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SPECIAL CONDITIONS
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CHAPTER 7

SPECIAL CONDITIONS

1. INTRODUCTION. Driving conditions encountered by California Highway Patrol (CHP) officers are among the most diverse in the world. Some of the heaviest travelled, multilane freeways in existence, as well as one-lane, unpaved, desert roads are located within the state. There are mountain passes above 8,000 feet and miles of fog-shrouded coastal roadways. Almost every extreme type of weather condition exists in California. Add to these conditions the fact that as of 2015 there were approximately 34.3 million vehicles registered within the state, and untold thousands of visitors travelling on California roadways. The job of patrolling these roadways and securing the orderly flow of traffic becomes more challenging each year. Each CHP Area has its own unique driving problems. Many Areas publish driving tips in their Standard Operating Procedures, and conduct training programs for officers new to the Area. This chapter will discuss special driving conditions created by weather, and other emergency situations.

2. RAIN. Every officer in the state must be familiar with driving in the rain as stopping rates increase in rainy weather. The first rains of the season can result in very slippery driving conditions, sometimes almost as slippery as snow. The rain mixes with dust, dirt, motor oil drippings, and the oil released from the asphalt pavement by the sun. An officer should always anticipate a reduced coefficient of friction with the first rain following an extended period of dry weather.

a. Rain also reduces visibility, particularly at night. Water on the pavement reflects the headlights into the air instead of up the road. On rainy nights, roadway markings can be difficult to see, and distinguishing the shoulder from the roadway can be problematic.

(1) The water on the windshield further reduces visibility; therefore, good windshield wiper blades are vital. Thoroughly cleaning the wiper blades with a paper towel and soap will restore them. If that does not work, or if the rubber has deteriorated, the blades should be replaced.

(2) Oil film on the windshield should be washed off with soap. If a driver is operating in heavy traffic conditions, this oil film will reappear after time.

3. HYDROPLANING. The phenomenon known as hydroplaning is frequently misunderstood. Dynamic hydroplaning exists when a film of water begins to separate the normal contact area of the tire tread from the roadway. There are four contributing

factors in dynamic hydroplaning: water depth, tire tread depth, tire pressure, and vehicle speed.

a. Before hydroplaning can exist, there must be a sufficient depth of standing or flowing water to submerge the tire tread. Normally, with good tires, 1/2 inch of water is enough; with worn tread, very little water is needed. When a sufficient quantity of water is present on the roadway, the speed at which the car will hydroplane can be computed by multiplying the square root of the tire pressure by 10.3. (Refer to Annex A.)

(1) With a tire pressure of 25 pounds per square inch (psi), multiply 5 by 10.3; hydroplaning will occur at 51.5 miles per hour (mph).

(2) In the case of patrol vehicles, recommended tire inflation is 35 psi. This gives a hydroplaning speed of 60.9 mph, although partial hydroplaning may occur well below this.

b. It should be emphasized and understood that the preceding figures give the speed at which total hydroplaning should be expected. In total hydroplaning, the front tires are completely separated from the roadway. Directional stability might be maintained in a straight line only by the contact of the rear tires with the pavement within the tire "wipes" created by the front wheels. However, at this point a gust of wind, steering input, or a curve in the road would result in loss of control.

c. During inclement weather, an officer should ascertain that the patrol vehicle is equipped with good, deep tread, and that all four tires are properly inflated. Tests at the Academy indicate that an increase of up to four psi over recommended cold inflation pressure can be beneficial on wet pavement.

d. Even with good tires properly inflated, the only certain defense an officer has against hydroplaning is to reduce speeds below the critical levels when water begins to accumulate on the roadway. A slight advantage can be gained by driving in a lane that allows you to stay within the tire wipes of other traffic.

