



Vehicle Accident Investigation Reference Booklet



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Vehicle Accident Investigation Checklist



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Please note that this Checklist is to be used in conjunction with the accompanying booklet which provides further information and advice

Before Leaving the Office (page 2)

Equipment

| | | |
|--|---------------------------|---|
| | Health & Safety Equipment | High visibility jacket, safety shoes/boots, appropriate clothing for conditions, amber flashing beacon/warning lights |
| | Colour Camera and video | Film/memory card, batteries (spare film/memory card and batteries) |
| | Measuring | Measuring wheel, 5 metre metal tape (15 feet) – if equipment not available use walking paces (page 10) |
| | High power torch | Batteries, plus spare batteries and bulbs |
| | Marking equipment | Road spray paint and chalk/crayon |
| | Reporting equipment | Paper (all weather), Clipboard, Pen, Pencil, Eraser, etc |

Location

| | |
|--|--|
| | Ensure the incident location is known, plan the route to scene, inform company of deployment to incident and drive to the scene in a safe manner adhering to local laws. |
|--|--|



At the Scene (pages 3 – 6)

Health and Safety (page 3)



| | | |
|--|--|--|
| | Park in a safe area | Do not park on live traffic lanes unless safe to do so. Use amber beacon if vehicle visible to traffic |
| | Identify yourself to Police (if on scene) | Try to gain an understanding of the circumstances of the incident |
| | Determine whether photographs and scene measurements can be taken safely | Undertake a dynamic risk assessment, particularly if in a dangerous or high speed environment |
| | Video drive through of site on relevant approaches | This is especially useful if road has been reopened and is too dangerous to inspect |

Identify Scene Evidence (pages 4 – 6)










| | | |
|--|--|--|
| | Type, make, model and year of vehicles | Specifically identify the BP vehicle |
| | Vehicle positions | Identify and measure post impact positions, ascertain whether they were moved following the incident |
| | Tyre marks (note whether straight or curved) | On the road and surrounding ground |
| | Gouge, scratch, scrape marks | On the road and surrounding ground |
| | Debris | Note the extent of debris including concentration areas, include fluid deposits such as oil |
| | Road environment | Including barrier and kerb strikes, fence and sign impacts. Note defects (blocked drainage, potholes, etc) |
| | Damage to vegetation | Marks on trees, broken roadside vegetation |
| | Speed limit and road signs | Note the road speed limit(s) and the road signs on each vehicle's approach (visible and hidden) |

Measuring the Evidence (pages 7 – 11)

Locate the scene within surrounding area (page 7-8)

| | | |
|---|---|--|
|  | Find fixed feature/location (reference point) | Take measurements of the site relative to this point, ensure that you will be able to identify this point on another visit |
|  | Locate this feature to the wider environment | Measure its distance from the nearest junction, bridge or signpost (or other fixed feature) |

Take measurements of the site from a reference point (pages 7 – 11)

| | | |
|---|------------------------------|--|
|  | Road environment | Measure lane widths, road width, road markings, locations of obvious features such as lighting columns and signposts. Additionally, measure the location of any defects. |
|  | Vehicle positions | Measure to each corner |
|  | Tyre Marks | Measure start point, end point and the location of any sudden deviations in the marks, record the overall length of each mark |
|  | Curved tyre marks (study 3) | Measure as shown in booklet (page 8-9, case study 3) |
|  | Gouge, scratch, scrape marks | Measure as a point or, if long, measure start point and end point including the location of large deviations |
|  | Debris | Measure the start and end of the obvious debris field along the road, identify the area(s) of greatest debris concentration, measure the location of fluid (e.g., engine oil) spillage on the road |
|  | Damage to road environment | Measure as a point location |
|  | Damage to vegetation | Measure as a point location or length |
|  | Visibility restrictions | Attempt to identify, measure, and photograph driver's view where it may have been restricted by a road feature, wall, tree or parked vehicle, for example. Measure the position of such features |

Photographing the Evidence (pages 12 – 18)

- Use colour photography where possible. Set camera to give a field of view close to that of the human eye. If using a SLR camera use a 50mm lens or zoom setting. Approximate by zoom setting with other cameras
- Take lots of photographs. Take photographs to give others the **best possible** understanding of the site. Remember, camera film is very cheap compared to the cost of the accident
- If vehicles have been removed from the scene, determine where they have been taken and arrange to inspect them to take photographs

