the P/EVO's responsibilities. A positive attitude toward identifying potential emergencies and planning for their occurrence is of primary importance.

When emergencies occur, it is important for P/EVOs to document all actions taken in response to the emergency and maintain a record of calls made and any activity performed and by whom. These observations should be compiled as soon after the emergency as possible in a post-trip report. The primary focus of Module 6 is post-trip activities.

In summary, planning saves lives and protects property. Advance planning for load movement produces other benefits as described in this section. Effective contingency planning, permit and route review, and engaging with other load movement team members are all activities central to safely moving oversize loads.

→ TEST YOUR KNOWLEDGE

1. Why is an open climate of cooperation among members of the load team so critical to safety?
2. What question does contingency planning address?
3. What are four benefits of contingency planning?

▶▶ LESSON 2: PRE-TRIP SAFETY MEETING

A pre-trip safety meeting is strongly recommended, and in many States, this meeting is required before load movement; Minnesota is one such State. According to Minnesota's Administrative Rules, the pre-trip safety meeting should include the load drivers, P/EVOs, law enforcement escorts (when required), as well as permit officials, representatives from public utilities and local jurisdictions, and others who may be involved in the movement of an oversize load.⁵⁷

It is perhaps obvious that permitting officials and utility representatives would not typically be physically present at these meetings. These officials would be involved in planning meetings involving only the largest superloads; however, these individuals should be contacted during the meeting whenever possible to address questions and concerns of any of the movement team members. The individual conducting the meeting should use the speakerphone feature, for example, to allow all members of the team to have their concerns and questions addressed. And, it is important to document these meetings as part of the trip log.

In Washington State, for example, required pre-trip procedures for the P/EVO include discussing aspects of the vehicle configuration, the route, and any additional responsibilities to be assigned by or shared with the load driver. In addition, reviewing the permit conditions—including any special requirements for entering local jurisdictions—reviewing the route survey, and establishing the need to pre-run any portions of the route should be discussed. Proper and preferred positioning of P/EVOs and the need for any additional flaggers and law enforcement escorts should be discussed, along with determining procedures to be followed based on the load dimensions, weather conditions, and other factors. In addition, all members of the movement team should conduct vehicle inspections, ensure all required equipment is on board and working, and check driver's licenses, certifications, and insurance verifications for all drivers. Finally, the members of the team must check the communication system to ensure clarity and to determine the channel to be used.⁵⁸

Communication Issues

All team members should (or as required by the State) be equipped with operable two-way communication capability. During the pre-trip meeting, confirm equipment compatibility and review communication procedures, including the channel and the alternate channel to be used. Review communication procedures for emergency response situations and test the system, including back-up equipment. During contingency planning, determine what forms of communication are to be used if two-way radio communication equipment fails. If all forms of electronic communication are unavailable, the load should be parked until communication capability is restored.⁵⁹

⁵⁷ Minnesota Administrative Code, *Chapter 7455, Pilot Vehicle Escort for Overdimensional Load*, "Sec. 7455.1300 Pretrip Coordination Meeting." Available at: <https://www.revisor.mn.gov/rules/?id=7455>.

⁵⁸ Washington Administrative Code, Title 468, Chapter 468-38, "Section 468-38-100 Pilot/escort vehicle and operator requirements." Available at: <http://apps.leg.wa.gov/WAC/default.aspx?cite=468-38-100>.

⁵⁹ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 27.

Although the pre-trip meeting is the responsibility of the permit holder (typically the load driver as representative of the carrier), the P/EVOs must be in attendance. The pre-trip meeting should be considered one of the most important responsibilities of the P/EVOs, and it is important to note that P/EVOs are required to abide by the permit. Therefore, each P/EVO should have a copy of the permit and be in attendance at pre-trip meeting(s); it is crucial each P/EVO be prepared to raise any issues, questions, and concerns about the load movement during this meeting.

The pre-trip meeting establishes team dynamics, informs team members about the permit and route risks, specific hazards related to the specific load, and contingency planning. In addition, communication equipment must be tested and the team must prepare for the movement of the load.

Establishing Team Dynamics

As with any job requiring multiple individuals, the load movement team will have escorts and load drivers of varying levels of expertise and experience. In the pre-trip meeting, it is of primary importance to establish visual and voice recognition for each team member. The meeting should address individual roles and preferences. Keep in mind that exhibiting a spirit of cooperation, professionalism, and competence benefits the team. As mentioned, these issues are directly related to safe load movement. The better the communication among team members, the greater the flexibility and speed with which decisions can be made. This is most apparent in emergency situations.

The ability to negotiate and maintain a cooperative attitude are important in this team context. Compromise is necessary, as is accommodation, within the terms of the permit, to the preferences of other team members. Some behaviors are blatantly unsafe, such as the load vehicle following the lead P/EVO too closely or ignoring the permit in terms of route or curfew. These are not open to negotiation. The ability to negotiate and maintaining a cooperative attitude are important for solving problems that inevitably arise during load movement. Issues must be addressed and resolved as they arise. Failure to address a hazardous condition is irresponsible and unsafe.

Goals for the team should be realistic in terms of distance traveled per day, delivery times, fueling and safety breaks, and other aspects of the move. Adequate breaks enhance safety and are, therefore, necessary. It is important to avoid the tendency to “push on” when the team has been moving for more than 4 hours without a break. The American Automobile Association, better known as AAA, recommends a break after every 2 hours of driving, especially when in a vehicle alone.⁶⁰

Finally, it may be necessary to stop the load and conduct a safety meeting when conditions change, such as if a member of the team is unable to complete his or her duties, or weather conditions change. It is necessary for all team members to work together and to establish a culture of collaboration and safety. Team members should not be reluctant to raise issues related to potential hazards or unsafe behavior.

⁶⁰ American Automobile Association Foundation for Traffic Safety, “How to Avoid Drowsy Driving.” Available at: <http://exchange.aaa.com/wp-content/uploads/2012/10/AAA-FTS-Drowsy-Driving-Brochure.pdf>.

Load Issues

Each load is unique. This is true even if the P/EVO has escorted the same load with the same load driver in the same configuration. Something will make the load movement different: different team members, different weather, different number of daylight hours, etc. Each load must be assessed for its unique risks.

P/EVOs must understand ground clearance, load height, and maneuvering and turning limitations. They are expected to use common sense, knowledge, and experience to assess the potential risks associated with the particular load they are escorting.

With respect to limited **ground clearance**, it is railroad grade crossings or other uneven ground surfaces that are of primary concern. A route survey, as described in the previous module, is very important for loads with limited ground clearance. P/EVOs should make certain they have all the contact information necessary for railroads and emergencies. Whenever possible, the lead P/EVO escorting the load should also complete the route survey. This enhances safety in that the P/EVO who completes the route survey has seen first-hand the risks and obstacles the load will encounter.

For **tall loads**, skid boards may be needed to mitigate problems with utility lines. It should be noted that many States prohibit anyone other than utility company employees from touching lines, and P/EVOs should never touch utility lines for safety reasons. The team should carefully check the route survey, ask questions, and make measurements before the load moves. A height pole may be required. As with so many of the P/EVO requirements, each State defines what “tall” means (typically 13 feet 6 inches or taller, though Western States frequently have higher thresholds), and when a height pole is required. (See height pole information in Module 5, Lesson 2.)

Knowing the number of axles of the load vehicle, the space between them, and the ground clearance is important because this affects the **maneuverability of the load vehicle** and the ability to successfully traverse railroad crossings and other sloped or angled surfaces. States also vary in regulations dealing with axle spacing and weight distribution, with some requiring special bridge analyses. This is the carrier’s responsibility, of course, but knowing about the maneuverability and limitations of the load are necessary for the P/EVO to operate safely and to properly inform load drivers of all relevant potential hazards for that particular load on that particular route at that particular time.

Hazardous Materials

While it is not a common situation, drivers, including P/EVOs, should have at least basic information about any hazardous materials that are being transported. It is important for the P/EVO to know about the cargo and the required paperwork (and the location of that paperwork) in case the load driver becomes incapacitated,

for example. Hazardous materials are substances that pose a risk to health, safety, and property during transportation. When escorting loads with hazardous material, containment rules are in place to:

Contain the product. Many hazardous products can injure or kill on contact. To protect drivers and the general public from contact, rules tell shippers how to package safely. Similar rules tell drivers how to load, transport, and unload bulk tanks.

Communicate the risk. The shipper uses a shipping paper and diamond shaped hazard labels to warn dockworkers and other load handlers of the risk. In the event of an accident, the load driver may be injured and unable to communicate the hazards being transported. Firefighters and police can prevent or reduce the amount of damage or injury at the scene if they know what hazardous materials are in the vehicle. Lives may depend on quickly locating the hazardous materials shipping papers. The P/EVOs must know where these documents are kept in the event the load driver becomes unable to communicate. Load drivers are instructed to keep shipping papers in a pouch on the driver's door and either in clear view within reach while driving or on the driver's seat when out of the vehicle. It is vital that the P/EVO know the location of these documents.

It is important for the P/EVO to have a chart that shows the kinds of hazardous materials being transported, and knowledge of the basic codes used by first responders to identify hazardous materials. Knowing this puts the P/EVO in a position to help limit injuries by keeping people away from the incident scene and helping inform first responders. The P/EVO can find lists of chemicals and the identification numbers assigned to them in the U.S. Department of Transportation's *Emergency Response Guidebook* (ERG).⁶¹ All of this should be covered during the pre-trip meeting.

Given these and other considerations, it is perhaps easy to understand the statement: for the P/EVO, every job is a prototype.

This is a profession that requires continuous information exchange, vigilance, and plan modification. However, while this job is seriously important, it does not preclude the P/EVO from seeing the irony in adversity, and a sense of humor goes a long way.

Permit and Route Review

P/EVOs must check all permits and route survey documents to make sure they are clear. The Federal Highway Administration (FHWA) maintains a list of all State permit offices (as well as Canadian provinces) that include websites and telephone numbers.⁶² It is necessary for P/EVOs to have adequate information about the load dimensions, the route, obstacles on the route, traffic control plans, curfews, local jurisdictional requirements, and every other aspect of the move in order to perform

⁶¹ U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, 2012 *Emergency Response Guidebook*. Available at: <http://www.phmsa.dot.gov/hazmat/library/erg>.

⁶² For list of permit offices for each State and Canadian Province, go to: http://www.ops.fhwa.dot.gov/Freight/sw/permit_report/index.htm.

“For the
P/EVO, every
job is
a prototype.”

their duties. Permits dictate the route to be followed, times of travel, and are the final authority on these issues. Every member of the load movement team should have a copy of permits, route survey documents, relevant maps, and any cargo information related to hazardous materials.

Permits, as mentioned, and discussed on page 52, are required for oversize load movement [23 CFR §658.17(h)]. Permits have many functions beyond simply granting permission to transport a load, however. A permit also:

- Specifies the route, load, and period of time for which it is valid.
- Outlines applicable curfews.
- Identifies the local jurisdictions that must be notified when the load arrives in the city or county.
- Indicates how many escorts are required.

It is unlawful to move a load before or after the designated times and dates shown on the permit. The carrier must have a permit for each State the load will travel through. The permit may not be altered by anyone other than the agency that issued the permit. A permit is void if discrepancies exist between the load description and the actual load being moved, or if the load deviates from the route specified on the permit.

Permits often provide a 5-mile allowance for fueling, food, rest, or parking; however, this allowance is not to be used for changing the permitted route. A 5-mile allowance is also granted sometimes when the load must travel on local roads (this flexibility is useful when delivering oilfield equipment, windmill blades and bases, and other loads delivered in near-roadless areas). If a problem occurs in which the load cannot travel on the route specified on the permit (due to an extreme weather event or an accident that makes a segment of the route impassable, for example), the best solution is for the load driver and escort(s) to pre-drive an alternate route, then contact the permit office to request a modified permit.

When reviewing the permit, P/EVOs should confirm:

- Dates of travel.
- Point-of-origin, permitted routes, and destination point.
- Load dimensions.
- Travel restrictions and curfews.
- Equipment requirements.
- Escorts required (P/EVOs and law enforcement escorts, when specified).
- Notifications required (utility companies, railroads, etc.).⁶³
- Any other special provisions.⁶⁴

⁶³ While notifications are the responsibility of the carrier or permit holder, it is important that the P/EVO have back-up phone numbers for State and local permit offices, railroads, and utility companies. In case the information on the permit is inaccurate or incomplete, or if the copy is illegible or if the contact provided doesn't answer the phone, it is important to have that contingency covered.

⁶⁴ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 9.

Everyone on the load movement team should review the route survey and compare it to the permitted route and an actual map. Any information about road construction or work zone detours should be considered. Each member of the team should have a thorough understanding of the planned route, all related potential risks, and the planned response to the risks. To shortcut the planning phases of load movement compromises safety.

Team members should exchange personal information. Everyone should provide contact information and at least two family contacts; vehicle description and any special equipment, capabilities, or limitations; any health conditions that may arise including symptoms and responses required. All team members should have the emergency contact information for the carrier.

Team members can check each other's paperwork, licenses, certification cards, and other documents to make sure nothing is expired or inappropriate for a certain State. It is important to share information in this way in order to take advantage of the wealth of information available from the experiences of others. Developing strong networks of reliable professionals in the industry is a worthwhile investment. Openly sharing information benefits not only the individual in particular, but also the industry in general.

Comply with State-specific age requirements for P/EVOs, and the certification requirements in each State. It is the P/EVO's responsibility to know and comply with rules that govern P/EVO operations in each State.

As noted, States vary in their definition of "tall" loads, and they vary in the number of escorts they require for loads of various sizes—width, length, as well as height. However, there are some areas of substantial convergence in terms of basic load size and the number of escorts required.

In summary, it is vital to safe operations that all load movement team members share in the process of planning for contingencies, discussing load dimensions and configurations, and in reviewing permit requirements, the route, and route survey.

When Pre-Trip Activities Are Not Possible: The Modified Pre-Trip Meeting

In some situations, P/EVOs engage in non-stationary transfers of responsibilities, or what is referred to by some as a "pick up on the move." This situation occurs when the load doesn't stop, but the escorts do stop traveling with the load as new escorts "pick up" the departing escorts' responsibilities. This arrangement is challenging because of the lack of information, lack of contingency planning, and lack of knowledge of team members and their preferences and skills. As described during the discussion of the benefits of planning in the previous section, a "pick up on the move" happens initially without any of those benefits. Sharing information, planning for contingencies, and developing team dynamics are delayed in a non-stationary transfer, but they should be delayed no longer than absolutely necessary.

These transfers of responsibility occur for a variety of reasons. Sometimes P/EVOs are not needed to accompany a load on interstate highways but are required on two-lane roads. Sometimes escorts are not certified to operate in a certain State, or the load driver needs the particular skills of a P/EVO in certain places.

At the first opportunity to conduct the delayed safety meeting, the procedure for the pre-trip meeting should be followed, including permit review, route review, inspections of vehicles, correcting any issues with communication equipment, exchanging of information including contact information, and anything that is unique to this load and route.

This modified pre-trip meeting should be conducted with as little pressure to “get back on the road” as possible. Understanding the tasks, hazards, and limitations saves substantial time when one considers how long getting back on the correct route after making a wrong turn can take, or prompting enforcement officials to conduct safety checks that can be very time consuming, and sometimes very costly.

At a minimum, the successor escort must know how the transfer is to take place. Will the P/EVOs overlap or will the transfer be an abrupt change? If P/EVOs overlap, it is possible for the successor P/EVOs to have a few miles to “read” what the departing escorts are doing and this overlap, when it lasts until the location for the safety meeting is reached, creates a safer environment for highway users and the load and driver. If an overlapping P/EVO transfer isn’t possible, the load and successor escorts should take the first safe opportunity to conduct the meeting, inspections, and reviews. This abrupt-change option should be the exception rather than the rule as it poses the greater risk of the two “pick up on the move” options.

Until the meeting place is reached, safety procedures must be followed:

- First, ensure effective radio communication is possible.
- Identify team members and their positions.
- Be clear when giving your own name and position in order to help others recognize your voice.
- Ask for information about the load and current status of the move.
 - For example, have the P/EVOs who are departing been monitoring anything in particular such as low tires, loose tie downs, or load shifting.
- Ask if there have been any recent problems or repairs that should be monitored.
- Verify where the load will stop for the meeting, and if there are any turns between the load’s current location and the pullover area.

Once safely parked, conduct the safety meeting just as described in the preceding section. This includes a detailed review of the P/EVO responsibilities as described by the load driver and law enforcement escorts (when present), identification of risks associated with the specific load (fire, explosive potential, hazardous material,

load configuration, time sensitive or perishable materials) and confirm the load dimensions, configuration, and maneuvering limitations, as mentioned. Make sure all required equipment and signs are displayed or onboard the escort vehicle, and review contact information and contingency plans.⁶⁵

→ TEST YOUR KNOWLEDGE

1. What information should be obtained when confirming a P/EVO assignment? During pre-trip safety meeting?
2. What determines the number of escorts required for a specific load? What determines the route? Curfews?
3. What is meant by the statement, “For the P/EVO, every job is a proto-type?”
4. If communication cannot be established between P/EVOs and the load driver, what is the recommended procedure?
5. What is meant by a “pick up on the move?” How does it change pre-trip responsibilities?
6. In what situations might non-stationary transfers of responsibility used?
7. What are the two methods of completing a “pick up on the move?” Which of the two is recommended?

▶▶ LESSON 3: VEHICLE INSPECTIONS

Pre-trip Inspections and Opportunity Inspections

According to a 2010 study by the *Transportation Research Record*,⁶⁶ almost 55 percent of trucks that crashed had at least one mechanical violation and almost 30 percent had at least one condition serious enough to have taken the vehicle immediately out of service. Violations in the brakes (36 percent) and lighting (19 percent) were most frequent. A truck with an out-of-adjustment brake condition was almost twice as likely to be the vehicle that precipitated the crash.

As these findings suggest, safety is the most important reason for inspecting vehicles, and all vehicles, load and escorts, should be inspected at every opportunity. Inspections improve safety for the public, the load driver, the P/EVO(s), as well as the load vehicle and the load, escort vehicles, transportation infrastructure, and other property. Vehicle defects found during pre-trip and other inspections not only improve safety, but also reduce on-the-road breakdowns,

⁶⁵ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 31.

⁶⁶ D. Blower, P.E. Green, and A. Matteson, “Condition of trucks and truck crash involvement: Evidence from the large truck crash causation study.” *Transportation Research Record* 2194 (2010): 21-28.

violations, and fines. Of course, on-the-road breakdowns are expensive, but unsafe vehicles contribute to crashes and disabled vehicles contribute directly to crashes.⁶⁷

As part of the vehicle inspection, review requirements for each jurisdiction issuing permits for the load movement. Ensure required equipment, certifications, vehicle stickers and/or signs, insurance coverage, and other rules are followed. Failure to comply with permit requirements and/or restrictions can result in a voided permit, delays, and financial consequences, regardless of which member of the team is out of compliance.⁶⁸

Federal and State laws require that drivers with commercial driver's licenses inspect their vehicles [49 CFR part 396]. As mentioned, many States also require pre-trip meetings, including inspections, for P/EVOs. Regardless of whether a State specifically requires a pre-trip meeting and inspection or not, it is a practice that should be adopted by P/EVOs in the interest of safety and professionalism.

Beyond the safety and other issues discussed, there is at least one more thing to consider: when a P/EVO has mechanical problems, the load doesn't move until that vehicle is repaired or another P/EVO can take over. It is important to do everything possible to avoid this situation by having well maintained vehicles and equipment, an adequate array of spare parts and tools, and contingency plans for who can take over in the event that a vehicle cannot be repaired in a reasonable time, or if the P/EVO becomes ill, for example.

This is important for P/EVOs, especially those in front of the load vehicle, to know and mitigate to the greatest extent possible potential hazards. This is similar to the idea that the rear P/EVO should check and monitor the load, tiedowns, securement devices, under-ride prevention devices, brake and tail lights, etc., in part because of the direct danger posed to the rear P/EVO. The front P/EVO has a great interest in the safe operation of the braking systems on the load vehicle, the vigilance and experience of the driver, the driver's familiarity with the load and the route, and his or her willingness to follow the P/EVO at a safe distance.

Finally, vehicle inspections should not be limited to those completed prior to the trip. Vehicle inspections are not only safety enhancing activities, they can be significant time and money savers, too. Inspections should be conducted at every opportunity, including during breaks, fuel stops, and at the end of each day. Post-trip inspections and activities are covered in Module 6.

During the pre-trip walk-around inspection, the P/EVO should check all mandatory equipment for each State in which the team will be operating. Mounting signs, checking lights, adjusting mirrors, checking radios, and other activities must be completed during this time, and, on longer trips, this routine should be repeated every morning before the load moves.

⁶⁷ Adapted from American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2. Available at: <http://www.aamva.org/CDL-Manual/>.

⁶⁸ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 20.

This is also a good time to make sure each driver has railroad emergency and other safety information, maps, routes, exit numbers for fuelling stops and breaks, copies of the carrier's accident policy and incident report forms, extra copies of licenses, certification cards, medical cards, and other trip-related documents before the team rolls. A brief reminder about the dangers and inexcusability of distracted driving is important. One in four crashes now involve at least one distracted driver. See also Module 7, Lesson 1: Distracted Driving for a more in-depth discussion of this important safety topic.

As mentioned, it is the P/EVO's responsibility to be familiar with the rules and regulations governing pilot car operations in every jurisdiction in which they work. States vary substantially in the training and certifications required of P/EVOs, in the equipment P/EVOs are required to carry in the escort vehicle or display on the vehicle, and in the insurance they must have in place to operate lawfully.

It is important to verify that all licenses are in force (not expired or suspended), that escort certifications are up-to-date, and that P/EVOs meet the age requirements. The P/EVO should be free of health conditions—physical, mental, and emotional—that may negatively affect driving. In addition, P/EVOs must not be under the influence of any substance (prescription drugs, over-the-counter medications, or illicit drugs) that potentially impairs their ability to fulfill their responsibilities safely.⁶⁹

This process is critical for orienting new drivers to the open climate of cooperation and support among team members, and should be handled in a non-threatening manner. For example, load movement team members should not ask another team member for any documentation they would not be willing to provide themselves. The process of review is about safety and about team members helping each other stay in compliance and operate safely.

In the interest of safety, as well as preventing expensive repairs and avoiding breakdowns and down time, P/EVOs must monitor gauges for signs of trouble. Be familiar with all warning messages and icons in the dashboard display of the vehicle being used. And, just as with the load driver, look, listen, smell, and feel. Check critical items on the escort vehicle when stopped for fuel, rest, or food, including tires, wheels, and rims; brakes, lights, reflectors, and flags; and on the load vehicle, help the load driver check tires and wheels, brake and electrical connections, load vehicle lights, and trailer coupling and cargo securement devices. Check the load for any shifting or loose tie-downs. Look for fluid leaks underneath the vehicles. Each major area that should be included in vehicle inspections is described below.

⁶⁹ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 16.

Specific Parts of the Vehicle to Address

Tire Problems. Too much or too little air pressure, or a bad pattern of wear should be addressed. At least 4/32-inch tread depth for front tires and at least 2/32-inch on other tires is recommended. P/EVOs should check for cuts or other damage to tires, tread separation, and cut or cracked valve stems. If the escort vehicle has dual tires, check to make sure they aren't in contact with each other or with any parts of the vehicle. Tread requirements for commercial vehicles are found in 49 CFR 393.75.

Wheels and Rims. P/EVOs should look for damage to rims, rust around wheel nuts (this can indicate the nuts are loose), or missing clamps, spacers, or lug nuts. After a tire has been changed, re-check the tightness of the nuts at the next stop.

Brakes and Steering System. Check for any leaking fluids. Test brakes and steering before entering roadway.

Suspension System. Broken suspension parts can be extremely dangerous, especially to vehicles following the load. P/EVOs should look for cracked or broken spring hangers, leaking shocks, torque rod or arm, u-bolts, or other parts.

Exhaust System. Broken exhaust systems can let poison fumes into the vehicle (including a sleeper berth on the load vehicle). P/EVOs (and load drivers) should look for loose, broken or missing exhaust pipes, mufflers, tailpipes, mounting brackets, clamps, bolts, or nuts.

Emergency Equipment. P/EVOs and load drivers must be certain all emergency equipment is in/on the escort vehicle, and that it is in working order. When stopped and parked at hotels and restaurants, check to make sure no equipment has been taken, moved, or damaged. Fire extinguishers, warning devices, and traffic control equipment must be on board and easily located.

During the pre-trip inspection, check to make sure spare parts including bulbs, hoses, and belts, spare electrical fuses, and other parts are onboard. Make sure the full-size spare tire is inflated properly and that tools needed to change the tire are in place.

