

# TRAFFIC ACCIDENT STUDY GUIDE 2010

## SECTION THREE



This study guide is designed to provide the law enforcement Explorer with basic principles. The guide is not all inclusive, and does not delineate specific techniques that must be used. The focus of this guide is to provide principals that are flexible and adaptable to various law enforcement situations.

Following the basic principals in this guide should allow the law enforcement Explorer to successfully handle various law enforcement training activities safely and professionally.

The study guide was developed through the cooperation of International Association of Chiefs of Police and the Federal Law Enforcement Training Center.



# **SECTION THREE**

## **HIGHWAY TERMINOLOGY**

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# SYLLABUS

**COURSE TITLE:** Highway Terminology

**LENGTH OF PRESENTATION:**

LECTURE	LAB	P.E.	TOTAL	PROGRAM	OPTION
2:00			2:00		

**DESCRIPTION:**

This course introduces the student to the need for the use of uniform terminology in describing factors and events in the course of an accident investigation. The student will become familiar with the terminology used in traffic accident reports.

**TERMINAL PERFORMANCE OBJECTIVE (TPO):**

Given a written, multiple-choice examination, the student will identify and define the correct terminology used in accident reports and court testimony with 70 percent accuracy.

**ENABLING PERFORMANCE OBJECTIVES:**

EPO #1: Identify the correct terminology used in describing the accident site.

EPO #2: Identify the correct terminology used in describing the physical evidence found at an accident scene.

EPO #3: Identify the correct terminology for various tire and skid marks.

EPO #4: Identify the terminology used to describe the “chain of events” in a traffic collision.

**STUDENT SPECIAL REQUIREMENTS:**

None

## **INSTRUCTOR GUIDE**

### **METHODOLOGIES:**

1. Lecture.
2. Discussion.

### **TRAINING AIDS AND EQUIPMENT:**

1. Instructor
  - a. Traffic Accident Investigation Manual, Baker, J. Standard; Traffic Institute, Northwestern University; Ninth Edition, 1986.
  - b. Magnetic cars.
2. Student
  - a. Note taking material.

### **INSTRUCTOR SPECIAL REQUIREMENTS:**

None

## **OUTLINE OF INSTRUCTION**

### **I. INTRODUCTION**

#### **A. Establishing rapport and opening statement.**

1. The traffic accident report may be the only source of unbiased information in an accident investigation. The details and information included in this report often determine the outcome of a serious legal action for defendants or individuals involved and reflects on the officer and the agency involved in the investigation.
2. It is imperative that officers use proper, consistent, and uniform terminology in the traffic accident report. This is an official document, which may be examined by many individuals including U.S. Magistrates, prosecutors, defense attorneys, insurance companies, media, public officials, other law enforcement agencies, and the public.

#### **B. Lesson Plan Overview**

1. Identify the correct terminology used in describing the accident site.
2. Identify the correct terminology used in describing the physical evidence found at an accident scene.
3. Identify the correct terminology for various tire and skid marks.
4. Identify the terminology used to describe the "chain of events" in a traffic collision.

### **II. PRESENTATION**

#### **A. EPO #1: Identify the correct terminology used in describing the accident site.**

1. One of the duties of a law enforcement officer with road patrol responsibilities includes handling and investigating motor vehicle accidents. To assist in effectively carrying out this task, an officer must have a strong knowledge and understanding of general and specific vocabulary/terms related to the investigation and documentation of traffic accidents. An appreciation of the proper terminology involved enables the officer to write more accurate and understandable reports and present a professional and comprehensive case in court.
  - a. **ACCIDENT** - According to the Northwest Traffic Accident Investigation Institute an accident is defined as, "That

occurrence in a sequence of events which usually produces unintended injury, death or property damage.”

- b. ROADWAY – That portion of the highway improved, designed, or ordinarily used for vehicular travel, excluding the berm or shoulder.
- c. ROAD – The part of a highway that includes both the roadway and the shoulder.
- d. TRAFFICWAY – The entire width of the road from property line to property line. The property line and “the first harmful event” determine which jurisdiction investigates the accident.
- e. ROAD SURFACE MATERIALS – Materials used alone or in combination to create a road surface:
  - (1) PORTLAND CEMENT CONCRETE – A form of concrete made with Portland cement.
  - (2) ASPHALTIC CONCRETE – Any paving material using asphalt as a binding medium.
  - (3) OTHER COMMON MATERIALS – Dirt, gravel, sand, etc.
- f. GRADE – the change in elevation along the centerline of a roadway. This change in elevation can be determined with the traffic template.
- g. SUPERELEVATION (bank) – the degree to which the outside edge of a roadway is higher than the inside edge of the curve.

**NOTE:** Both grade and superelevation can have an effect on the speed estimated from skid marks. An uphill grade will slow down a vehicle and cause it to slide less. A down hill grade will cause the opposite to happen.

- h. ENCROACH – To move into an area properly assigned to another vehicle, or traffic unit.