Scene Evidence (pages 14 – 19)

- Photograph key evidence Take close up and wider positional views of: tyre marks, gouges and scrapes, debris, marks on adjacent ground, vehicle rest positions
- Photograph the vehicles Photograph **vehicle exteriors/damage** in a structured way, sides, front, rear, square on. Take close ups of damage square on. Use oblique views if this will assist (pages 16 – 18)

Photograph vehicle interiors, photograph obvious evidence such as blood, seatbelts, and items within the vehicle (particularly on front seats and in foot wells)

Scene Evidence (pages 14 – 19)

- Photograph the approach Take photographs at regular intervals going paths of vehicles back from the area of the crash (say, every 25 metres for 200 metres). Repeat for each relevant approach to the site. **Include photographs of road defects, poor surface, blocked drainage, broken signs etc** (page 12)
- Photograph driver views Take photographs showing the driver's views as they approach the junction (for example, the view to the right/left, etc)

Overview

This manual is intended for use at road traffic accident sites, and is designed in conjunction with the Vehicle Accident Investigation Checklist to provide guidance for the gathering of physical evidence at accident sites by personnel providing the initial response to an accident. The information that can be collected from live accident scenes, or recent accident sites, can be crucial in allowing investigators to accurately reconstruct an incident. This “physical evidence” is much more reliable than witness statements in allowing the incident to be reconstructed.

Firstly, working on the road is a dangerous activity and should only be undertaken with appropriate personal protective equipment (high visibility jackets or vests, safety boots) and preferably with a vehicle fitted with reflective markers and a permanent or removable flashing beacon. Even with this equipment do not park on live traffic lanes on high speed roads. If your vehicle has no markings or beacon park it away from the road carriageway that you are inspecting. All other BP health and safety rules should be adhered to at all times.

If attending the scene whilst the police are still in attendance do not cross police lines without identifying yourself and receiving permission to enter the scene. If the road has been reopened after the incident then careful consideration of the safety of the site is required before any decision is made to collect information.

The key themes of the Checklist and booklet are:

Safety of personnel

Obtaining good quality photographs of the incident site, any “physical evidence” and of the involved vehicles

Obtaining measurements of the evidence

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Before Leaving the Office



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Before Leaving the Office

Location



Ensure that the exact location of the incident is known.



Ensure a suitable and safe route to the scene has been planned prior to setting out.



Inform colleagues of your attendance. Do not risk your safety or others by rushing to the accident site or scene.

Equipment



A full set of equipment should be ready at all times.



Camera films should be replaced, memory cards cleared and batteries changed or recharged (including spare sets) after use.

Evidence Recording

Make clear and detailed notes of relevant information and measurements, such that they allow someone who has not attended the scene to fully understand them. This should take the form of written notes and sketches with measurements.

2

At the Scene



At the Scene

Safety

Ensure personal safety at all times.

Park your vehicle in a safe location and use amber flashing beacons if available. Never park on live traffic lanes unless on road parking does not create a hazard for other road users. You may need to move your vehicle away from the scene if instructed to do so by emergency services. Wear personal protective equipment and ensure personal safety at all times. Identify yourself to police if they are in attendance.

Accident Information

If Police are in attendance then you must identify yourself to the person in charge. Police may be able to give you an understanding of what has happened.

Important information to note at the scene:

- Type of vehicles involved
- Their directions of travel
- Weather, road condition
- Impact location, post impact positions
- Evidence marks (tyre marks, gouges, scrapes, debris and fluids, eg engine oil or brake fluid)
- Damage to vehicles
- Damage to the road environment
- Any other information deemed relevant

All information that may be lost relatively quickly needs to be documented.

