

Arizona Peace Officer Standards and Training

Basic Curriculum Model Lesson Plan

LESSON TITLE: TRAFFIC COLLISION INVESTIGATION 4.3

SUBJECT:	Traffic Collision Investigation
AZ POST DESIGNATION:	4.3
HOURS:	12
COURSE CONTENT:	<p>A delineation of the proper procedures for traffic collision investigation. Techniques for interviewing drivers and witnesses are described. The study of vehicle damage, road conditions, traffic signs and signals is emphasized. Proper methods for taking and recording evidence, measurements and photographs of the collision scene are demonstrated. Procedures for hit-and-run investigations and the mechanics of completing the collision report form are provided.</p>
PERFORMANCE OBJECTIVES:	<p>Upon completion of this course of instruction, students using notes, handouts and other support materials as references, within the allotted time, will:</p> <ul style="list-style-type: none">P.O. 4.3.1 Identify what constitutes a reportable traffic collision and those circumstances that would require a report to be taken per A.R.S. §28-667.P.O. 4.3.2 Identify what information must be exchanged between drivers per A.R.S. §28-663.P.O. 4.3.3 Identify how potential civil liability can be reduced through proper scene management including, but not limited to, the following areas:<ul style="list-style-type: none">A. Arrive safely.B. Provide for medical assistance.C. Protect persons and property.D. Securing scene evidence.E. Remove conditions that may lead to additional collisions.F. Clear scene.

P.O. 4.3.4 Identify the definitions of the following collision terms:

- A. Collision.
- B. Area of collision/impact.
- C. Centered impact.
- D. Critical speed scuff.
- E. Drag factor (coefficient of friction).
- F. Eccentric impact.
- G. Gap skid.
- H. Intersection.
- I. Junction vs. non-junction.
- J. Occupant movement.
- K. Point of Impact
- L. Point of rest.
- M. Reference point/permanent point.
- N. Skip skid.

P.O. 4.3.5 Identify proper interviewing techniques for:

- A. Drivers.
- B. Passengers.
- C. Witnesses.

P.O. 4.3.6 Identify and document evidence from vehicles including the following:

- A. Identification.
- B. Contact damage.

- C. Induced damage.
 - D. Restraint usage, physical proof vs. occupant claims.
- P.O. 4.3.7 Identify and document roadway evidence that proves direction of travel and area of impact, including the following:
- A. Skid marks.
 - B. Skid deflection.
 - C. Collision scrub/scuff.
 - D. Gouge marks:
 - 1. Chips.
 - 2. Chops.
 - 3. Grooves
 - 4. Scratch marks.
 - E. Debris:
 - 1. Vehicle parts.
 - 2. Glass.
 - 3. Liquid debris.
 - 4. Miscellaneous.
 - F. Vehicle dynamics.
- P.O. 4.3.8 Demonstrate the use of a speed Nomograph and calculate a minimum speed.
- P.O. 4.3.9 Identify correct responding and reporting procedures necessary for a hit-and-run, including fraud factors.
- P.O. 4.3.10 Identify what photographs need to be taken to document collision-related evidence, including:

- A. When photographs need to be taken.
- B. Vehicle damage.
- C. Roadway evidence.
- D. Victim/suspect.
- E. Overall scene condition.

P.O. 4.3.11 Given simulations depicting traffic collisions; complete the State Collision Report form by using the instruction manual and glossary.

DATE FIRST PREPARED: March 27, 2001

PREPARED BY: SME Committee

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AZ POST – APPROVAL:	Stephen Enteman	DATE: July 2019
AZ POST – APPROVAL:	Lori Wait	DATE: December 2021

INSTRUCTOR REFERENCES:

CLASS LEVEL: Student

TRAINING AIDS: Traffic template, rolatape, 100' tape, 25' tape and "pace." The American Standard Manual on Classification of Motor Vehicle Traffic
Accidents.<http://www.azleg.gov/ArizonaRevisedStatutes.asp>

INSTRUCTIONAL STRATEGY: Interactive lecture, class discussion and demonstration activities.

SUCCESS CRITERIA: 70% or above on a written, multiple-choice examination.

COMPUTER FILE NAME: 4.3 Traffic Collision Investigation

DATE RELEASED TO THE SHARE FILE: May 27, 2022

I. INTRODUCTION

- A. Instructor – (self) introduction.
- B. Preview of performance objectives.
- C. More people are injured and killed and the monetary loss is greater in a traffic collision than all other types of collisions combined. **INSTRUCTOR NOTE:** Police officers are the only source of an unbiased investigation.

II. PURPOSE OF A COLLISION INVESTIGATION

- A. To collect data for safety programs in collision prevention for safer roads, safer vehicles, seat belts, airbags, better brakes, tires, better laws, etc.
- B. To protect the rights of all involved by recording evidence (25% of insurance claims are fraudulent).
- C. To determine violations and to take enforcement action (record evidence for criminal cases of civil traffic violations).
- D. Educate the Public.