4. SNOW AND ICE. Snow and ice can team up to make one of the most dangerous driving conditions an officer can encounter. Frequently, a snow storm will reduce visibility to only a few feet. The single most hazardous factor is the sharply reduced coefficient of friction. Glare ice, which is ice that has a smooth, glassy surface that reflects sunlight, can produce a coefficient of friction as low as 5 percent; the variation in traction on one mile of roadway can be tremendous.

a. Extreme caution should be used because an icy stretch may not be visible to the eye. This is frequently called black ice, since it can be nonreflective and looks

like bare pavement. Speed should be kept low and all control of the car must be preplanned, smooth, and deliberate.

b. The techniques of skid control must be instinctive to a snow driver. Remember what effect reduced traction has on other drivers. Never stop at the bottom of a hill, low side of a banked curve, or anywhere traffic may not see the patrol car or would slide into it.

c. Ice and snow tend to accumulate more in some places than in others. A shaded portion of roadway will have ice longer than a sunny stretch. Bridges and overpasses always freeze up sooner than the adjacent roadway because the cold air under them reduces the temperature of the pavement surface. At night, areas that melted from the daytime sun will frequently produce long, icy stretches. When driving under these conditions, expect lengthened stopping distances and sharply reduced traction on curves; when the emergency occurs, the prepared driver can cope with it.

5. FOG, DUST, AND SMOKE. Fog, dust, and smoke can occur in sufficient concentration to reduce visibility to nearly zero. When this happens, speed must be sharply reduced.

a. To calculate the reaction distance, take the speedometer reading and add the first digit. Example: 30 mph equals 33 feet. If visibility is limited to less than 33 feet, adjust your speed accordingly.

b. When driving under these conditions at night, headlights should be maintained on low beam as high beams only reflect the light back and increase the glare, further reducing visibility.

c. When driving for a prolonged period of time under these conditions, eye strain can become an issue. Officers should make frequent stops in a safe place, walk around the car, and relax their eyes for a moment. The ability to be seen by other traffic is of prime importance. Do not hesitate to utilize emergency flashers to the rear and turn on headlights during daylight hours.

d. When the right circumstances exist, fog can accumulate in relatively small, dense patches. This is frequently called tule fog, because it is normally associated with lowlands or depressions on the highway. When these conditions are observed, a driver should watch well ahead and be prepared to slow rapidly. In a few hundred feet, visibility can change to only a short distance in front of the vehicle.

e. Activation of the forward facing antennae of the radar can pick up an oncoming vehicle in dense fog to alert the driver.

6. GRADES. Ascending a grade puts a greater demand on the engine than driving on level roadways, and means a lesser rate of acceleration than the vehicle is normally capable of. When passing other traffic on a hill, an officer must allow a longer distance to complete the pass. Think about other drivers in the line of traffic which is being passed. Another car could change lanes abruptly in front of an officer in order to pass a slow truck. If the passing speed is too great, a collision will be unavoidable. Plan a pass that will allow for a hole to pull back into if the passing movement takes longer than anticipated. Descending a grade brings other potential hazards into focus. It is very easy to allow the speed to increase. Stopping distance will be appreciably lengthened because of the increased energy requiring the braking system to convert to heat. When appropriate, select a lower gear before descending a hill, as the engine compression will assist in keeping speeds down and will offer a certain amount of deceleration when stopping.

7. NIGHT DRIVING. The most common error committed by drivers during darkness is driving beyond the vehicle's headlights. Most busy freeways or business districts have enough lighting to eliminate this problem. On rural or unlighted roadways, a driver should periodically assess the limits of visibility within the scope of the vehicle's headlights. As discussed in fog driving, speed should be adjusted to allow adequate reaction time.

a. At night, most drivers' perception of depth and rate of closure are affected. Before crossing or entering another roadway, look twice and ascertain that cross traffic is not going faster than it appears. Also keep in mind that other traffic may have a similar closure rate problem. Severe right-of-way collisions can occur at night, and many times the responsible drivers admit seeing the other traffic, but underestimated the speed of the other vehicle.

b. It is a common occurrence to come over the crest of a hill, or around a curve at night, and be greeted by the blinding high beams of an oncoming vehicle. Usually, the other driver will lower the beams almost immediately. At times, the other driver may not respond to repeated flashing of high beams and will keep their high beams on. The officer should not stare at the other vehicle's headlights, but attempt to focus their eyes on the right shoulder of the road. This will help to see possible hazards, and minimize the constriction of the pupil so that night vision can return to normal as quickly as possible.