Identify Scene Evidence



Skid Marks



Curved tyre marks



Kerb Strikes



Gouges



Scratch Marks



Liquids

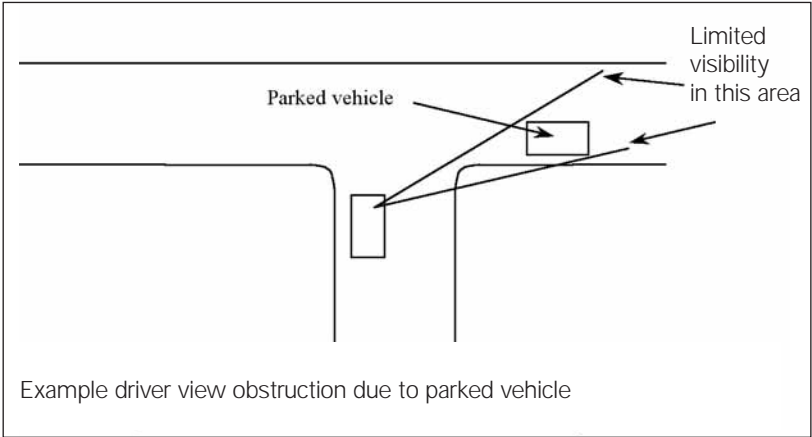
Other scene evidence can include tyre marks through soft ground or sand, fluids or other deposits on the road surface, damage to vegetation, damage to infrastructure (signs, barriers etc). These marks should look fresh, otherwise they may not be related to the incident.



Examine the scene before and beyond the collision location to identify any marks that may be associated with the incident. The vehicle may have lost control some distance prior to the impact. Walk along vehicle approaches looking for evidence of tyre marks, broken vehicle components, or other related debris on verges or within ditches etc.

Restricted visibility often contributes to traffic incidents. This can take the form of parked vehicle obscuring views of pedestrians crossing, or road side vegetation restricting a driver's view around a bend. Incorrectly positioned road signs can also obstruct the vision of a driver.

Take note and measure the location of obvious visibility restrictions (including parked vehicles)



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Measuring the Evidence



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Measuring the Evidence

Locate the Scene

The scene may be easy to find within a few hours; however, it can be very difficult once cleared.

Mark the scene and record location in a way to allow it to be easily identifiable to a person attending sometime later.

This can simply be marking a sign post to be used as the reference (fixed) location for all measurements, or may require the road surface to be marked in some way (where allowed) or, where this is not possible, putting in your own fixed reference point marker, such as a post.

To assist with identifying the area of the scene to others, try and locate this marker relative to other features, such as a junction, bridge, or building. Where appropriate, use paint to mark these points to avoid any confusion, as a measurement from a tree in a wooded area is likely to lead to a misunderstanding.

A GPS fix at the scene (if available) can provide the required accuracy for someone to find the scene. This can be taken from a Satellite Navigation System or similar system.

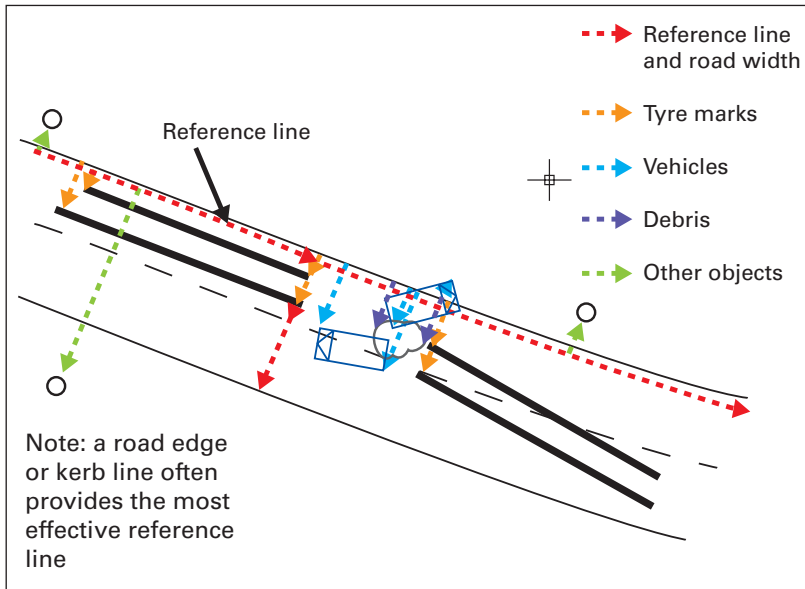
Measuring

At the reference point zero reading on the measuring wheel, then walk along the road edge with the measuring wheel.

When directly adjacent to evidence (vehicles, marks, debris etc) **stop!**

Measure the distance across the road from the measuring wheel to the evidence point using the metal tape measure.