III. THE COLLISION INVESTIGATOR

- A. Must be trained to recognize, measure and record the collision evidence.
- B. Must skillfully question drivers and witnesses to determine what they actually observed in the collision versus what they thought they observed.
- C. Must analyze evidence and reach sound conclusions based on facts.
- D. Must carefully organize the investigation to avoid mistakes or omissions.
- E. Must use evidence from the investigation to support their opinions about civil and criminal offenses committed by the drivers involved.
- F. Must remain objective (impartial) at all times.

IV. LAWS REQUIRING REPORTING OF COLLISIONS

- A. Per A.R.S. §28-663, the driver of any vehicle involved in a collision resulting in injury to, or death of, any person or damage to a vehicle that is driven, or attended, by a person shall:

P. O. 4.3.2

1. Give the driver's name, address and registration number of the vehicle the driver is

driving.

2. On request, exhibit the person's driver license to the person struck or the driver or occupants of or person attending a vehicle collided with.
 3. Render reasonable assistance to a person injured in the collision, including making arrangements for the care of the person to a physician, surgeon or hospital for medical or surgical treatment if it is apparent that treatment is necessary or if the care is requested by the injured person.
- B. A person who fails to comply with this section is guilty of a class 3 misdemeanor.
- C. Per A.R.S. §28-666, the driver of a vehicle involved in a collision resulting in injury to, or death of, a person shall give notice of the collision immediately by the quickest means of communication, whether oral or written, to:
1. The local police department if the collision occurs within a municipality.
 2. The office of the county sheriff.
 3. The nearest office of the highway patrol.
- D. Per A.R.S. §28-667, written collision report definition: **P.O. 4.3.1**
1. A law enforcement officer or public employee who, in the regular course of duty, investigates a motor vehicle collision resulting in bodily injury, death or damage to the property of any person in excess of \$1,000 or in the issuance of a citation shall complete a written report of the collision as follows:
 - a. Either at the time of and at the scene of the collision or after the collision by interviewing participants or witnesses.
 - b. Within 24 hours after completing the investigation.
 2. One thousand dollars or less, or no citation, or no injury or death, basic information will be collected and documented.
- E. Per A.R.S. §28-669(A), Collision Report forms:
1. Uniform report forms designed and issued by the Department of Transportation.
 2. NOTE! Department policies may be stricter than state law (i.e., requiring a completed collision form on non-reportable collisions on private property).
 3. Electronic Forms must be approved by AZDOT.
 4. A.R.S. §28-674 Traffic Collision Quick Clearance: Vehicles can be to a safe location, if drivable and done safely.

V. PROTECT YOURSELF FROM CIVIL LIABILITY**P.O. 4.3.3**

- A. Our duty to protect and serve the public requires us to do the following:
1. Arrive safely.
 2. Provide for medical assistance.
 3. Protect people and property.
 4. Secure scene evidence.
 5. Conduct a proper investigation.
 6. Remove conditions that may lead to additional collisions (e.g., sand, liquid, vehicle parts, damaged devices, etc.).
 7. Clear scene.
 8. Civil liability can be reduced through proper scene management.

VI. DEFINITIONS – THOSE YOU WILL NEED MOST OFTEN

- A. Motor vehicle traffic collision.
1. If a collision occurs involving a motor vehicle, a determination has to be made as to the classification of the event.
 2. Read the following criteria and if the response is “yes” to the first seven (7) questions, (or eight (8) if a railroad train is involved), then the incident should be classified as a reportable vehicle traffic collision:
 - a. Did the incident involve one (1) or more occurrences of injury, death or damage?
 - b. Was there at least one (1) occurrence of injury, death or damage that was not a direct result of cataclysm?
 - c. Was the bodily death or damage to the property of any person in excess of \$2,000? (See A.R.S. §28-667.) **INSTRUCTOR NOTE:** Change effective August 2019.
 - d. Did the incident involve one (1) or more motor vehicles?
 - e. Of the motor vehicles involved, was at least one (1) in transport?
 - f. Was the incident an unstabilized situation?