B. EPO #2: Identify the correct terminology used in describing the physical evidence found at an accident scene.

- 1. When arriving at an accident scene, the officer should look for different marks, fluids, and debris (CLUES) that are evidence of

what may have caused or contributed to the accident. The physical evidence can make the difference in the outcome of the accident investigation. Areas that deserve particular attention include actual damage caused to the road surface, and debris and damage left by the vehicle(s) on the traffic way. Marks left on the roadway can be critical in determining vehicle positions at the time of the collision.

- a. GOUGES - Places where pavement material has been dug out by a strong metal part (tire rims, broken axle...).
  - (1) Three types of gouges:
    - (a) **Chips** – Small, deep gouges, usually created during maximum engagement. This generally indicates the point of maximum engagement due to the compression of the vehicle's suspension. Normally there are no striations.
    - (b) **Chops** – Broad, shallow gouges that clearly indicate the direction of motion from the deep sharp side to the shallow, ragged side. This may result in striations and scratches on the more shallow side.
    - (c) **Grooves** – Long and narrow indentations that are made by a vehicle part dragging on the road. These marks may continue for some distance beyond the point of maximum engagement.
- b. FURROW – A channel in loose or soft material, such as snow or soil, made by a tire or some part of a moving vehicle.
- c. UNDERBODY DEBRIS – This is debris consisting of mud, dust, snow or road tar, etc. that has been loosened by a collision or impact.
- d. LIQUID DEBRIS – This is debris consisting of liquids from a vehicle or its cargo, i.e., oil, transmission fluid, or radiator fluid. Liquid debris can be broken down into five categories or patterns found at the accident scene.
  - (1) **Spatter** – Spatter is the collection of spots on the road made by liquid squirted from the vehicle or its cargo by the force of collision. One example is coolant from the radiator.

- (2) **Dribble** – Dribble is the liquid from a vehicle or its cargo that drops to the ground. This may often leave a trail if the vehicle is moving. The spatter pattern may also give an indication of the direction of travel/motion at the time of impact.
- (3) **Puddle** – Wet area where dribble accumulates after a vehicle has come to rest.

**NOTE:** This is an important piece of evidence. If there is a puddle and the vehicle is not over it, the vehicle was moved. Now the investigator will have to compare verbal statements of witnesses or parties involved.

- (4) **Run-off** – Run-off is rivulets of liquid from a puddle area flowing downhill toward soak-in at the edge of the pavement.
- (5) **Soak-in** – An area saturated with liquid, either at the end of the run-off or as a puddle marking the rest position of a vehicle.

C. EPO #3: Identify the correct terminology for various tire and skid marks.

- 1. **TIRE PRINTS/MARKS** – the marks left on a surface by a rotating wheel. They can be found in dirt, mud, snow, and sometimes are left on pavement by tires that have passed through liquid debris. Tire prints can be an essential element in an accident investigation. It is important that the accident investigator have a knowledge and understanding of the different types of tire marks and what they indicate, to accurately evaluate the sequence of events at the accident scene.
- 2. **SKID MARKS** – a skid mark is defined as a friction mark left on a surface by a tire that has limited rotation or is locked and sliding. Skid marks may be broken down into many different categories or types. We will cover the seven most common:

**NOTE:** Recognizing skid marks may assist in determining the location brakes were applied, the minimum speed the vehicle was traveling when the skid began, location of the vehicle on the roadway (both before and after the collision), direction of travel, and the number of wheels active in the braking process.

- a. **IMPENDING SKID** (shadow) – skid mark left by a wheel that is still rotating, but at a reduced rate.

- (1) This is the point where braking is most effective.
  - (2) The visual mark may appear as a cleaning action, which leads into the skid mark.
  - (3) The impending skid may be difficult to see; however, it is an important factor in determination of speed from skid marks.
  - (4) Most skid marks left by ABS equipped vehicles will resemble the shadow or impending skid. May be difficult to see and may disappear quickly.
- b. **LOCKED WHEEL SKID** (skid mark) – A skid mark that is left on a surface by a tire that is sliding without rotation. This type of skid is less efficient at stopping a vehicle than an impending skid.
- c. **GAP SKID** (intermittent skid marks) – A braking skid mark which is interrupted by the release and reapplication of the brakes.
- (1) Drivers can cause these types of skids by “pumping” defective brakes or through their indecision (i.e. applying, releasing, and reapplying the brakes).
  - (2) The blank spaces or gaps in between the visible skid marks are usually a minimum of 15-20 feet, and are dependent on the speed of the vehicle at the time of the accident and the operators’ reaction time.
  - (3) When taking measurements of these skids, measure the series of obvious skid marks (omitting the gaps) and add them for the total length.
- d. **SKIP SKID** (bounce skids) – A braking skid mark interrupted at frequent, regular intervals.
- (1) Made when a locked vehicle/wheel bounces on the roadway. May be caused by potholes, bumps, suspension problems, or colliding with another vehicle or object, resulting in the rear of the vehicle lifting off the roadway.
  - (2) This type of skid mark is often observed in tractor-trailers that are not fully loaded.