3 Measuring the Evidence



Plan view of a scene with typical evidence and measurement

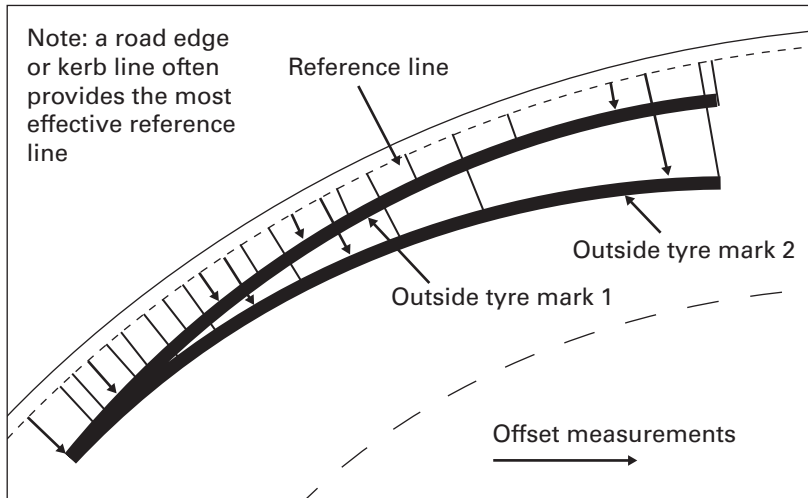
Record the measuring wheel and the tape measure measurements (along and across road) plus a description of the evidence, and continue. If measuring in both directions from the reference point indicate positive and negative measurements.

Measure to the four corners of each involved vehicle.

For tyre marks, gouge and scratch marks, measure the start and end points plus the location of obvious deviations in marks (Case Studies 1 and 2).

For curved tyre marks, measure to the outer edge of each mark at several locations (see below and Case Study 3).

In all cases use a systematic approach when taking measurements, record the reference line and offset measurements clearly for each point measured,



and describe what is being measured at each point. Use a measurement table as presented in Case Study 1 to assist.

The reference line should be a fixed part of the road, either a painted line on the edge of the road, or the road edge itself. Care should be taken when identifying the tyre marks as they may be overlaid.

Take additional measurements to record the basic dimensions of the road environment including the width of road and lanes, and the distances between road markings (these can be used when interpreting photographs of the site).

Additional Evidence Measurements

In addition to positioning accident marks, measure their length using the measuring wheel (tyre, gouge and scrape marks).



If there are several scratch/scrape marks in a confined area measure the overall distance, not each individual mark.

Look beyond the immediate accident scene and measure any other evidence, or features such as road signs.

Identify any road damage such as potholes, or other road deterioration. Evidence of poor road maintenance, blocked drainage features, faulty road lighting, missing or damaged marker posts, reflectors or line markings.

Alternative Measuring Practice

If a measuring wheel and/or metal tape are not available to measure the incident scene and associated evidence, then the investigator can use walking paces.

This method requires the investigator to follow the same procedure for measuring (along the scene and offset measurements), but by counting the number of paces and determining their average pace length.

The walking pace should be normal and controlled to ensure that each pace distance is consistent.

To interpret these measurements the investigator should determine the number of paces they take over measured distances of 25 and 50 metres. Using their average pace length, an estimate of a distance of 30 metres can be made, which should then be checked to ensure accuracy.

Secure Evidence

Make particular efforts to secure access to any evidence that you feel may be relevant to the incident.

3 Measuring the Evidence



If a tyre is deflated on scene, then it may, or may not, have been a causative factor in the incident. If a driver of a particular vehicle maintains that there was a mechanical fault, then it may be necessary to gain access to the vehicle to investigate their concerns.

Seatbelts can be inspected by experts to ascertain if they have been worn. Arrange to have them removed by qualified personnel if considered relevant and/or discuss with the investigating authorities.

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Photographing the Evidence



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Photography

The Approaches



100m



50m



25m



10m

Photograph the approach to the incident scene along the path of each involved vehicle. Use the measuring wheel to ensure accurate distances.

Set the camera to give a view similar to human eye (50mm lens on standard SLR camera).

Take a close up view of scene (from 10 metres).

Take photographs at regular intervals such as every 25 metres from where the likely impact point was to a distance of around 150 metres away.

Thereafter take photographs at 50 metre intervals, ensuring all relevant evidence on the approach are recorded (road signs etc).

Take photographs from a position that approximates drivers head position of the relevant vehicle.

Take additional photographs to show any visibility restrictions. For example, the photograph sequence below shows the driver's view on the approach to a junction looking in a direction where a building and parked vehicles obscure the view.