- g. Did the unstabilized situation originate on a trafficway or did injury or damage occur on a trafficway?
 - i. **Stabilized Situation**- A condition prevailing after motion and other actions constituting the events of a collision have ceased and no further harm will ensue unless a new series of events are initiated by some other means.
 - ii. **Unstabilized situation**- A set of events not under human control that originates when control is lost and terminates when control is gained, or when all persons and property are at rest. **INSTRUCTOR NOTE:** DISCUSS intentional vs. unintentional.
 - h. If a collision involves a train, was a collision at or near grade crossing.
- B. Motor vehicle.
- 1. See Title 28 definition.
 - 2. Any mechanically- or electrically-powered device not operated on rails, upon which, or by which, any person or property may be transported upon a roadway.
 - 3. Go-ped's or bicycles are not vehicles.
- C. In transport.
- 1. Means in motion or on a roadway when applied to motor vehicles.
 - 2. "In transport" includes: Motor vehicles in traffic on a highway, driverless motor vehicles in motion and motionless motor vehicles abandoned on a roadway, disabled motor vehicles on a roadway. Etc.
 - 3. In roadway lanes used for travel during rush hours and parked during off-peak hours, a parked motor vehicle is in transport during periods when parking is forbidden.
- D. Intersection.
- 1. When two (2) or more roadways cross or connect.
 - 2. The area contained within the extension of the curb lines or lateral roadway boundary lines.
- E. Trafficway.
- 1. Any land way open to the public as a matter of right or custom for moving persons or property from one place to another Property line to property line.

- F. Road.
 - 1. Traveled portion and shoulder.
- G. Roadway.
 - 1. Traveled portion only.
- H. Driveway access.
 - 1. A roadway by which motor vehicles may enter or leave a trafficway and is limited to the portion that is entirely within the confines of the trafficway.
 - 2. Includes driveways and entrances to, and exits from, property adjacent to the trafficway.
- I. Junction area: Either an intersection or the connection between the driveway access and the roadway other than the driveway access.
- J. First harmful event: The first occurrence of damage, injury, or death in the series of events that constitute a motor vehicle traffic collision.
- K. Traffic collision.
 - 1. The incident included one or more occurrences of injury, death, or damage, which were not a direct result of a cataclysm, and in excess of one thousand dollars (as defined by Arizona Statute 28-667).
 - 2. The incident involved one or more motor vehicles, at least one of which was in transport.
 - 3. The incident was an unstabilized situation originating on a trafficway, or the injury, damage, or death occurred on a trafficway.
 - 4. If a motor vehicle collided with a railway train the incident would have to have occurred at or near a railroad crossing.
- L. Area of collision/impact.
 - 1. An Area of Impact (AOI) is the area(s) at which damage or injury occurs as the result of a collision, where involved parties come into contact with one another, another object, or surface.
- M. Centered impact.
 - 1. Occurs when the line of impact of the collision is centered from one or both of the colliding body's mass.

- N. Critical speed skuff.
 - 1. A tire mark from a wheel that is both rotating and slipping.
- O. Drag factor (coefficient of friction).
 - 1. The acceleration or deceleration rate of a vehicle expressed as a fraction of the acceleration of gravity. The horizontal force needed to produce acceleration divided by the weight of the body. With all wheels locked, the Drag Factor and the Coefficient of Friction have the same value.
- P. Eccentric impact.
 - 1. Occurs when the line of impact of the collision is offset from one or both of the colliding body's mass centers
- Q. Gap skid.
 - 1. Skid mark made by application and release of the brakes.
- R. Intersection.
 - 1. When two or more roadways cross or connect, the area contained within the extension of curb lines, or, if none then the lateral roadway boundary lines is defined as the intersection. Driveway accesses are not classified as intersections.
- S. Junction vs. non-junction.
 - 1. The area in the vicinity of the intersection of two or more roadways.
- T. Occupant movement.
 - 1. The location and relationship of the occupants of a vehicle relative to the position during the collision sequence.
- U. Point of impact.
 - 1. The point where two colliding vehicles first touch.
- V. Point of rest.
 - 1. The place where a colliding vehicle stops after collision.
- W. Reference point/permanent point.
 - 1. A permanent point is a tangible fixed point or object

2. A reference point is an intangible point that must be referenced to a permanent point. It does NOT need to be the same as the permanent point.

X. Skip skid.

1. Caused by a locked tire bouncing on the surface (possibly due to rough road, suspension too stiff, or poor shocks). Usually less than three feet between marks.

VII. NECESSARY EQUIPMENT AND FORMS

A. Have, and know how to use, the necessary equipment.

1. Flares and cones.
2. Clipboard.
3. Chalk and/or spray paint.
4. Measuring devices:
5. 100' Tape, Roll-a-tape, AIMS, etc.
6. Traffic diagram template.
7. Camera.
8. Flashlight.
9. Safety vest.
10. Tape Recorder. (optional)

B. Have the necessary forms:

1. Arizona State Traffic Collision report and supplements.
2. Information exchange.
3. Witness statements.
4. Citations.
5. Tow reports.
6. Reports unique to your department/agency.
7. Paper for notes.

VIII. ARIZONA STATE COLLISION REPORT FORM AND SUPPLEMENTS**P.O. 4.3.11**

- A. Refer to instruction manual and glossary for the Arizona State Collision Report form and supplements.
- B. Explain how the form is to be filled out.
- C. Fill out the form (optional class exercise).