The Seven-Step Inspection Method⁷⁰

Pre-trip (and other) inspections should be done the same way, and in the same order each time in order to avoid leaving out steps or forgetting something that should be checked.

1. In P/EVO fleet situations, drivers should review the reports of previous drivers and address any issues in the reports.
2. Check the engine compartment; look for bulging hoses, loose belts, leaks, empty reservoirs, loose caps or cables, etc.
3. Start the engine and inspect inside the vehicle; listen for unusual noises and look at the gauges including oil pressure, voltmeter, coolant temperature, and warning lights. Check the following: the windshield for cracks, wipers

⁷⁰ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014). Available at: <http://www.aamva.org/CDL-Manual/>.

and wiper blades; the windshield washer fluid indicator; the lights, including headlights (high and low beam), turn signals, four-way flashers, parking lights, brake lights, and fog lights; mirrors for cracks, dirt, and obstructions; and the safety belt for wear, rips, or fraying. Adjust the seat position, ensuring seat mechanisms are operating properly. Also check the head restraints for proper positioning.

4. Turn off the engine and check the lights. Make sure the parking brake is set, and turn on the headlights. Get out of the vehicle and look at the lights, etc. Have someone help with checking brake lights, high beams, etc. Clean the glass in the windows, inside and out, and all mirrors.
5. Perform a walk-around inspection. Go to the front of vehicle and check that low beams are on and both of the four-way flashers are working. Push the dimmer switch and check the high beams. Turn off the headlights and four-way flashers. Turn on the parking lights and check the right and left turn signal lights. Walk around and inspect (and clean when necessary) the lights and lenses.
 - a. On the **left side**, check the driver's door glass, and ensure that the locks are working properly. Evaluate the left front wheel. Check the condition of wheel and rim, lug nuts, and tread depth and look for uneven wear. Check to see that tire is properly inflated, that the valve stem and cap are in place and have no serious cuts, bulges, or tread wear. Use a wrench to test rust-streaked lug nuts and the lugs on tires recently changed. Check for leaks from hubs. Look at the left front suspension and brake elements.
 - b. Move to the **front** of the vehicle. Look at the condition of the front axle steering system, checking for loose, worn, bent, damaged, or missing parts. Check the condition of the windshield and clean it inside and out.
 - c. On the **right side** of the vehicle, check all items listed above for the left side list.
 - d. At the **rear** of the vehicle, check the spare tire pressure and that tire changing tools are securely in place and operable. Check the tailgate, license plate and tag light, and ensure the license plate is securely mounted.
 - e. **Rear P/EVOs** should assist the driver with checking the load to ensure all signs and flags are in place and mounted properly. Look at the load to see if it is secure, with cargo blocked, braced, tied, chained, etc. Ensure tarps are in place, if required, and placed and secured in a way that avoids tearing or billowing. Secure anything that may fly off and strike the P/EVO or other highway users.

6. Get **inside the vehicle**. Check for all paperwork, including P/EVO's license, certification card, insurance verifications, permits, route surveys, emergency phone numbers, maps. Secure all loose articles in the vehicle that may interfere with operation of controls or hit occupants in a crash. Check that all **required equipment for each State** on the route is in/on the escort vehicle. Ensure all equipment is properly stowed, and in operable condition. Check for additional equipment or materials that should be in the truck in case of emergencies or unexpected events; for example, contact information for the carrier and load driver, accident reporting kit, company insurance policy information, etc. Put on a safety vest and ensure that a hardhat, *STOP/SLOW* paddle, and warning devices are easily located. Check the radio and channel.
7. Start the engine and check the brakes, parking brakes, and the safety belt. Check the dash lights for any warning indicators, and set the dimmer for interior lights.

In summary, vehicle inspections are significant ways to solve problems before the trip begins and to make the load movement safer, less costly, and more efficient. Inspections should be considered an ongoing activity. Inspect vehicles continually: watch gauges and warning indicators while on the road, monitor the load vehicle, and inspect all vehicles at every fuel and safety/rest stop, as well as every evening and every morning.

*Inspection is
a process, not
an event.*

→TEST YOUR KNOWLEDGE

1. What is meant by the statement: "Inspection is a process, not an event?"
When should vehicle inspections be conducted?
2. What should be done if a P/EVO has mechanical problems or an illness, for example, and cannot continue with the load movement team?
3. What should be checked, at a minimum, when inspecting the escort vehicle?
4. What should be checked inside the escort vehicle?
5. During the trip, what must P/EVOs monitor?
6. What is meant by the statement that drivers should "look, listen, smell, and feel?"
7. Why should P/EVOs be familiar with the Seven-Step Inspection Method?

MODULE 5

Trip Operations

This module contains many of the “nuts and bolts” of escort vehicle operations, including the role of the P/EVO, positioning of the front (or lead) escort and the rear escort (also called the chase car), safe operation of the escort vehicle, how and when to deploy equipment, controlling traffic, railroad crossing hazards, and emergency operations.

This module includes six lessons: The Role of the P/EVO, Equipment Use, Roadway Positioning and Procedures, Traffic Control, Railroad Crossings, and Emergency Procedures.

Oversize load movement “may require multi-jurisdictional permits. These permits may have differing restrictions, conditions, and regulations, which may result in cumbersome and confusing procedures. This process is further complicated by the lack of State standards for P/EVOs. The resulting delays, inconsistencies, and unpredictable procedures have long created havoc for the transportation industry,” according to the 2004 edition of the P/EVO Best Practices Guidelines.⁷¹

Now, more than a decade later, these conditions persist. Permits are still issued by States that have differing requirements for equipment, curfews, P/EVO certification and training requirements, and other differences. Very few regional permits are available, and no national standards for P/EVOs exist. Inconsistencies in requirements and procedures continue to produce delays and less-than-optimal safety conditions in the movement of oversize loads, in addition to presenting a maze of rules and requirements that is difficult to negotiate and provides little if any benefit.

It must be clear to individuals operating pilot/escort vehicles that P/EVOs must stop at all stop signs and traffic lights, must yield to oncoming traffic, and must follow all laws and regulations in the jurisdictions in which they operate. It is never appropriate for P/EVOs to ignore stop signs and traffic signals, speed limits, move-over laws, to cross centerlines, run motorists off the road, or to violate any other traffic laws.

Characteristics of Oversize Loads

P/EVOs must remember that the oversize load is operationally more difficult to drive and has more blind spots. The oversize load is less maneuverable, takes

⁷¹ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 35.

longer to stop and accelerate, and has a wider turning radius. Drivers of oversize load vehicles have difficulty maintaining speeds on roads with moderate to severe grades. The oversize load vehicle is less stable, some are more likely to roll over, and they are often subject to trailer sway and rearward amplification,⁷² tail swing, offtracking, and other phenomena.⁷³

P/EVOs must be prepared to deal effectively and safely with oversize loads, including accommodating these characteristics:

- Oversize loads require extended distance to stop, change lanes, and pass other vehicles. P/EVOs assist by warning motorists when the load is going to change lanes, pass another vehicle, etc.
- Oversize loads have more blind spots, and the blind spots are larger than in other vehicles. It is important for the P/EVO to warn load drivers of hazards they cannot see. P/EVOs must warn load drivers in time for the driver to react and to also warn motorists to keep them from striking the load.
- Oversize loads also have difficulty gaining sufficient speed on acceleration ramps to merge with traffic on multi-lane highways, and may have difficulty braking on long and steep downgrades.
- When making turns, the oversize load may swing wide before turning. In addition, an extremely long load may block at least two lanes of the roadway it is turning from as well as simultaneously blocking at least two lanes of the roadway it is turning *onto*. P/EVOs should know how to control traffic anytime the load is blocking a lane of traffic, *especially when the load must move into oncoming traffic*. When authorized, P/EVOs must continue to control traffic until the travel lane is clear. See also Lesson 4, below.
- When starting movement on an inclined surface, the oversize load may roll backward. Rear P/EVOs must be aware of this and prohibit vehicles from getting too near the rear of a load when on an incline.
- Avoid situations that make it necessary for the load driver to back up. Spotters are needed, as described in the next section.

Parking and Backing Issues

While parking the load vehicle is clearly the load driver's domain, the P/EVO may help the driver avoid all situations in which the load vehicle must back up. If the P/EVO is familiar with the route, this can be very helpful to a load driver who is not familiar; for example, the P/EVO may know about safe places to park the oversize load, or to sleep, get fuel, or food. Backing a truck is always dangerous; oversize loads, especially articulated loads, carry enhanced risks. When parking, the P/EVO should assist the driver in finding a location that allows the load vehicle to be moved forward when resuming travel.

⁷² American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 6.1.2. Available at: <http://www.aamva.org/CDL-Manual/>.

⁷³ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 43.

If a longer combination vehicle or any load vehicle must be moved in reverse, the P/EVO must be prepared to assist the load driver. Having the P/EVO serve as a spotter is important. The P/EVO should check all around the vehicle (preferably with the load driver). Monitor clearances front and rear, above and below, and on both sides of the load vehicle as it moves. Spotters should always stand on the driver's side of the vehicle once the backing begins, and move with the load in order to remain visible to the driver at all times. **The spotter must be able to see the driver at all times.** Spotters and drivers must agree upon a set of hand signals, especially a clear signal for "stop."⁷⁴

Stopping Distances

Safe driving practices can very frequently be linked to stopping distance. Therefore, it is crucial that P/EVOs understand the risks they are taking when they fail to operate in ways that allow for the limitations of the load and the presence of other motorists.

Stopping distances increase by the SQUARE of the amount the speed is increased. So if speed doubles from 20 mph to 40 mph, the distance needed to stop increases by 4 times.

Trucks often weigh 20 to 30 times as much as passenger vehicles, and trucks are taller, often with greater ground clearance, resulting in smaller vehicles under-riding trucks in crashes. This is a special concern for rear pilot/escort vehicle operators (P/EVO).⁷⁵

Compared with passenger vehicles, stopping distances for trucks are much longer, and trains are much longer than trucks. Loaded tractor-trailers take 20 to 40 percent more distance than cars to stop, and the discrepancy is greater on wet and slippery roads or with poorly maintained brakes.⁷⁶ This is important for the lead P/EVO, in particular. For more information about stopping distances, see Module 7, Lesson 4.

→ TEST YOUR KNOWLEDGE

1. When is it appropriate for P/EVOs to ignore traffic laws?
2. What are common characteristics of oversize loads that P/EVOs must understand and accommodate?
3. How is stopping distance affected by speed?

⁷⁴ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 6-4 and 6-5. Available at: <http://www.aamva.org/CDL-Manual/>.

⁷⁵ Insurance Institute for Highway Safety (IIHS), Fatality Facts web page, "Large Trucks, 2013." Available at: <http://www.iihs.org/iihs/topics/l/large-trucks/fatalityfacts/large-trucks/2013>.

⁷⁶ Ibid.

▶▶ LESSON 1: LOAD MOVEMENT—THE ROLE OF PILOT/ESCORT VEHICLE OPERATORS

As discussed in previous modules, the roles assigned to P/EVOs differ substantially from State to State, as do training and certification requirements, insurance requirements and other aspects of operating a pilot/escort vehicle. It is generally agreed among the States that the P/EVO is responsible for warning motorists about the presence of an oversize load. In addition, where permitted by State law, the P/EVO is also responsible for controlling traffic, often in conjunction with law enforcement escorts, to allow the oversize load driver to negotiate turns, avoid striking roadway structures and vehicles, and adapt to traffic conditions.

Even though many States do converge to some degree on these purposes, variations within these categories also exist. For example with respect to warning motorists, the major consistency is that all States require an Oversize Load sign on all vehicles (load and escort vehicles); however, the size of the sign varies, as do rules about where on the escort vehicle the sign must be displayed. The color scheme is consistent for the signs across States (black letters on yellow background), yet the size of loads that require the signs varies. This situation is perhaps one of the most difficult tasks the P/EVO encounters: How to comply with diverse and differing rules and permit restrictions in each State and local jurisdictions.

Standardizing P/EVO rules, processes and procedures is an important safety issue. Uniform operating procedures, designed with safety as the primary goal, reduce confusion of highway users, load movement team, and even enforcement officers, as well as promoting effective operations and improving load movement safety.

Permits

Each State has rules about the allowable size for loads moving on highways within the State. When loads exceed these allowable limits, the State issues a permit that specifies when the load can be moved, the route the load must follow, the number of P/EVOs required, and other information. The commercial carrier must have the necessary permits, and it is important for P/EVOs to review all permits carefully. Routes are selected first and foremost to provide extra measures of safety for the general public. With safety as the primary focus, the route may involve increased distances, or restrictions on specific times of movement that make the load movement more time consuming or difficult. However, failure to follow the route as specified on a permit constitutes a violation of the permit that in most States renders the permit invalid.⁷⁷

Even though the carrier is the permit holder, it is important that the escort also comply with permit requirements. Violations that occur include failing to comply with provisions in the permit in terms of route or curfew, for example, or providing false information in order to get a permit.

⁷⁷ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 36-37.

Load Movement Preparation

As discussed in Module 4, transporting oversize loads requires extensive planning. Moving large loads will often involve not only P/EVOs but also law enforcement escorts and utility crews to move electric or other lines or to facilitate traffic control. With State-issued permits and the variance in rules among the States, planning is critical to ensure the load movement is being performed safely and in compliance with the many applicable State and local rules.

Just prior to load movements, P/EVOs should check communication equipment, make sure lights are on, and all paperwork is in the vehicle. And, in the last few minutes before the load moves, P/EVOs should do the following:

Paperwork check: Licenses, P/EVO cards, Transportation Worker Identification Credential (TWIC) cards,⁷⁸ insurance, copies of permit, route survey, and maps.

Vehicle check: All required equipment for all States, warning light and headlights on, signs displayed, flags in place, height pole installed and calibrated, if required.

Route check: Ensure all load movement team members know the route, and specifically review the first few turns and/or the route and all known hazards up to the next stop. Discuss curfews and parking issues, identify the next planned stop and any emergency pullover areas along the route.

Traffic Control Plan(s): Review flagging procedures for narrow bridges or turning long loads. Ensure all team members know what to do and when to stop traffic if required and allowed.

Communication equipment check: Select channel and test all equipment, identify team members, and establish voice recognition.

Emergency procedures: Review with the entire team the immediately relevant emergency procedures, such as becoming lodged at a crossing or experiencing a vehicle breakdown.

Before movement, each member of the load movement team should adjust mirrors and seat, set radio channel and volume, heat/air controls, and put on safety vest.

Inspection and Monitoring During Load Movement

During the trip, P/EVOs should report everything they see, hear, smell, or anything that feels or looks different in the way the vehicles or load rides or handles.⁷⁹

The load and escort vehicles should be inspected at every stop, as well as monitoring all dashboard instruments including temperature and oil pressure gauges, tire pressure and warning lights while on the road.

⁷⁸ TWIC cards are required to enter secure areas of maritime ports. TWIC cards are not required for P/EVOs, but are often useful to those who operate in maritime ports.

⁷⁹ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2. Available at: <http://www.aamva.org/CDL-Manual/>.

Immediately after starting the day, rear P/EVOs, especially, should pay attention to the load and securement devices. P/EVOs must **notify load drivers immediately** if the cargo shifts or any securement device slips or loosens, or any other situation arises with the load vehicle or cargo that may create an unsafe environment for motorists, including the P/EVO following the load.

Pilot/Escort Vehicle Operator Responsibilities

It is vital that P/EVOs communicate with motorists near the oversize load by signaling intentions to turn or change lanes as far in advance as possible. When making lane changes, turn signal on earlier than under normal circumstances. The escort should change lanes first, in order to protect the load from oncoming traffic, and vice versa, during the lane change. The entire load movement team should change lanes slowly and smoothly so that other motorists have time to honk or move out of the way in the event the P/EVO doesn't see a vehicle moving in a blind spot or blocked by vehicle pillars. It is important to remember that a motorcycle can be blocked from view by an object no bigger than a pencil.⁸⁰

Similarly, it is crucial to warn drivers approaching from the rear of the oversize load when slowing down. Tap the brake pedal a few times to flash brake lights to warn drivers when slowing down. This is especially important in hilly terrain, on curvy roadways, and on wet surfaces.

P/EVOs and load drivers must slow down gradually and signal their intentions early. They must do everything possible to avoid forcing the load driver to stop suddenly. Motorists do not realize how fast, at highway speeds, they close the gap between their vehicle and a slow moving vehicle. It is important to use every lawful means to warn approaching motorists of slow moving loads.

Likewise, oversize loads make it particularly difficult for motorists behind the load to see hazards ahead. The rear P/EVO and the load driver must do everything they can to alert drivers to hazards and when it is unsafe to pass, for example.

It is NOT recommended that P/EVOs or load drivers wave cars around or make any attempt to signal other motorists when it may be safe to pass. The load driver and the P/EVOs must focus on the specific job they are doing. It is not possible to drive safely and to direct traffic simultaneously.

When delaying traffic more than 5 minutes or when more than five vehicles are behind the load, if possible, move over and allow the vehicles to pass. In certain situations, it may be necessary for the load and P/EVOs to stop and flag traffic around the load (See Lesson 4, below).

⁸⁰ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.5.1. Available at: <http://www.aamva.org/CDL-Manual/>.

Role of the Lead Pilot/Escort Vehicle Operator

Lead car responsibilities include navigation, communication, height pole operation, and providing adequate warning to motorists. It is the lead P/EVO who must also monitor and evaluate hazards in real time and communicate about hazards in enough time for the load driver to successfully negotiate the hazard.

Maintaining an attentive and proactive visual lead is perhaps the most important skill front P/EVOs must cultivate. Monitoring obstructions such as signs, guardrails, and mailboxes is critical to the safe movement of oversize loads, but monitoring is only the beginning of this task. If the distance between the escort and the load is too small, or if the P/EVO does not notice the hazard in time to notify the driver, no amount of monitoring will ensure the safety of highway users, the load driver, the P/EVOs, and transportation infrastructure. Even if the P/EVO has time to notify the load driver about the hazard, there is frequently no time left for the driver to avoid it. This also highlights the vital nature of effective communication equipment and processes.

The visual lead every member of the team should maintain varies with the speed of the traffic, weather conditions, features of the terrain, and other factors. Similar to recommended following distances, an adequate visual lead is at least 20 seconds for oversize load movement, and more lead time should be added for each hazard that exists in a given situation, such as a wet roadway, darkness, hills and curves, driver fatigue, or traffic congestion.

Seeing Hazards

First, what is a hazard? Any road condition or other road user (driver, bicyclist, pedestrian) that is a possible danger.⁸¹ For example, a car in front of you braking suddenly, or heavy rain in a dark work zone. Seeing hazards increases preparedness. If prepared and vigilant, drivers can frequently avoid hazards that can become emergencies. Monitoring mirrors and scanning at least 20 seconds ahead, as well as managing space around the oversize load vehicle, reduce risk and increase the time available to react to hazards.⁸² To be safe, all drivers must know what is going on all around the vehicle. Inattention is a major cause of crashes. When escorting oversize loads, the P/EVO must look much farther ahead than when operating a vehicle under ordinary conditions.

The P/EVO has reduced effectiveness if the scope of vision is limited to what the load driver can already see. The lead P/EVO should maintain a position that gives a range of vision that exceeds that of the load driver, and be alert for changes in the surroundings.⁸³

The lead P/EVO should maintain a position that gives a range of vision that exceeds that of the load driver, and be alert for changes in the surroundings.

⁸¹ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.4. Available at: <http://www.aamva.org/CDL-Manual/>

⁸² Ibid., Section 2.8.

⁸³ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 42.

Lean forward and elevate the body if needed to see around mirrors, A-pillars and other obstacles, especially when merging or changing lanes.

The load vehicle takes longer to stop and maneuver, and depending on its size and weight, load vehicles are not capable of making quick adjustments in speed and direction, as mentioned. For oversize loads, stopping and changing lanes, for example, take a lot more distance. Changing lanes and entering and exiting roadways must be planned well in advance. Adequate distance between the load and P/EVOs and between the load and all other vehicles on the roadway must be maintained in order to operate safely when unexpected events occur, such as experiencing mechanical problems, encountering stalled or abandoned vehicles or other obstructions, or weather conditions.

In day-to-day driving, vigilant drivers look at least 12 to 15 seconds ahead, while continually monitoring mirrors, nearby vehicles, and traffic control devices. At lower speeds, that is about one block. At highway speeds in good conditions, recommended following distance is 3 seconds. For P/EVOs and the oversize load driver, those distances should be doubled. P/EVOs and load drivers should be monitoring at least 30 seconds ahead and following distances should be increased to 6 seconds in good conditions; that is, flat, level, dry, pavement in daylight.

Attentive drivers (i.e., non-distracted, well rested) direct their attention to mirrors, seeing ahead, and seeing near to far, as well as monitoring instruments and warning indicators, the load and load vehicle, and nearby vehicles.

However, for the lead P/EVO, even these attentive behaviors are not adequate. Because of the size and weight of loads and load vehicles, maneuverability is much more difficult and represents a highly dangerous situation for even basic operations such as changing lanes or stopping for a roadway obstruction. Lead P/EVOs in particular must look for vehicles coming onto the roadway, changing lanes, or turning, as well as watching for brake lights from slowing vehicles. It is important to adjust to traffic lights sooner when escorting oversize loads. For example, if a traffic light has been green for a long time, the load will need to slow down and prepare to stop in situations in which a passenger car would likely be able to make it through the intersection.⁸⁴

Other Hazards

Hazards to be aware of, especially for lead P/EVOs and load drivers, include those related to roadways and infrastructure and hazards related to other drivers.⁸⁵ Roadway hazards include work zones, edge drop off, foreign objects, on/off ramps, overhead obstructions, changes in elevation, and other hazards.

Work Zones. Speeding traffic is the number one cause of injuries and death in work zones, and speeding is the number one citation issued to drivers in work zones. To operate safely, P/EVO and load drivers must observe posted speed limits at all times, and especially when approaching and driving through work zones. Drivers must be mindful of their speed and avoid increasing speed while traveling through the work zone, especially long sections of construction.

⁸⁴ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.4. Available at: <http://www.aamva.org/CDL-Manual/>.

⁸⁵ *Ibid.*, Section 2.8.



Figure 1. Photo. *Manual on Uniform Traffic Control Devices (MUTCD)* work zone warning road sign.

Source: FHWA



Figure 2. Photo. Maryland road sign.

Source: Maryland DOT

Maintain adequate following distance, and decrease speed in adverse weather or road conditions, and when workers are near the roadway. Work zones often involve narrower lanes, sharper turns, and uneven surfaces in addition to the more significant hazards that exist when workers are near highway traffic. Other drivers may be distracted or confused in an active work zone, and construction workers themselves are often focused on their jobs, so it is crucial that P/EVOs, oversize load drivers, and all drivers adopt a policy in order to remain alert and prepared for changes in driving conditions and all drivers refrain from using any devices in work zones, in order to remain alert and prepared for changes in driving conditions.

Edge Drop-off is dangerous because driving too near the edge can tilt vehicles toward the side of the road, causing the top of the vehicle to hit roadside objects (signs or tree limbs, for example), especially when over-steering occurs. Driving off the edge is dangerous and negatively affects steering. Top-heavy vehicles may roll over. Attempting to come back onto the road too quickly or at speeds that are too fast can produce a crash. If a vehicle drives off the edge of the road surface, let off the accelerator and gradually steer back onto the road once speed is adequately reduced. For load vehicles, this is particularly dangerous, and severe damage can be inflicted when load vehicles hit potholes, ruts, or other irregularities in the surface of the roadside or the edge of the pavement.

Foreign Objects that have fallen onto the roadway are also potential hazards. Such objects can be a danger to tires and wheels on any vehicle, or may damage the load vehicle's electrical or brake lines. Objects can also get caught between dual tires and cause severe damage. Some obstacles may appear to be harmless but are actually very dangerous. Cardboard boxes may be empty, or they may contain some solid or heavy object capable of causing damage or producing a loss of control. Bags, even empty ones, can become wrapped around vehicle parts and create breakdowns and damage. Monitoring space ahead far enough in front of the vehicle to avoid obstacles is critical. The lead P/EVO must be especially vigilant, and maintain adequate distance from the load to allow the load driver enough time to respond to road hazard information provided by the P/EVO.

On/Off Ramps can be particularly dangerous for large vehicles. Posted speeds on ramps are safe for well-maintained passenger vehicles operating in good conditions, but may not be safe for large, heavily loaded vehicles. Exits that slope downhill and turn at the same time can be especially dangerous. The downgrade makes it difficult to reduce speed. Braking and turning at the same time can be a dangerous practice. It is important to drive slowly enough before getting to the curved part of an on/off ramp.⁸⁶

→ TEST YOUR KNOWLEDGE

1. What are the primary duties of P/EVOs?
2. What are the benefits of standardizing P/EVO rules, requirements, processes and procedures?
3. What determines the route for oversize loads?
4. What must the load movement team do just prior to load movement?
5. What must all P/EVOs do during load movement?
6. When should load drivers and/or P/EVOs signal to motorists when it is safe to pass the oversize load?
7. When should the load and P/EVOs pull over and allow traffic to pass?
8. What is the primary skill that lead P/EVOs, in particular, must develop?
9. What is the number one cause of injuries and death in construction work zones?

