

Class 3

Traffic Control Devices and Laws & Tire Safety and Maintenance

Definition and Purpose of Traffic Control Devices

Fact Sheet 4.1 Lesson Content

Traffic Control Devices

Definition and Purpose of Traffic Control Devices

Traffic control devices include:

- Traffic signs
- Traffic signals
- Pavement markings

The purpose of traffic control devices is to help ensure highway safety by providing for the orderly and predictable movement of all traffic, motorized and non-motorized, throughout the highway transportation system. These devices tell drivers where they are, where they are going and how to get there. They provide information about laws, dangers and the roadway.

In a work zone, the most common traffic control devices used to guide drivers safely through work zones include barricades, vertical signs, concrete barriers, barrels and cones.

Communication Modes

Traffic control devices communicate their message in several ways, by color, shape, words, symbols and placement to provide information. Through their messages, they direct drivers' actions and provide a framework of uniform guidance.

Traffic SignsFact Sheet 4.2Content Information			
Traffic Signs			
Signs are specific sizes, shapes and colors so they can be easily identified at long distances.			
Color of signs			
STOP	Red – prohibitive or stop	ONE WAY	Black - regulatory signs
	Blue – motorist service signs	DO NOT PASS	White – regulatory signs
	Green – guide information, such as direction or guidance signs	STATE PARK	Brown – recreational and cultural interest
~	Yellow – general warning, caution	XX	Fluorescent Optic Yellow – school zones, school crossings and pedestrian crossings
•	Orange – construction and maintenance work		Fluorescent Pink – incident signs
Shape of signs			
\bigcirc	Octagon – Stop		Horizontal rectangle – Directions
\bigtriangledown	Triangle – Yield		Vertical rectangle – Indicates law
\Diamond	Diamond – Warning	\bigcirc	Round – Advance warning of railroad crossing
\bigcirc	Pentagon – School	\bigotimes	Crossbuck – Railroad crossing
\triangleright	Pennant – Advance warning of no passing zones		

Traffic Signs

Fact Sheet 4.2 continued Content Information

Traffic Signs

Signs are specific sizes, shapes and colors so they can be easily identified at long distances.

• **Regulatory signs** tell the driver about specific laws that a driver must obey. They regulate the speed and movement of traffic. These signs are usually rectangle in shape and have a color pattern of red/white, white/black or red/white/black.









• Warning signs tell a driver of possible danger (road, environmental and traffic conditions) that is a short distance ahead to allow the driver time to safely minimize risk. These signs are mostly diamond shape and have a yellow/black color pattern. Some warning signs such as school zones, school crossing and pedestrian crossings may be fluorescent optic yellow.



- A **chevron sign** is a type of warning sign, which means sharp curve.

• **Railroad crossing warning signs** caution the driver to slow down, look and listen for a train or railroad vehicle and be prepared to stop if a train is approaching. A white, X-shaped sign with "Railroad Crossing" printed on it is located at the railroad crossing. A driver must wait for a train that is approaching the intersection and remain behind the stop line.





Traffic Signals

Fact Sheet 4.3 Content Information

Traffic Signals

Traffic signals are lights that tell drivers when or where they should stop and go and who should be given the right-of-way. Traffic lights are usually at intersections and are always in the same order, red, yellow and green from top to bottom to assist drivers who may be color blind or whose view may be partially blocked. It is important that drivers understand the meaning of each color and symbol, and respond correctly. Traffic control can also be provided by law enforcement, highway personnel or school crossing guards in special situations. Drivers must obey directions from these persons.

• Steady RED indicates moving traffic shall stop prior to the stop line, pedestrian crosswalk, or roadway edge line and remain stopped as long as the signal is red. When turning right at an intersection, if there is no sign prohibiting a right turn on a red light, drivers may turn after stopping and checking for traffic and pedestrians. Some states allow a left turn on red in certain situations. Check your state law on this maneuver.



• Steady YELLOW indicates the traffic light is about to change to red. Drivers should slow down and come to a complete stop, if safe to do so and if traffic flow to the rear allows. If drivers are in the intersection or too close to stop safely when the yellow light comes on, they may continue safely through the intersection.