IX. BASIC COLLISION INVESTIGATION PROCEDURES

- A. Know your responsibilities:
 - 1. Arrive safely on scene.
 - 2. Department policies.
 - 3. State law.
- B. Know your beat:
 - 1. Know how to get around in your beat.
 - 2. Know what is in the beat and where you can get help.
- C. Begin planning the investigation while en route.
- D. Upon arrival, park safely, assess the collision, request assistance if needed and contact a supervisor if you have a serious or fatal collision.
- E. Take command of your scene.
- F. Check for hazards:
 - 1. Fire.
 - 2. Fuel.
 - 3. Downed wires.
 - 4. Traffic problems.
- G. Protect the scene, if needed.
 - 1. Cones/flares.

2. Vehicles.
 3. Traffic control.
- H. Care for the injured if medical personnel are not at the scene.
- I. Locate, identify, interview and check for impairment of the drivers.
- J. Secure any property belonging to the victims.
- K. Locate and get witness information as soon as possible.
- L. Identify, mark, measure and document any physical evidence, including the location and condition of the vehicles.
- M. Do not allow bystanders in the street or in your scene.
1. If a bystander is helping, give clear instructions.
 2. Replace with a police officer ASAP.
- N. If a minor collision, get the vehicles out of the roadway to facilitate traffic congestion.
1. Location of vehicles can be marked prior to moving them.
 2. Officer is authorized under state law to remove vehicles from the roadway.
- O. Document the drivers, vehicles and insurance information. **INSTRUCTOR NOTE:** Evidence of financial responsibility can now be displayed on smartphones or other hand held devices.
- P. Exchange the information with the drivers, if possible, and remember a hospital follow-up may be necessary.
- Q. When the investigation is almost complete, if a tow truck is needed, one should be called so it will arrive at the appropriate time.
- R. Determine what happened and take enforcement action.
- S. Clear the scene, ensuring that the roadway is in safe condition.
- T. Conduct follow-up investigation as needed:
1. At the hospital.
 2. Family notification.
 3. At an impound lot.

4. Impounding property.
5. Continue hit-and-run investigation.
6. Consult specialists if needed. **INSTRUCTOR NOTE:** Commercial Vehicle Inspectors, Prosecutors, Mechanics, etc.
7. Any additional follow-up.
8. Speed estimates.
9. Assist the prosecutor.
10. Testify in court.

X. THINGS AN INVESTIGATOR SHOULD NOT DO:

- A. Take sides during a collision investigation. The investigator is not a referee or umpire, but a fact finder.
- B. Tell any participant that he/she is in the clear.
- C. Tell anyone that the collision is their fault or that they are to blame. Matter of blame or fault goes beyond the scope of the investigation.
- D. Tell someone that you will be glad to be a witness for him or her.
- E. Mention garage or repair bills or civil liability. These matters are not part of the investigation.
- F. Enter in discussions regarding probable or possible penalty amounts; this is a court function not an investigative matter.
- G. Be too hasty in making a decision as to the collision cause(s). Get all of the facts possible, evaluate and then take the necessary action.

XI. PROPER INTERVIEWING TECHNIQUES

P.O. 4.4.5

A. Drivers.

P.O. 4.3.5A

1. One of the first priorities after the emergency is to find out who was driving. ASK! Be careful not to rush to judgment as to who the drivers were.
2. Drivers are required to produce their driver's license, registration and proof of insurance.
3. Interview the driver and obtain what they recall about the collision.

4. Be sure you understand what the person is telling you. Verify what they tell you. Use diplomacy and understanding. Remember, they may lie to avoid responsibility.
 - a. The collision event occurs in a fraction of a second.
 - b. Most drivers will have only fragmentary information.
 5. Be suspicious and extra cautious of a person with no identification.
 6. Drivers will rationalize their actions and will be reluctant to admit doing anything wrong.
 7. Do not hesitate to get written or tape recorded statements from drivers. The best statements are those given immediately after a collision, before the person has had a chance to rationalize his/her actions or speak with an attorney.
 8. Match injuries, if any, to the interior of the vehicle.
 - a. Question restraint usage.
 - b. If possible, look for evidence of usage.
 9. Always have some means of placing the driver behind the wheel, especially if you plan enforcement action.
- B. Passengers/witnesses. **P.O. 4.3.5B**
P.O. 4.3.5C
1. Passengers and witnesses do not have to talk to you. Drivers do have to show their drivers' license and registration. Drivers involved must exchange information. If injury or death, the driver must notify police.
 2. Get identification of the witnesses.
 3. Separate witnesses.
 4. Get written or tape recorded statements, if applicable (all times in critical injury, fatality and government vehicle).
 5. Remember that witness information can be very poor at times.
 6. Make note of the relative position of the witnesses to the collision to determine their chances of seeing what they said they observed. **INSTRUCTOR NOTE:** Have them record their beliefs – Do not correct them.
 7. Understand that witnesses' perceptions can be influenced by noise, vehicle size, stereotype vehicles or drivers. **INSTRUCTOR NOTE:** Do not dismiss witnesses due to them being incorrect.

