

TRAFFIC CRASH INVESTIGATION TRAINING COURSE

CONTENT OVERVIEW

Welcome to this course in Traffic Crash Investigation!

We thank participants for taking the time to learn new skills that will help you in your role as a Police Officer, and also help save your fellow citizens from death or serious injury on your roads.

Due to travel restrictions resulting from the COVID-19 pandemic response we are not able to deliver face-to-face training. Instead, this training course will be delivered through written material and participation in a series of webinars which will be at the end of each of the five modules that make up this course, where we can talk about what has been learned and answer any questions.

In addition, there will be a short test at the end of each module.

Sadly, as more and more people use motor vehicles worldwide, motor vehicle crashes continue to be a major cause of death and injury. If we are going to stop this trend, we need to know what is causing the crashes that are killing and hurting people.

Crash Investigation has a vital part to play to make sure we understand how and why crashes are happening, and how we can prevent them.

We hope that after completing this training participants will think differently about crashes. They will become curious about why it happened and will think more about the many things that happen during a crash.

OVERALL COURSE OBJECTIVES

This course in Traffic Crash Investigation will provide participants with the skills to attend and manage a traffic crash scene. They will know what the various marks left on the roadway are, how they are caused and what they mean.

Participants will understand how and why vehicles move as they do after impact and be able to place the vehicles back at their impact positions. Participants will gain the skills to complete sketch and scale plans and how to correctly photograph a scene.

After completing this course participants will have the confidence to investigate traffic crashes and provide robust information on what happened, how it happened and why it happened.

WHO SHOULD ATTEND?

Staff attending this training will ideally;

- Have two years' experience in traffic enforcement,
- Be tasked with attending serious traffic crashes as part of their duties,
- Demonstrate the ability to think creatively and question what they see
- Be able to commit to completing

TIME COMMITMENT

This course consists of five modules. Each module represents approximately 1 hour of reading and absorption time. Each Module is supported by a 2 hour webinar where the module content is reinforced through discussion and example. A 10 question multiple choice knowledge test is included in the webinar.

The total time commitment is approximately 15 hours.

Module 1 – Introduction to Crash Investigation and Reporting

COURSE CONTENT

1. Why attend Road Traffic Crashes
2. Accuracy
3. The Difference Between Reporting and Investigating
4. Causative Factors
5. Levels of Crash Investigation
 - 5.1. Reporting
 - 5.2. At Scene Investigation
 - 5.3. Technical Preparation
 - 5.4. Professional Analysis
 - 5.5. Cause Analysis
6. Crash Investigation Strategic Influences
7. A Transport System
 - 7.1. Physical Properties
 - 7.2. Users
 - 7.3. Controlling Elements
8. A Safe System
 - 8.1. Safe roads and roadsides
 - 8.2. Safe vehicles
 - 8.3. Safe speeds
 - 8.4. Safe users
9. The Crash Investigator
10. Preparation – Attending the Crash
 - 10.1. Equipment
 - 10.2. Getting the Call to Attend the Crash

LEARNING OBJECTIVES

This module provides you with the reasons we investigate traffic crashes. It examines transport systems, the uses of crash data and the importance of collecting accurate information. It also introduces the need to plan and manage attendance at crash scenes in order to ensure the safety of those at the scene, and to capture all necessary information.

On completing Module 1 participants will,

- Understand how traffic crash report information is used;
- Understand the importance of gathering accurate information;
- Understand the 'Safe System' approach to road safety;
- Know the difference between reporting and investigating;
- Appreciate and develop the skills needed to be a good investigator;
- Undertake pre-planning when attending incidents.

Module 2 – Identifying and Collecting Road Crash Evidence

COURSE CONTENT

1. INTRODUCTION
 - 1.1. Recording of Information
 - 1.2. Road Evidence
2. TYRE MARKS
 - 2.1. Skid Marks
 - 2.1.1. Life of Tyre Marks
 - 2.1.2. Characteristics of ABS Skid Marks
 - 2.1.3. Characteristics of Non ABS Skid Marks
 - 2.1.4. Striations
 - 2.1.5. Motorcycle Skid Marks

- 2.1.6. Unequal Skid Length
- 2.1.7. Weight Shift Due to Breaking
- 2.1.8. Irregularities in Skid Marks
- 2.1.9. Tyre Over Deflation
- 2.1.10. Skip or Bounce Marks
- 2.1.11. Collision Scrubs
- 2.1.12. Crook Marks
- 2.1.13. Broadside Skid Marks
- 2.1.14. Swerved skid marks
- 2.1.15. Impending Skid
- 2.2. Taking and Recording Measurements
- 2.3. Scuff Marks
 - 2.3.1. Yaw Marks
 - 2.3.2. Characteristics of Yaw marks
 - 2.3.3. Acceleration Scuff
 - 2.3.4. Flat Tyre Marks
- 2.4. Imprints
- 2.5. Tyre Mark Summary
- 3. ROAD SCARS
 - 3.1. Gouges
 - 3.2. Chips and Chops
 - 3.3. Scrape marks
 - 3.4. Grooves
 - 3.5. Scars to Roadside Objects
 - 3.6. Debris
 - 3.7. Vehicle Fluids
 - 3.8. Vehicle parts
- 4. MARKING EVIDENCE
- SUMMARY

LEARNING OBJECTIVES

This module provides you with the knowledge to correctly identify the various marks left on a road surface following a traffic crash. The reasons for the marks and how they are caused will be explained, allowing you to form sound opinions on what has happened.

On completing Module 2 participants will have the knowledge to,

- Identify different tyre marks and how they are caused,
- Identify scars on the road surface and explain how they are caused,
- Understand vehicle weight shift and how that effects tyre skid marks,
- Know how to mark road evidence.