- Steady GREEN indicates traffic shall go through the intersection if it is clear to do so. Drivers must yield to emergency vehicles and other roadway users as required by law. Drivers may turn left at a green light, but only when the intersection is clear. Drivers must yield to oncoming traffic and pedestrians before turning.
- **Flashing RED** indicates traffic shall stop before entering the intersection and use the same procedure as a driver would at a stop sign by yielding to other vehicles and pedestrians before proceeding.
- Flashing YELLOW indicates a need to slow down and proceed with caution.
- **RED arrow** indicates traffic direction. Drivers may not go in the direction of the arrow.
- YELLOW arrow indicates the green arrow is ending and drivers should be prepared to stop for any traffic. Sometimes a left turn light will display a yellow flashing arrow. Drivers may proceed into the left turn without stopping but must yield to oncoming traffic if present.
- **GREEN arrow** indicates drivers can safely turn in the direction of the arrow if the intersection is clear. When the arrow is green, oncoming or crossing traffic should have a red light and yield to the driver's turning action.

Traffic Signals

Fact Sheet 4.3 continued Content Information

Pedestrian Signals

Drivers must yield to pedestrians at all times. Even if they are not in a crosswalk. At intersections drivers may find pedestrian signals, which indicate when it is safe for pedestrians to cross. Drivers may also find signs at mid-block crosswalks, which require drivers to yield as they would at an intersection.

- **Countdown timers** indicate how much time is left for pedestrians to cross the street and many emit audible beeps to correspond with the countdown.
- "Walk" signal means pedestrians may proceed across the street.
- Flashing "don't walk" signal means pedestrians already in the street may continue walking across the street, others should not start.
- Steady "don't walk" signal means pedestrians should not enter the street, unless traffic is clear. In some states pedestrians may walk on the "don't walk" signal provided the traffic is clear. All drivers should be alert to pedestrians at all times.





Fact Sheet 4.4 Content Information

Pavement Markings - Yellow Lines

Pavement markings are usually lines, arrows, symbols or words painted yellow or white on the roadway to give a driver directions or warnings. Lines can be solid, broken, single or double.

Pavement markings - yellow lines

- Yellow lines separate traffic moving in opposite directions.
- Solid yellow center lines indicate two-way traffic moving in opposite direction with no passing allowed. Always keep to the right of the yellow line.
- Broken yellow center line means passing is permitted in either direction. Passing should only be done when the way ahead is clear, sightlines are not obstructed and the law allows.
- Broken yellow lines alongside a solid yellow line means passing is permitted on the side with the broken line. Passing is not permitted on the side with the solid line.
- Double solid yellow lines means passing is not permitted in either direction but crossing the lines is permitted when making a left turn. Solid yellow lines also mark the left edge on divided highways and one-way roads.



Fact Sheet 4.4 Content Information

Pavement Markings - White Lines

Pavement markings - white lines and arrows

- White lines separate lanes of traffic going in the same direction.
- Broken white lines may be crossed with caution (lane change).
- Solid white lines designate turn lanes and prevent lane changes near intersections.
- Solid white lines mark the right edge of the roadway.
- Stop lines, crosswalks and parking spaces are marked by white lines.
- White arrows on the roadway indicate the direction traffic is flowing and can also indicate the turn allowed from a traffic lane or turn lane.



Fact Sheet 4.4 Content Information

Pavement Markings – Shared Left-turn Lanes

Shared Left-turn Lanes

- Used to make a left turn in either direction. Located in the middle of the roadway on many urban and suburban streets where it is difficult to make a left turn safely. In some states these lanes can also be used by drivers who want to make left turns from a driveway/parking lot, or side street onto a roadway to wait and merge into a gap in traffic. Check your state law.
- Has a solid yellow line and a broken yellow line on each side with white left-turn arrows on the pavement between the yellow lines. The solid yellow centerlines means drivers cannot use the center lane for passing. The broken yellow centerlines show that vehicles traveling in either direction may use the center lane only to make left turns.
- The lane may be used by vehicles traveling in either direction when turning left from the roadway.
- When using a shared left-turn lane do not move into the lane too soon. The longer drivers stay in the lane, the more likely they are to meet someone coming in the opposite direction.
- Watch for vehicles pulling out of entrances and side streets and do not use a shared leftturn lane for anything but turning left.
- Sometimes shared left-turn lanes at intersections become a left turn lane for one-way traffic only so oncoming traffic cannot enter the shared left-turn lane too close to the intersection, as shown in the second graphic below.