- (3) Skid marks are usually very dark, short, and usually two to three feet in length.
  - (4) Unlike gap skid marks, **with the skip skid, measure the entire distance, as though there is no gap.** (The weight pushing down at the end of the bounce offsets the loss of friction while air born.)
- e. **CENTRIFUGAL SKID** (yaw mark) – The mark left on the surface by a rotating tire that is slipping or sliding. Also known as a SCUFF MARK.
- (1) These marks are left when a vehicle is “yawing” (moving sideways or in direction other than the vehicle was originally heading). The centrifugal force, such as when going into a turn at a high speed, is pushing the vehicle to the outside, or away from the center. This force overcomes the adhesion or frictional resistance between the tires and the roadway resulting sliding or skidding.
  - (2) This particular skid mark is characterized by striations left on the pavement.
- f. **ACCELERATION SKID** (acceleration scuff) – Vehicles may leave these skids when drivers apply sufficient power to the driving wheels to cause them to skid on the road surface (i.e. lose adhesion with the road surface). The beginning portion of the mark is very dark, from the weight transfer of the vehicle (inertia). Tire tread rib marks may be visible.
- g. **OFFSET SKID** (bends, crooks) – Skid mark that changes direction due to an outside force.
- (1) An offset mark shows the position of a tire at the onset of the collision. (This is not necessarily the first point of impact).
  - (2) These marks are often the end of pre-impact skid marks and the start of after impact tire marks.

D. EPO#4: Identify the terminology used to describe the “chain of events” in a traffic collision.

- 1. It is the responsibility of the officer investigating the accident to determine what happened at that scene. In order to accomplish this, the officer must piece together evidence found at the scene and information supplied by witnesses to establish a sequence of

events or chain of events that resulted in the accident. Accurately “mapping out” these events can determine the outcome of court decisions as well as help to alleviate some of the mental suffering of survivors.

- a. POINT OF POSSIBLE PERCEPTION – The place and time, at which the hazard could have been perceived, e.g. entering an intersection.
- b. POINT OF PERCEPTION – The time of actual recognition and comprehension of a hazard. This point may not occur, resulting in the accident. This may also occur at or after the Point of No Escape, thus resulting in an accident, e.g., entering an intersection, and not observing another vehicle entering from a side road, or seeing it too late.
- c. POINT OF NO ESCAPE – The place and time after or beyond which the accident cannot be prevented, e.g., both vehicles in the intersection.
- d. FIRST CONTACT – The initial touching of objects involved in a collision. This was formerly called “point of impact,” e.g., the vehicles touch front bumper to driver’s side.
- e. FIRST HARMFUL EVENT – The first occurrence that results in appreciable damage or injury. This element explains:
  - (1) When the accident actually occurred,
  - (2) Where the accident actually occurred, e.g., front bumper pushes into driver’s side door.
- f. MAXIMUM ENGAGEMENT – The greatest penetration of one body by another during a collision, e.g., front bumper is pushed into other vehicle at its deepest point.
- g. LAST CONTACT – The final touching of objects in a collision before separation, e.g., last point/moment cars remain in contact, bumper to door prior to separating or coming to complete rest.
- h. STABILIZED POSITION – The condition prevailing after motion and other actions constituting the events of an accident have ceased. At this point, no further harm or damage will follow unless a new series of events are initiated by different means.

- i. FINAL POSITION – The specific location of a vehicle or object after the collision or accident. This is the position prior to change of location by other means (such as moving a vehicle to the side of or off the roadway after vehicle has come to rest). This position may or may not be the same as the stabilized position.

### **III. SUMMARY**

- A. Summarize the enabling performance objectives.
  1. Identify the correct terminology used in describing the accident site.
  2. Identify the correct terminology used in describing the physical evidence found at an accident scene.
  3. Identify the correct terminology for various tire and skid marks.
  4. Identify the terminology used to describe the “chain of events” in a traffic collision.
- B. Summarize main teaching points.
  1. Investigating traffic accidents is an important and integral part of the law enforcement officers’ duties.
  2. The accident report often times is the only official document substantiating the occurrences that resulted in the event.
  3. It is important to remember the accident report is an official court document that may be viewed and scrutinized by many officials as well as laypersons. This document may also be the determining factor which driver(s) is (are) at fault. For this reason, accident investigators must have a strong understanding and knowledge of the terminology used to describe every aspect of traffic collisions.

### **IV. APPLICATION**

None

## REFERENCES

Baker, J.Stannard, and Fricke, Lynn B. (1986). The Traffic Accident Investigation Manual At-Scene Investigation and Technical Follow-up. Evanston, Ill: Northwestern University Traffic Institute. 1986.

Rivers, R.W. Traffic Accident Investigators' Handbook. Charles C. Thomas, Springfield Ill. 1980.