8. WHEEL OFF THE ROAD. At some point in time, the right-side wheels may drop off the pavement and onto a soft or low shoulder. This seemingly harmless situation has been the direct cause of many fatal accidents. The instinctive reaction to yank the vehicle back onto the road can be deadly. Invariably, the tires will hang up momentarily on the edge of the pavement. When the steering wheel is turned, the vehicle will suddenly swerve across the roadway into opposing traffic, or go into a broadside skid. Either case is a recipe for a serious accident.

a. If the wheels drop off the pavement, ease off the throttle and straddle the edge of the road. Keep a firm grip on the wheel and do not brake until the speed is reduced. After slowing down considerably, steer the vehicle back onto the road.

9. RAPID/CATASTROPHIC TIRE DEFLATION. A good defensive driver expects the unexpected. A tire blowout is an unexpected event which happens quickly, and seldom gives advanced warning. The two most common types of rapid tire deflation situations are tread separation and debris penetration into the tire. The importance of checking tire pressure and being aware of the vehicle's attitude is critical.

a. The driver should be aware of any abnormal sounds in the vehicle. Often, a separated tire tread will hit the inner fender well of the vehicle, causing a loud thumping noise.

b. Debris penetration is more difficult to detect as the tire may begin to deflate slowly prior to a catastrophic failure. The driver should be mindful of the potential for debris penetration if they have turned through a center divide or recently driven on the shoulder. If the vehicle starts to become unstable or vibrate, immediately reduce speed and bring the vehicle to a stop at a safe location for inspection.

c. Catastrophic tire deflation differs from rapid tire deflation in that the tire becomes separated from the wheel, leaving only the rim in contact patch with the roadway surface. Catastrophic tire deflation at high speeds generally occurs with little or no prior warning. A leading cause of catastrophic tire deflation is underinflation of the tire, causing excessive heat buildup, especially at high speed.

d. The actions of the driver will vary depending upon the circumstances presented to the individual at that moment, but there are some general guidelines:

(1) Do not immediately apply the brakes. Braking can cause the vehicle to pull severely to the side of the vehicle on which the deflation occurred.

(2) Do not rapidly release the throttle. Initially, maintain steady throttle pressure; this will allow the vehicle to maintain momentum that can help the vehicle retain straight-line stability.

(3) Expect the vehicle to pull to the right or left. Do not introduce rapid, abrupt steering. Attempt to maintain a straight line within the lane unless a greater hazard exists. Once control of the vehicle is established, gently and gradually guide the vehicle in the direction it is pulling.

(4) Maintain a high visual horizon. This will assist in maintaining control of the vehicle and locating a safe area to bring the vehicle to a gradual stop.

(5) Do not try to stop as quickly as possible in order to minimize damage to the vehicle, tire, or rim. This situation is dangerous, and the preservation of life and avoidance of injury are of primary importance.

10. HOOD UP. Federal regulations require that automobile hoods have a secondary or safety latch. This device is intended to function as a fail-safe if the primary latch opens, thereby preventing the hood from flying up while the vehicle is in motion. There have been instances of this system failing. In mountainous areas the hood latch has been released as a result of ice and snow accumulating under the grill. If the hood releases at high speed, the result can be serious, especially if the wind forces it backwards and into the windshield.

a. At lower speed, the upraised hood will block the driver's vision to the front. Usually, there will be a gap at the bottom of the hood just above the dashboard through which to see. If this is impractical, the only other choice would be to roll down the left window and attempt to look around the hood, slowing down, and pulling off the road.

11. ANIMALS IN THE ROAD. In residential or urban areas, pets, livestock, or wildlife can appear in the roadway suddenly and without warning. When this occurs, even the most experienced driver may have to fight the instinct to brake or swerve. If there is no traffic around, a driver may be able to take evasive action and continue on without incident. If traffic is heavy or an officer is driving fast, it may be wise to strike the animal rather than lose control or cause an accident that injures people. Either course of action will have to be decided upon instantly. The enforcement driver would be well-advised to periodically consider the possible alternatives to this and other driving emergencies. Then, when the emergency presents itself, reaction time will not be wasted in decision-making.

a. The size of an animal can dictate what action is called for. For example, a house cat would seldom damage an automobile, but a 2,000-pound bull could total a vehicle and kill the driver. If faced with an imminent collision with a large animal, it might be appropriate to swerve through a fence or into a ditch. The car might be damaged, but the driver could walk away from it.