Fact Sheet 4.4 Content Information

Pavement Markings – Reversible Lanes

Reversible lanes

- Used in some areas where the shared center turn lane becomes a "reversible lane" during rush hours.
- Carries traffic in opposite directions at different times.
- Marked with double broken yellow lines with signals above the lanes to designate traffic flow.
- Improves the flow of traffic by changing the direction of travel within lanes.
- Before entering the lane, check to see that it can be used at that time.
- A GREEN arrow means drivers are permitted to drive in that lane.
- **A RED X** means the lane is closed to drivers. Never drive in a lane under a red X signal.
- A steady YELLOW X indicates the driver should safely vacate this lane because it will soon be controlled by a red X.
- A flashing YELLOW X means the lane is for turning left only.



Fact Sheet 4.4 Content Information

Pavement Markings – Reserved or Restricted Lanes

Reserved or restricted lanes

- On some roadways, one or more lanes may be reserved for special vehicles (i.e., buses, bicycles, high occupancy vehicles).
- Marked by special signs stating the lane is reserved for special use and often have a white diamond on the sign or painted on the road surface.
- Transit or bus means the lane is for bus use only.
- Bicycle means the lane is reserved for bicyclists only.
- HOV signs or markings mean "High Occupancy Vehicles" and indicate lanes reserved for vehicles with two or more people in them.
- Signs may indicate how many people must be in the vehicle, as well as the days and hours, which apply to the lane use.



Fact Sheet 4.4 **Pavement Markings Content Information Other Pavement Markings** • **Railroad crossings** – Railroad crossings are marked by an "X" and two "Rs" on each side of the roadway to warn driver's that a railroad crossing is ahead. • School zones – A school zone is marked by the word "SCHOOL" painted on the roadway. Drivers should SCHOOL watch for children in the area when they see this marking. × • Handicapped parking – Parking spaces reserved for vehicles with handicapped drivers or passengers are marked with the handicapped parking symbol and vertical lines between handicapped parking spaces. Lines may be white, yellow or blue. There may also be signs that say "Handicapped Parking Only." It is illegal to park in this space without the proper permit or plate. • Curb markings – Curbs along a road may be painted to warn that parking is not permitted. No-parking zones are usually near intersections, pedestrian crosswalks and fire hydrants. The markings may be yellow, white, red or blue and are usually accompanied by signs indicating the meaning. - White – stop only long enough to pick up or drop off passengers. - **Yellow** – stop only long enough to load or unload. Stay with the car. **Red** – fire hydrant, do not stop, stand, or park. **Blue** – parking is reserved for persons with disabilities • Multiple turn lanes – Two or more lanes turning in the same direction. Lanes for turning left or right are marked with a white arrow pointing either to the left or right, indicating which lane a driver should turn from and follow 155-110 through the intersection.

Traffic and Vehicle Laws

Fact Sheet 4.5 Content Information

State Specific Traffic and Vehicle Laws

During this session, the discussion of traffic laws, signs, signals and pavement markings will be limited to those which, in the normal course of events, would likely be encountered during the first one or two hours of in-car instruction.

It is critical that the student better understand that the purpose of traffic laws is to enable highway users to better predict what other users are going to do. Deliberate or inadvertent failure to follow the rules lessens one's ability to predict actions and increases the chance of a collision.

Review your state's vehicle law with students. Put emphasis on obeying traffic control devices and police officers.

