ITS Driver Assistance and Traffic Devices

Intelligent Transportation Systems or ITS technologies provide traveler information to improve trip choices, help to prevent crashes through 'smart' warnings, manage traffic, and alert drivers to congestion or other roadway conditions. These intelligent systems are intended to reduce congestion and improve the safety of our transportation system by using and communicating real or near real-time information to those who need it.

Some ITS technologies work behind the scenes using up-to-date information to improve safety and efficiency of roadways, transit, and emergency services. In these cases, no particular knowledge or action is needed on the part of drivers except to obey current speed limits and other traffic control devices. For example, adaptive signal control may coordinate traffic lights on busy roadways to adjust to changing traffic volumes and speeds. Therefore, for the smoothest and safest driving experience, drive at speeds similar to those around you, as long as you drive safely and within the currently posted limit.

Other ITS applications use information on traffic volumes, speeds, weather, work zones, and emergencies to provide dynamic traffic control or messages that require a driver response. These messages are communicated through electronic roadway signs, signals, and special devices, as well as other more traditional-looking signs and roadway markings. Some examples of ITS-based devices that drivers should become familiar with are described later in this section.

ITS aids are also available that help with trip planning. These aids are described next.

Trip Planning

Drivers can make use of ITS information resources before travel to choose driving routes, plan alternate travel times to avoid problem areas and delays, or use alternative means of transportation. Up-to-date traveler information about road conditions, as well as transit times and schedules, may be available from a variety of sources including:

- Regular television or radio broadcasts
- **511**, a telephone number that provides current information about travel conditions. Over half of the states have implemented 511 telephone systems that provide continually updated traveler information about delays, traffic speeds, weather or other travel conditions for specific areas or routes.
- Internet or wireless communications systems and internet websites providing real-time information

- Traveler information kiosks at rest areas, travel plazas, and tourist locations

Updates on conditions or detours may also be available during travel from:

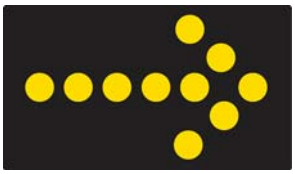
- Radio broadcasts including regular broadcast and highway advisory radio. Highway signs are typically used to indicate the radio frequency that broadcasts roadway information.
- Variable message signs along the highway
- **511** phone number
- Internet or wireless devices such as pagers, PDAs and in-vehicle systems capable of receiving and displaying information on recommended routes, such as a Global Positioning System (GPS) enabled in-vehicle navigation system.

Planning ahead and paying attention to information about roadway and traffic conditions can help reduce delay and frustration, and help you to arrive safely at your destination. To prevent being distracted from the driving task, be sure to have a passenger make phone calls or use wireless devices to obtain roadway information. If no passengers are present, find a safe place to pull off the roadway in order to use these devices.

Traffic Management and Control

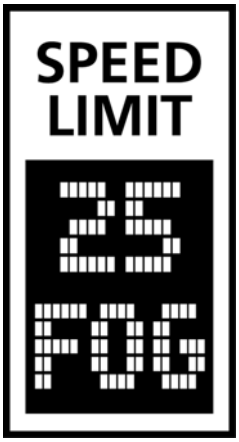
ITS devices may be used to manage traffic on busy freeways, at entrances to freeways, in work zones, during rush hours, and for special events. Heavily-traveled roads and freeways in urban areas are the most likely places to encounter these devices, but ITS-based controls may also be encountered in rural areas. Use of these technologies is expanding, so all drivers should be aware of and heed ITS signs and signals as well as traditional traffic control, warning, and message devices.

Drivers should be prepared to see and respond to a variety of traffic control signs and signals including:

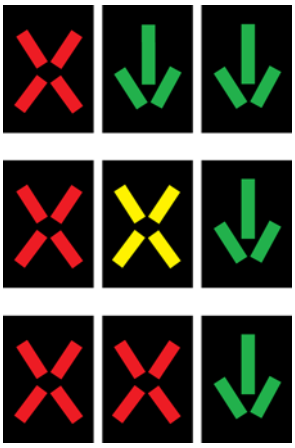


Lane Closures / Lane Control – Lane control signs allow the temporary closure of lanes to avoid construction, crashes or other road incidents, or to allow quick access by emergency or other priority vehicles. Drivers should obey signs and cooperate in merging at the appropriate point.

Variable Speed Limit Signs – Variable speed limit systems use sensors to monitor current traffic and/or weather conditions, and post appropriate speed limits on dynamic message signs. These speed limits should be obeyed just like any posted speed limit.

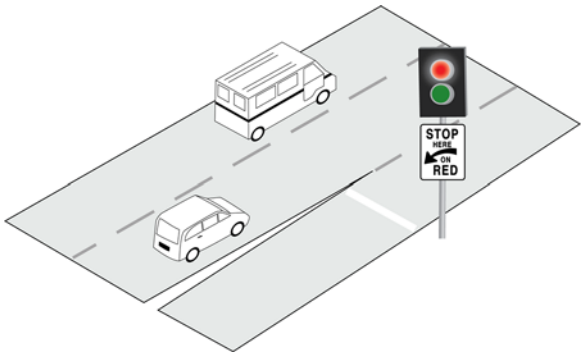


Reversible Flow Lanes – Traffic sensors and lane control signals can be used to change the direction of travel for certain lanes, allowing travel in the peak direction during rush hours or to handle traffic for special events. A green downward arrow indicates that it is permitted to drive in the lane beneath. A red 'X' means do not drive in the lane beneath. A yellow 'X' means that you should merge into another permitted lane as soon as safely possible; a yellow 'X' will soon be followed by a red 'X'. Reversible flow lanes may also be used during emergency evacuations of an area.