Role of Rear Pilot/Escort Vehicle Operator

When the P/EVO is behind the load, the tasks for safe load movement include watching motorists approaching from the rear, watching the amount of traffic behind the load, and reporting information to the team. Additionally, the rear escort (also known as the chase car) must watch the load vehicle itself to report shifting of load, flat tires, tie-down malfunctions, and anything about the load and load vehicle that might interfere with safe load movement.

Seeing to the Sides and Rear. P/EVOs must monitor mirrors and warn traffic nearby of the presence of the oversize load—that is the P/EVO’s primary mission. And, it is important to notify the load driver of potential hazards.⁸⁷ As with all drivers, the rear P/EVO must continually monitor mirrors and be aware of nearby motorists. It is important to monitor vehicles to the sides of the escort and load vehicles in case an evasive maneuver is required, such as an unexpected lane

⁸⁶ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.8. Available at: <http://www.aamva.org/CDL-Manual/>.

⁸⁷ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 39-40.

change. It is vital that the load driver and P/EVOs remain in contact to warn of hazards that arise from front, rear, and sides. Basic maneuvers are potentially dangerous situations when they involve oversize loads. This includes lane changes, turns, merges, and other tight maneuvers.

Lane changes require the rear P/EVO to notify the load driver when the lane is clear and then to move into that lane before the load does. Once the rear P/EVO is blocking the lane to other traffic, the load can move into the lane. This is the best practice, whether moving into a lane to the left or to the right. When turning, depending on the size of the load, make sure the rear of the vehicle will not hit anything (see the Offtracking section, below), particularly signs and signal devices. Many situations involving oversize loads produce tight maneuvers that under ordinary circumstances are easily accomplished. With long loads, making a turn may involve every lane at the intersection for example, which means the P/EVOs are required to warn traffic and, in many States, control traffic in order to complete a “simple” right turn.

As mentioned in previous modules, the primary job of the P/EVO is to warn traffic of the presence of the oversize load; however, the rear P/EVO must also monitor the load vehicle, the load/cargo, securement devices, tires, lights, as well as traffic coming from behind. It is especially important to notify the load driver when other large vehicles are approaching.

Load-Related Hazards

Although it is not typical that the P/EVO is involved in the loading and securing of the cargo, the rear escort in particular has an inherent and keen interest in this process. If cargo is loaded incorrectly or is not secured properly, it can be a danger to any motorist operating nearby, including the rear P/EVO.⁸⁸

Loose cargo that falls off a vehicle at best can cause traffic problems. At worst, they can cause crashes that injure or kill motorists. Loose cargo can also kill load drivers during a quick stop or a crash. Further, vehicles can be easily damaged when they are overloaded, and steering, tire, and/or brake performance may be negatively affected.

If hazardous materials are involved, it is important for the P/EVOs to know what the load vehicle displays and placards mean. As mentioned, the P/EVO can be of little assistance when emergencies with hazardous materials occur if the P/EVO is unaware of what the hazardous materials are and how they are to be handled in the event of a spill, for example. These issues must be adequately addressed during pre-trip planning. Having the proper fire extinguishers should be discussed, for example. Emergency procedures and contact information for reporting emergencies for each State and major local jurisdictions should be distributed to the load movement team.

⁸⁸ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 3, p. 3-1. Available at: <http://www.aamva.org/CDL-Manual/>. Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 41-42.

Securing cargo by blocking the front, back, and sides of a piece of cargo, as appropriate, is effective for keeping the cargo from sliding. **Blocking** is shaped to fit snugly against cargo and be secured to the cargo deck to prevent movement of the load. **Bracing** is also used; bracing goes from the upper part of the cargo to the floor or walls of the cargo compartment. Cargo tie downs are used on flatbed trailers or trailers without sides. Even in closed cargo compartments, tie downs help prevent the load from shifting.

Tie downs must be of the proper type and proper strength. If possible, the P/EVO should carry extra tie downs. Tie down equipment includes ropes, straps, chains, and tensioning devices (winches, ratchets, clinching components). Tie downs must be attached to the vehicle correctly (i.e., hooks, bolts, rails, rings). It is important for the safety of the public, and especially the rear P/EVO, that the load be secure. Loads should be covered when people, especially those traveling behind or beside the load, must be protected from spilled or airborne cargo, loose chains, or other securement devices.⁸⁹

The weight of the load should be balanced to prevent steering and handling issues. Too much weight can damage axles and tires. If weight is too far to the rear, steering is negatively affected and drive wheels may spin easily. It is important that all load movement team members be extra vigilant anytime equipment is being used in a way that stresses its capabilities (for example, vehicle weight limits).

After starting the trip, especially the first few miles, the rear P/EVO should inspect the cargo and the securing devices in place. As mentioned, load drivers typically **check the load after the first 50 miles of driving**. At this point, it is advisable to stop, if safe to do so, to perform a more detailed inspection of all the securing devices and the cargo. After that, **the load should be checked every 3 hours or 150 miles of driving**. Assist the load driver in checking the load carefully at every opportunity, including fuel stops, food and rest stops.⁹⁰

Offtracking

Offtracking occurs when a vehicle's front and rear wheels do not follow the same path. An oversize load typically has a large turning radius. This limitation may result in excessive offtracking when the vehicle turns through an intersection, negotiates an interchange, or rounds a curve. The danger is that offtracking may result in lane encroachment. The P/EVO must understand this maneuvering limitation to adequately protect motorists. The extent of offtracking generally increases with the spacing between the axles of the vehicle and decreases for larger radius turns.

The extent of offtracking is defined as the distance between the path of the front inside wheel and the path of the rear inside wheel as a vehicle traverses a curve or turn. Offtracking is a function of the wheelbases of the tractor and trailers and

⁸⁹ See 49 CFR 393.100 for Federal standards.

⁹⁰ American Association of Motor Vehicle Administrators, Model Commercial Driver License Manual (AAMVA, July 2014), Section 3.1, p. 3-1. Available at: <http://www.aamva.org/CDL-Manual/>.

the number of articulation points. If the width of the vehicle plus the amount of offtracking exceeds the width of the travel lane, then the vehicle will encroach into adjacent lanes, onto the shoulder, or run off the road during the turning maneuver.⁹¹

The length and number of articulation points have the greatest effect on trailer stability. The vehicle will be less stable if the trailer is shorter and there are a greater number of articulation points. Although the P/EVO typically has no involvement in determining the configuration of the load vehicle, knowledge of these vehicle stability factors contributes substantially to safe load movement.

Top-Heavy Loads

A high center of gravity increases rollover chances. For top-heavy loads, P/EVOs must be vigilant about warning drivers of curves and slopes on entry/exit ramps, for example. Oversize loads are frequently susceptible to rollover incidents. They are subject to trailer sway, tail swing, and rearward amplification (defined as the tendency of the trailer to exaggerate the side-to-side motions of the preceding unit).⁹² The vehicle's level of stability is affected by the height of the vehicle's center of gravity; weight and load distribution; type and condition of connections; number of articulation points; trailer length, type, and condition; road demographics; speed; and driver skill.

Ground Clearance

Trailers today sometimes have only a few inches of ground clearance. This is a critical concern for the oversize load driver encountering a change in grade, such as a railroad crossing. P/EVOs and route surveyors must assess each railroad crossing and other grade changes along the route when escorting low-clearance loads, even sections of rough roadway surface or rocks in the roadway. Some loads are not even carried on trailers, but are suspended between trailers, leaving the load skimming barely above the surface of the roadway.

Being Prepared

Effective P/EVOs prevent incidents in spite of the unsafe actions of other team members or highway users in general. Anticipating hazards and knowing proper responses that protect the public, the team, and the load are the central responsibilities of every P/EVO. Being alert and free of visual, physical, and mental distractions is also necessary. Being alert means watching, recognizing, and communicating hazards. The ability to assess traffic situations as far ahead as possible is crucial to safe load movement. A constant assessment of the levels of risk is necessary.

⁹¹ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 45.

⁹² American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 6.1.2. Available at: <http://www.aamva.org/CDL-Manual/>.

The P/EVO must anticipate traffic problems likely to develop and communicate clearly the problem to the load movement team. Competent P/EVOs operate in a manner that avoids enabling the team to be involved in or contribute to a collision. Awareness of the maneuvering limitations of the oversize load, including offtracking, high center-of-gravity, low ground clearance, and articulation points, is critical to safe load movement.

Driver-Related Hazards

Driver-related hazards include blocked vision, delivery trucks, double-parked and other parked vehicles, pedestrians and bicyclists, distractions, children, workers, disabled vehicles, accidents, shopping areas, schools, confused drivers, slow drivers, drivers signaling a turn, drivers in a hurry, and impaired drivers, among other risky conditions and behaviors.

Drivers who can't see other vehicles are dangerous; for example, drivers of cargo vans and panel trucks. Be alert for such vehicles, including vans, motor homes, loaded station wagons, and cars with the rear window blocked. Watch other trucks carefully, especially rented ones! Vehicles with frosted, ice-covered, or snow-covered windows are hazards, as well.

Delivery trucks can present a hazard in part because packages may block the driver's vision. In addition, these drivers are often in a hurry and make frequent and sudden stops. Parked vehicles also present hazards, especially to oversize loads. People fail to look before getting out of parked vehicles, or drivers may pull out in front of oncoming traffic. Whenever possible, create a lane between your vehicle and parked vehicles.

Pedestrians and bicyclists create hazards, too. Walkers, joggers, and bicyclists may be on the road with their backs to traffic. These individuals often wear portable headphones so they don't hear oncoming vehicles. In rainy conditions, pedestrians and others may not see vehicles because of hats or umbrellas. Pedestrians are not as visible in rainy conditions, creating a greater danger, especially when combined with increased stopping distances. And with more and more frequency, these highway users are also distracted by devices they operate while walking or peddling, adding to the danger.

Children tend to act quickly and without checking traffic. This is especially true when a group of children is playing and may be unaware of traffic nearby. Be especially careful in school zones and near cross walks, school buses, parks, and ice cream trucks.

Collisions create a rich environment for subsequent or secondary collisions. People involved in the crash may not look for traffic. Passing drivers are distracted by the accident, and emergency vehicles and police may be attempting to get to the site. Debris may be present on the roadway, as well as spilled fuel that can be extremely hazardous.

Confused drivers often change direction suddenly or stop without warning. Confusion is common near freeway or turnpike interchanges, major intersections, and work zones. Tourist areas are dangerous for this reason, and also for the number of pedestrians, including children, who may be present. Shoppers are focused on finding stores rather than traffic flow, and shopping areas frequently have a high traffic volume. Clues to identifying tourists include car-top luggage and out-of-State license plates. Drivers who are confused are often looking at street signs, maps, and house numbers rather than surrounding traffic. Also, drivers signaling a turn may be hazardous, regardless of location.

Slow drivers are also hazards. Seeing far enough ahead is critical to react adequately to slow-moving vehicles. Some vehicles, including many oversize loads, are, by their nature, slow. Drivers in a hurry create even greater hazards in this context. Drivers may pass without a safe gap, may cut too close in front of other vehicles, and may demonstrate aggressive behavior. Be aware of these drivers and make every attempt to get out of their way and let them pass.

Impaired drivers include fatigued drivers; those who have consumed alcohol, prescription drugs, over-the-counter medications, or illicit drugs; and drivers experiencing medical problems, among other impairments. Weaving, dropping right wheels onto the shoulder or bumping across curbs or median dividers, drifting onto the rumble strip, stopping at a green light or waiting too long at a stop sign, speeding up or slowing down suddenly, and driving at night without headlights are typical behaviors of impaired drivers. For more information about distractions, fatigue, drowsy driving and other impairments, see Module 7.

Drug Impairment

Laws prohibit possession or use of many drugs while driving (and rules for alcohol and drugs are more stringent for holders of commercial driver's licenses (CDL) than for individuals with a regular operator's license). Drivers are prohibited in every State from being under the influence of any controlled substance, narcotics, or any other substance that impairs driving ability. This includes a variety of prescription and over-the-counter medications.

Certain types of medication are especially dangerous. These include cold and flu medications that often contain substantial amounts of alcohol and allergy medications that frequently produce pronounced drowsiness. Alcohol can make the effects of these and other drugs more intense, or in some cases, negate the effects of medications.⁹³

Drivers must pay attention to warning labels and to doctor's instructions. It is important to take a new medication on a day when no driving is required to determine its effects. With some medications, more time may be needed; i.e., to give a drug time to build up in the bloodstream. Drivers should monitor their own behavior as new medications begin to take full effect.

⁹³ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-40. Available at: <http://www.aamva.org/CDL-Manual/>.

Avoid both drugs that mask fatigue as well as excessive use of caffeine to stay awake. Over-caffeinated drivers can behave erratically and often drive aggressively. The only cure for fatigue is rest.

Drowsy drivers are more dangerous than individuals realize. P/EVOs are not currently subject to hours-of-service rules and are not required to maintain logbooks. However, incidents that occur while moving oversized loads are often found to have involved fatigued drivers. See Module 7, Lesson 2 for more information about the dangers of fatigue and drowsy driving. Federal hours of service (HOS) rules for load drivers are found at 49 CFR 395, and the Federal Motor Carrier Safety Administration (FMCSA) provides an “Hours-of-Service (HOS) Regulations – Comparison” visor card that addresses HOS regulations.⁹⁴

It is important during the pre-trip planning process to include plans for adequate rest. Plans for load movement must accommodate the team members’ need for rest as a matter of safety. Fatigue can be deadly, and the only adequate remedy for fatigue is sleep.

Tests have shown that after being awake for 18 hours, drivers score no better on driving skill tests than drivers with a blood alcohol concentration of .05 percent. After being awake for 24 hours, the driver’s skill is reduced to that demonstrated by drivers at the .10 blood alcohol concentration. Planning for rest is as important as any other plans made for moving loads safely.

→ TEST YOUR KNOWLEDGE

1. What are the primary functions of the rear P/EVO?
2. What is meant by the term “offtracking?”
3. How does being top-heavy (having a high center-of-gravity) affect the maneuverability of the load?
4. What is the primary hazard a load with low ground clearance encounters?
5. How do the driving abilities of drowsy drivers and drinking drivers compare?

▶▶ LESSON 2: EQUIPMENT DEPLOYMENT AND OPERATION

The focus of this lesson is on information about how and when to use the required equipment covered in Module 2, Lesson 2. Each State has its own requirements for P/EVO equipment, so it is important for the P/EVO to know what each State requires. It is also useful to review, from time to time, regulations at 49 CFR 393.95 for information about emergency equipment requirements, and the *Manual*

⁹⁴ Federal Motor Carrier Safety Administration, “Hours-of-Service (HOS) Regulations – Comparison,” FMCSA-ADO-13-006C (Washington, DC: 2013). Available at: <https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/HOS%20Visor%20Card%20Oct%202013.pdf>.

on *Uniform Traffic Control Devices* (MUTCD) for flagging and flagger equipment standards and guidance.

The focus of this lesson is on devices and equipment related to traffic control operations—*STOP/SLOW* paddle, hardhat, safety vest, emergency flag, fire extinguisher(s), communication equipment, emergency warning devices (cones, reflective triangles, flares), lights, flags, and signs—that are typically required. It is important to remember that not all States require the same equipment, nor do State rules align in terms of when and how certain equipment is to be used. States vary in the authority given to P/EVOs to control traffic. For example, many States allow P/EVOs to control traffic, and others allow it only if the P/EVO is also a certified flagger.

Flagging Equipment

Hardhats and Safety Vests.⁹⁵ Type II hardhats, as described in Module 2, Lesson 2, are recommended for P/EVOs. Safety vests for flaggers, as specified in the *Manual on Uniform Traffic Control Devices* (MUTCD)⁹⁶ and American National Standards Institute Standard 107-2015, must be fluorescent orange-red, fluorescent yellow-green, or a combination of the two with retro-reflective material visible at 1,000 feet.

STOP/SLOW Paddle.⁹⁷ Most States require P/EVOs carry at least one 18-inch *STOP/SLOW* paddle. The paddle should have a retroreflective surface and be standard in color and shape (i.e., octagonal shape). The “stop” side must be red with white letters, and the “slow” side must be orange with black letters. The minimum size is 18 inches with 6-inch letters; however, when controlling traffic at highway speeds, a 24-inch paddle is recommended. It is also recommended that P/EVOs have an extra *STOP/SLOW* paddle; because most collisions happen at intersections, traffic may need to be controlled in several directions. In these situations, the load driver may need to help with traffic control, and load drivers are not currently required to carry a *STOP/SLOW* paddle. The P/EVO should have a pole about 7-feet tall for mounting the *STOP/SLOW* paddle when traffic control will be needed for more than a few minutes. Standard traffic signs are installed so that the bottom of the sign is 7 feet above the ground (as specified in the MUTCD). By having a pole this length, the *STOP/SLOW* paddle will be at the height drivers are accustomed to seeing road signs.

As mentioned in Module 2, Lesson 3, the *STOP/SLOW* paddle may be modified to improve conspicuity by incorporating either white or red flashing lights on the STOP face, and either white or yellow flashing lights on the SLOW face. The flashing lights may be arranged in any of the several patterns. See the MUTCD, Section 6E.03, for details on light placement and other specifications.

⁹⁵ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 12.

⁹⁶ Federal Highway Administration, *Manual on Uniform Traffic Control Devices*, Section 6E-02. See also ANSI, *High-Visibility Apparel and Headwear*, Section 1A.11.

⁹⁷ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 12. See also, *Manual on Uniform Traffic Control Devices*, Section 6E.

In addition to the *STOP/SLOW* paddle(s), many States also require P/EVOs carry a 24-inch by 24-inch red flag (or red-orange or fluorescent versions of those colors) for controlling traffic in an emergency *only* when no *STOP/SLOW* paddle is available.

Flashlight. Some States require a flashlight with a cone (traffic wand) attached. For this reason, it is a good idea to have a large flashlight with a safety nose cone along with extra replacement batteries and bulbs. The flashlight should be durable, water resistant, have a non-slip handle, and be appropriate for roadside operations day or night. Even if the P/EVO is escorting a load that moves only daylight to dark, this doesn't mean the P/EVO won't be flagging traffic after dark, especially in the event that the load becomes disabled.

Emergency Equipment

Fire Extinguisher(s).⁹⁸ The P/EVO should read all instructions and warnings for the extinguisher (before the trip begins). All members of the load movement team must know how to use the extinguishers and where they are located in each vehicle.⁹⁹

If no hazardous materials are being transported, P/EVOs should have extinguishers with an Underwriters' Laboratories (UL) rating of 5 B:C or more or two fire extinguishers, each with a rating of 4 B:C or more. Each fire extinguisher must be labeled or marked by the manufacturer with its UL rating, and must be designed, constructed, and maintained so that visual determination of whether the extinguisher is fully charged or not is possible.

The fire extinguisher(s) must be filled and located so they are readily accessible. Many States require the extinguisher(s) to be securely mounted to prevent sliding, rolling, or vertical movement relative to the motor vehicle. Finally, fire extinguishers must use an extinguishing agent that does not need protection from freezing, and extinguishing agents must comply with the toxicity provisions of the Environmental Protection Agency's Significant New Alternatives Policy regulations.¹⁰⁰ It is also recommended the extinguishers be shaken frequently to avoid settling and packing of the extinguishing agent, which occurs due to normal vehicle vibration while driving.

Warning Devices: Flares, Cones, and Reflectors. States vary in what they require for warning devices. Some require flares, and chemical flares are strongly recommended, especially in areas where wildfires are a concern. Others require triangle reflectors (a minimum of three; some States require more) and still others require cones of various sizes. It is the responsibility of the P/EVO to know what is required by each State. When flagging, it is a good idea to put a cone or reflector in the lane being controlled by the flagger, and/or between the flagger and the first stopped vehicle. This lets motorists know exactly where the P/EVO want drivers to stop, and provides an extra measure of safety for the P/EVO controlling traffic.

⁹⁸ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 13.

⁹⁹ See 49 CFR 393.95 (a).

¹⁰⁰ 40 CFR Part 82, Subpart G.

Placement of Warning Devices. When a load vehicle is stopped on the traveled portion of the shoulder of a highway, as soon as possible (and certainly within 10 minutes), the driver should place required warning devices in the following manner on multilane highways as specified in the American Association of Motor Vehicle Administrators *Model Commercial Driver License Manual*:¹⁰¹

1. One warning device (triangle reflector, flare, or cone) on the traffic side and 4 paces (approximately 3 meters or 10 feet) from the stopped commercial motor vehicle in the direction of approaching traffic.
2. A second warning device at 40 paces (approximately 30 meters or 100 feet) from the stopped commercial motor vehicle in the center of the traffic lane or shoulder occupied by the vehicle and in the direction of approaching traffic.
3. A third warning device at 40 paces (approximately 30 meters or 100 feet) from the second device (approximately 210 feet from the vehicle) and in the direction of approaching traffic.
4. The *STOP/SLOW* paddle should never be left unattended (propped on equipment or stuck in a safety cone, for example).

If fusees (flares that burn brightly in wet or dry conditions) or liquid-burning flares are used, the P/EVOs or the load driver should place at least one fusee or flare at each of the locations as specified in the preceding paragraph. These must remain in place and visible as long as the load is stopped. Before the load is moved, the driver(s) must extinguish and remove all fusees or liquid-burning flares.

Pilot/Escort Vehicle Operator Special Skills

Height Pole Operation

When loads are tall, the lead P/EVO should (or as required by the State) use a height pole. State requirements vary, but if a height pole is required it is typically specified on the permit. Height pole operation is designed to prevent the load from hitting bridges, power and utility lines, signs, traffic lights, and other primarily overhead obstructions. In many States, a load is considered over-height if it is taller than 13 feet 6 inches. States also differ about when a height pole must be used and the way it must be calibrated.

The height pole should (or as required by the State) be made of a non-conductive, non-destructive flexible material and should (or as required by the State) be securely mounted on the escort vehicle in order to avoid creating a hazard to surrounding motorists and vehicles, transportation infrastructure, the escort vehicles, or the load vehicle. The height pole is mounted on the front of the lead escort vehicle and must be calibrated as described below.

The P/EVO operating the height pole must have an unobstructed view of the pole and must be far enough ahead of the load to be able to communicate to the load driver in enough time to get the load stopped before striking any overhead obstruction.

¹⁰¹ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.5.2, p. 2-13. Available at: <http://www.aamva.org/CDL-Manual/>.

Calibration

States vary in what they require¹⁰² when installing the height pole; established best practice is that all height poles should be, at a minimum, set 3 to 6 inches above the tallest part of the load.¹⁰³ Measure the load and set the height pole, with the assistance of the load driver. Confirm the height with the load driver.

Tillerman/Steerman

A tillerman or steerman is an individual who steers any axle of an articulated trailer. In 2011, the Federal Motor Carrier Safety Administration (FMCSA) provided regulatory guidance¹⁰⁴ on the applicability of the definition of a “driver” to “tillerman,” a person exercising control over the movement of a steerable rear axle on a commercial motor vehicle. The agency had previously determined that although a tillerman does not control the vehicle’s speed or braking, the rear-axle steering he or she performs is essential to prevent the trailer from offtracking into other lanes or vehicles or going off the highway entirely, and because this function is critical to the safe operation of vehicles with steerable rear axles, the tillerman had been defined as a “driver” and thus is subject to commercial motor vehicle (CMV) regulations.

However, FMCSA has more recently concluded the person operating the steerable rear axle should be classified as a “tillerman.” CDL knowledge and skills testing would have little relevance to the remote-control operation of a steerable rear axle on an oversized vehicle. FMCSA said it considers the tillerman’s physical location in, on, or around a CMV to be the most relevant factor in determining whether the person is a driver, and that anyone controlling a steerable rear axle from outside the CMV would be doing so under the direction of the person in the cab, and therefore should not be considered a driver.¹⁰⁵ (See 49 CFR Parts 383 and 390 for clarification.)

As with most other P/EVO regulations, it is necessary to check with the State agency that oversees oversize load permits and P/EVO operations to find out what the rules are regarding steering articulated trailers. It is not recommended, and is unlawful in many States, for a single individual to perform two driving tasks simultaneously; that is, functioning as both the P/EVO and the tillerman at the same time. This is true in some States regardless of how the trailer is steered. Further, in many States, a tillerman/steerman must have a Class A CDL. (See 49 CFR Parts 383 and 390 for clarification of Federal rules. Check with each State for additional rules.)

¹⁰² Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 7 and p. 28.

¹⁰³ Minnesota highlights the FHWA’s *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* in its course materials, for example.