8. Avoid prejudice and do not jump to conclusions.
9. Be specific.
 - a. "Very fast" to one (1) person may mean 70-80 M.P.H., while to someone else it may mean 45-50 M.P.H.
 - b. "Going down the street" is not as specific as saying, "He was traveling northbound on Central Avenue in the curb lane."
- C. Check on the proper condition of persons involved.
 1. Hospital follow-up is important.
 2. Impairment from alcohol/drugs.
 3. Illness/fatigue.
 4. Age, behavior, past medical conditions, hearing and vision defects.
 5. Distractions/anger.
 - a. Road rage.
 - b. Fight between occupants.
 - c. Electronic Devices ***INSTRUCTOR NOTE:*** Cell phones, texting, navigational systems, musical devices, tablets,etc.

XII. EVIDENCE FROM VEHICLES**P.O. 4.3.6**

- A. Identification. **P.O. 4.3.6A**
 1. License number.
 2. V.I.N.
 - a. List the numbers on the bottom of the box.
 - b. Offset the letters to the upper part of the box.
 3. Color.
 4. Make and specific model.
- B. Condition prior to collision.

1. Be careful not to suggest a vehicle defect as an excuse or cause for the collision.
 2. Example: "Did you have a blowout?"
- C. Damage/condition after collision.
1. Contact damage = damage to any part of the vehicle caused by direct contact with some object which is not part of the vehicle. **P.O. 4.3.6B**
 2. This will help to establish the vehicle's position at impact.
 3. Induced damage = damage to any part of the vehicle caused by the shock of the collision. **P.O. 4.3.6C**
 4. Glass damage.
 - a. Contact vs. induced.
 - b. Tempered vs. laminated safety.
 - c. Contact damage to laminated glass can help establish occupant positions.
 5. Eccentric impact.
 6. Centered impact.
 7. Collision of tire/wheels.
 - a. ABS brakes, make note, marks are more difficult to see.
 - b. A tire failure should leave road evidence if the tire failure is a cause of the collision.
 - c. Tires go flat during most rollovers as the lateral force on the tire dislodges the tire bead from the tire rim.
 8. Lamp condition. **INSTRUCTOR NOTE:** Do not turn on the lights to see if they are working. Note the positions of the switches.
 - a. Headlamps.
 - b. Taillights.
 - c. Turn signals.
 9. Underside contact with ground.

10. Signs of skidding on tire tread.
11. Interior damage and condition.
12. Restraints. **P.O. 4.3.6E**
 - a. Seat belts.
 - b. Airbag.
 - c. Child restraints properly installed.
13. Any other unusual conditions.
14. Other electronic systems in the vehicle may provide data using data retrieval systems such as CDR, GPS, On-Star type systems. **INSTRUCTOR NOTE:** Instructors may discuss with students the different data recovery systems used by their agency.

XIII. INFORMATION FROM ROADWAY**P.O. 4.3.7**

- A. Describe roadway.
 1. Type of surface (i.e., asphalt, gravel, dirt, etc.).
 2. View obstructions (remember, this can be very subjective).
 3. Weather conditions affecting roadway (at time of collision).
 4. Light conditions at the time the call was received.
 5. Surface conditions.
 6. Traffic control devices:
 - a. Stop signs.
 - b. Signal lights.
 - c. Construction zones.
 - d. Speed limits.
 - e. Warning signs.
- B. Final positions of vehicles and bodies.

1. Controlled (definition).
 2. Uncontrolled (definition).
- C. Tire marks.
1. Skid marks: **P.O. 4.3.7A**
 - a. “Friction mark created by a tire which is sliding and not rotating.”
 - b. Skid marks may vary in length, color and appearance.
 - c. Skid marks show the vehicle’s position, direction of travel, point of impact and speed reduction.
 - d. Durability of skid marks depends upon weather, traffic, road repairs, maintenance, etc. Can last for many weeks or as short as a few minutes.
 - e. Physical characteristics = relatively straight, consistent width striations with the mark running parallel with outside edges of the mark.
 - f. Skid marks can be curved: Caused by unequal braking due to road surface, grade, super elevation or some wheels not braking (unequal braking).
 - g. Finding the beginning of skid marks, shadow skid or impending skid. Created by tire scuffing just prior to lockup. ABS and impending skid have a short life span.
 - h. Irregularities in braking skid marks = skip skid, collision skid, after-collision skid, gap skid and towing skid mark.
 - i. If only the rear wheels lock, rotation will occur. If the front wheels lock, the vehicle will not rotate.
 - j. Skid mark deflection can show area of impact. **P.O. 4.3.7**
 2. Skip skid and gap skid.
 - a. Skip skid – caused by rough road or poor shocks. Measure the entire distance including the gaps. The skid gap is usually less than three (3) feet.
 - b. Gap skid – caused by release and re-application of brakes. Measure the skid only. The gap should be at least 10 feet or greater (rare occurrence).
 3. Scuff marks.
 - a. Friction mark created by a vehicle tire that is sliding across a surface while rotating. Short life span; dissipates quickly.