The following are some topics to discuss:

- Police officers
- Traffic control devices
- Pavement markings
- Traffic signs
- Backing
- Lane selection
- Yielding to pedestrians
- Right of way
- Rules for school buses & crossing guards

- Positioning for and while turning
- Preparing to move vehicle
- Electronic signal/hand/arm communication
- Speed restrictions
- Stopping at signal lights and stop signs
- Where to stop at intersections
 - Stop line
 - Crosswalks marked or unmarked
 - Edge of intersection



Automobile crashes are the number one killer of teens in the U.S., with nearly 2,500 deaths each year (*Source: Insurance Institute for Highway Safety*). Of the 2.2 million vehicle crashes taking place annually, 12 percent involve inexperienced drivers and tire-related issues such as insufficient tread depth or improper tire inflation. (*2012 NHTSA Study: Tire-Related Factors in the Pre-Crash Phase*).

- 52% of teens don't inspect their tires at least monthly
- 27% of teens never check the condition of their tires
- 44% of teens don't know how to check tire tread
- 55% of teens don't know the proper tire inflation level for their car
- 32% of teens don't know how to check tire pressure
- 38% of parents consider themselves to be extremely knowledgeable about tire maintenance

(Source: Michelin/FIA Road Safety Perception Survey)

Crashes due to tire maintenance are preventable and simple steps can save lives. Driving on underinflated or overinflated tires or tires with low tread can lead to safety issues on the road.

Why It Is Important to Maintain Your Tires?

- It ensures your safety. Your tires are the only point of contact that your vehicle has with the road they need to be in good working condition at all times to ensure your safety. Maintaining your tires helps protect you from avoidable breakdowns and crashes.
- It can help save you money by extending the life of your tires. Checking tire air pressure, and regular tire maintenance such as rotation, alignment and inspections can help you save money.
 - Simple things like checking your tires pressure to make sure that they are properly inflated can make a real difference in how long your tires last.
 - Under or over-inflated tires don't wear evenly and won't last as long. For example a tire that should normally last 60,000 miles may be worn out by 48,000 miles.
 - Also, since the front and rear axles and right and left sides of your car wear down your tires differently, rotating your tires regularly between the different positions will ensure they wear evenly and last longer.
- It can save you money on fuel.
 - <u>Under-inflated tires are one of the biggest causes of using excess fuel.</u>
 - Under-inflated tires have higher rolling resistance, which means it takes more effort from the engine to move your vehicle, which uses excess fuel.

How to Maintain Your Tires

To avoid any problems, follow these important care tips:

- **Inspect your tires:** You may not always notice if one of the tires has damage. Inspect your tires regularly for wear and any damage to avoid sudden problems. Also, have a professional inspect your tires every year.
- Check the air pressure: Driving with incorrect tire pressures can affect a vehicle's handling and braking, particularly in wet conditions, and can seriously compromise your safety. Driving on severely under-inflated tires can cause heat build-up and eventually a premature failure. Check your tire pressure monthly and before every long trip. Do not rely on a low tire warning light as they do not activate until dangerously low. Digital monitoring systems are more accurate.

Note the impact of tire pressure on hydroplaning:



- **Driving at high speed can damage your tire:** At greater speeds, tires have a greater chance of being damaged by road hazards or heat build-up. High speeds can also contribute to a rapid air loss or even a sudden tire explosion, which can cause the loss of control of the vehicle.
- Use your spare tire! If you see any damage to a tire or wheel, replace it with the spare tire and have the tire checked immediately by a professional.

Fact Sheet 14.2 Content Information

Checking Your Air Pressure

General Guidelines

- Check the pressure of all your tires monthly, including the spare and that the lug nuts are properly tightened. Even if you don't see any damage, tires can lose up to 1 psi pounds per square inch every month.
- Check your tire pressure before making a long trip.
- For best results, check your tire pressure when tires are cool- before driving the car or if it has covered less than 3 miles at low speed to receive the correct tire pressure reading.
- If the tire is hot, add 4-5 psi to the car manufacturer's recommended pressure value or wait until it has cooled down, which is an average of three hours after parking the car. A hot tire will have increased tire pressure because driving causes the tires to heat up and the air inside them to expand.
- Never deflate a hot tire.

Where to find the recommended pressure for your tires?