¹⁰⁴ Federal Register, “Regulatory Guidance on the Designation of Steerable Rear Axle Operators (Tillermen) as Drivers of Commercial Motor Vehicles,” June 2011. Available at: <https://www.federalregister.gov/articles/2011/06/06/2011-13902/regulatory-guidance-on-the-designation-of-steerable-rear-axle-operators-tillermen-as-drivers-of>.

¹⁰⁵ CJ Staff, “Groups ask for clarification on ‘tillerman’ definition,” *Commercial Carrier Journal*, June 6, 2011. Available at: <http://www.ccjdigital.com/groups-ask-for-clarification-on-%E2%80%98tillerman%E2%80%99-definition/>.

→ TEST YOUR KNOWLEDGE

1. Where should warning devices be placed in vehicle breakdown or other roadside emergency situations?
2. What is the function of a height pole?
3. How are height poles calibrated?
4. What is a tillerman and what does he/she do?

▶▶ LESSON 3: ROADWAY POSITIONS AND PROCEDURES

State permits typically specify how many escorts are required for a given overdimensional load. However, no specific laws or rules exist about how far the P/EVO should be from the load, where the escort should be when passing other vehicles, operating in urban versus rural environments, or other particular situations.

Because of the prototypical nature of the job, specific rules are not possible. Each situation requires the load movement team to adjust to current conditions and the limitations of the load. For example, there are few if any rules that establish in actual feet the distance P/EVOs should be from the oversize load vehicle. This decision should be made in light of the situation rather than a rule. For example, factors affecting safe distance from the load include weather conditions, night or day, volume of traffic, features of the terrain, and the size and configuration of the load. Rules are necessarily non-specific in order to provide latitude for the load movement team to appropriately and safely adjust procedures to conditions.

The P/EVO is responsible for warning motorists of the presence of an oversize load, flagging traffic when necessary and allowed, and helping the load driver negotiate obstructions and successfully complete challenging maneuvers.

The number of P/EVOs required for a particular load varies from State to State; however, some similarities exist. It is the State permit, ultimately, that determines the minimum number of P/EVOs required and where they are to be positioned in relationship to the load during movement. It should be noted that, as is the case with State laws, requirements set forth on the permit (or in laws) are minimum standards. The carrier or the owner of the load itself may provide more P/EVOs than required by permitting officials.

The following provisions are consistent with laws in many States:¹⁰⁶

- Loads in excess of 12-feet wide require one P/EVO in front of the load on two-lane roadways and one P/EVO behind the load on multi-lane roads.
- Loads in excess of 14-feet wide often require two P/EVOs—one in front and one behind on all roadways.

¹⁰⁶ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 37-38.

- Loads in excess of 90-feet long commonly require one P/EVO behind the load.
- Loads in excess of 150-feet long require two P/EVOs, one in front and one behind the load.
- Loads in excess of 14-feet 6-inches tall require at a minimum one P/EVO in front of the load, and that P/EVO must have a height pole in place.

Of course, many loads may exceed more than one dimension, so these are basic similarities only. As mentioned, it is the permit that specifies the minimum standards in terms of the number of P/EVOs.

Pilot/Escort Vehicle Operator Positions

Not only do the rules about P/EVOs being in front of or behind the load vary from State to State, the exact placement of the P/EVO also varies depending on traffic speed, traffic volume, type of roadway, number of lanes, and, of course, the size of the load. It is *very important* for every member of the team to be familiar with the permitted route, permit restrictions, and the route survey. However, it is vital for the lead P/EVO to know the route in order to notify the team of hazards, both expected and unexpected, and to keep the team informed about upcoming turns, exits, or hazards.

Distance From The Load

Guidelines and rules also vary from State to State when it comes to the distance between the P/EVO and the load vehicle. In general, distances must be increased, especially between the load and the lead P/EVO, due to the size and weight of the load. Properly estimating stopping distance is crucial in determining the safe vehicle spacing between the P/EVOs and the load vehicle, as well as the space between the load movement team and all other highway users.

The P/EVO must be located a safe distance from the load while also giving the traveling public maximum warning. In normal conditions, the front P/EVO should be 4 seconds ahead of the load, or 1 second for each 10 feet (or portion of 10 feet) of load length. Another second should be added when the load moves at 40 mph or more. The rear P/EVO should be 3 to 4 seconds behind the load. Distances should be adjusted for nighttime travel, rainy conditions, and other potential hazards that negatively affect visibility, traction, or braking. However, the distance should not exceed ½ mile in order to stay within radio range.

The lead P/EVO must be far enough ahead of the load to give the load driver ample time to take action when obstacles or hazards are encountered. All drivers face two sometimes life-altering choices when confronting an obstruction: to stop before hitting it or to steer around it. Both of these choices take much longer to execute in an oversize load vehicle. While it is impossible to consider every potential situation, some common scenarios are described below.

Passing a Slower Vehicle. First, if there is a front escort only, the P/EVO and load driver should communicate the intention to pass a slow-moving vehicle. The P/EVO and load driver should consider speed and clearance to ensure the passing maneuver can be made safely. If there is only a rear escort, once the intention to pass is communicated, the rear escort driver moves into the passing lane, then the load passes the slow-moving vehicle. The P/EVO should alert the load driver when it is safe to move the load back into the right lane once the load is a safe distance in front of the vehicle(s) just passed. The rear P/EVO then completes the pass and moves back into the right lane.

Restricted Visibility. When traveling through terrain with blind curves, hills, and other conditions of restricted visibility, it is important to adjust vehicle spacing to ensure adequate advance warning can be given to motorists and for the load driver to react to problems. If distance between P/EVOs and load vehicle is extended, check radio communication. It is critical that the lead P/EVO be far enough ahead of the load vehicle (i.e., over the hill, around the curve) to allow enough time for motorists and the load driver to react to problems. Reducing the distance between the escort vehicle and the load if communication capability is lost in hilly terrain requires the team to reduce speed overall. This is important to remember about moving through mountainous terrain: the P/EVO must be close enough to the load to remain in communication contact, yet must be far enough ahead (or behind) the load to timely warn motorists of the presence of the oversize load they cannot see.

Merging onto a Multi-Lane Highway. In nearly all situations, if a P/EVO is required for multi-lane highways, he or she will be positioned behind the load. An exception is when the load is tall, and the P/EVO is operating a height pole. For either a rear or front P/EVO, when the load is merging onto a highway, the P/EVO moves onto the highway before the load does. In this way, the P/EVO warns motorists of the presence of the oversize load coming into the right lane.

Negotiating Turns with Long Loads. When turning long loads, it is crucial that the lead P/EVO control traffic, according to relevant jurisdictional rules, to allow the long load to successfully execute the turn by crossing into oncoming lanes. Once the load has cleared the intersection and has moved back into the normal travel lanes, the lead P/EVO can resume the normal travel position in front of the load. It is also crucial that the rear P/EVO control traffic approaching from the rear to avoid motorists encroaching into the path of the long load, especially motorists who attempt to pass the oversize load on the right.¹⁰⁷ ***Under no circumstances should a flagger stop flagging until the blocked lanes(s) are clear.*** This is true regardless of whether the P/EVO is controlling traffic behind the load or controlling oncoming lane(s) of traffic.

¹⁰⁷ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 37-40.

→ TEST YOUR KNOWLEDGE

1. What determines the number of escorts and their placement relative to the load (that is, front or back)?
2. Why are many laws and rules governing P/EVOs ambiguous and non-specific?
3. What should be considered when establishing distance between the P/EVOs and the oversize load vehicle?
4. What common traffic maneuvers require extra vigilance on the part of P/EVOs?

▶▶ LESSON 4: TRAFFIC CONTROL OPERATIONS

P/EVOs may be required to flag traffic not only in known, that is, *planned situations* such as closing a narrow bridge to allow the oversize load to cross, but P/EVOs may also be required to control traffic in emergencies, or *unplanned situations* such as a vehicle breakdown, or a weather or traffic event that makes load movement unsafe or impossible. Therefore P/EVOs must be prepared to control traffic at any time and in any conditions: night or day, hot or cold, wet or dry, even when the load moves only from daylight to dark.

States require flaggers be at least 18 years old, and some States require P/EVOs and flaggers be at least 21 years old. Each potential flagger should read, in addition to this lesson, at least one flagger handbook, and should review the material in the MUTCD, Part 6, especially the diagrams such as TA-10.¹⁰⁸

¹⁰⁸ Federal Highway Administration, “2009 Edition Part 6 Figure 6H-10. Lane Closure on a Two-Lane Road Using Flaggers(TA-10).” Available at: https://mutcd.fhwa.dot.gov/htm/2009/part6/fig6h_10_longdesc.htm.

Table 1. Sample of State rules for traffic control/flagging.

Manual on Uniform Traffic Control Devices (MUTCD) (Federal Standards)	None of the dozens of procedure descriptions and illustrations found in the MUTCD depict flaggers inside vehicles. ¹
Alaska	Flag-persons must be at least 18 years old, must wear bright orange jacket or vest, and be equipped with a <i>STOP/SLOW</i> paddle and a red hand flag. These items are to be utilized by the P/EVO in the event that it becomes necessary to park the pilot car and stop or control highway traffic. At no time will the <i>SLOW/STOP</i> paddle and/or red flags be displayed out of the window of a moving vehicle. ²
Colorado	“When directing traffic . . . [the] Pilot Escort driver shall: Stand outside the Pilot Escort Vehicle. ” ³
Minnesota	P/EVOs are “ authorized to control and direct traffic as a flagger during the movement of an overdimensional load following the MUTCD standards as defined by the Federal Highway Administration and Minnesota Statutes, Section 169.06, Subdivision 4.” ⁴
Oklahoma	“In the performance of duties as the operator of an escort vehicle, the operator is authorized to direct traffic to stop, slow down or proceed in situations where such direction is necessary to allow traffic or the escorted vehicle or load to continue moving safely.” The only place P/EVOs are not authorized to control traffic in Oklahoma is an intersection with a working traffic light. ⁵

¹ Federal Highway Administration, *Manual on Uniform Traffic Control Devices*, 2009 Edition. Available at: <http://mutcd.fhwa.dot.gov>.

² Alaska Department of Natural Resources, Administrative Permit Manual, Oversize and Overweight Permits, Section 12, p. 22 <http://dnr.alaska.gov/ag/Index/PermitsManual.pdf>.

³ Code of Colorado Regulations 2 CCR 601-4 p. 26 <https://www.codot.gov/business/permits/truckpermits/documents/rulesregsread.pdf>.

⁴ 2015 Minnesota Statutes, *Chapter 169. Traffic Regulations*, “Section 169.06 Signs, Signals, Markings.” Available at: <https://www.revisor.mn.gov/statutes/?id=169.06>.

⁵ Oklahoma Administrative Code, 595:30-3-17(e)(1).

Information about equipment and procedures for controlling traffic is found in the MUTCD. Temporary traffic control (TTC) is the type of flagging typically performed by P/EVOs in States that allow it. If P/EVOs are not allowed to flag traffic in a specific jurisdiction, this task typically falls to law enforcement officials. It is important that P/EVOs understand and acknowledge the role of law enforcement officers in this context—when law enforcement officers are on the scene, they are in charge.

Table 2. Hierarchy of traffic control personnel.

Carrier/Permittee	Hires pilot/escort vehicle operators (P/EVO) and flaggers
P/EVO	Control traffic in jurisdictions that allow it
Law Enforcement Escorts	When required, law enforcement escorts are in charge of traffic control operations when present

TTC is particularly dangerous, in part because the flagger does not have advantages typically found in other traffic control situations such as construction work zones. For P/EVOs, there are no advance warning signs (Flagger Ahead, or One-Lane-Road signs, for example). TTC zones “present constantly changing conditions that are unexpected by the road user. This creates an even higher degree of vulnerability for the workers and incident management responders on or near the roadway.”¹⁰⁹ The lack of advance warning devices combined with the unpredictability inherent in moving oversize loads produce a potentially dangerous situation.

For these reasons, it is vital the flagger be positioned so that he or she will be seen by motorists. Several factors affect where the flagger should be located. First, how fast is traffic moving? The P/EVO must consider stopping distances based on how heavy a vehicle is, how fast it is moving, whether it is on a down slope or not, whether the roadway is gravel or asphalt, wet or dry. When considering the position for the flagger, consider how long it will take for the largest, heaviest, fastest moving vehicle that may approach the flagger to stop, and place the flagger in a position that allows adequate stopping distance for that vehicle.

The flagger must display the *STOP/SLOW* paddle in the place drivers typically see signs. This is an important example of standardization that enhances safety for the motoring public and the load movement team. Motorists do not look for stop signs in moving vehicles. Flagging traffic involves getting out of the vehicle.

It is never appropriate to attempt to control traffic by parking a vehicle across lanes of traffic, especially at highway speeds. This behavior is exceedingly dangerous and irresponsible. One of the first rules new drivers are taught is to never, ever stop in a roadway.

Flaggers must be in the standard position (right shoulder of lane being controlled) with standard equipment (*STOP/SLOW* paddle), at the standard height (7-foot pole) and wearing standard safety gear (hardhat, safety vest) to control traffic safely.

How far should the flagger be ahead of the activity area or disabled load? **Decision sight distance** and other considerations are significant to safely positioning the flagger. **Decision sight distance** is the total distance traveled during the time required for a driver to:

- Detect an unexpected or otherwise difficult-to-perceive information source or hazard in a roadway environment that may be visually cluttered.
- Recognize the hazard or its potential threat.
- Select an appropriate speed and path.
- Initiate and complete the required maneuver safely and efficiently.¹¹⁰

¹⁰⁹ Federal Highway Administration, *Manual on Uniform Traffic Control Devices, 2009 Edition*, “Chapter 6D. Pedestrian and Worker Safety: Section 6D.03 Worker Safety Considerations.” Available at: <http://mutcd.fhwa.dot.gov/htm/2009r1r2/part6/part6d.htm>.

¹¹⁰ Ibid., “Chapter 6C. Temporary Traffic Control Elements: Table 6-C-2. Stopping Sight Distance as a Function of Speed.” Available at: <http://mutcd.fhwa.dot.gov/htm/2009r1r2/part6/part6c.htm>.

Conditions to be considered when deciding where to place a flagger include how fast traffic is moving, features of the terrain, and the condition and type of roadway surface. Other considerations include weather, darkness, and traffic volume.

Equipment for Controlling Traffic

As with most aspects of pilot/escort operations, States vary in the traffic control equipment required. However, the *STOP/SLOW* paddle, a 24-inch by 24-inch red flag, a radio, and retroreflective safety vest are required in nearly all States.

For controlling traffic, as described in more detail in Module 2, Lesson 2, most States require an 18-inch *STOP/SLOW* paddle (minimum size) with reflective surface. Some States require two paddles, given that most incidents happen at intersections where traffic in more than one direction may need to be controlled. It is also advisable to have a 24-inch *STOP/SLOW* paddle for higher speed roadways, where traffic is moving at more than 60 mph as drivers are more likely to see a larger paddle at higher speeds. A 7-foot pole for mounting the *STOP/SLOW* paddle should be available when traffic needs to be controlled for longer than 10 to 15 minutes. Some States require the P/EVO carry an extra paddle because load drivers are not required to carry one, and most collisions happen at intersections where more than one lane of traffic may need to be controlled, as mentioned.

Most States require P/EVOs wear a safety vest with retroreflective material, yellow, orange, yellow green, or a fluorescent variation of these same colors for enhanced visibility during daytime and nighttime operations. It is important to remember that it may not be in the plans to control traffic after dark. If a load becomes disabled, it is likely the P/EVO will remain with the load vehicle until it is repaired or towed. Safety clothing should be provided for every adult in the escort vehicle, in those States that allow passengers, in the case of an emergency. A hardhat is required for P/EVOs in most States. A yellow green, orange, or fluorescent yellow green hardhat increases visibility to approaching traffic.¹¹¹

A two-way radio compatible with those of other team members, including other flaggers and the load driver, is required. Some States (Alaska, for example) actually require the use of CB radios. Alaska rules state that radio communication is “required between towing vehicle and pilot car(s) . . . [and] shall be open and monitored at all times . . . C.B. radios are the only approved radio communications.”¹¹²

¹¹¹ Federal Highway Administration, *Manual on Uniform Traffic Control Devices, 2009 Edition*, “Chapter 6E. Flagger Control: Section 6E.02 High-Visibility Safety Apparel.” Available at: <http://mutcd.fhwa.dot.gov/hm/2009r1r2/part6/part6e.htm>.

¹¹² The only exception is properly marked zones where blasting operations are being conducted. See Pilot Car Information Attachment PC for more information: http://pilotcartraining.com/documents/Attachment_PC_Pilot_Car.pdf.

Cones, flares, and/or reflective triangles are important to mark the spot where the P/EVO wants cars to stop. Placing a cone or reflector between the flagger and oncoming traffic provides another measure of safety and visibility.

Flagging Dos and Don'ts

- Be alert.
- Remain standing at all times, facing oncoming traffic.
- Park vehicles off the road and away from the flagger station.
- Never turn or look away from oncoming traffic.
- Never stand in the path of moving traffic.
- Never stand near or between parked vehicles on the roadside.
- Nothing should be near the flagger—no devices such as music players or smart phones.
- No person should be near the flagger.
- Never stop flagging until the blocked lanes(s) are clear. This is true regardless of whether the P/EVO is controlling traffic behind the load or controlling oncoming lane(s) of traffic.
- Never lean on vehicles; be polite but brief. Never argue with a motorist.

Additional Traffic Control Issues

If a driver ignores the flagger's instructions, *do not stop flagging*. First, warn people in the control zone/activity area of the presence of the errant vehicle. Get a description of the vehicle, including the tag number if possible. Finally, report the motorist to authorities.

Flaggers must have frequent breaks (no more than two hours of flagging). The hotter, colder, windier, or wetter the conditions, the more frequently flaggers must have breaks.

It is important for P/EVOs to be aware of traffic conditions at nearby intersections, especially in high-volume intersections or during peak traffic times. It is important that P/EVOs avoid causing potentially dangerous situations, including traffic backups in intersections or on exit and entry ramps, for example. Traffic tie-ups create a rich environment for collisions. Another situation to consider is that when an intersection exists *within* the activity area, an additional flagger may be needed to control traffic entering from that intersection.

Remember, emergency vehicles have priority. When emergency vehicles approach, flaggers should stop all traffic under their control until the emergency vehicle has cleared the area.

Traffic Control Authority

States also differ in the authority extended to P/EVOs to control traffic. Many States allow it, while others do not. As mentioned, if P/EVOs are not authorized to control traffic in a given jurisdiction, this responsibility is typically delegated to law enforcement officials—and these officials are in charge of the load movement while they are engaged in the process.

As discussed throughout this manual, P/EVOs frequently encounter situations during load movement for which there are no set rules or laws. Case studies, accident investigations, and experience are a source of best practices for typical traffic control situations.

→ TEST YOUR KNOWLEDGE

1. What equipment must flaggers have?
2. What must flaggers NOT have?
3. In what situations might P/EVOs be required to control (flag) traffic?
4. When is it appropriate to control traffic from inside a vehicle?
5. What does TTC stand for? Why is it dangerous?
6. When is it appropriate to control traffic by parking a vehicle across lanes of traffic?
7. What should be considered when deciding where to place a flagger?
8. How big, according to the MUTCD, are typical stop signs on highways with speed limits of 60 mph or more?
9. Are P/EVOs authorized to control traffic in all States?

▶▶ LESSON 5: RAILROAD CROSSINGS

Because railroad crossings and other grade fluctuations present high levels of risk for oversize loads with low ground clearance, P/EVOs must be familiar with the oversize load and its limitations in order to be able to warn highway users and load drivers of problematic crossings. The combination of high-profile crossings and low-clearance vehicles presents great challenges in moving oversize loads. Railroad tracks are built up to create effective draining. Frequently, abrupt changes in the level of the road surface as the road crosses the tracks increases the risk of low clearance vehicles becoming stuck at the crossing.

All railroad crossing (and other grade changes) should (or as required by the State) be included in the route survey, along with emergency contact numbers for each crossing. **This information should be reviewed daily**; that is, before starting travel for the day, the load movement team should be reminded of the hazardous crossings on that day's route, and the emergency procedures and contingency plans to be followed if the load should become lodged at a crossing. However, it is important to remember, the decision about whether to traverse a crossing remains with the load driver.

Railroad crossing are extremely hazardous, and a good route survey doesn't change that, of course. Knowing about the crossings does not reduce their potential impact on load movement. The hazards primarily include speed and stopping distance. It can take more than a mile for a train to stop once emergency brakes are applied. In addition, freight trains average a mile in length and travel at 50 to 60 mph and more.¹¹³ A 150-car freight train traveling at 50 mph needs 8,000 feet (1.5 miles) to stop; an 8-car passenger train at 79 mph needs about 6,000 feet (1.125 miles) to stop.

Stopping distances for trains is substantially longer primarily because of the weight of the train, but stopping a train includes processes similar to those involved in stopping other vehicles: stopping distance is the sum of perception time, reaction time, brake lag, and braking distance. The contact area between a train's steel wheels and the steel rails is about the size of a dime, producing limited friction that is required to stop a train.¹¹⁴

When an engineer sees an obstruction at a crossing, effectively about a half-mile ahead of the crossing, it is already too late to avoid a collision.

Because the risks, outcomes, and costs of truck/train collisions are so high, a commercial driver can lose his or her CDL for 60 days for a first violation of railroad crossing rules, for at least 120 days for a second violation within a 3-year period, and for at least 1 year for a third violation within a 3-year period. While the P/EVO is not subject to these same rules when driving the escort vehicle, it is important for the P/EVO to understand what the load driver is required to do.

Railroad crossing violations for CDL holders include failing to stop before reaching the crossing if the tracks are not clear, failing to slow down and check that the tracks are clear of an approaching train, failing to come to a complete stop when required to do so, failing to have sufficient space to drive completely through the crossing without stopping, failing to obey a traffic control device or the directions of an enforcement official at a crossing, and failing to negotiate a crossing because of insufficient undercarriage clearance.¹¹⁵

Table 3. Total highway-rail incidents for all States, January to May, 2010 to 2015.

YEAR	Number of Incidents
2010	848
2011	815
2012	800
2013	851
2014	974
2015	830

Source: Federal Railroad Administration, Office of Safety Analysis.

¹¹³ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 25-26.

¹¹⁴ Ibid.

¹¹⁵ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014). Available at: <http://www.aamva.org/CDL-Manual/>

In 1972, more than 1,500 fatalities and 12,000 accidents occurred. Ten years later, 500 fatalities, and approximately 1,000 accidents occurred. The statistics have remained static since then, in spite of the significant increases in railroad and highway traffic between 1984 and 1994 (remembering this report was published in 1996). In 1994, 615 people were killed and 1,961 were injured in 4,979 collisions with trains at highway-rail crossings.¹¹⁶

A report of a grade crossing safety task force, produced in 1996, identified five areas of safety problems related to railroad crossings: interconnected signals, vehicle storage space, high-profile crossings, light rail transit crossings, and special vehicle operations. Some of these affect oversize loads, as explained in the next section. The task force involved people from Federal Railroad Administration (FRA), FHWA, National Highway Transportation Safety Administration, Federal Transit Administration, American Association of State Highway and Transportation Officials, the Association of American Railroads, and the Institute of Transportation Engineers. The group looked at design, construction, operation, maintenance, and inspection of grade crossings.¹¹⁷

Operation Lifesaver (established at the national level in 1987), is a public education program designed to reduce the number of crashes, deaths, and injuries at highway-rail crossings and on railroad rights-of-way. Operation Lifesaver emphasizes education, engineering, and enforcement, and is funded by FHWA, FRA, and the rail industry.

As with many of the rules affecting P/EVOs, rules and standards for railroads are set at the State level. The regulatory framework as well as the building, maintaining, and inspecting of rail crossings, and controlling the traffic that traverses them, are inconsistent from State to State.¹¹⁸

Oversize Load Issues¹¹⁹

Vehicles with a deep-well or low-boy chassis are used to gain vertical clearance when transporting large loads through tunnels and under bridges. These trailers, however, may not have sufficient ground clearance to traverse high-profile rail crossings or other grade changes. Other vehicles, particularly long loads, may exceed the space available between highway-rail crossings and nearby highway-highway intersections or traffic control devices. This creates a situation where a load may be stuck on the tracks during a red light. These situations must be avoided. A load vehicle should never start across a track or series of tracks unless the load can traverse all the tracks without stopping and without shifting.

¹¹⁶ U.S. Department of Transportation, "Accidents That Shouldn't Happen: A Report of the Grade Crossing Safety Task Force to Secretary Federico Pena," March 1, 1996, pp. 2-3.

¹¹⁷ Ibid.

¹¹⁸ Ibid., p. 4.

¹¹⁹ Ibid., pp. 20-21.