- b. Physical characteristics vary in width, generally curved and diagonal striations within the mark.
- c. In all normal turns, the rear tires track inside the front (no skidding).
- d. In a critical speed turn, the rear tires track outside of front tires and produce a critical-speed scuff mark.
- e. Flat-tire scuff.
- f. Acceleration scuff can look like skid marks sometimes (rarely found at crash scenes).
- g. Collision scrub/scuff. **P.O. 4.3.7C**

4. Tire prints.

- a. Prints on pavement caused by material transfer such as dirt, dust, liquid or soft asphalt material.
- b. Prints in soft material such as dirt, mud or dust.
- c. Prints show tire tread or tire pattern.

5. ABS skid marks.

- a. Computer regulates the brake force to prevent the wheels from locking.
- b. The tire mark visible on the pavement is considerably lighter than a typical skid mark and resembles a skip skid.
- c. Advantages of ABS brakes:
 - i. Drivers can steer during maximum braking.
 - ii. Better control on slippery surfaces.
 - iii. Higher drag factor on some surfaces.

D. Metal scars. **P.O. 4.3.7D**

1. Scratches and scrapes on road surfaces.

- a. Shows path of vehicle after impact.
- b. Vehicle component failure.

2. Gouges.
 - a. Associated with the collision.
 - b. Always identify the part of the vehicle that caused the gouge.
 - c. Chips, chops and grooves.

E. Debris.**P.O. 4.3.7E**

1. Underbody debris from the vehicle.
 - a. Mud, rust, paint, snow or dirt.
 - b. Indication of area of collision, but not point of impact.
 - c. Very poor indicator. **INSTRUCTOR NOTE:** Give example.
2. Vehicle liquids = coolants, oils, fuel, acids or fluids.
 - a. Allows you to determine the vehicle's post-collision path.
 - b. Pooling will tell you the vehicle/body point of rest.
 - c. Forms = spatter, dribble, pooling, run-off, soak-in or tracking.
3. Vehicle parts.
 - a. Mechanical.
 - b. Body/decorative.
4. Glass.
 - a. Windows.
 - b. Windshield.
 - c. Lenses.
5. Personal belongings/miscellaneous.

F. Vehicle dynamics.**P.O. 4.3.7F**

XIV. PHOTOGRAPHY**P.O. 4.3.10****A. When photographs should be taken:****P.O. 4.3.10A**

1. Photograph per department policy and procedures.
2. Photograph all fatalities.
3. Photograph all cases involving criminal charges.
4. Photographs should be taken after the scene is secure and the injured treated.
5. Photographs should be taken before the scene evidence is removed and the scene cleared.

B. Photographing vehicles and damage.**P.O. 4.3.10B**

1. One (1) photo of each of the four (4) sides of the vehicle.
2. One (1) photo of each corner.
3. Photograph the contact damage on the vehicle, including any imprinting.
4. Photograph the interior contact damage from occupants.
5. Photograph the induced damage, both interior and exterior.
6. Include a photo of the license plate for identification.

C. Photographing the roadway evidence.**P.O. 4.3.10C**

1. Photograph tire marks, skid, scuff and prints.
2. Photograph metal marks, gouges, scrapes and grooves.
3. Photograph debris, glass, liquid and vehicle parts.

D. Photographing victims.**P.O. 4.3.10D**

1. Photograph body final rest positions.
2. Photograph marks left on the body, which can be matched to a vehicle or point of impact.

E. Overall scene condition.**P.O. 4.3.10E**

1. Approach direction of each vehicle.
2. Path of travel of each vehicle.
3. Traffic control devices from the viewpoint of the vehicle drivers.
4. Photograph any unusual roadway conditions that may have been a factor in the collision.
 - a. Construction equipment.
 - b. Barricades.
 - c. Signs.
 - d. View obstructions.

XV. SPEED ESTIMATES FROM SKID MARKS

- A. Factors needed to make a speed estimate:
 1. Skid distance.
 2. Drag factor.
- B. The speed obtained from a skid mark is never the exact speed of the vehicle.
 1. Minimum speed.
 2. Errors.
- C. Differing weights of vehicles (i.e., compact vs. large pickup trucks make no appreciable difference in the stopping distance).
- D. Collisions involving commercial vehicles and motorcycles – contact more experienced help when trying to determine speed from tire marks.
- E. Skid chart.
 1. Explain how skid distance, drag factor and speed are related.
 2. Point out that the average drag factor for a vehicle with full braking on dry, level asphalt is .70.
 3. Exceptions (i.e., commercial vehicles, motorcycles and vehicles towing trailers).
 4. Discuss test skids and advise against making these tests.