- In the vehicle owner's manual.
- On a sticker on the inside driver's side door jamb.





Checking Your Air Pressure

How to check your tire pressure?

- 1. Purchase a trusted pressure gauge.
- 2. Open your car door and on the inside jamb you should find a sticker with your vehicle's recommended psi (the measurements for tire pressure).
- 3. Check your tires "cold" before you've driven or at least three hours after you've driven.
- 4. Insert pressure gauge into the valve stem on your tire. (The gauge will "pop" out and show a number. When you hear a "psst" sound, that's air escaping the tire. This shouldn't affect pressure substantially, unless you hold down the air pressure gauge too long.)
- 5. Compare the measured psi to the psi found on the sticker inside the driver's door or in the owner's manual.
- 6. If your psi is above the number, let air out until it matches. If it's below, add air (or have a professional help you) until it reaches the proper number.
- 7. To add air to the tire insert the air hose into the tire valve and add air in short bursts. Check the pressure with your tire gauge. If you add too much, let some out by pressing the pin on the tire valve with the back of the air hose nozzle. Keep checking the tire pressure until right.

About pressure gauges

- Be careful if you are using a pressure gauge provided in gas stations. The pressure gauge is often not reliable.
- Buy a high-quality pressure gauge and check its accuracy with a tire professional.

Getting it right is important

• Under-inflated or over-inflated tires can wear down faster than expected, have reduced grip, and can consume more fuel. It just takes a few minutes a month to help ensure your safety and the longevity of your tires.

Fact Sheet 14.2 Content Information

Checking Your Tread Wear

General Guidelines

 To effectively grip the road, evacuate water and maintain control, tires need to have a safe amount of remaining tread. If the grooves in the tire design have almost disappeared, the tire will simply not grip the road as well. This is particularly dangerous in wet or wintry conditions.

Here is an example of different tread wear and how it effects driving in wet conditions:

Full Tread Depth at 55 mph in Wet Conditions





- Plus, if you drive with tires under the legal tread limit, depending on the state you drive in, you may be fined.
- You should check the wear of tires regularly. Once every month, or before you go on a long trip, check tires for wear and damage problems. See below on how to check tread wear yourself. If tires are approaching the legal limit or if you have any doubts, get them checked by a tire professional.

Fact Sheet 14.2 Content Information

Checking Your Tread Wear

Two methods to check the tread wear:

1. Use the Penny Test

- Take a penny and hold Abraham Lincoln's body between your thumb and forefinger.
- Insert the penny into multiple points in the tread across the tire to check for wear. Do the Penny Test on multiple places on the tire tread because tires can wear unevenly. If the top of Lincoln's head is covered by the tread, you've got over 2/32nd's of an inch of tread in that spot.



• If you can see a space between the tread and the top of Lincoln's head, your tread is below approximately 2/32 of an inch. Your car's ability to

grip the road in adverse conditions is greatly reduced. 2/32nd's of an inch is the distance between the top of Lincoln's head and the bottom of the penny.

2. Check the tread wear indicators.

- Tires have tread wear indicators molded into the base of the main grooves.
- When the tread surface is worn to the same level as these indicators, the tire is at the legal limit and should be replaced.

Tire Maintenance Issues

Fact Sheet 14.3 Content Information

Identifying Maintenance Issues

Some of the most common issues that may occur with your vehicle's tires include, underinflation, uneven wear issues, tire damage and vibration issues.

Under-inflation

If your tires are under-inflated add air to your tire until it reaches the recommended air pressure. If your tire continues to lose pressure, visit a tire professional.

Uneven Wear Issues

If your tires have uneven front or rear tire wear your vehicle may need a "front end" alignment or a "four wheel" alignment. See your tire professional for assistance.

Damage to Tires

If your tire(s) is damaged by a nail hole or is cut up to $\frac{1}{4}$ " it may be repaired or replaced by a trained professional. Replace your damaged tire with a spare, if available and take your vehicle to a tire professional as soon as possible.