Another issue involves signs and warning devices at the crossing that may impede turning movements of oversize loads, especially long ones. Finally, low ground clearance, defined by the Uniform Vehicle Code and Model Traffic Ordinance as equipment with a vertical body or load clearance of less than 9 inches above a level roadway surface, presents substantial challenges during oversize load movement.

Route Survey Issues

When assessing a railroad crossing, it is important to know the ground clearance of the load vehicle. It is critical for the load driver to know when the railroad must be contacted before attempting to move the load over the tracks.

Route surveys should include each railroad crossing along with any potential obstructions and nearby transportation infrastructure. Whether a route survey is conducted or not, the following should be considered:

- What is the **rise** (upward slope) of the crossing from the level road approaching the crossing on the ascending edge?
- What is the **drop** (downward slope) from the crossing to the level road on the descending edge?
- What is the **length** of the top of the crossing, or the number of tracks in the crossing?
- What is the **approach** to the crossing? Straight? Turn? Or curve?
- What is the **descent** from the crossing? Straight? Turn? Or curve?
- What are the requirements /instructions for **advance notification** to the railroad company?

Types of Crossings

Types of crossings include passive and active crossings. A **passive crossing** does not have any traffic control devices such as a gate. The decision to stop or proceed rests entirely with drivers. Passive crossings typically have yellow circular advance warning signs, pavement markings, and advance warning signs. **Active crossings** have traffic control devices installed to regulate traffic, including flashing red lights (with or without bells) and gates.

Procedures for Negotiating Railroad Crossings

It is clear how important route surveys and front P/EVOs can be in assisting load drivers in successfully negotiating railroad-highway grade crossings when they cannot be avoided.

The FMCSA recommends the load stop at least 15 feet but not more than 50 feet from the railroad track(s). When stopping, the load driver and P/EVOs should turn on emergency flashers and use pull-out lanes if available. The load driver and the escorts should listen. Turn off fans and turn down the radio. Roll down windows. Look and listen carefully.¹²⁰

¹²⁰ Federal Motor Carrier Safety Administration, "7 Steps for Safety – Highway Rail Grade Crossings," FMCSA-ESO-06-0014 (Washington, DC: FMCSA, 2010). Available at: http://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/7_Steps_for_Highway-Rail_Grade_Crossing_Safety.pdf.

Never allow traffic conditions to trap the load vehicle on the tracks. And, as mentioned, make sure the load can get completely across all tracks before attempting to cross. It takes a typical tractor-trailer about 14 seconds to clear a single track, and more time must be allowed to cross multiple tracks.

Other situations to be alert to are highway traffic signal timing that doesn't accommodate long loads. Finally, load vehicles (and all others) must be at least 6 feet past the rail before stopping, because trains overhang the rail by at least that much.

If the Load Becomes Lodged at a Railroad Crossing

Hanging up on a railroad crossing is a dangerous predicament, and is becoming too common as more very low trailers are manufactured. Lowboy trailers, car carriers, moving vans, and possum-belly livestock trailers are particularly susceptible, as are single-axle tractors pulling a long trailer with its landing gear set to accommodate a tandem-axle tractor.¹²¹

If hung at a railroad crossing:

- ***Get out of the vehicle and off the tracks immediately.*** Do not go back onto the tracks for any reason.
- Move away from the tracks. Move TOWARD an oncoming train, and AWAY from the tracks. When a vehicle is struck by a train, debris moves in the same direction the train is moving.
- Locate the emergency phone number and the DOT crossing identification number located near the intersection. (See illustration below.)
- Call for help. Call the railroad's emergency phone number, the local police, and/or 911. Note: call the local police or 911 if you cannot locate the railroad emergency phone number at the site. This information for each railroad crossing on the route should be included in the route survey.
- Call 911. Describe the situation and the exact location. Ask them to notify the railroad and assist on site as soon as possible.
- If a train approaches, move as far as possible from the track(s).¹²²

Detailed plans about the response of each individual team member if the load becomes lodged at the crossing must be set out during the pre-trip meeting. Every member of the team must know how to find the emergency contact information for railroads and what his or her exact responsibility is if this hazard becomes an emergency. P/EVOs should assist local law enforcement in controlling traffic until the issues are resolved and the load is safely off the tracks.

¹²¹ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-28 to 2-30. Available at: <http://www.aamva.org/CDL-Manual/>.

¹²² U.S. Department of Transportation, "Accidents That Shouldn't Happen: A Report of the Grade Crossing Safety Task Force to Secretary Federico Pena," March 1, 1996, p. 28.

Railroad Crossing Safety Reminders

Based on safety information from Operation Lifesaver, FMCSA, American Association of Motor Vehicle Administrators, and others, P/EVOs must keep the following things in mind when the designated route includes railroad crossings.

- **Never race a train to a crossing.**¹²³ Slow down when approaching a crossing in case a train is present. Be prepared to stop at the first railroad warning sign, at least 15 feet from the crossing.
- **Look up and down the tracks.** It is difficult to judge the distance and approach speed of a train. If in doubt, be safe, stop, and wait.
- **Keep your rear in the clear.** Trains are wider than the tracks, typically 6 feet beyond the rail. Be sure to leave some “living” room.¹²⁴
- **If it won’t fit, don’t commit.** FMCSA states, “Do not enter a crossing unless you can drive completely through without stopping.” Further, because trains are wider than the track, there must be enough room on the other side for the back of the truck and any overhanging cargo to avoid stopping until the load is 6 feet past the last rail at the crossing.¹²⁵
- **Don’t expect to hear a train.** In part, this is due to the noise inside the vehicle, and/or the sounds of the engine. Don’t rely on the signals. Do not rely on the train whistle. Noise inside the vehicle may be too loud to hear the warning.
- **A full stop is required for certain vehicles** and cargo, especially hazardous materials and tankers. When stopping be sure to watch traffic from behind, and turn on emergency flashers when stopping to reduce the likelihood of being struck from behind.
- **Be especially alert at passive crossings**—those that do not have gates or flashing red signal lights.
- Remember that **multiple tracks require multiple checks**; a train on one track may hide a train on another track.
- Be cautious for obstructions that may block the view of an approaching train—vegetation, buildings, standing railcars, etc.
- It is crucial that the load be able to **cross all tracks without changing gears, braking, or stopping.**¹²⁶ FMCSA recommends the load driver keep moving, once starting over the tracks, even if lights start flashing and the gates come down. Make sure any traffic lights or stop signs are far enough past the tracks to allow the load to completely cross and be an adequate distance from the tracks before stopping.

¹²³ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 29. Available at: <http://www.aamva.org/CDL-Manual/>.

¹²⁴ Ibid.

¹²⁵ Federal Motor Carrier Safety Administration, “7 Steps for Safety – Highway Rail Grade Crossings,” FMCSA–ESO–06–0014 (Washington, DC: FMCSA, 2010). Available at: http://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/7_Steps_for_Highway-Rail_Grade_Crossing_Safety.pdf.

¹²⁶ Ibid.

- ***Expect a train on any track at any time.*** Each crossing must be approached with the expectation that a train is coming.¹²⁷
- ***Be alert to weather*** and how it affects conditions at the crossings, such as impaired vision and substantially increased stopping distances for not only highway traffic, but also the train.
- Recognize that in certain areas and at certain times, trains may have several hundred passengers on them.
- ***Print the FMCSA's railroad safety visor card and put one in every escort vehicle and the load vehicle(s).*** Mention the rules and hazards of any crossings anticipated for that day at daily pre-trip meetings, and review the contingency plans. Verify contact information for notifying railroads of emergency situations. And it is important to realize that in some situations railroads must be notified immediately before the load crosses the tracks. In these cases, it is important for the P/EVO to assist the load driver in finding a safe area to stop while making any required notifications.
- Be sure to ***check emergency numbers and update as needed.*** Make sure to gather both local and nationwide emergency response numbers. In the case of railroads, it is important to know which company owns and/or maintains a particular crossing. Emergency numbers for eight major railroads are available at: <https://www.fmcsa.dot.gov/safety/rail-crossing/railroads-emergency-phone-numbers>.

¹²⁷ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-28. Available at: <http://www.aamva.org/CDL-Manual/>.

→ TEST YOUR KNOWLEDGE

1. When escorting a load with low ground clearance, what must P/EVOs do daily?
2. How long does it take a train to stop?
3. What railroad crossing violations exist for CDL holders?
4. What information about railroad crossings should be included in a route survey?
5. What are two types of railroad crossings?
6. Where should the load stop in relation to the tracks? How does this affect where the P/EVOs should be?
7. What must be done if a load becomes lodged at a railroad crossing?

▶▶ LESSON 6: EMERGENCY PROCEDURES

Emergencies have several common characteristics:

- An emergency is **unexpected**.
- An emergency **threatens a population**.
- Threats may be **real or possible**.
- Emergencies demand a **rapid**, sometimes **immediate, response**.
- Responses **may reduce or enhance** an emergency.

It is also useful to consider what an emergency is *not*. An emergency is not the same as risk. Risk is exposure to the possibility of physical injury, damage, financial loss or gain, or delay as a result of uncertainty associated with taking a specific action.¹²⁸ Risk is the probability of an event and is mitigated by maintaining insurance policies, carrying spare parts, and performing other acts of *preparedness*.

When it comes to oversize load movement, emergencies span a range of possibilities. **Traffic emergencies** involve vehicles that collide with other vehicles, transportation infrastructure, or obstacles in the roadway. **Vehicle emergencies** occur when tires, brakes, or other parts of the vehicle, the load, or load securement devices fail during operation. Another form of emergency especially relevant to the movement of oversize loads is **roadside breakdown**. In many situations, it isn't possible to get the oversize load completely off the roadway. This presents hazards to motorists, especially when traveling at night, during heavy traffic, or in bad

¹²⁸ Cooper, D. and C. Chapman, *Risk Analysis for Large Projects: Models, Methods and Cases* (Somerset, NJ: John Wiley & Sons: 1987).

weather or low visibility situations. Crashes create emergencies, and the choices made by P/EVOs and load drivers contribute substantially to the outcomes of emergency situations.¹²⁹

Traffic Emergencies

Drivers have two choices when facing a collision: **stop or steer**. Chances of avoiding a crash depend on how well a driver responds in an emergency situation.

Vehicles cannot be steered or stopped unless there is traction. Traction is friction between the tires and the road. Some road conditions reduce traction and, therefore, require lower speeds to accommodate longer stopping distances.

Stopping to Avoid a Crash

The lead P/EVO must help prevent the need for emergency stops/braking. And the rear P/EVO needs to be prepared to keep other vehicles away if the oversize load driver must use hard braking or attempt a sudden steering maneuver. The P/EVO must learn to anticipate skids and jackknife situations and protect motorists approaching a load that is out of control.¹³⁰

Any time the brakes are applied hard, watch the trailer to make sure it is staying where it should be. If the trailer swings out of the lane, it is very difficult to prevent a jackknife. It is vital that the rear escort prevent other motorists from driving alongside a skidding vehicle. Braking can cause a loss of control, even with anti-lock brakes. Avoid turning while braking, as this also increases the chance of producing a skid situation in all types of vehicles.

A Note about Anti-lock Brakes. Anti-lock brakes (ABS) keep wheels from locking up during hard braking. ABS does not produce shorter braking distances, but does help the driver better control the vehicle during hard braking. ABS systems are required on most commercial vehicles with gross vehicle weight rating of 10,000 pounds or more. Trucks and trailers typically have yellow ABS malfunction lamps on the instrument panel and trailers will have a yellow lamp on the left side on either the front or rear corner, typically.

ABS will not allow drivers to go faster, follow more closely, or drive less carefully. ABS will not prevent power or turning skids. While ABS should prevent brake-induced skids, it will not compensate for bad brakes, poor maintenance, or a lack of driver vigilance.¹³¹

¹²⁹ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.17, p. 2-31. Available at: <http://www.aamva.org/CDL-Manual/>.

¹³⁰ Ibid., Section 5.4.3, p. 5-8.

¹³¹ Ibid., Section 2.18.3.

Steering to Avoid a Crash

Stopping is not always the safest thing to do in an emergency. When a driver does not have enough room to stop, steering away from obstacles is frequently the best option. It is nearly always the case that drivers can steer to miss an obstacle more quickly than they can stop the vehicle. It is important to note, however, that top-heavy vehicles and tractors with multiple trailers may flip over as a result of a sudden change in direction. The lead P/EVO must alert load drivers immediately about objects in the roadway.¹³² Taking into account the clearance the load requires, in addition to the primary function of warning motorists of the presence of the oversize load, the lead P/EVO must watch for tree limbs, mailboxes, stalled vehicles, etc. It is also critical for the P/EVO to know the size of the gap needed for the load to accelerate and merge with traffic and other limitations of the oversize load vehicle in terms of maneuverability.

Keep both hands on the steering wheel. In order to steer quickly, a firm grip on the steering wheel is necessary. A quick turn can be made safely, even by the load vehicle, if done correctly. First, do not apply the brakes when turning. Wheels are easily locked when braking, and this may produce a skid when turning. Do not turn any more than needed to clear whatever is in the way. The sharper the turn, the greater the chance of skid or rollover. Finally, be prepared to countersteer; that is, to turn the wheel back in the other direction once the obstacle has been cleared. Think of steering and countersteering as two parts of the same action.

If a vehicle drifts into an occupied lane, drivers should move to the right. Vigilant drivers use mirrors to monitor which lanes are empty. If the shoulder is clear, drivers can move in that direction to avoid colliding with another vehicle. If blocked on both sides, moving to the right is advisable, so that other vehicles won't be forced into opposing traffic.

In some emergencies, drivers may have to drive off the road to avoid a collision. Most shoulders are strong enough to support the weight of a large vehicle. Lack of shoulders and inadequate shoulders should be included on the route survey. If a driver must leave the roadway, follow these guidelines:

1. Take foot off accelerator, but do not brake until speed has dropped. Then brake very gently to avoid skidding, especially if driving onto on a loose surface like gravel or dirt.
2. Keep two wheels on the pavement to help maintain control of the vehicle.
3. Stay on the shoulder if it is clear.
4. When re-entering the road surface, ease onto the roadway gradually when the lane is clear.¹³³

¹³² American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 4-3. Available at: <http://www.aamva.org/CDL-Manual/>.

¹³³ *Ibid.*, Section 2.17.1.

Crashes

If a crash occurs, actions must be taken immediately to prevent further damage or injury. The priorities are to protect the area, notify authorities, and care for the injured. The first thing to do at the scene of a collision is to prevent another collision. Turn on emergency flashers. Put on a safety vest, hardhat, and take a radio and flashlight and/or *STOP/SLOW* paddle.

Try to get the vehicles involved to the side of the road. If stopping to help, park away from the accident. Put on emergency flashers and set out reflective triangles and/or flares to alert other drivers especially in hilly, curvy terrain, and at night.

Vehicle Emergencies

Brake Failure

Brake failure is rare, but steep grades can produce an emergency for the load driver and, therefore, the load movement team and nearby motorists. When a brake pedal goes to the floor without results, it is crucial for the driver (whether it is the load driver or a P/EVO) to notify the rest of the team. If it is the load vehicle whose brakes fail, P/EVOs must be alert and do whatever they can to keep motorists a safe distance from the load. Driving an appropriate speed and braking properly are methods for preventing brake failure on long downgrades. However, once the brakes fail, something outside the vehicle will be required to stop it. The best option is an escape ramp which should be part of the route survey and revisited at the daily briefing. If a ramp is not available, look for a place for the driver to turn uphill.

If the vehicle is near a curb when brakes fail, the driver can steer the vehicle so that the tires and wheels rub against the curb to help slow the vehicle. In this case the rear P/EVO must alert approaching drivers to the hazard as the affected vehicle reduces speed. Turn on emergency flashers.

The load movement team must have contingency plans for brake failure long before the emergency happens¹³⁴ because during the emergency, the P/EVO must focus on protecting the public. If an effective contingency plan is in place, positive outcomes are more likely. And remember, **if a collision cannot be avoided, every degree off center that a vehicle impacts an obstacle reduces force on the body of the driver and passengers exponentially.**

Tire Failure

P/EVOs must learn to recognize tire failure and how it affects the oversize load vehicle. The bang of a tire blowout, the vibration of the vehicle, and, for the load driver, the feel of the steering wheel, indicate a tire problem. Failure of a rear tire on the load vehicle may produce fishtailing, so it is important during the emergency event for the rear P/EVO to protect highway users by making every attempt to keep other vehicles from pulling alongside the oversize load.

¹³⁴ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-34. Available at: <http://www.aamva.org/CDL-Manual/>.

With respect to the escort vehicle, when a tire fails, P/EVOs should hold the steering wheel firmly. Failure of a front tire can twist the steering wheel out of a driver's hands, so holding the wheel firmly at the 8 o'clock and 4 o'clock positions (or lower) is critical. Next, avoid braking as it can cause a loss of control. Unless the vehicle is in danger of colliding with something, stay off the brake until the vehicle is moving more slowly. Then brake very gently and ease off the roadway.¹³⁵

Skid Control and Recovery

A skid happens whenever tires lose their grip on the road. The earliest and best way for a load driver to recognize that the trailer has started to skid is by seeing it in the mirrors.¹³⁶ However, the rear P/EVO can also monitor and alert the load drivers.

Skids are caused by over-braking, over-steering, over-acceleration, and driving too fast. Over-braking locks up the wheels, producing a skid. Over-steering (turning the wheels more sharply than the vehicle can turn) will often produce a skid. Over-acceleration (supplying too much power to drive wheels) causes tires to spin. And most serious skids result from driving too fast for road conditions. Excessive speed produces situations in which drivers attempt to correct a movement of the vehicle by over-steering and over-braking, further contributing to skids.

Drive-wheel skids are the most common type. The rear wheels lose traction through excessive braking or acceleration. Skids caused by acceleration typically happen on ice or snow. The driver should take his or her foot off the accelerator. Rear wheel braking skids occur when the rear drive wheels lock. Locked wheels have less traction than rolling wheels, so the rear wheels usually slide sideways. With vehicles towing trailers, a drive-wheel skid means the trailer may push the towing vehicle sideways, causing a sudden jackknife.

Front-wheel skids are typically caused by driving too fast for conditions. Other causes include lack of tread and cargo loaded so that not enough weight is on the front axle. In a front-wheel skid, the front end tends to go straight regardless of how much the steering wheel is turned. The remedy for a front-wheel skid is to let the vehicle slow down. Stop turning and braking and allow the vehicle to slow down.

All commercial drivers should have a precision driving course at least every 5 years and a driver improvement or defensive driving course every 3 years. There are safety benefits to this training, of course, and frequently insurance rate reductions and liability mediation are also benefits.

Hazardous Materials Emergencies

In the event the load contains hazardous materials and is involved in an incident, if the load driver asks or is unable to report an incident, P/EVOs should be prepared to give:

- Their name.

¹³⁵ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-34. Available at: <http://www.aamva.org/CDL-Manual/>.

¹³⁶ *Ibid.*, p. 6-2.

- Name and address of the carrier and load driver.
- Phone number.
- Date and time and location of incident.
- A description of any injuries.

In addition, the P/EVO should know the **classification, name, and quantity** of hazardous materials involved. Emergency personnel must know whether a danger to life exists or could develop.¹³⁷

The **National Response Center** helps coordinate emergency response to chemical hazards. It is a resource used by police and firefighters and has a 24-hour, toll-free telephone hotline. It is vital the load driver and the P/EVOs, if the load driver is unable, are able to report any hazardous materials incident in which: a person is killed, an injured person requires hospitalization, estimated property damage exceeds \$50,000, the general public is evacuated for more than 1 hour, or one or more major transportation arteries or facilities are closed for 1 hour or more. In addition, any incident involving fire, breakage, spillage, or suspected radioactive contamination, or contamination involving shipment of etiologic agents (bacteria or toxins, for example), or any situation that involves danger to life or that in the judgment of the carrier, must be reported.

Emergency Roadside Parking/Breakdowns

When it is necessary to park on the side of the road, pull off the road as far as possible and immediately turn on the emergency flashers on all vehicles. This is especially important at night. Taillights are not adequate; motorists have crashed into parked vehicles because they perceived the parked vehicle was moving normally. Judging speed and distance at night is difficult. Mountainous terrain enhances these risks.

Before exiting the vehicle, all drivers must put on retro-reflective safety vests (as required by MUTCD 6D.03) and hardhats (as required by the States). Vests should be worn at all times, and the hardhat should be stored in the vehicle within easy reach of the driver. Quickly deploy emergency warning devices (triangles, cones, or flares). Triangles should be placed behind both load and escort vehicles, with one at 10 feet behind the vehicle, another at 100 feet behind, and a third at 200 feet behind the vehicle on one-way or divided highways. If on a two-lane road or undivided highway, place warning devices within 10 feet of the front or rear corners to mark the location of the vehicle, and 100 feet behind and ahead of the vehicle on the shoulder or in the lane the vehicle is occupying. When placing triangles or other warning devices, hold them between you and oncoming traffic to enhance your visibility.

¹³⁷ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 9-17. Available at: <http://www.aamva.org/CDL-Manual/>.

Pay attention to features of the terrain when placing the warning devices to allow fast-moving or heavy vehicles enough time to stop before colliding with any vehicles that may be blocking a roadway or with any emergency vehicles or investigators who may be operating at the scene. If hills and curves are involved, find safe places at the top of hills and at the beginning of curved portions of the roadway to warn traffic in time to stop. Do everything to assure motorists can see the parked vehicle from at least 500 feet, and more in higher speed zones.

Control traffic with the *STOP/SLOW* paddle when appropriate and lawful. When acting in the capacity of a flagger during an emergency event, the P/EVO must have a sense of responsibility for public safety and adequate training in safe TTC practices (See Lesson 4, above). As with other aspects of load movement, emergency traffic control should be addressed in pre-trip planning and reviewed in detail frequently.¹³⁸

No roadside operations should be conducted without wearing a retroreflective safety vest.

Fighting Fires

It is important that P/EVOs know how to extinguish fires. Causes of vehicle fires are numerous. After accidents, spilled fuel or improper use of flares may cause a fire. Under-inflated tires and duals that touch may also produce fires. Electrical systems can malfunction, fuel systems may have loose connections, or smokers may be too close to vehicles that are being fueled. Cargo may be flammable, improperly sealed, or poorly ventilated. Any number of situations may produce a vehicle fire.

Avoiding fires starts with the pre-trip inspection. Make certain fire extinguishers are on board and working. En-route inspections should also be performed: check tires, wheels, and vehicle body for signs of heat. Drivers should monitor the instrument panel and gauges for engine overheating. Follow correct safety procedures for fueling the vehicle, using brakes, handling flares, and other activities that can cause a fire. Monitor mirrors for signs of smoke from tires or the vehicle.

All members of the load movement team must study the instructions printed on the extinguishers. Review those instructions regularly. When a fire is detected or suspected, pull off the road immediately, into an open area, away from buildings, trees, brush, other vehicles or anything that might catch fire. **Do NOT pull into a service station.** Notify emergency services of the problem and location. **Do NOT assume someone else has called 911.** Keep the fire from spreading before trying to extinguish a fire.

¹³⁸ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004).

Above all, learn from experience and share what you have learned. Use and share all that you learn, especially when dealing with emergencies. This can do more to prevent future emergencies than any other strategy. Create an open climate, a safe place to discuss how load movement can be safer.

For an engine fire, turn off the engine as soon as possible. Don't open the hood if it can be avoided. Shoot foam through louvers, radiator, and underneath the vehicle. **Do NOT crawl under a vehicle** in this situation. For a cargo fire in a box trailer, keep the doors shut, especially if the cargo contains hazardous materials. Opening the door(s) will feed the fire with oxygen.

To extinguish the fire, stay as far away from the fire as possible. Aim the fire extinguisher at the base of the fire, not up into the flames. It is important to use the right fire extinguisher for the type of fire encountered.

The **B:C type** fire extinguisher is for electrical fires and burning liquids. The **A:B:C type** extinguisher is for burning wood, paper, and cloth as well as electrical fires and burning liquids. Water can be used on wood, paper, or cloth but **do NOT use water on an electrical fire** (can cause shock) **or a gasoline fire** (water will spread the flames).

A burning tire must be cooled. Lots of water may be required. If there is doubt about which extinguisher to use or whether or not to use water, wait for firefighters.

Position all persons upwind of the fire; let the wind carry the extinguisher to the fire. Continue until whatever was burning has been cooled. Remember, the absence of smoke or flame does NOT mean the fire won't restart. (See Module 5, Lesson 4 regarding emergency traffic control strategies.)

Injury Issues

If a medically qualified person is at the accident scene and helping the injured, stay out of the way unless asked to assist. Otherwise, don't move an injured person unless they are in danger where they are located (for example, near a vehicle that smells like gasoline) or if the injured person is walking around or lying in a roadway. Keep the injured person as still and calm as possible and contact medical assistance and family members.