5. Calculations.
 - a. Equation $S = \text{square root of } 30 \cdot d \cdot f$.
 - i. $S = \text{speed in m.p.h.}$
 - ii. $30 = \text{constant.}$
 - iii. $d = \text{distance in feet (longest mark minus the wheelbase).}$
 - iv. $f = \text{drag factor (.70).}$
 - b. Demonstrate use of skid chart/Nomograph to estimate speed.

P.O. 4.3.8
- F. Combining speeds.
 1. When you have to calculate two (2) or more speeds together for a vehicle involved in a collision, you cannot add those speeds together.
 2. You combine speeds.
 - a. Example: A vehicle skids 20 feet, has a gap and skids 20 feet and stops.
 - b. Data needed: Accurate estimates of speeds that are to be combined.
 - c. Never add two (2) speeds together! They must be combined using either of the following methods:
 - i. Calculations:
Equation $S_c = \text{square root } S_1^2 + S_2^2$.
 - ii. Combine speeds graphically.
- G. Critical Speed. **INSTRUCTOR NOTE:** Section G. Taught at discretion and knowledge base of instructor. Use a template. MPH X 1.4666 (Convert miles per hour (mph) to feet per second (fps))
 1. Review definition of:
 - a. Critical speed scuff.
 - b. Factors:
 - i. Radius of mark.
 - ii. Drag factor.

2. Explain how to:
 - a. Obtain radius.
 - b. Obtain measurements of the chord and middle ordinate.
3. Explain how to use the critical speed scuff chart to estimate speed.

XVI. IDENTIFY THE DEFINITIONS OF THE FOLLOWING COLLISION TERMS:	P.O. 4.3.4
A. Collision.	P.O. 4.3.4A
B. Area of collision/impact.	P.O. 4.3.4B
C. Centered impact.	P.O. 4.3.4C
D. Critical speed scuff.	P.O. 4.3.4D
E. Drag factor (coefficient of friction).	P.O. 4.3.4E
F. Eccentric impact.	P.O. 4.3.4F
G. Gap skid.	P.O. 4.3.4G
H. Intersection.	P.O. 4.3.4H
I. Junction vs. non-junction.	P.O. 4.3.4I
J. Occupant movement.	P.O. 4.3.4J
K. Point of impact.	P.O. 4.3.4K
L. Point of rest.	P.O. 4.3.4L
M. Reference point/permanent point.	P.O. 4.3.4M
N. Skip skid.	P.O. 4.3.4N

XVII. MEASUREMENTS

- A. Demonstrate the use of measuring devices.
 1. Rolatape, 100' tape

2. Pace.
 3. Tape measures.
 - a. 100' fiberglass.
 - b. Carpenter's 25' tape.
- B. Recommended abbreviations:
- | | |
|--------------------|--------------------------|
| AI | Area of Impact |
| PP | Permanent Point |
| PI | Point of Impact |
| RP | Reference Point |
| AC | Area Collision |
| PR | Point of Rest |
| N,S,E,W | North, South, East, West |
| LFC, RFC, LRC, RRC | Left front corner, etc. |
| LFW, RFW, LRW, RRW | Left front wheel, etc. |
| N/B, S/B, E/B, W/B | Northbound, etc. |
| ECL, WCL, NCL, SCL | East curb line, etc. |
| VEH | Vehicle |
| M/C | Motorcycle |
| PED | Pedestrian |
| P/U | Pickup Truck |
- C. Measurements to be taken – typically, the more serious the collision, the more measurements you will need. The minimum measurements taken will include:
1. Area of collision or point of impact (physical location where objects collide).
 2. Points of rest of vehicles or final position (physical location where objects or vehicles come to rest). **INSTRUCTOR NOTE:** Show what to measure.
 3. Start and end of straight skid marks.
 - a. Curved tire marks or any curved path.
 - b. Measure a point on that curve every 20' maximum.
 4. Length of skid marks for speed estimates.
 - a. This distance can be obtained from your scale diagram (you have plotted the start and end point on your skids).
 - b. Path of the vehicle:

- i. Fluids.
 - ii. Scratches.
 - 5. Distance traveled from impact to rest.
 - 6. Street width/lane width.
 - 7. Miscellaneous measurements:
 - a. Warning signs.
 - b. Barricades.
- D. When taking your measurements, draw a field sketch showing a rough layout of your collision scene.
 - 1. Field sketch does not have to be to scale.
 - 2. Show an example of a field sketch.
- E. Locate permanent points as reference.
 - 1. Extension of road edges/curbs.
 - 2. Power poles.
 - 3. Fire hydrants.
 - 4. Any other available permanent points.
- F. Coordinate method of measurements from reference point or reference.
 - 1. Demonstrate process of coordinate measuring.
 - 2. Plan your measurements.
 - a. Measure progressively.
 - b. Decide what you want to measure after completing the field sketch.
 - 3. Measure from reference lines.
 - 4. Baseline technique:
 - a. Use a 100' tape measure.