Module 3 – Vehicle Dynamics, Damage and Equipment Inspection

COURSE CONTENT

- 1. VEHICLE DAMAGE AND DYNAMICS
 - 1.1. Damage Classification
 - 1.2. The Three Stages of a Collision
 - 1.3. Principle Direction of Force
 - 1.4. Centred and Eccentric Collison
 - 1.4.1. Centred Force
 - 1.4.2. Eccentric Force
- 2. NEWTON'S LAWS OF MOTION
 - 2.1. Newton's First Law
 - 2.2. Newton's Second Law

- 2.2. Newton's Third Law
- 3. VEHICLE EQUIPMENT EXAMINATION
- 4. BRAKES
 - 4.1. ABS Brakes
 - 4.2. ABS and Non-ABS Brake Failure Claims
 - 4.3. Scene Evidence
 - 4.4. Dashboard Warning Lights
 - 4.5. Brakes Systems Issues
- 5. STEERING
- 6. SUSPENSION
- 7. DRIVER AND PASSENGER RESTRAINTS
 - 7.1. Evidence of Seatbelt Use
- 8. TYRES
 - 8.1. Tyre Construction
 - 8.2. Tyre Markings
 - 8.3. Tyre Failure
 - 8.4. Crash Investigation Procedures for Tyres
- 9. LAMP INSPECTION
 - 9.1. Operation of the Incandescent lamp
 - 9.2. Lamp Abnormalities
 - 9.3. Aged Lamps
 - 9.4. Bulb Burnout
 - 9.5. Filament Oxidation
 - 9.6. Fused Glass Particles
 - 9.7. Filament Deformation
 - 9.8. Hot Break
 - 9.9. Cold Shock
 - 9.10. LED and HID Lamps
- 10. CRASH DATA RETRIEVAL (CDR)

SUMMARY

LEARNING OBJECTIVES

This module will provide you with the knowledge to understand how and why vehicles move as they do during and after a collision. You will be able to describe why vehicles rotate or spin after impact, where the vehicles were on the roadway at the moment of full impact and the approach angles between vehicles. You will gain an understanding of the critical components of a vehicle and how to determine if lights were on or off and if tyres were deflated before the crash.

On completing Module 3 participants will,

- Understand how impact alignment directs post-impact movement,
- Know how to determine where the impact forces travelled through the vehicle,
- Know what different vehicle components do and what to look for as causative failure,
- Be able to determine if seatbelts were being worn at the time of impact.

Module 4 – Scene Diagram, Plans and Photography

COURSE CONTENT

- 1. CAPTURING A TRAFFIC CRASH SCENE
 - 1.1. Taking Measurements
 - 1.2. Equipment Required
 - 1.3. Sketch Plan
 - 1.4. Scale Plans
 - 1.4.1. The '10 Second Rule'
 - 1.5. Scene Measurements

- 1.5.1. Baseline – Offset. Example
- 1.5.2. Triangulation
- 1.5.3. Choosing a Scale for Your Plan
- 1.5.4. Drawing a Sketch
- 1.5.5. Drawing a Scale Plan

2. PHOTOGRAPHY

- 2.1. Photography Equipment
- 2.2. Photography Methods
- 2.3. Evidence
 - 2.3.1. Vehicle Photographs
 - 2.3.2. Night Time Photographs
 - 2.3.3. Macro photography

LEARNING OBJECTIVES

This module provides you with the knowledge to complete a sketch plan of a traffic crash scene, take measurements from which a scale plan can be drawn, and how to capture scene and vehicle evidence with photographs.

On completing this module, participants will;

- Understand the requirements of a sketch plan,
- Understand the requirements of a scale plan,
- Be able to complete both sketch and scale plans,
- Understand the importance of correctly photographing a scene and vehicle, and
- Be able to complete a full photographic record of a crash scene and the evidence observed within it.

Module 5 – Mathematics – Velocity and Reaction Time, Speed Estimates from Skid Marks

COURSE CONTENT

1. SPEED AND VELOCITY

- 1.1. Order of Operations - Mathematics
- 1.2. Converting Kilometres per Hour into Metres per Second
- 1.3. Distance Time and Velocity
- 1.4. Perception Reaction Time
- 1.5. Perception Reaction Time in Crash Investigation
- 1.6. Drag Factor

2. SPEED FROM SKID MARKS AND VELOCITY

- 2.1. Calculating Speed Using the Slide to Stop Equation
- 2.2. Calculating Drag Factor from Test Skids
- 2.3. Determining Drag factor Example
- 2.4. Determining Skid Length Example
- 2.5. Special Consideration for the Speed Equation – The ‘N’ Factor
- 2.6. Gradient
- 2.7. Skids Over Multiple Surfaces
- 2.8. Special Considerations
 - 2.8.1. Motorcycle Skids
 - 2.8.2. Truck Skids
 - 2.8.3. Vehicles Towing Unbraked Trailers

3. SPEED FROM YAW MARKS

- 3.1. Calculating the radius

LEARNING OBJECTIVES

The ability to complete speed estimations and determine if speed was a causative or contributing factor in a traffic crash is a valuable skill for a crash investigator. This module will introduce equations used to determine vehicle speed from tyre marks, and how to calculate travel times, stopping distances and distances travelled during perception/reaction time.

On completing this module, you will;

- Understand how to convert speeds in kilometres per Hour (km/h) to velocity in metres per second (m/s),
- Understand the distance / time / velocity relationship and equations,
- Be able to calculate vehicle speeds from measured skid marks,
- Understand the various factors that influence the results of the speed from skid equation.