→ TEST YOUR KNOWLEDGE

1. What common characteristics do emergencies have?
2. What two options do drivers have when confronting an obstacle in the roadway?
3. For P/EVOs, what two types of emergencies are most common?

MODULE 6

Post-Trip Responsibilities and Activities

Regardless of similarities among trips, aspects of each trip are unique.

Once the load is delivered, the pilot/escort vehicle operator (P/EVO) has important tasks remaining. These include duties related to the escort vehicle itself, such as turning off lights and removing flags, but several other post-trip activities are critical for improving safety and efficiency in oversize load movement.

As mentioned in Module 1, each trip is prototypical for P/EVOs: regardless of similarities among multiple trips (identical load, same vehicle configuration, same load driver, same route, etc.) aspects of each trip are unique (weather, hours of daylight, vehicle failure, work zones, unexpected road closures, etc.). This means that each trip is a valuable source of information, and the experiences of the entire team should be evaluated with a focus on how to make operations safer for all highway users, including load drivers and P/EVOs, as well as the load, load and escort vehicles, and transportation infrastructure.

Post-trip evaluations should include discussion about all aspects of the load movement, including the adequacy of pre-trip planning, preparations for the move, operating procedures used during the trip, and, if an emergency occurred, the adequacy of the team's response to it.

In Lesson 1, information is provided about the escort vehicle and equipment tasks that must be performed once the load movement is concluded. Lesson 2 is focused on the post-trip evaluation process including assignment evaluation, route survey and communication issues, and emergency responses. Finally, Lesson 3 offers suggestions about written reports and trip logs.

▶▶ LESSON 1: AFTER THE TRIP – VEHICLE AND EQUIPMENT TASKS

At the conclusion of the load movement (i.e., once the oversize load is parked and secure), the P/EVO must comply with State requirements regarding the pilot/escort vehicle including the removal and storage of signs, flags, lights, and warning devices. As mentioned, P/EVOs are responsible for knowing and following the laws in any State in which they operate.

While the rules in each State differ, some similarities exist related to exterior lights, Oversize Load signs, warning lights, flags, and other equipment. To be clear, the rules related to the equipment mentioned below are *similar, but not identical* across States.

Warning Lights

Check all vehicle lights, including headlights (high and low beam), tail lights, front and rear turn signals, brake lights, emergency flashers, fog lights, tag light, and the amber warning light. Replace necessary bulbs (at least those needed for non-escort vehicle use), replace or repair damaged lenses, and clean the lights. Check the mounting device(s). Tighten screws or bolts, and replace any that are missing to ensure parts do not detach from the vehicle.

Once this assessment is complete, turn off, cover, or remove amber warning light(s), according to the laws of the State in which the operations are taking place. Turn off, cover, or remove any other warning lights.

Oversize Load Signs and Flags

Check the Oversize Load sign and the mounting apparatus. Once checked, make notes of any problems or correct the problem if the sign may fall off the vehicle. If no serious problems are detected, remove or cover the Oversize Load sign.

Assess the condition of each flag and the mounting apparatus. Replace frayed or faded flags, or note the need for new flags and any problems with the mounting devices that need to be addressed before the next trip. Once the assessment is complete, remove and properly store the flags.

Height Pole

Check the height pole and mount for damage. Make notes of any problems that need to be addressed. Remove or retract the height pole.

Data for Trip Log

It is important to take a few minutes to write down the “vital statistics” that may escape: vehicle mileage, the date and time of delivery, names of individuals related to the delivery, and exact location of delivery. Check with the load driver or other carrier representatives about any information or trip documentation needed and to whom it should be provided. All meetings, including pre-trip and daily meetings, should be documented and included as part of the trip log.

These post-trip tasks are important, and written reports about the vehicle and equipment condition are especially significant in situations involving escort vehicles driven by several different P/EVOs; i.e., in fleet operations. After-trip inspections and reports also help the P/EVO anticipate when an escort vehicle needs maintenance service.

The carrier or escort company may require written report(s) daily or at the end of the trip. In either case, the P/EVO must record basic trip data every day, including miles driven, stops made, start and stop times, equipment or vehicle failures, downtime, route survey issues, communication issues, etc. Data gathering should be considered in the pre-trip planning to ensure the data recorded is sufficient to complete all required reports.

→ TEST YOUR KNOWLEDGE

1. What are the recommended/required post-trip activities related to the escort vehicle?
2. What other tasks, besides those related to the escort vehicle, must be completed at the end of the trip?

▶▶ LESSON 2: POST-TRIP EVALUATION

Once P/EVO duties are complete and the escort vehicle is prepared for regular travel (that is, not as an escort vehicle), a meeting to conduct a comprehensive review of the trip should be held as soon as possible. To gain the best information and ideas, this review should involve as many members of the team as possible, and all aspects of the load movement should be discussed. Problems encountered and the team's responses to those problems should be evaluated. Post-trip reports are much like contingency plans: if they aren't shared, they are substantially less effective.

During this review, it is important to assess whether pre-trip planning was adequate, whether the team was effective, and what lessons can be learned from the experience. Another area for analysis involves comparing plans to actual events; i.e., the elements of the route survey to the actual route, or the proposed schedule to events as they actually occurred.

The review is an opportunity for team members to voice concerns and suggest possible changes to operating procedures. Discussions about what went right, what went wrong, and what can be done better are critical. Team members must feel safe to raise issues and offer suggestions.

Information gained during the evaluation should be captured and distributed in a written report. By doing this, team members who cannot be involved in the actual post-trip meeting can get the information about what was learned and aspects of the load movement that may be modified if or when similar situations arise. The after-trip report provides feedback about the performance of team members, the adequacy of pre-trip planning, as well as the operations during the load movement, the quality of emergency responses, and completion of the overall mission.

Assignment Evaluation

Each member of the team should be encouraged to evaluate the overall load movement process. This should be done as soon as possible after the load movement is complete for several reasons. First, once the team disperses to different jobs or home States, a face-to-face meeting is not possible. Second, memories and issues related to the trip will be most accurate and inclusive at the immediate conclusion of the trip rather than at some later time. It is important to point out that whoever leads this meeting must ensure that team members feel safe

to discuss any aspect of the trip without reprisal or having their ideas and thoughts belittled or ignored. The goal is to get as much information as possible from each of the team members.

The focus of the assignment evaluation should be on the procedures used to assess and address risks during pre-trip planning and related meetings. This evaluation addresses the following questions:

- Were the risks addressed during planning adequate?
- Did other risks become apparent during load movement?
- Were procedures designed to reduce risk adequate? Were they specific enough?
- Did all team members know and understand the roles they were assigned?
- What should be done to correct any risk assessment deficiencies?
- If an emergency did occur, what was the impact on the load? The team? To public safety?
- Were the emergency contingency plans adequate? Were they specific enough?
- How could the emergency have been avoided?

It is frequently the case that some individuals are not comfortable making comments that question or criticize other team members when meeting face-to-face. Therefore, it is vital that the leader provide another channel for gaining team members' feedback (telephone or email, for example). The person in charge of gathering data should be available in the days following the trip to discuss problems not addressed during the post-trip meeting (or in lieu of the meeting). The leader should reach out to reticent team members to gain feedback, and to welcome comments from team members who may wish to add to or clarify their comments.

Remember, it is rare that an individual has no ideas, comments, or suggestions; it is common, on the other hand, that individuals are unwilling to offer their ideas, comments, and suggestions in a group context. Sometimes this is because an individual has general communication anxiety and avoids voicing opinions in public situations, or, as mentioned, people are sometimes reluctant to offer ideas that involve even indirect criticism of other members of the group. Leaders must recognize this situation and seek other methods for getting feedback from all team members and related support personnel. Of course, it is also important to prevent overly harsh criticism of team members by others. The purpose of the meeting is to gain constructive feedback that will optimize the lessons learned from the experience.

Route Survey Evaluation

All aspects of the route survey should be discussed, including the scope of the information and the accuracy of it. The following questions should be addressed:

- Was the route survey complete?
- What additional information was needed?
- What other information would have been useful in this context?

- Was the route survey accurate? If not, what effects did the inaccuracies or lack of information have on the load movement?
- What suggestions do team members have that might improve future route surveys?

Communication Equipment and Procedures Evaluation

Communication among team members is critical to the safe movement of the oversize load. Any problems with communication can have disastrous effects; a lack of ability to communicate is never a minor issue.

Communication equipment should be assessed for adequate range and functionality (portability for flagger use, for example).

- Did the equipment function properly? Did it have the expected range?
- Was the technical quality adequate so that all team members were able to identify the speaker?
- Was communication equipment for flaggers adequate?
- Were all team members familiar with the equipment and how to use it?

Communication procedures must also be considered.

- Were all team members professional, brief, and clear in their communication?
- Did each team member respond appropriately?
- Did team members relay relevant information?
- Did they provide information in enough time for the load driver and other P/EVOs to react appropriately?
- Is standard terminology used by team members?
- If traffic control operations were required, were flaggers able to communicate effectively with other members of the team?
- Were communications between flaggers clear and adequate?

It is important to discuss any communication difficulties the team members experienced during the load movement. An assessment of both equipment and procedures is necessary to ensure effective communication at all times and for all team members during load movement. Individuals should be encouraged to raise questions and to assess their own performance during the post-trip evaluations.

Emergency Response Evaluation

Based on substantial evidence presented here and elsewhere, highway accidents involving oversize loads produce serious and fatal consequences every year across the United States.

Once an emergency situation is stabilized, P/EVOs should document all actions taken in response to the emergency. Take a few minutes to jot down information about the time of the incident, exact location, vehicles involved, the sequence of events, calls made, and any other activity that may be significant. These observations should be compiled as soon after the emergency as possible.

Once the post-trip information has been gathered from the planning documents, route survey, permit, and the team members, use this information to reconstruct the load movement. This is useful to identify discrepancies between what was planned and what actually occurred. As mentioned, encourage team members to discuss what was especially good about the trip and what areas need improvement.

Review the suggestions and identify possible solutions and modifications to procedures that should be made. Determine whether a situation needs to be monitored or if action should be taken.

→ TEST YOUR KNOWLEDGE

1. What should, at a minimum, be included in a post-trip evaluation?
2. What aspects of pre-trip activities should be evaluated?
3. What aspects of communication should be evaluated?
4. Why is post-trip evaluation of emergency responses so important?

▶▶ LESSON 3: WRITTEN REPORTS AND TRIP LOGS

When writing reports, be inclusive. Make every attempt to include the comments and recommendations that have been agreed to during meetings and other interactions, as well as suggestions for changes in procedures. Front- and rear-facing cameras, still cameras, and digital voice recorders are all useful to keep accurate records of events during load movement.

Trip logs should include a detailed summary of the assignment: the dates of the trip, origin and destination, load description and vehicle configuration, description of the route, and information about emergencies, inadequacies, and malfunctions. Record names of team members, the carrier and P/EVOs, as well as support personnel and notifications documentation. Emergencies should be documented in every detail possible, including onboard camera footage and still photographs.

The report should address any training needs that are apparent, the levels of experience that are needed, and any special expertise required such as height pole operation, route survey specialist, or P/EVOs with experience moving long loads. The focus of the report is inherently to provide an honest critique of the trip. The report need not be negative, rather its purpose is to provide a learning opportunity. The report should address the primary question: How can we do a better job, based on the experience gained on this trip?

→ TEST YOUR KNOWLEDGE

1. What should be included in a trip log?

MODULE 7

Driver Safety Issues

“
Driving
IS
multi-tasking.”

▶▶ LESSON 1: DISTRACTIONS

Distracted driving, a form of driver impairment as dangerous as drinking and driving and drowsy driving, is a deadly epidemic on America’s roadways. In 2013, there were 3,154 people killed in distracted driving crashes. This represents a 6.7 percent decrease in the number of fatalities recorded in 2012. About 424,000 people were injured—an increase from the 421,000 people who were injured in 2012.¹³⁹ An estimated 80 percent of collisions involve some form of driver inattention, and each year, driver inattention is a factor in more than 1 million crashes in North America, according to American Automobile Association (AAA).¹⁴⁰ These figures most certainly underestimate the role of distraction in fatal crashes because data is self-reported and, “It is rare that cell phone billing records are subpoenaed and examined.”¹⁴¹ This is not the case, however, when crashes involving oversize load movement occur.

Since 2009, the U.S. Department of Transportation has held national distracted driving summits, has **banned texting and cell phone use for commercial drivers [49 CFR §392.82]**, encouraged States to adopt tough laws, and launched several campaigns to raise public awareness about the dangers of distracted driving. Engaging in visual-manual activities (such as reaching for a phone, dialing, and texting) associated with the use of hand-held phones and other portable devices increased the risk of getting into a crash by three times for light vehicles and cars.¹⁴² However, for heavy vehicles or trucks, dialing a cell phone increased the risk of a crash or near-crash event to 5.9 times as high as non-distracted drivers.¹⁴³ Studies also show that 5 seconds is the average time a driver’s eyes are off the road while texting. When traveling at 55 mph, that’s enough time to cover the length of a football field blindfolded.¹⁴⁴ Looking away from the path of travel for 2 or more seconds doubles the likelihood of a crash, according to AAA.¹⁴⁵

¹³⁹ [Distraction.gov](http://www.distraction.gov), “Facts and Statistics,” available at: <http://www.distraction.gov/stats-research-laws/facts-and-statistics.html>.

¹⁴⁰ American Automobile Association (AAA), *The Effects of Distractions, Drowsiness, and Emotions on Driving*, 2013, p. 286.

¹⁴¹ Insurance Institute for Highway Safety, David Kidd, PhD, *Searching for the Answers to Distracted Driving*, Insurance Institute for Highway Safety, Joint meeting of Drive Smart Virginia and the ASSE Colonial Virginia Chapter, April 21, 2015, slide 3.

¹⁴² Virginia Tech Transportation Institute (VTI), *The Impact of Hand-Held and Hands-Free Cell Phone Use on Driving Performance and Safety Critical Event Risk*, 2013. Available at: <http://www.vtti.vt.edu/featured/?p=193>.

¹⁴³ Virginia Tech, “New data from Virginia Tech Transportation institute provides insight into cell phone use and driving distraction,” July 2009. Available at: <http://www.vtnews.vt.edu/articles/2009/07/2009-571.html>.

¹⁴⁴ *Ibid.*; see also the Texting and Driving Safety Campaign web page, available at: <http://www.textinganddrivingsafety.com/texting-and-driving-stats>.

¹⁴⁵ American Automobile Association (AAA) *The Effects of Distractions, Drowsiness, and Emotions on Driving*, 2013, p. 286.

Headset cell phone use is not substantially safer than hand-held use.¹⁴⁶

The Insurance Institute for Highway Safety (IIHS) suggests that completely mitigating cognitive distraction is unlikely, in part because it is more difficult to identify and measure than activities that take a driver's eyes off the road or hands off the wheel.¹⁴⁷

Drivers are approximately 400 percent more likely to crash when talking on cell phone while driving.¹⁴⁸ However, according to the AAA Foundation for Traffic Safety, "With 75 percent of drivers believing hands-free technology is safe," drivers are often surprised to learn these new vehicle features may actually increase distraction. Voice-activated interactions were most distracting when they were less accurate. Studies found that ***drivers miss stop signs, pedestrians (who are often also looking at a screen), and other cars while using voice technologies.***¹⁴⁹

Whenever a driver's attention is not on the road, that driver is putting himself/herself and passengers, other vehicles and their occupants, and pedestrians in danger.¹⁵⁰ The Centers for Disease Control and Prevention (CDC) describes three main types of distractions while driving: **visual** distractions, which cause you to take your eyes off the road; **physical** distractions, which cause you to take your hands off the wheel; and **mental** distractions, which cause drivers to take their mind off the task of driving.¹⁵¹ Distractions include (but are not limited to) talking to passengers; adjusting the radio or media player, climate controls, and mirrors; eating, drinking, or smoking; reading maps or other printed material; picking up something that fell; reading billboards; watching other motorists or their passengers; and of course, talking on cell phones and the ultra-dangerous behavior of texting or checking email while driving.

According to a study performed by the Virginia Tech Transportation Institute, text messaging creates a crash risk 23 times (that's 2300 percent) worse than driving while not distracted.¹⁵²

Sending or receiving a text takes a driver's eyes from the road for an average of 4.6 seconds. That means when traveling at 55 mph and looking at a text, the driver is operating the vehicle blindly for the distance of an entire football field. Texting is

¹⁴⁶ Federal Motor Carrier Safety Administration, *Driver Distraction In Commercial Vehicle Operations*, FMCSA-RRR-09-042 (Washington, DC: FMCSA, 2009). Available at: <https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/FMCSA-RRR-09-042.pdf>.

¹⁴⁷ Ian Reagan, Ph.D., "Mitigating cognitive distraction and its effects with interface design and collision avoidance systems," presentation to the NHTSA Cognitive Distraction Forum in Washington, DC, held on May 12, 2015. Available at: http://www.iihs.org/media/5978ffb2-f3dd-48b6-82aa-1552dffec776/-1702734340/Presentations/Reagan_May2015_distraction.pdf.

¹⁴⁸ This is supported by studies conducted in Canada and Australia. See David Kidd, Ph.D. "Searching for answers to the problem of distracted driving," presentation to the Joint meeting of Drive Smart Virginia and the ASSE Colonial Virginia Chapter, April 21, 2015, slide 5. Available at: http://www.iihs.org/media/d5958a09-77ab-4417-99ff-781b78c36f77/1734298945/Presentations/Kidd_2015%20VA%20DriveSmart.pdf.

¹⁴⁹ AAA "Imperfect Hands-Free Systems Causing Potentially Unsafe Driver Distractions", October 2014. <http://newsroom.aaa.com/2014/10/imperfect-hands-free-systems-causing-potentially-unsafe-driver-distractions/>.

¹⁵⁰ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014) Section 2.9, p. 2-22. Available at: <http://www.aamva.org/CDL-Manual/>.

¹⁵¹ The National Institute for Occupational Safety and Health (NIOSH), "Distracted Driving" web page. Available at: <http://www.cdc.gov/niosh/topics/distracteddriving/default.html>.

¹⁵² Virginia Tech Transportation Institute, "New data from Virginia Tech Transportation Institute provides insight into cell phone use and driving distraction," July 29, 2009. Available at: <http://www.vtnews.vt.edu/articles/2009/07/2009-571.html>.

so much more dangerous than talking because texting, as well as dialing, scanning contacts, and checking email, involve all three types of distractions simultaneously: hands off the wheel, eyes off the road, and mind off the task. Driving tasks are on “pause” during the time a driver is interacting with a device (or engaged in other distractions), often for 4 or 5 seconds at a time, and often while the vehicle is moving more than 100 feet per second (approximately 70 mph).

Distractions are deadly because of the lack of driver vigilance and slower reaction times, among other contributing factors. If drivers react a half-second slower because of a distraction, crashes double.¹⁵³

Here are some ways to avoid becoming distracted while driving:

- Review and be familiar with all safety features of the vehicle being driven; the driver should be totally familiar with all in-vehicle electronics before driving.
- Clear the vehicle of any unnecessary objects.
- Review maps and plan the route before driving.
- Adjust all mirrors, seat, and steering wheel before driving.
- Do not attempt to read or write while driving.
- Avoid smoking, eating, and drinking while driving.
- Do not use cell phones or any other electronic devices while driving. When drivers need to make phone calls, they should find a safe place to park to make telephone calls.
- Never use the cell phone for social conversations while driving.

P/EVOs must not only refrain from distractions, they must watch out for distracted drivers. Safe drivers learn to recognize other drivers engaged in distracting behaviors. Vehicles that drive over the lane divider lines or weave within their own lane, or who drive over the fog line may be distracted.

Given the risks associated with using cell phones and similar devices while driving, combined with the relative ease with which phone records can be obtained, the risks associated with cell phone use not only represent a physical danger to the distracted driver and all highway users, they represent a liability issue that P/EVOs (and all drivers) must consider. Distracted drivers not only risk their own lives and the lives of their passengers and nearby motorists, they also risk substantial financial losses.

It is clear that distractions are dangerous, but the solution is not complex. When a professional driver is found to be at fault, the costs to the driver who chooses to take such risks are not limited to death, personal injury, and property damage. It is often the case that the driver’s license will be suspended, ending the driver’s ability to work as a P/EVO, at least for some period of time. Even when the driver’s license is re-instated, carriers are highly reluctant to hire a driver with an at-fault

¹⁵³ American Automobile Association, *How to Drive*, “Chapter 13. The Effects of Distractions, Drowsiness and Emotions on Driving.” Available for a fee at: <https://drivertraining.aaa.biz/shop/how-to-drive/how-to-drive-student-manual/>.

crash on his or her driving record. In addition, insurance companies also refuse to cover risky drivers, or demand very high premiums that for many P/EVOs are simply out of reach.

Distractions are deadly. All drivers, especially professional ones, must recognize this danger and avoid becoming another casualty. The P/EVO's job requires vigilance beyond that of other highway users. For this reason, in addition to the other reasons provided here, the escort vehicle should be a **No-Phone Zone**.

→ TEST YOUR KNOWLEDGE

1. What are the three types of distractions?
2. Are hands free devices safe to use while driving? Are they substantially different than handheld devices?
3. What is meant by the statement, "Driving is multitasking?"
4. How can drivers avoid becoming distracted?
5. How much more likely are talking drivers to crash, when compared to non-talking drivers? How much more likely are texting drivers to crash?
6. Why is texting (or dialing a phone or scanning contacts or checking email, anything that involves interacting with a screen) so much more dangerous than talking on a cell phone?

▶▶ LESSON 2: DROWSY DRIVING (FATIGUE)

According to the IIHS Highway Loss Data Institute (HLDI), driver fatigue is an increasing factor in crashes. Truck drivers **working for more than 8 hours are twice as likely to crash**.¹⁵⁴ When a driver is sleepy, trying to "push on" is far more dangerous than drivers think. Drowsy driving is a major cause of fatal accidents.

According to the CDC, among nearly 150,000 adults studied, aged at least 18 years or older in 19 States and the District of Columbia, 4.2 percent reported they had fallen asleep while driving at least once in the previous 30 days! Individuals who snore or sleep 6 hours or less each day were more likely to report this behavior, and **drivers who get 7 to 9 hours of sleep each day are involved in less than half as many crashes** whether they snore or not.¹⁵⁵

The National Highway Transportation Safety Administration (NHTSA) estimates that more than 100,000 crashes annually are the direct result of drowsy driving, resulting in an estimated 1,550 deaths, 71,000 injuries, and \$125 billion in

¹⁵⁴ Insurance Institute for Highway Safety, Highway Loss Data Institute, "Large Trucks Q and A." Available at: <http://www.iihs.org/iihs/topics/t/large-trucks/qanda>

¹⁵⁵ U.S. Centers for Disease Control and Prevention, *Drowsy Driving—19 States and the District of Columbia*, 2009-2010.

monetary losses.¹⁵⁶ The CDC states these estimates are probably conservative, though, and up to 5,000 to 6,000 fatal crashes each year may be caused by drowsy drivers.¹⁵⁷

Hours of Service Rules

As was the case when the 2004 *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* was published, P/EVOs are not required to follow hours of service (HOS) rules or maintain logbooks (unless the escort vehicle is 10,000 pounds or is otherwise subject to commercial vehicle rules). Commercial carrier regulations do not apply to P/EVOs. This does not mean, however, that P/EVOs should schedule assignments that prevent adequate rest—7 to 9 hours of sleep per day, as the CDC suggests.

Surveys indicate that many commercial drivers violate the regulations, working longer than permitted.¹⁵⁸ While changes in HOS rules enacted in 2012 are an improvement over 2003 rules, these new rules “might still allow more driving than the regulation before 2003,” according to the IIHS.¹⁵⁹ The Federal Motor Carrier Safety Administration (FMCSA) has produced an hours of service visor card that explains the rules for holders of commercial driver’s licenses (CDL).¹⁶⁰

Dangers of Drowsy Driving/Fatigue

Crashes involving sleepy drivers have several characteristics: these crashes occur late night/early morning or mid-afternoon; crashes are likely to be serious and involve a single vehicle leaving the roadway; crashes occur frequently on high-speed roads when the driver is alone and does not attempt to avoid a crash.¹⁶¹

According to CDC,¹⁶² the specific driving skills that are negatively affected by fatigue include:

- Attention to detail.
- Reaction times.

¹⁵⁶ National Highway Traffic Safety Administration, “Drowsy Driving and Automobile Crashes – NCSDR/NHTSA Expert Panel on Driver Fatigue and Sleepiness” (n.d.). Available at: http://www.nhtsa.gov/people/injury/drowsy_driving1/drowsy.html#V.%20POPULATION%20GROUPS.