HOV Facilities – High Occupancy Vehicle (HOV) lanes are for use by buses, passenger vehicles carrying passengers in addition to the driver (the specific requirements will be posted on signs), and sometimes motorcycles. Some HOV lanes are adjacent to other lanes and separated by a painted stripe. Others are separate facilities, often in the median. These lanes may also change direction of flow for morning and afternoon rush hours or other periods. Dynamic message signs and moveable barriers control the operation of these types of HOV lanes. HOV facilities may be enforced by automated detection devices. Do not use the lanes if your vehicle does not meet the requirements.

Ramp Metering – Ramp meters control the entrance of vehicles onto freeways. Allowing one or two vehicles to enter at a time helps prevent sudden traffic slow-downs, back-ups and crashes on the freeway.



- To enter a freeway with a ramp meter, drive your vehicle all the way to the stop line on the pavement next to the ramp signal in order to trigger the signal. Wait for the green light: when the signal for your lane turns green, one car may accelerate along the ramp. Be alert, as the signal will change more rapidly than a signal at an intersection. If the signal is turned off, enter and merge safely onto the freeway as you would in the absence of a ramp metering signal.
- Drivers still need to check for gaps in traffic on the freeway and carry out a safe merge once given the green light by the signal. The meter does not change this situation.

Finally, some high-speed toll roads, as well as transit and parking systems, have begun to implement automated or electronic payment systems to save time, fuel, and other costs. Customers receive a card or transponder to mount on their vehicle that communicates with devices maintained by the transportation agency to conduct and record payment transactions. Drivers with an electronic payment system do not stop at freeway toll booths but should use the designated lanes and follow posted speed limits and other directions to pass safely through the toll area. Be aware of vehicles changing lanes, accelerating, and braking in these areas. Pay particular attention to differences in speed between vehicles using the toll booths and those using the automated system as they merge back into shared lanes.

Crash Prevention

Crash prevention and safety systems detect unsafe or risky roadway conditions and provide warnings to drivers to take action to avoid crashes. These systems use sensors to monitor the speed and characteristics of approaching vehicles or other roadway conditions and provide specific warning messages or activate flashing indicators. Some systems provide a general warning of the recommended speed for prevailing or temporary roadway conditions.

Examples of ITS-based warning devices include the following:

Dynamic or Changeable Message Signs (permanent or portable) – Message signs may provide warnings or advance notice of a variety of conditions including crashes or other incidents, work zones, advance notice of ramp or lane closures/merges, detours, special events, and other roadway or weather conditions. Be prepared to slow, stop, merge, or detour as needed, according to the message.

A changeable message sign can also provide informational messages, such as:

- Expected reopening of an existing closed lane.
- Roadway status for special events.

Road Geometry Warning Systems – These systems warn drivers, typically those in commercial trucks and other heavy vehicles, of potentially dangerous speeds that may cause rollovers or other crashes on **ramps, curves, or downgrades**. Slow to an appropriate speed for conditions.

Intersection Collision Warning Systems – These systems monitor traffic approaching dangerous intersections and warn drivers of approaching cross traffic by flashing roadside signs. Be sure that the intersection is clear and no vehicles are approaching on the cross-streets before entering.

Highway Rail Crossing Systems – These systems use detectors, electronic warning signs to warn roadway traffic of approaching trains, and automated enforcement to discourage drivers from violating railroad crossing traffic controls. Stop and yield to oncoming trains and proceed only when the way is clear. It is illegal to drive around gates.

Pedestrian Safety Systems – Pedestrian safety devices can help protect pedestrians by activating warnings to alert drivers as pedestrians enter crosswalks. Other systems include in-roadway warning lights at crosswalks, 'countdown' pedestrian traffic signals, and pedestrian detectors that extend the “Walk” phase for pedestrians needing more time to cross a street. Yield to pedestrians and proceed when the way is clear.

Bicycle Warning Systems – Bicycle Warning Systems use detectors and electronic warning signs to notify drivers when a bicyclist is in an upcoming segment of roadway such as a narrow bridge, tunnel, or other high-caution section of the roadway. Slow down, and be prepared to wait for a safe location or gap to pass the bicyclist.

Animal Warning Systems – These systems monitor and detect large animals approaching the roadway, and alert drivers by activating flashers on warning signs located before high frequency crossing areas. Slow down and be prepared to stop to wait for animals crossing.

In-vehicle ITS Technologies

In-vehicle technologies such as GPS navigation systems and warning devices are also increasingly available to help drivers reach their destinations safely. As these technologies develop, some vehicles may have driver alerts that respond to sensor-triggered warnings at intersections, railroads, pedestrian, and animal crossings. New technologies may also provide warnings when your vehicle is following another too closely or about to drift unintentionally off the roadway or out of the lane. GPS systems can help map routes before travel and adapt to detours or unexpected changes during a trip. All in-vehicle devices should be used with caution to ensure that they don’t become a distraction instead of the aid they were intended to be.

If despite all precautions, you are involved in a crash, some vehicles are equipped with Mayday or Automated Collision Notification systems to alert emergency response agencies of the crash location, and possibly the type of collision and likely number of injuries. With due care, hopefully, these emergency communication systems won’t be needed.