(1) Experienced mountain and country road drivers usually know at which areas and what time of the year deer or livestock might be expected on the roadway, and then exercise caution when the potential exists.

(2) During darkness, the outline of a deer or cow may be almost impossible to see in the headlights, but nature provides the alert driver with a sort of warning device. Animals are fascinated by bright lights and will usually stare at them. The light from a vehicle's headlamps will be reflected back to a driver by the animal's eyes. When a driver can see what appear to be two or more small lights or reflectors at the shoulder of the road, they should immediately reduce speed and prepare to take evasive action.

(3) Deer usually travel in groups at night. Knowledgeable mountain drivers always slow if a deer crosses the roadway, even if well ahead of the vehicle, because it is a certainty that there are additional unseen deer in the area.

12. POWER FAILURE. Modern patrol vehicles are equipped with large engines, heavy-duty suspension systems, transmissions, and brakes, plus the added-on emergency equipment. Both the power brake system and the power steering are dependent upon engine operation to function properly. Under the following circumstances, most modern vehicles will maintain power steering and power brakes, even with a dead engine.

a. If the vehicle is in motion when the engine dies, power steering will continue to function down to a low speed, if the transmission is left in gear. The pressure in the torque converter of the transmission will allow the momentum of the car to turn the engine over, which will operate the power steering pump.

(1) The driver should expect to lose power-assisted steering as speed decreases. The testing of many vehicles has shown this speed can range from 15 to 25 mph, depending on make, model, or vehicle condition. At this low speed, a driver should be able to maneuver the vehicle off the roadway to a safe stopping place.

(2) If a driver experiences engine failure at low speeds, or places the transmission in neutral when the engine dies, the power steering will cease to function immediately. Field officers should remember, if they elect to push a disabled vehicle, the driver will not have power steering and may not be strong enough to control the car.

(3) The power brake system is actuated by engine vacuum. When the engine fails to run, a vacuum is no longer produced. If the system is functioning properly, the power brake system has a reserve tank or canister that stores a

limited amount of vacuum. Upon engine failure, this reserve vacuum will ordinarily provide two power-assisted brake applications. Again, this should normally be adequate to bring the vehicle to a safe stop off the highway.

(a) In the absence of power-assisted brakes, the operator should simply remember that a great deal more pressure will have to be applied to the brake pedal, but the car will still stop.

b. These guidelines refer in particular to departmental enforcement vehicles, but are generalizations that would apply to most modern vehicles.

13. CARRYING GASOLINE. Occasionally, the field officer will have reason to transport gasoline for a disabled motorist. Gasoline should never be carried in the trunk of the patrol vehicle because few containers are completely leak-proof. The enclosed environment of the trunk is ideal for buildup of potentially explosive gasoline fumes. The mobile radio is mounted in the trunk and switches inside the radio can produce electrical sparks which can ignite gasoline fumes. When gasoline is transported in the patrol vehicle, it should be carried on the right front floorboard. It would also be wise to open windows to permit ventilation.

ANNEX A

TABLE OF SPEEDS AT WHICH TOTAL HYDROPLANING WILL OCCUR WHEN
STANDING WATER EXCEEDS TIRE TREAD DEPTH

TIRE PRESSURE IN POUNDS PER SQUARE INCH	SPEED IN MILES PER HOUR
(Based on formula $\sqrt{\text{tire pressure}} \times 10.3 = \text{speed in miles per hour.}$)	
15	39.9
20	46.1
25	51.5
30	56.4
35	60.9
40	65.1
45	69.1
50	72.8
55	76.4
60	79.8
65	83.0
70	86.2
75	89.2
80	92.1
85	95.0
90	97.7
95	100.4
100	103.0

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