¹⁵⁷ S.V. Masten, J.C. Stutts, and C.A. Martell. “Predicting daytime and nighttime drowsy driving crashes based on crash characteristic models.” 50th Annual Proceedings, Association for the Advancement of Automotive Medicine, October 2006, Chicago, IL. See also National Highway Traffic Safety Administration, *The Impact of Driver Inattention on Near-Crash/Crash Risk: An Analysis Using the 100-Car Naturalistic Study Data*, DOT-HS-810-594 (Washington, DC: NHTSA, 2006). See also, AAA Foundation for Traffic Safety, “Asleep at the wheel: the prevalence and impact of drowsy driving,” (Washington, DC: AAA, 2010). Available at: <http://www.aaafoundation.org/pdf/2010DrowsyDrivingReport.pdf>.

¹⁵⁸ T. McCartt, L.A. Hellinga, and M.G. Solomon, “Work schedules of long-distance truck drivers before and after 2004 hours-of-service rule change,” *Traffic Injury Prevention* 9 (2008):201-10.

¹⁵⁹ Insurance Institute for Highway Safety, Highway Loss Data Institute, “Large Trucks Q and A.” Available at: <http://www.iihs.org/iihs/topics/l/large-trucks/qanda>.

¹⁶⁰ Visor Card available at: <http://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/HOS%20Visor%20Card%20Oct%202013.pdf>.

¹⁶¹ National Highway Traffic Safety Administration, “Drowsy Driving and Automobile Crashes – NCSDR/NHTSA Expert Panel on Driver Fatigue and Sleepiness” (n.d.). Available at: http://www.nhtsa.gov/people/injury/drowsy_driving1/drowsy.html#V.%20population%20groups.

¹⁶² U.S. Centers for Disease Control and Prevention Features, “Drowsy Driving: Asleep at the Wheel” Web page. Available at: <http://www.cdc.gov/Features/dsDrowsyDriving/>.

- Ability to think and act decisively.

Other major findings about the impact of fatigue on drivers include:

- Driver alertness and performance are more consistently related to time-of-day than to time-on-task.
- During their daily main sleep period, drivers slept for only about 5 hours, at least 2 hours less sleep than the ideal requirement of 7 to 9 hours.
- Drivers' self-assessments of levels of alertness did not correlate well with objective measures of performance. In other words, drivers are not very good at assessing their own levels of alertness.¹⁶³

Recognizing Danger Signs of Drowsiness and Fatigue

All drivers, regardless of rules and regulations related to HOS, must plan for adequate rest just as carefully as they plan other parts of load movement operations. Drivers must learn to recognize the early signs of fatigue. When drivers are unable to respond to events quickly, regardless of the reason, they are compromising safety.

Every driver must understand his or her body's natural clock, and the natural patterns of alertness and rest. The studies cited above show the time of the trip is as important as the consecutive hours of driving. If a P/EVO typically sleeps between midnight to 6:00 a.m., for example, then performing escort duties during that normal rest period increases the risk of fatigue.

As mentioned, another time period during which the risk of fatigue is elevated is after lunch. For many people, the two hours after lunch is the most difficult time to stay awake. Even when team members get enough rest overnight, it is important for P/EVOs to monitor themselves and each other during times when alertness is compromised.

Sleep is not voluntary. After about 17 hours of being awake, people become drowsy and the body begins to experience "micro-sleeps," brief lapses that can last for several seconds. At 50 miles an hour, during a 4-second lapse, the vehicle moves 300 feet. If any of the following happen, it is time for the driver to rest:

- The driver has difficulty focusing or his or her eyes close.
- The vehicle repeatedly hits the rumble strips delineating the shoulder.
- The driver has trouble keeping his or her head up.
- The driver can't stop yawning.
- The driver has wandering, disconnected thoughts.
- The driver doesn't remember driving the last few miles.
- The driver is tailgating or missing traffic signs.

¹⁶³ From Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004) p. 17, citing FMCSA's *Driver Fatigue and Alertness Study* (n.d.).

- The driver keeps jerking the vehicle back into the lane or drifting across lanes.
- The driver misses a turn or exit.
- The driver has difficulty remembering exit numbers, addresses, or street names.

Perhaps of most importance, though, is that **P/EVOs must have the courage to speak up and stop driving when fatigue is present.** Drivers too frequently continue driving when fatigued, and the consequences are very similar to those that involve drinking drivers.¹⁶⁴

These more recent findings are consistent with previous studies. For example, the National Transportation Safety Board concluded that the critical factors in predicting crashes related to fatigue were:

- Duration of the most recent sleep period.
- The amount of sleep in the previous 24 hours.
- Fragmented sleep patterns.¹⁶⁵

According to the NHTSA,¹⁶⁶ the critical aspects of driving impairment for fatigued drivers are: negative effects on reaction time, vigilance, attention, and information processing abilities.

As mentioned above, numerous studies have shown that drowsy drivers perform no better on driving tasks than drinking drivers.¹⁶⁷ And in addition, low levels of alcohol (below the legal limit of .08% for drivers; .04% for CDL holders) amplify the effects of inadequate sleep.¹⁶⁸

Drowsy drivers may feel morally superior to the drinking driver, or feel that fatigue is not as dangerous as drinking and driving, but tests show ***fatigued drivers are no better at driving than those who have been drinking alcohol.***

¹⁶⁴ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 17.

¹⁶⁵ National Highway Traffic Safety Administration and National Center on Sleep Disorders Research Expert Panel on Driver Fatigue and Sleepiness. *Drowsy Driving and Automobile Crashes*. Available at: http://www.nhtsa.gov/people/injury/drowsy_driving1/drowsy.html#V%20population%20groups.

¹⁶⁶ Ibid.

¹⁶⁷ D. Dawson and K. Reid, "Fatigue, alcohol and performance impairment," *Nature* 388(6639):235. See also: A.M. Williamson and A.M. Feyer AM. "Moderate sleep deprivation produces impairments in cognitive and motor performance equivalent to legally prescribed levels of alcohol intoxication," *Occupational and Environmental Medicine* 57(10):649-55. In addition: J.T. Arnedt, G.J. Wilde, P.W. Munt, and A.W. MacLean, "How do prolonged wakefulness and alcohol compare in the decrements they produce on a simulated driving task?" *Accident Analysis and Prevention* 33(3): 337-44.

¹⁶⁸ M.E. Howard et al., "The interactive effects of extended wakefulness and low-dose alcohol on simulated driving and vigilance," *Sleep* 30(10):1334-40. See also: A. Vakulin, et al., "Effects of moderate sleep deprivation and low-dose alcohol on driving simulator performance and perception in young men," *Sleep* 30(10):1327-33.

Fatigue and Vision

Early signs of fatigue related to vision include being bothered by oncoming headlights (a sign that pupil constriction is slowed, increasing glare blindness), having difficulty keeping eyes open and focused, being troubled by burning and/or watering eyes, and failing to maintain a visual lead and manage space around the vehicle.¹⁶⁹

Fatigue means the body is shutting down. For adults, there is no solid line between being asleep and being awake. Rather, falling asleep is a process. And one of the first things the body does as it transitions from wakeful alertness to sleep is it stops processing visual information—obviously a concern for every driver.

Drivers should have a comprehensive eye examination at least once a year, and *an extra pair of glasses should be within reach of all drivers* who require them.¹⁷⁰ Drivers who use contact lenses often have adverse effects on vision after 10 to 12 hours of wearing contact lenses. Drivers should have glasses, as well as sunglasses, available, even if the driver typically wears contact lenses.

Preventing Drowsy Driving

Get enough sleep. Driving for long periods of time is tiring. Even the best drivers become less alert. It is important for drivers to get enough sleep. Sleep cannot be “saved up” and many workers in all fields in the United States operate with a sleep deficit. The average adult needs 7 to 8 hours of sleep during every 24-hour period, according to the National Institutes of Health.¹⁷¹

Seek treatment for sleep disorders. Sleep disorders are significant for drivers and should be monitored and corrected.

Arrange work schedules to avoid starting a trip with a “sleep deficit,” and try to schedule trips for the hours drivers are typically awake. Many heavy vehicle crashes happen between midnight and 6 a.m. Tired drivers fall asleep during these times, especially if they don’t regularly drive during those hours. Trying to push on and finish a long trip at these times can be very dangerous.¹⁷²

Avoid drinking alcohol before driving. Follow all State laws in terms of hours prior to driving that must be alcohol free. And, remember that rules for CDL holders are more strict than those for other drivers.

Avoid medication that produces drowsiness. Pay attention to warnings on medication labels, especially those that warn against operating vehicles or machinery. One of the most common examples is over-the-counter cold medication. A driver is better off suffering from the cold symptoms than from the drowsy-inducing effects of medication that reduces those symptoms.

¹⁶⁹ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 17.

¹⁷⁰ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-25. Available at: <http://www.aamva.org/CDL-Manual/>.

¹⁷¹ National Institutes of Health, “How Much Sleep Is Enough?” Web page. Available at: <http://www.nhlbi.nih.gov/health/health-topics/topics/sdd/howmuch>.

¹⁷² American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-41. Available at: <http://www.aamva.org/CDL-Manual/>.

Exercise regularly. This builds resistance to fatigue and improves the quality of sleep. Eating healthy food is also beneficial. While it is frequently difficult for drivers to find healthy food, they should look for ways to incorporate balanced meals and snacks. As nearly every health organization stresses, consume more fruits and vegetables and less fat, salt, and sugar. Use caffeine sparingly.

Keep the vehicle cool. Hot, poorly ventilated vehicles can produce sleepiness. Open a window or vent and use the air conditioner to keep the environment cool.

Take breaks that involve physical activity. Inspect the vehicle and/or take a short, brisk walk. It is especially important to take a mid-afternoon break when all people, including drivers, typically experience drowsiness.

In summary, when a driver becomes sleepy, stop to sleep. Take a nap. Do NOT rely on coffee or another source of caffeine. Do NOT rely on an open window, sour candy, singing to the radio, using a cell phone, or other “tricks” that often add to the danger. **When a driver is sleepy, there is one solution: sleep.**

In the future, **electronic on-board recorders (EOBR)** may become required equipment. The IIHS has petitioned Federal Highway Administration (FHWA) for a mandate many times (1986, 1987, 1995, 2005), arguing EOBRs “will make regulation more effective and reduce truck driver fatigue,” according to the IIHS.

→ TEST YOUR KNOWLEDGE

1. How does getting 7 to 9 hours of sleep each day affect a driver’s chance of being involved in a crash?
2. How does fatigue (also called “drowsy driving”) affect driving skills?
3. How does time of day affect driver alertness?
4. What are “micro-sleeps?”
5. How do fatigued drivers and drinking drivers compare in terms of driving skill?
6. What should drivers do to avoid fatigue?

▶▶ LESSON 3: AGGRESSION

NHTSA defines aggressive driving as an event that occurs “when individuals commit a combination of moving traffic offenses so as to endanger other persons or property.” Some other communities define aggressive driving as “the operation of a motor vehicle involving three or more moving violations as part of a single continuous sequence of driving acts, which is likely to endanger any person or property.”

Road rage differs from aggressive driving. Road rage is a criminal offense, defined as “an assault with a motor vehicle or other dangerous weapon by the operator or passenger(s) of one motor vehicle on the operator or passenger(s) of another motor vehicle or is caused by an incident that occurred on a roadway.”

The American Association of Motor Vehicle Administrators (AMVA) defines *aggressive driving* as the act of operating a vehicle in a selfish, bold, or pushy manner, without regard for the rights or safety of others, and road rage as operating a vehicle with the intent of doing harm to others or physically assaulting a driver or his or her vehicle.

Behaviors typically associated with aggressive driving include: exceeding the posted speed limit, following too closely/tailgating, erratic or unsafe lane changes, improperly signaling or failing to signal lane changes, and failure to obey traffic control devices (stop signs, yield signs, traffic signals, railroad grade cross signals, etc.). NHTSA labels running a red light as one of the most dangerous forms of aggressive driving.¹⁷³

A dangerous form of passive/aggressive behavior is obstructing traffic, in particular, driving at or under the speed limit in the left lane. Most States have rules indicating the left lane is for passing only; when drivers ignore that law, they create moving roadblocks that further frustrate drivers.

High traffic volume, tight schedules, and unexpected delays such as encountering an oversize load, produce a rich environment for aggressive driving and road rage. Americans drive more miles every year, and many drivers take out their anger and frustration on other roadway users.

Somewhat ironically, many aggressive drivers were in a negative frame of mind before they ever entered their vehicles, but aggressive individuals most often blame others for difficulties they encounter.

What Can a Pilot/Escort Vehicle Operator Do To Minimize Aggressive Behavior?

P/EVOs can reduce frustration in several ways. First, it is important that the team be realistic about travel times.

¹⁷³ National Highway Traffic Safety Administration, *Aggressive Driving Enforcement: Strategies for Implementing Best Practices*, (Washington, DC: NHTSA, 2000).

*A vehicle is
not a time
machine.*

When drivers leave too late to arrive at the destination on time, trying to make up the time while driving is a dangerous, albeit popular, strategy. P/EVOs must acknowledge this and resist any temptation to participate in such behaviors. If an individual is angered by other drivers and stressful traffic conditions, a career as a P/EVO is not recommended.

One way to minimize stress is to avoid being distracted by a clock. Recognize that ideal traffic conditions are not typical. Drivers must accept that if they depart late, they will arrive late. It is important from a safety standpoint to acknowledge the reason for a late arrival was a late departure rather than something other drivers may have done.

Expect delays and be courteous to other drivers. Slow down and maintain adequate following distance. Do not drive in the left lane unless passing other vehicles; as mentioned, to do so creates moving roadblocks that frustrate drivers and create or elevate unsafe conditions.

Avoid gestures, even those not intended to provoke another driver. Keep your hands on the wheel and your eyes on the road and surrounding vehicles.

Avoid cutting people off—this is much easier when drivers are not distracted. Be responsive to other drivers—accommodate their needs to change lanes or merge onto a roadway.

What Can a Pilot/Escort Vehicle Operator Do If Confronted by an Aggressive Driver?

If the team encounters an aggressive driver, make every attempt to get out of the way. Do not challenge an aggressive driver or attempt to restrict their movement. Avoid eye contact and ignore any gestures.

Report aggressive drivers to the appropriate authorities by providing a vehicle description, license number if possible (do not tailgate in order to read the tag number, however), and the vehicle's location and direction of travel. If an aggressive driver is involved in a crash, stop a safe distance from the crash scene, wait for the police to arrive, and report what you witnessed.¹⁷⁴

→ TEST YOUR KNOWLEDGE

1. What are the differences between aggressive driving and road rage?
2. What are some of the behaviors exhibited by aggressive drivers?
3. What can P/EVOs do if confronted by an aggressive driver or witnesses an incident of road rage?

¹⁷⁴ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-23. Available at: <http://www.aamva.org/CDL-Manual/>.

▶▶ LESSON 4: GENERAL SAFE DRIVING PRACTICES ¹⁷⁵

As with other safety issues, knowing the oversize load maneuvering limitations is crucial to safe load movement. Safe drivers are always monitoring surroundings for hazards. By learning to see hazards and maintaining focus on the roadway and traffic, hazards are substantially less likely to become emergencies. By watching for hazards and maintaining a safe distance from other vehicles, drivers have time to plan a way to avoid an emergency and execute the plan successfully. When a P/EVO sees a hazard, that driver must continually consider emergencies that can develop with the particular load being escorted, and decide how to reduce the risks involved. Driving at night, in fog, in very hot weather, and in mountains present extra challenges when moving oversize loads, as discussed in the next sections.

Adverse or hazardous conditions include anything that negatively affects visibility, traction, or braking. Conversely, good conditions means flat, level, dry pavement in the daytime. When incidents happen, rarely is some previously unknown hazard found to have contributed to it. Rather, we as drivers make the same kinds of mistakes under similar conditions, as explained below.

Driving in Adverse Conditions

Nighttime Driving

Nighttime driving presents greater risks primarily because of drivers' inability to see hazards as quickly as in daylight, and therefore, they have less time to respond. Problems related to driving at night involve the driver, the roadway, and the vehicle. Driver factors include vision, glare, and fatigue. People don't see as sharply at night or in dim light. Also, drivers' eyes need time to adjust to dim light and varying light as when driving through tunnels. Glare can blind drivers for short periods, and eyes take some time to recover from this temporary blindness. This is similar to the effect of a camera flash. It can take several seconds to recover from glare, and alcohol and medications can negatively affect how quickly pupils constrict, extending the problem. Even two seconds of "glare blindness" can be dangerous.¹⁷⁶ As looking away from the road for two seconds doubles crash risk, glare blindness can produce similar risks. Remember, a passenger vehicle moving at 50 mph moves 75 feet per second; at 70 mph, that is 105 feet per second. And remember the increased distances required for large vehicles to stop. In the time it takes for a driver's vision to recover, the vehicle will have moved about half the distance of a football field. If a vehicle approaching you has high beam headlights on, or the lights are particularly bright, look at the right side of the road, at the fog line.

¹⁷⁵ This section is adapted from the American Association of Motor Vehicle Administrators *Model Commercial Driver License Manual*.

¹⁷⁶ It is important to remember that alcohol and some medications slow down response rates. When an individual consumes alcohol, for example, the muscles react more slowly, including the muscles in the eyes that control pupil constriction. Considering that most drinking and driving is done during nighttime hours, this means that the vision of drinking drivers is much more debilitated, especially "glare blindness" that can last much longer than drivers who have not consumed alcohol due to the slower rate of pupil constriction.

Roadway factors affecting drivers at night include poor lighting and inadequate highway markings. Another hazard of nighttime driving is the increased prevalence of drinking drivers and fatigued drivers. Finally, the vehicle factor that negatively affects driving at night the most is the limitation of headlights. Drivers must be sure they can stop in the distance they can see ahead. With low beams, drivers can see ahead about 250 feet; high beams vary from 350 to 500 feet. Drivers must adjust speed to keep stopping distance within sight distance. If a driver is not able to stop within the range of the headlights, by the time the driver sees a hazard, he or she cannot stop before striking it.

Dirty headlights not only cut down the driver's ability to see, they also reduce the visibility of the vehicle. Headlights can be out of adjustment, i.e., not pointed in the right direction. In addition to reducing the ability of the driver to see, the lights may create problems for other drivers if pointed at them. It is particularly important at night for drivers to ensure all lights are working and clean, including brake lights, tail lights, turn signals, and warning lights.

It is important for P/EVOs to check lights on the load vehicle as well as other escort vehicles, and notify drivers if lights are not working properly. It is also important for P/EVOs and load drivers to carry replacement bulbs for all lights on the vehicle. Clean windshields and mirrors are particularly important for nighttime driving. Bright lights at night can cause dirt on the windshield or mirrors to create glare. If using high beams, in the absence of nearby traffic, dim lights within 500 feet of oncoming vehicles or vehicles in front. Headlights from behind, shining into cars moving in the same direction create glare from reflections in mirrors. So, dim headlights when moving within 500 feet of a vehicle ahead. As mentioned, look at the side of the road, at the fog line if present, when meeting vehicles. Do not turn on high beams within 500 feet of an oncoming driver. This is dangerous as the glare can blind the driver and he or she may drift across the centerline. This behavior is aggressive and frequently provokes other drivers, including P/EVOs. Avoid these behaviors and minimize reactions to them.

At dawn or dusk, in rain or snow, it is more difficult for motorists to see the load. In order to be seen, all drivers should use low beam headlights at all times, day and night. This is especially beneficial when the vehicle is white, silver, gray, or blue—colors that blend into the horizon. Drivers should use high beams only when it produces no negative effect for oncoming drivers or drivers traveling in front of the load or P/EVO.

If the plan calls for a part of the trip to be made during nighttime hours, make sure you are rested and alert before the trip begins. If drowsy, sleep before driving. Even a nap can save lives. Make sure eyeglasses are clean and unscratched. Be sure to inspect the vehicle, especially lights, at every opportunity when traveling at night. Clean the inside and outside of the windshield and mirrors frequently.

Driving in Fog

Fog can occur at any time and on highways can be extremely dangerous. Fog is often unexpected and visibility can deteriorate rapidly. Watch for foggy conditions and be ready to reduce speed. Do not assume fog will thin out after entering it. Maintain stopping/sight distance. A best practice is to avoid driving in fog. Pull off the road into a rest area or truck stop until visibility improves. Parking on the shoulder in foggy conditions is not recommended.

If a driver cannot stop safely when encountering fog, be sure to obey all fog-related warning signs; slow down before entering fog; use low-beam headlights and fog lights, even in daytime; be alert for other drivers who may have forgotten to turn on their lights; turn on four-way flashers; watch for vehicles on the side of the roadway (seeing taillights or headlights in front of you in fog may not be a true indication of where the road is; the vehicle may not be on the road at all); use highway reflectors as guides to determine how the road may curve; listen for traffic you cannot see; avoid passing other vehicles.

Driving in Extreme Heat

Hot weather requires checking tire pressure every 2 hours or 100 miles in very hot weather. Do not let air out as the pressure will be too low when the tires cool. If a tire is too hot to touch, remain stopped until the tire cools off; the tire may blow out or catch fire otherwise. It is also important to monitor engine oil levels and temperature gauge. Make sure the engine cooling system has enough water and antifreeze based on the engine manufacturer's directions. (Antifreeze helps the engine under hot conditions, too.) Carefully monitor the water temperature gauge. Remember that if a coolant reservoir is available, and if it is not part of the pressurized system, coolant may be added even if the engine is at operating temperature. It is never safe to remove the radiator cap or any part of a pressurized system until it is cool. Steam and boiling water can spray, causing severe burns. If the radiator cap is cool enough to touch with bare hands, the engine is probably cool enough to open. If coolant needs to be added and there is no reservoir, follow these steps:

1. Shut engine off.
2. Wait until engine has cooled.
3. Protect hands (use gloves or thick cloth).
4. Turn radiator cap slowly to the first stop, which releases the pressure seal.
5. Step back while pressure is released from cooling system.
6. When all the pressure has been released, press down on the cap and turn it further to remove it.
7. Visually check level of coolant and add more, if necessary.
8. Replace the cap and turn it all the way to the closed position.

Belts and hoses are also negatively affected by high temperatures. Learn how to check belt tightness by pressing on the belts. Loose belts will not turn the water pump and/or fan properly, resulting in overheating. Failure of coolant hoses can lead to engine failure and even fire.

While driving in extremely hot conditions, watch for bleeding tar that is very slippery. Also, remember that high speeds create more heat for tires and the engine.

Driving in Mountainous Terrain

Gravity plays a major role in mountain driving. On upgrades, gravity slows the vehicle. The steeper the grade, the longer the grade, and the heavier the load, the more the load driver must use lower gears to climb mountains. In coming down long, steep downgrades, gravity causes the speed of the vehicle to increase. Selecting a safe speed and maintaining proper distance from the lead vehicle is vital for the lead P/EVO.

In selecting a safe following distance, it is important to consider the stopping distance of the lead vehicle, specifically:

- Total weight of the vehicle and cargo.
- Length of the grade.
- Steepness of the grade.
- Road conditions.
- Weather conditions.

If a speed limit or a sign indicating maximum safe speed is posted, never exceed the speed shown. Shift to lower gears before starting down a grade. Avoid downshifting after speed is built up, for either manual or automatic transmissions.

Brakes are designed so that brake shoes or pads rub against the brake drum or disc to slow the vehicle. Braking creates heat, and brakes are designed to sustain heat. However, brakes can fade or fail from excessive heat caused by using them too much and not relying on the engine braking effect (i.e., using lower gears)—an essential element of safe mountain driving.

Brake fade is also affected by adjustment. In order to safely control a vehicle, every brake must do its share of the work. If one brake is not doing the work it is designed to do, this puts extra stress—and heat—on the remaining brakes. This can produce overheating and fading, leaving inadequate braking power to control the vehicle. And, brake linings wear faster when they are hot.

The use of brakes on a long or steep downgrade is *only a supplement* to the braking effect of the engine. Once the vehicle is in the proper low gear, do the following:

1. Apply brakes just hard enough to feel a definite slowdown.
2. When speed has been reduced to approximately 5 mph below the safe operating speed, release the brakes (this brake application should last for about 3 seconds).
3. When speed has increased to a safe speed, repeat steps 1 and 2.

Escape ramps are available on many steep mountain downgrades and *should be included on the route survey*. These ramps are made to stop runaway vehicles safely without injuring drivers and passengers. P/EVOs should know the locations of escape ramps, and this is the kind of information that must be covered in the *pre-trip meeting each day*. This level of detail about the route is too much to remember for the entire trip, so remind team members—when the information becomes vital—in a daily briefing.