Vibration Issues

Tires that are out of balance can cause a vibration that can lead to driver fatigue, premature or uneven tire wear, and unnecessary wear and tear on your vehicle's suspension. Tires should be balanced when they are mounted on wheels for the first time or when they are remounted after being repaired. Visit your tire professional at the first sign of vibration or "shimmy."

<u>Flat Tire</u>

Have a plan prepared with your parent in case you get a flat tire, including calling the parent or roadside assistance or learning how to change a flat tire. If you have a flat tire get off the roadway as far as possible. If you are on the interstate get off at the next exit. Do not stop on the interstate. Do not attempt to change a tire if it risks the safety of you or your passengers.











Tire Maintenance

Fact Sheet 14.4 Content Information

Tire Maintenance: Tire Rotation, Balancing and Alignment

Tire Rotation

During rotation, each tire and wheel is removed from your vehicle and moved to a different position to ensure that all tires wear evenly and last longer.

Tires should be rotated based on your vehicle manufacturer's recommendation or every 6,000 to 8,000 miles. Monthly inspection for tire wear is recommended.

Since the position of the tire on your vehicle can affect how it wears down, regular rotation helps ensure that tires wear evenly, extending the life of your tires and improving performance.

Tire Alignment

Is a simple process, which may require slight adjustment of front and/or rear suspension components. If your alignment is off, your vehicle could be unsafe to drive.

You should have your alignment checked when you've hit a sizable object on the road, you see a wear pattern developing on the shoulders (outer edges) of the tires,

you notice a difference in your vehicle's handling or when you are steering (vehicle pulls to one side, steering wheel does not return easily after a turn, steering wheel remains at an angle when driving in a straight line), when you replace suspension or steering components, at least every 4,350 miles.

This helps minimize wear and tear and to maximize driver and passenger comfort.

Tire Balancing

A wheel is out of balance when one area is heavier or lighter than the rest. The result is bouncing or wobbling, which can decrease tread life, increase vibration, and cause stress on your vehicle.

You should have your tires balanced when a tire is replaced, when a balance weight is moved or removed and when you purchase new tires.







Buying Tires

Is My Tire Worn Out?

We recommend to replace your tires if:

• The tread is worn beyond the recommended tread depth levels

1. Inspect your tires regularly and look for:

- Uneven tread wear
- Shallow tread
- Troublemakers (rocks, nails, etc.)
- Damaged areas
- Damaged valve caps

2. Pay attention to the "feel" of your tires as you drive.

- A rough ride may indicate tire damage or excessive wear.
- If you notice vibrations or other disturbances while driving, immediately reduce speed, drive with caution until you can safely pull off the road and stop, and inspect your tires.
- If a tire is damaged, deflate it and replace it with your spare. If you do not see any tire damage and cannot identify the source of the vibration, take the vehicle to a tire professional for a thorough inspection.

3. See a professional

• If you see something on your tire that you're not sure about during your inspection, have it examined by your tire professional.

Buying Tires

Replacing Your Tires

General advice

- A lot goes into choosing the correct tire. You can find your vehicle's tire size in your vehicle owner's manual or on the driver's side door jamb. Consult your tire professional when replacing your tires to determine the correct tire size.
- It is recommended to replace all four tires at the same time for maximum safety to maintain even wear and traction on all four tires.
- Take time to research. You can replace your original equipment tires with the same tire or another tire that meets the original equipment specifications.
- There are different types of tires depending on the climate in which you live (i.e. all-season, summer, and winter tires).
- See a tire professional to mount and align your new tires.

Replacing only two tires

When replacing two new tires instead of four, be sure that your new tires are the same size and tire type as your current tires. Most tire professionals recommend installing the new tires on the rear axle of your vehicle.

Why Put New Tires on the Rear Axle?

- New tires will provide better wet grip than half-worn tires.
- When new tires are installed on the rear, it helps reduce the potential for your vehicle to oversteer and loss of vehicle stability in wet conditions.

What guidelines should I follow when mixing tires?

If no instructions for tire mixing appear in the vehicle owner's manual, adhere to the following guidelines:

- Do not mix sizes. All four tires must be branded with the same tire size.
- Do not mix tread pattern types.