- b. Show an example for a dirt road curve where there are no curb lines.
- 5. Measure in feet and inches.
 - a. Be careful. Some tapes measure in metric.
 - b. Show how to label measurements.
- 6. Marking points on the roadway with lumber crayon, spray paint, etc.
- 7. Measurements legends.

XVIII. DIAGRAMMING

- A. Use a template.
- B. Demonstrate the use of the template.
- C. Use the scale of 1 inch = 20 feet.
- D. Show your vehicles with dotted lines at the point of impact. **INSTRUCTOR NOTE:** Agency Specific.
- E. Show your vehicles with solid lines at the point of rest. **INSTRUCTOR NOTE:** Agency Specific.
- F. Drawing process:
 - 1. Plan ahead; use a pencil first.
 - 2. Layout streets and reference points.
 - a. Lane widths.
 - b. Driveways.
 - c. Corners and curves.
 - 3. Place physical evidence into a diagram showing traffic units at PI (dotted).
 - 4. Add symbols, words and measurements.

XIX. HIT-AND-RUN COLLISIONS**P.O. 4.3.9**

- A. Response is the same procedure as for all other collisions.
 - 1. Be on the lookout for a “run” vehicle while you are responding.

2. The hit-and-run vehicle may not be the at-fault vehicle.
- B. Get witness information quickly.
1. Vehicle description.
 - a. Make, model, body style, color, year, license plate number and state.
 - b. Any unusual characteristics.
 - i. Bumper stickers, vanity plates, flags or banners, etc.
 - ii. Low rider, lift kit, oversized tires, etc.
 - c. Direction of travel.
 - d. Damage, area and extent.
 2. Occupant description:
 - a. Number of occupants, including the driver.
 - b. Sex, age, race and physical description.
 3. Broadcast all available information.
 4. Update as new information is learned and/or developed.
 5. Check for any available video or photographic security systems.
- C. Laws related to requirements when involved in a collision.
1. A.R.S. §28-661 – Collisions involving death or personal injury – shall:
 - a. Immediately stop.
 - b. Remain at the scene until you fulfill requirements of A.R.S. §28-663.
 - c. Penalties:
 - i. Death or serious injury involved: Class 3 felony.
 - ii. Death or serious injury at fault: Class 2 felony.
 - iii. Injury other than serious: Class 5 felony.
 2. A.R.S. §28-662 – Collisions involving damage to vehicles shall:

- a. Immediately stop.
 - b. Remain at the scene until the driver fulfills requirements of A.R.S. §28-663.
 - c. Make the stop without obstructing traffic more than is necessary.
 - d. Class 2 misdemeanor.
3. A.R.S. §28-663 – Duty to give information and assistance if a vehicle is driven, or attended, by a person.
- a. Give name, address and registration number of vehicle.
 - b. On request, exhibit the person’s driver’s license.
 - c. Render reasonable assistance.
4. A.R.S. §28-664 – Duty on striking unattended vehicle shall:
- a. Stop.
 - b. Either:
 - i. Locate and notify the operator or owner of the struck vehicle.
 - ii. Leave written notice giving name and address of vehicle owner and operator.
5. A.R.S. §28-666 – Notice of collision.
- a. If injury or death, shall give notice immediately by quickest means possible, whether oral or written, to:
 - b. The local police department if the collision occurs within a municipality.
 - c. The office of the county sheriff.
 - c. The nearest office of the highway patrol.
- D. Arizona traffic crash report.
1. Leave all unknowns blank.
 2. Follow-up investigation will fill in updated information on supplement.
 3. Put all descriptions in the report.

- E. Physical evidence.
 - 1. Be aware of fraud, 25% of collisions are fraudulent claims.
 - a. Physical evidence, or lack thereof, is not consistent with what the victim says.
 - b. Investigate; do not just report.
 - 2. Collect and photograph per department policy and procedures.
 - a. Photograph collision scene, evidence and vehicles.
 - b. Measure and document prior to moving, same as all other collisions.
 - c. Pedestrian fatalities.
 - i. Attend autopsy.
 - ii. Photographs and measurements of injuries.
 - iii. Collect clothing.
 - 3. Damage – photograph and measure.
 - a. Unusual marks and imprints.
 - i. Emblems – Ford, Chevrolet, etc.
 - ii. Partial plate imprint.
 - b. Compare scene evidence with suspect vehicle and photograph with and without evidence.

XX. CONCLUSION

- A. Review of performance objectives.
- B. Final question and answers.
- C. Instructor closing comments(s).