In mountainous terrain, the lead escort must be vigilant about the distance between the P/EVO and the load vehicle and be aware of brake issues. Adequate distance must be maintained in order to avoid the P/EVO being struck from behind by the load. For the rear P/EVO, when the load is moving uphill, it is recommended to allow enough distance to accommodate drivers approaching from the rear who may not detect how slowly the load is moving. By creating more distance between the rear P/EVO and the load, vigilant rear P/EVOS will have room to tap brakes to get attention of drivers approaching too quickly from the rear, as well as speeding up themselves to avoid being struck from behind. Needless to say, this system provides an extra measure of safety to the load vehicle, as well. (See also Managing Speed and Space and Braking Tips sections below.)

Managing Speed and Space

Why Speed Matters

According to IIHS, as vehicle speed increases, stopping distances as well as crash severity also increase. A large truck traveling at 75 mph takes about one-third longer to stop than one traveling at 65 mph. Large trucks often weigh 15 to 40 times more than passenger cars; stopping distances substantially increase. This is particularly important for lead escorts to remember.

Petitions by American Trucking Associations, Road Safe America and individual carriers have asked the Federal government to require speed governors on large trucks weighing 26,000 pounds or more that would set maximum speed at 68 mph, and would be tamper resistant with penalties for tampering. These issues continue to be debated.

Driving too fast is a major cause of fatal crashes. Drivers must adjust speed depending on weather and light conditions, traffic volume, size of load, features of the terrain, type and condition of roadway surface, and other factors.¹⁷⁷

Speed matters because of **stopping distances**.¹⁷⁸ Stopping a vehicle involves first seeing an obstruction, then deciding what to do, actually moving foot from accelerator to the brake pedal, and judging the distance it takes the vehicle to stop based on its size and weight; speed; roadway surface (gravel or asphalt, wet or dry); and whether the vehicle is on a down slope, up slope, or is on level terrain; how well the brakes are functioning; the vigilance, experience, and skill of the driver, and other factors. When crashes occur, drivers may see the obstruction, and conditions may be favorable (i.e., dry, level pavement), but there is simply not enough distance to get the vehicle stopped before striking an obstruction, including other vehicles.

Perception distance refers to the distance a vehicle travels, in ideal conditions, from the time a driver sees a hazard until the brain recognizes it. The average perception time for an alert, non-distracted driver is 1.75 seconds. At 55 mph, the vehicle has traveled more than 140 feet in that 1.75 seconds (1 mph = 1.5 feet/sec). Fatigue is a critical factor in perception time for both the load driver and the P/EVO. The decision making process is slowed and seconds are often doubled as are the corresponding distances. So at 60 mph, the vehicle travels 88 feet per second. (Three quarters of a second = 66 feet.)

Reaction distance refers to the distance the vehicle will continue to travel, in ideal conditions, before the driver applies the brakes in response to the hazard. The average driver has a reaction time of 0.75 to 1 second. So, at 55 mph, the vehicle moves an additional (average) of more than 60 feet—the amount of time it takes the driver to apply the brakes AFTER the driver perceives the brakes are needed. The average reaction time is another 0.75 second, or another 66 feet, for a total of 132 feet before the vehicle *begins* to slow down.¹⁷⁹

Braking distance refers to the distance the vehicle travels, in ideal conditions, while the driver is braking. At 55 mph on dry pavement with good brakes, a standard tractor-trailer rig (i.e., not oversize or overweight) takes about 216 feet to stop.

Stopping distance, then, is the sum of these three distances: perception distance + reaction distance + braking distance. Substantially more distance is needed for fatigued drivers, distracted driver, drivers on a down slope, or stopping on a wet roadway.

¹⁷⁷ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.6. Available at: <http://www.aamva.org/CDL-Manual/>.

¹⁷⁸ *Ibid.*, Section 2.6.1.

¹⁷⁹ Federal Highway Administration, *Pilot Car Escort Training Manual: Best Practices for Pilot Car Escorts* (Washington, DC: FHWA, 2004), p. 43.

Braking Tips¹⁸⁰

Brake in a straight line. ***Do one thing at a time.*** For example, when turning, brake before making the turn. When negotiating a curve, brake before entering the curve.

The Effect of Speed on Stopping Distance¹⁸¹

The faster a vehicle moves, the greater the impact or striking power of the vehicle. When speed doubles, from 20 to 40 mph, for example, the impact is 4 times greater. The braking distance is also four times longer. Triple the speed from 20 to 60 mph, and the impact and braking distance is nine times greater. At 60 mph, the stopping distance for a tractor-trailer is longer than a football field. Increase the speed to 80 mph and the impact and braking distance are 16 times greater than they were at 20 mph. High speeds greatly increase the severity of crashes and injuries.

Matching Speed to Road Conditions¹⁸²

Slippery surfaces require longer distances to stop, and also make it harder to turn without skidding. Slippery surfaces include, as mentioned above, bleeding tar in extremely hot conditions, but more typically, slippery conditions are associated with rain and ice. Roads are slippery when rain begins, for example, and ice may be hard to detect in shady areas and on bridges and other elevated surfaces.

Speed should be adjusted to allow the vehicle to stop in the same distance as on a dry road. Reduce speed by about one-third (slow down from 60 to 40 mph, for example) on a wet road. On packed snow, reduce speed by half or more. If the surface is icy, reduce speed to a crawl and stop driving as soon as you can safely get off the roadway and out of the way of skidding vehicles.

Slippery surfaces are sometimes difficult to detect. Watch for shady areas; they will remain icy and slippery long after the open areas have melted. Bridges freeze before the road does. Be especially careful when the temperature is close to 32 degrees. Watch for melting ice (wet ice); it is much more slippery than ice that is not wet. Black ice is a thin layer that is clear enough that you can see the road underneath it. The road appears wet. So when the temperature is below freezing and the road looks wet, it may be black ice.

An easy way to check for ice is to open the window and feel the front of the mirror or the mirror support. If there is ice on these, the road surface is probably starting to ice too. With respect to rain, beware of slippery conditions just after rain begins. The rain mixes with oil left on the road by vehicles. As rain continues to fall, the oil is washed away.

Hydroplaning is like water skiing—the tires lose their contact with the road and have little or no traction. It is difficult to control the vehicle—steering and braking are compromised. To regain control, drivers should release the accelerator but avoid applying the brakes. It does not take a lot of water to cause hydroplaning,

¹⁸⁰ American Automobile Association, *How to Drive: the Beginning Student Manual*, 2004, p. 78.

¹⁸¹ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), p. 2-15. Available at: <http://www.aamva.org/CDL-Manual/>.

¹⁸² *Ibid.*, Section 2.13.2.

“Wet roads double stopping distance. Stopping distance can more than double on a down slope.”

and hydroplaning can occur at speeds as low as 30 mph when there is a lot of standing water on the roadway. Hydroplaning is more likely if tire pressure is low or when the tread is worn. The grooves in a tire carry away the water; if they are shallow, they don't work well. Finally, road surfaces where water collects create conditions that increase hydroplaning possibility.

Speed and Curves

Drivers must adjust speed for curves in the road. Taking a curve too fast, two bad things can happen. First, the tires can lose traction and continue straight ahead, so the vehicle skids off the road. Or, the tires may keep their traction and the vehicle rolls over. A load vehicle with a high center of gravity can roll over at the posted speed limit for a curve. Lead P/EVOs must communicate any obstructions or problematic road surface conditions to the load driver in time for the driver to slow to a safe speed. This meets the responsibility for protecting motorists by working to ensure the load vehicle maintains traction, i.e., the ability to stop and steer.

Speed and Traffic Flow

Many local jurisdictions have restrictions about oversize loads moving in and around big cities during peak traffic volume. When driving in heavy traffic, the safest speed is the speed of other vehicles; vehicles moving in the same direction at the same speed are not likely to run into one another. However, oversize loads are an exception to this rule. First, avoid peak traffic times whenever possible, if the permit allows it at all. In many States, speed limits are lower for trucks, and may be even lower for oversize loads. A national speed limit for trucks of 65 mph has been proposed by many, while much research suggests collisions occur more frequently when large trucks travel slower than other traffic. Allowing adequate following distance and avoiding driving alongside large trucks appear to be most effective at reducing crashes, along with uniform traffic flow, and traveling at speeds appropriate for conditions.

Changing lanes becomes more difficult, as does maintaining a safe following distance, when transporting an oversize load. As traffic volume increases, vehicles travel much closer together. Beware of drivers who try to drive faster than the speed of traffic; these drivers take risks and increase the chances of a crash. Stay as far to the right as possible and maintain as much distance as possible around your vehicle.

Speed on Downgrades

Vehicle speed increases on downgrades because of gravity. The driver's most important objective is to select and maintain a speed that is not too fast for the total weight of the vehicle and load, the length of the grade, the steepness of the grade, road conditions (wet or dry, smooth or pot holes, etc.) and type (gravel, asphalt, etc.), and weather (including visibility and traction/braking issues).

Managing Space

Safe drivers maintain space all around their vehicles.¹⁸³ When things go wrong, space gives drivers time to see, think, and act. In order to have space available when something goes wrong, drivers must manage space. This is true for all drivers, and it is very important when operating (or escorting) large vehicles that require much more space for stopping and turning.

Space ahead. Of all the space around a vehicle, *it is the area ahead of the vehicle—the space it is moving into—that is most important.* Space ahead is important in case the vehicle must be stopped suddenly. According to accident reports, the vehicle that trucks and buses most often run into is the one in front of them. The most frequent cause is following too closely. Crash possibilities increase substantially if inadequate space ahead is not maintained. Given the difference in weight, trucks hitting cars results in more fatalities. And, remember: *if the vehicle ahead of you is smaller than yours, it can probably stop faster than you can.*

How much space ahead? Experts suggest that in good conditions (i.e., flat, level, dry pavement in the daytime), following distance should be a minimum of three seconds, with drivers adding one second for each hazardous condition that may exist. For example, if it is raining, add one second. If it is raining (visibility hazard) and it has been raining all night (standing water hazard), add two seconds. If the driver only slept six hours the previous night, add another second for the delayed reaction and perception time produced when a driver is operating with a sleep deficit.

Following distances for large trucks must be greater than the three-second rule. For a truck, recommended following distance is one second for each 10 feet of vehicle length at speeds below 40 mph. At greater speeds, add 1 second. For example if the vehicle is 60 feet long, and traveling at 50 mph, seven seconds of following distance is recommended in good conditions. If the roadway is wet, double the following distance.

To measure following distance in this way, look for an overpass. When the shadow strikes the vehicle in front of you, begin counting (one thousand one, one thousand two, etc.). You should get to at least three seconds before the shadow reaches your vehicle.

Space behind. Drivers cannot control the behavior of others, including those drivers who follow too closely. Some strategies for making such a situation safer include staying to the right, increasing following distance (making it easier for tailgaters to pass), avoiding quick changes (by monitoring the road ahead at least 12 to 15 seconds), maintaining speed (it is safer to be tailgated at lower speeds than at higher speeds) and communicating with drivers by using turn signals, signaling early, tapping brake pedal, and reducing speed very gradually.

Space to the sides. Oversize loads often take up all or most of a lane. Safe drivers will manage what little space is available by keeping the vehicle centered in the lane and by avoiding driving alongside other vehicles. At least three issues are

¹⁸³ American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 2.7. Available at: <http://www.aamva.org/CDL-Manual/>.

involved when traveling next to others. First, another driver may change lanes suddenly or may experience a mechanical failure such as a blown tire. This could lead to a crash when vehicles are very close together. Second, the oversize load and/or P/EVOs may get trapped when needing to make a lane change or a turn. And, third, strong winds make controlling large vehicles more difficult especially in mountainous terrain and exiting tunnels. Avoid driving alongside other vehicles.

Lead P/EVOs should alert the drivers of wide loads about guardrails, mailboxes, stalled vehicles, tree limbs, and numerous other potential obstructions. And, all drivers should avoid traveling in another vehicle's blind spots, and should adjust their speed to avoid having vehicles in their own blind spots.

Space overhead. Striking overhead objects is dangerous and expensive. Several general practices are imperative. First, never assume the heights posted at bridges and overpasses are correct. Re-paving or packed snow, for example, may reduce the clearances. Further, individual lanes may vary in terms of clearance due to the slope of the roadway and/or the slope of the bridge or overpass. In some situations, it is more difficult to clear objects along the edge of a road, such as signs, trees, bridge supports, mailboxes, guardrails, etc. If this is the case, drive closer to the center of the road. The lead P/EVOs should advise load driver of such objects and when the road is slanted to the degree it affects clearance and/or even possible shifting of the load. See also Module 5, Lesson 2.

Space below. Drivers often forget about the space underneath vehicles. This space is reduced when vehicles are heavily loaded. This problem is more common on dirt roads, when potholes exist, when roads have no shoulders, and when the roadside is lower than the road itself, creating a dangerous "lip" at the road's edge. With heavy vehicles, for example, hitting a pothole can break an axle. Drainage channels, road surfaces in work zones, and railroad crossings present significant challenges for oversize loads, especially those with low clearance. Escorts must know the dimensions of the load vehicle in order to inform the load driver of relevant hazards in enough time for the load driver to respond.

Space for turns. Wide turning and offtracking of large vehicles means the load vehicle can hit other vehicles or objects when turning. This is especially true of long vehicles that may require all lanes to complete a turn, especially on two-lane roads.

When making *right turns*, the P/EVO must block lanes needed by the load to complete turns. Turn slowly to give the load and other motorists more time to avoid problems. When escorting a load that cannot make a right turn without swinging into other lanes, turn wide while completing the turn, keeping the rear of the load vehicle close to the curb. This will reduce the chance that other drivers will attempt to pass on the right. Avoid swinging out to the left, however, because other motorists may think the load will turn left. Motorists may attempt to pass on the right, and the load and motorist may collide as the load completes the turn.

If the load must cross into the oncoming lanes to make a turn, the lead P/EVO should warn traffic and be in position to control traffic when the load is turning into oncoming traffic lanes. See Module 5, Lesson 4.

For *left turns*, the lead P/EVO should get to the center of the intersection before starting the left turn. If this lead P/EVO turns too soon, or more significantly, if the load driver does, the left side of the load vehicle may hit another motorist because of offtracking. If there are multiple turning lanes, don't start in the inside lane. The load may have to swing right to make the turn, and motorists on the left of the P/EVO and load vehicles are more easily seen.

Space needed to cross or enter traffic. P/EVOs must be aware of the load size and weight and the characteristics of the load vehicle in order to warn motorists and assist the load driver. This is apparent, for example, in the slow acceleration rate of large, heavy vehicles—the space and distance required for large loads to merge onto roadways is substantially longer than for passenger vehicles. Make sure the load has ample time to cross an intersection without blocking traffic.

→ TEST YOUR KNOWLEDGE

1. What is meant by the terms “hazardous conditions” or “good conditions?”
2. Drivers should dim lights (from high beam to low beam) within _____ feet of oncoming vehicles or when approaching a vehicle from behind.
3. When should headlights be used?
4. Stopping Distance equals what?

▶▶ LESSON 5: SAFETY TECHNOLOGIES

Analysis offered by the IIHS indicates that a combination of four crash avoidance features **has the potential to prevent or mitigate more than one of every four large truck crashes, one of every three injury crashes, and about one of five fatal crashes if every rig had them.**¹⁸⁴

These four crash avoidance technologies are side view assist, forward collision warning/ mitigation, lane departure warning/prevention, and electronic stability control.¹⁸⁵ These technologies are already available in many vehicles driven by P/EVOs.¹⁸⁶

¹⁸⁴ Insurance Institute for Highway Safety, Highway Loss Data Institute, “Large trucks to benefit from technology designed to help prevent crashes,” *Status Report* 45 (2010): 5. Available at: <http://www.iihs.org/iihs/sr/statusreport/article/45/5/3>.

¹⁸⁵ J. Jermakian, “Crash avoidance potential of four large truck technologies,” *Accident Analysis and Prevention* 49 (2012): 338–346.

¹⁸⁶ As mentioned in Module 1, it is important to mount the Oversize Load sign on top of the vehicle in order for the technology, installed in the bumpers of vehicles, to function. This will make roof-mounted Oversize Load signs the norm for the not-too-distant future.

Of the four technologies, *side view assist* has the greatest potential for preventing large truck crashes of any severity, according to the IIHS. The technology is potentially applicable to 39,000 crashes in the United States each year, including 2,000 serious and moderate injury crashes and 79 fatal crashes.

Electronic stability control (ESC) is another promising technology with the potential to prevent or mitigate up to 31,000 crashes per year including more serious crashes — up to 7,000 moderate-to-serious injury crashes and 439 fatal crashes per year. ESC, which helps improve traction after losing the grip on the road surface, could prevent or mitigate up to 20 percent of moderate-to-serious injury crashes and 11 percent of fatal large truck crashes.

Large trucks will soon be equipped with ESC, the same technology that has slashed rollover crashes in passenger vehicles, thanks to a NHTSA requirement for ESC on heavy vehicles. The rule (49 CFR Part 571), finalized in June 2015, affects almost all new truck tractors in 2017, with some other vehicle types having until 2019 to comply.¹⁸⁷

NHTSA estimates the ESC requirements will prevent up to 1,759 crashes, 649 injuries, and 49 deaths each year. An earlier IIHS analysis found that ESC on tractor-trailers could potentially prevent 295 fatal crashes a year, assuming the technology was 100 percent effective. Looking at all large trucks, not just tractor-trailers, ESC would be relevant to 439 fatal crashes.¹⁸⁸

Forward collision warning systems, the third technology under study currently, identify a potential collision and warns the driver. IIHS analysis indicates forward collision warning has the potential to prevent as many as 31,000 crashes per year, including 3000 serious and moderate injury crashes and 115 fatal crashes.

Finally, **lane departure warning/prevention systems**, the fourth technology in this group, could prevent up to 10,000 large truck crashes annually, including 1,000 serious and moderate injuries and 247 fatal injuries.¹⁸⁹

Crash avoidance technologies may help mitigate driver distractions (physical, visual, and mental),¹⁹⁰ and to some degree fatigue can be monitored with these new technologies. Crash avoidance technologies show a lot of promise in reducing crashes associated with distraction whether the distraction is physical, visual, or mental.

¹⁸⁷ Federal Register, “Federal Motor Vehicle Safety Standards; Electronic Stability Control Systems for Heavy Vehicles.” Available at: <https://www.federalregister.gov/articles/2015/06/23/2015-14127/federal-motor-vehicle-safety-standards-electronic-stability-control-systems-for-heavy-vehicles>.

¹⁸⁸ Insurance Institute for Highway Safety, Highway Loss Data Institute, “Large trucks to benefit from technology designed to help prevent crashes,” Status Report 45 (2010): 5. Available at: <http://www.iihs.org/iihs/sr/statusreport/article/45/5/3>.

¹⁸⁹ J. Jermakian, “Crash avoidance potential of four large truck technologies,” *Accident Analysis and Prevention* 49 (2012): 338–346.

¹⁹⁰ Ian Reagan, Ph.D., “Mitigating cognitive distraction and its effects with interface design and collision avoidance systems,” presentation to the NHTSA Cognitive Distraction Forum in Washington, DC, held on May 12, 2015. Available at: http://www.iihs.org/media/5978ffb2-f3dd-48b6-82aa-1552dfce776/-1702734340/Presentations/Reagan_May2015_distraction.pdf

Other Safety Technologies and Strategies

Adaptive Cruise Control uses forward-facing radar to detect a vehicle or other obstruction ahead. This helps mitigate rear-end collisions.

Automated braking systems show great potential for reducing collisions. NHTSA has endorsed automatic braking systems as one of its technological vehicle improvements and may eventually require installation of Automated Emergency Braking systems on all U.S. vehicles.

“We are entering a new era of vehicle safety, focused on preventing crashes from ever occurring, rather than just protecting occupants when crashes happen,” Transportation Secretary Anthony Foxx said in 2015 when announcing 10 major U.S. car companies had committed to making automated emergency braking standard on all vehicles.¹⁹¹

Blind spot monitoring and detection uses sensors or cameras to alert drivers when a vehicle is in blind spots.

Adaptive headlights turn about 15 degrees (creating a range of 30 degrees) as the vehicle is steered around curves and corners.

Under-ride guards are particularly important for rear P/EVOs. IIHS advocates stronger under-ride guard requirements that could prevent more deaths and injuries in rear-impact crashes.



Figure 3. Photo. Inadequate under-ride guards contribute to deaths and injuries in rear-impact crashes, as shown here.

(Source: Insurance Institute for Highway Safety)

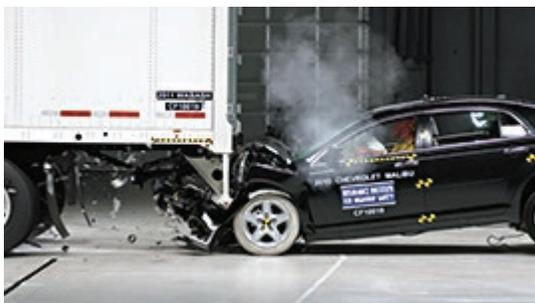


Figure 4. Photo. Stronger under-ride guards, as shown in this photo, reduce deaths and injuries in rear-impact crashes.

(Source: Insurance Institute for Highway Safety)

¹⁹¹ K. Laing, “Truck companies press for automatic brakes,” *The Hill*, October 20, 2015. Available at: <http://thehill.com/policy/transportation/257512-truck-companies-press-for-automatic-brakes>.

Making vehicles more visible to other drivers at night. IIHS research indicates that motorists can more accurately judge the speed and distance of objects moving at night when they recognize big vehicles. Crashes involving passenger vehicles crashing into trailers from the side or rear were much more common on unlighted roads. Enhanced reflective markings are now required on all trailers, and P/EVOs should consider using retro-reflective tape on their vehicles as well.

Finally, as mentioned in Lesson 2 of this module, **electronic on-board recorders (EOBR)** may become required equipment, reducing driver fatigue by monitoring hours of service for drivers and making regulation more effective.

Nothing will replace driver vigilance in collision prevention, but new technologies, as well as more established technologies being placed in broader use, can further reduce collisions. When the load movement team is committed to eliminating distractions, plans for adequate rest and breaks, and sets realistic daily travel goals to avoid frustration and unreasonable time pressures, these commitments promote safe load movement.

→ TEST YOUR KNOWLEDGE

1. What are benefits of crash avoidance technologies?

MODULE 8

Course Exam and Evaluation

There is a Federal requirement that each State have minimum standards for the licensing of commercial drivers.¹⁹² However there is no such requirement for pilot/escort vehicle operators (P/EVO) at the national level. For commercial driver's licenses (CDL) drivers, both written and driving tests are required. A passing grade on a closed-book knowledge test is required for basic drivers.

No current Federal law requires that each State have minimum standards for P/EVOs. In most States that do require P/EVOs be certified, the P/EVO must pass a written, closed-book test, although States vary in what the test includes. The *Pilot/Escort Vehicle Operators Best Practices Guidelines* document suggest the examination should include at least 30 questions, that the questions be objective in nature (multiple choice questions are recommended), and that the test be administered without notes or reference materials. Further, the guidelines suggest the examination should include questions covering each of the modules in this training manual. Typically States have established a passing score of at least 75 percent.¹⁹³

After reading the material presented here, along with the variety of source documents, the P/EVO is ready to go forward, not only to become certified, but more significantly, to continue learning from experienced well-trained P/EVOS.

¹⁹² Adapted from American Association of Motor Vehicle Administrators, *Model Commercial Driver License Manual* (AAMVA, July 2014), Section 1. Available at: <http://www.aamva.org/CDL-Manual/>.

¹⁹³ See also U.S. Department of Transportation, "Accidents That Shouldn't Happen: A Report of the Grade Crossing Safety Task Force to Secretary Federico Pena," March 1, 1996, p. 22.

GLOSSARY

Gross vehicle weight (GVW). The total weight of a single vehicle plus its load.

Gross combination weight (GCW). The total weight of a powered unit, plus trailer(s), plus the cargo.

Gross vehicle weight rating (GVWR). The maximum GVW specified by the manufacturer for a single vehicle plus its load.

Gross combination weight rating (GCWR). The maximum GCW specified by the manufacturer for a specific combination of vehicles plus its load.

Axle weight. The weight transmitted to the ground by one axle or one set of axles.

Tire load. The maximum safe weight a tire can carry at a specified pressure. This rating is stated on the side of each tire.

Suspension systems. Suspension systems have a manufacturer's weight capacity rating.

Coupling device capacity. Coupling devices are rated for the maximum weight they can pull and/or carry.

ADDITIONAL RESOURCES

Pilot Car Escort Best Practices Guidelines (FHWA): http://ops.fhwa.dot.gov/freight/documents/pilotcar_bpguideline/.

Flagging information: <http://mutcd.fhwa.dot.gov/>.

Work Zone Safety: https://www.workzonesafety.org/files/documents/news_events/wz_conference_2015/Large_trucks_symposium/artba_truck_safety_pamphlet.pdf.

The Federal Highway Administration maintains a list of all State permit offices (as well as Canadian provinces): http://www.ops.fhwa.dot.gov/Freight/sw/permit_report/index.htm.



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