Photograph additional evidence/features such as road signs and defects such as potholes, or other road deterioration. Evidence of poor road maintenance, blocked drainage features, faulty road lighting, missing or damaged marker posts, reflectors or line markings.



At traffic
signal stop



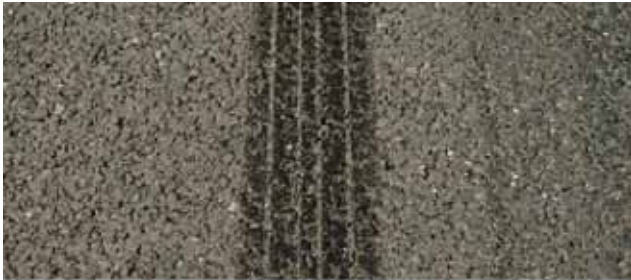
4m beyond
the stop line



12m beyond
the stop line

The Evidence

When photographing evidence, ensure that the photograph is taken showing the mark in the context of the scene, or take two separate photographs, one a close up showing the detail of the mark and the other to identify its position within the scene. See the following examples of a tyre mark and a gouge mark. These photographs help to defined the characteristics of the mark and its location.



Tyre mark close up



Tyre mark within scene



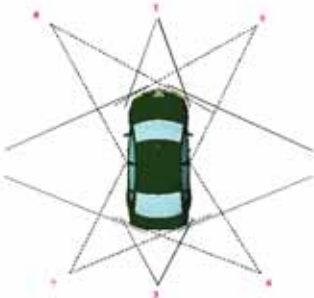
Gouge mark close up



Gouge mark in scene context

The Vehicles

- Take photographs so that the vehicle fills the frame
- Try and take all 8 photographs as shown below
- This may not be possible due to restricted access, therefore take these 8 photographs as close to method shown as possible
- Additional photographs can then be taken to show specific damage. Take these photographs square on and at oblique angles if necessary



4 Photography



After the standard photographs, take additional photographs to show the detail of any damage, ensuring that the detail of the photograph can be shown in the context of the whole vehicle.

A combination of photographs should be used to show detailed damage.



Wheel-rim damage



Identification of wheel



Close up of damage



Damage location

Limited Photography

In the event that only limited photography can be taken, prioritise capture of the following:

- Tyre marks (straight and curved tyre marks, including those on soft ground)
- Contributory factors within the road environment (road surface defects, blocked drainage, etc)
- Debris such as glass and engine fluids on the road (which can indicate the point of collision)
- Vehicle rest positions
- Damage to vehicles if unable to access them at later date
- Vehicle approaches to accident scene



5

Case Studies



Case Studies

Case Study 1 – Car vs. Pedestrian

This case study involves a pedestrian emerging from behind parked vehicles and being struck by a car. The images below show the view of the driver on the approach to the point of collision. In this case it is important to establish and record:

- The rest positions of the car and the pedestrian
- The type and location of the parked vehicles
- The point from which the pedestrian moved into the road
- The length of tyre marks and their position
- The damage to the car



Key features:

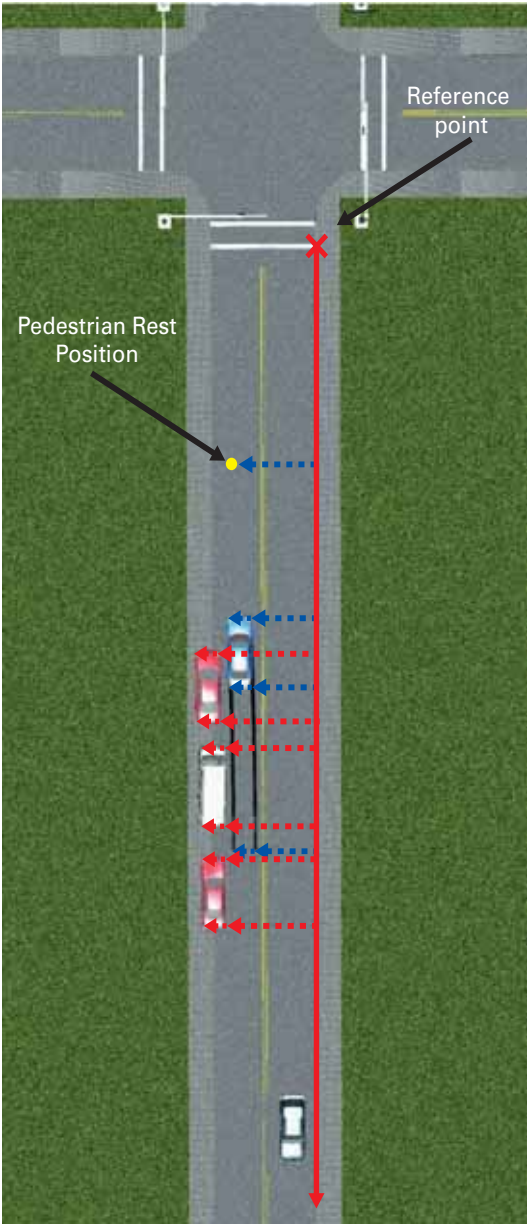
- Parked cars on approach to junction blocking visibility of footpath
- These vehicles may be moved after the incident, measure each vehicle's position or if moved, establish where they were
- Location of the start of skid marks can be used to calculate approximately when the driver reacted
- Position of skid marks in lane show the positioning of the vehicle
- It may not be possible to determine location of the point of impact from the evidence; however, attempt to find out where pedestrian crossed from (i.e. in front of white van)
- Measure to the point where the pedestrian came to rest. This may be evident by discolouration of the road surface by body fluids on the road (or police markings)
- If the accident vehicle is still on the scene, measure to each corner using the methods described. If the vehicle has been moved, its position may have been marked by the police using paint. If so, measure to each paint mark
- The skid marks may finish under the vehicle, and there may also be other evidence under the vehicle. Wait for vehicle to be moved to see and measure evidence underneath
- Log measurements from the site in a table similar to that shown below, including a description of the point being measured:



Example Table of Measurements from Case Study 1.

| Point No. | Distance along reference line (m) | Distance from reference line (offset) (m) | Description |
|-----------|-----------------------------------|---|--|
| 1 | 12.5 | 5.5 | Pedestrian rest position |
| 2 | 19.7 | 4.0, 5.6 | Vehicle 1 (V1) front offside and nearside corners |
| 3 | 24.4 | 4.0 | V1 end offside front tyre mark |
| 4 | 24.4 | 5.6 | V1 end nearside front tyre mark |
| 5 | 19.7 | 5.8, 7.4 | Parked vehicle 1 (P1) front offside and nearside corners |
| 6 | 23.1 | 4.0, 5.6 | V1 rear offside and nearside corners |
| 7 | 32.0 | 3.8 | P1 rear offside and nearside corners |
| 8 | 34.5 | 5.7 | P2 front offside and nearside corners |
| 9 | 39.2 | 7.6 | P2 rear offside and nearside corners |
| 10 | 42.1 | 3.8 | V1 start offside front tyre mark |
| 11 | 42.3 | 5.4 | V1 start nearside front tyre mark |
| 12 | 43.2 | 6.0 | P3 front offside and nearside corners |
| 13 | 46.0 | 7.6 | P3 rear offside and nearside corners |
| etc | | | |

Remember to measure road and lane widths, along with other relevant features such as sign posts, street lights etc.



- Reference line
- Measuring the position of parking vehicles
- Measuring the physical evidence, rest positions and skid marks

(NOT TO SCALE)

Case Study 2 – Car vs. Car

This case study involves a collision between two vehicles at a junction. The images below show the view from the red car (top images) and below a view from behind the approach of the blue car. In this case it is important to establish and record:

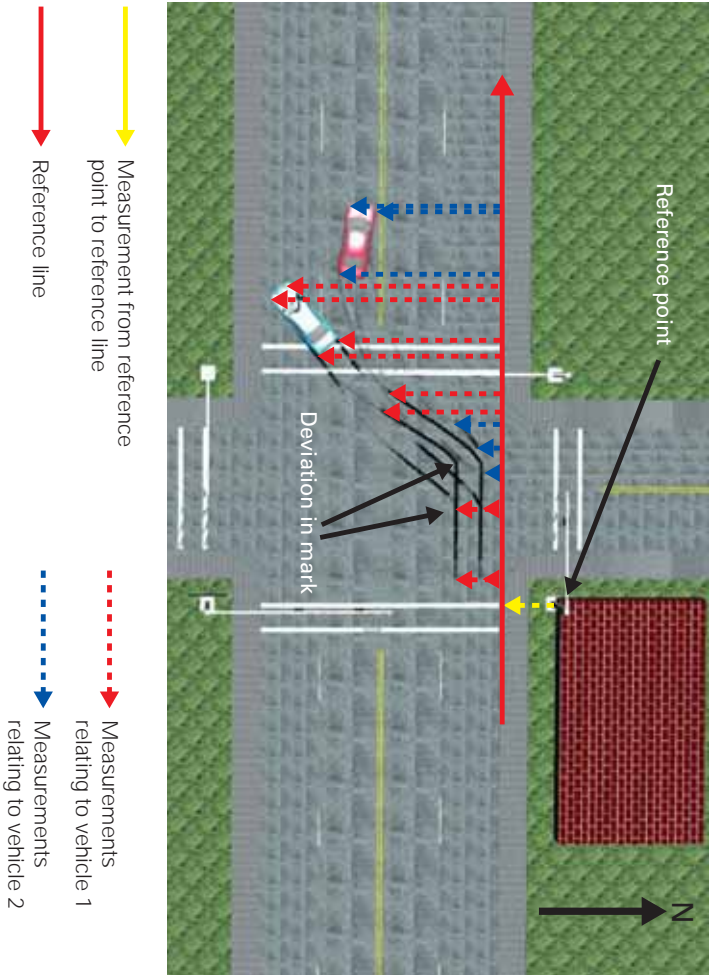
- the rest positions of the cars
- the location of the point of impact
- the length of tyre marks and their position
- the damage to the vehicles
- the presence and location of any features which could have restricted the driver's views of each other, and the general layout of the road.



Key features:

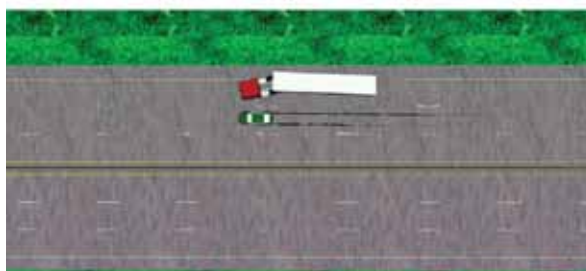
- Two vehicles approaching a junction from different directions
- Each driver's view of the other vehicle is blocked on the approach to the junction by a wall
- The visibility restriction is a fixed object, and therefore there is no need to measure its location immediately after the incident
- A traffic light column is used as the reference point
- Measurements taken relative to the reference point (in this case, measurement taken along the kerb of the road)
- Skid marks from the blue vehicle prior to the impact
- Deviations in these marks show the impact location
- Measure the start, end, and any deviations in the tyre marks as shown below
- For curved tyre marks, take more measurements to improve accuracy (take measurements at 4 or 5 points along the marks)

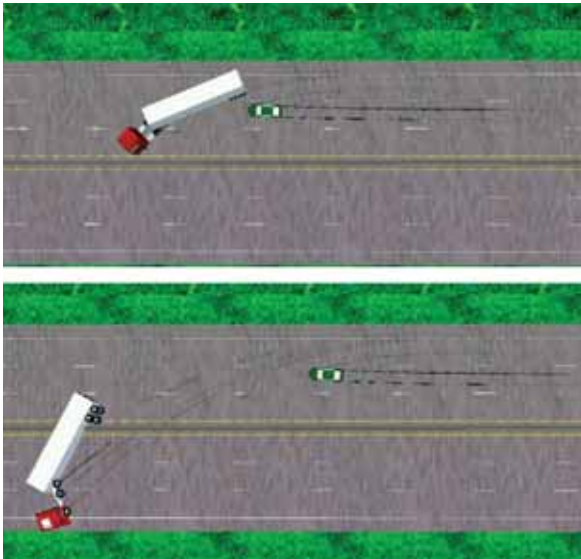
5 Case Studies



Case Study 3 – Lorry Rollover

- This case study involves an articulated vehicle rollover. The following images show a sequence in which the articulated vehicle is destabilised by driver steering and rolls over. In this case it is important to establish and record:
 - the rest positions of the involved vehicles
 - the presence of tyre marks from the articulated vehicle, their position, path and length (in particular where these marks start)
 - scratches and scrapes on the road surface from the truck and trailer as it rolled over (in particular where these marks start)
 - the presence of evidence from other vehicles, tyre marks, points of collision of other vehicles, etc
 - the geometry of the road environment, carriageway widths, lane widths, etc

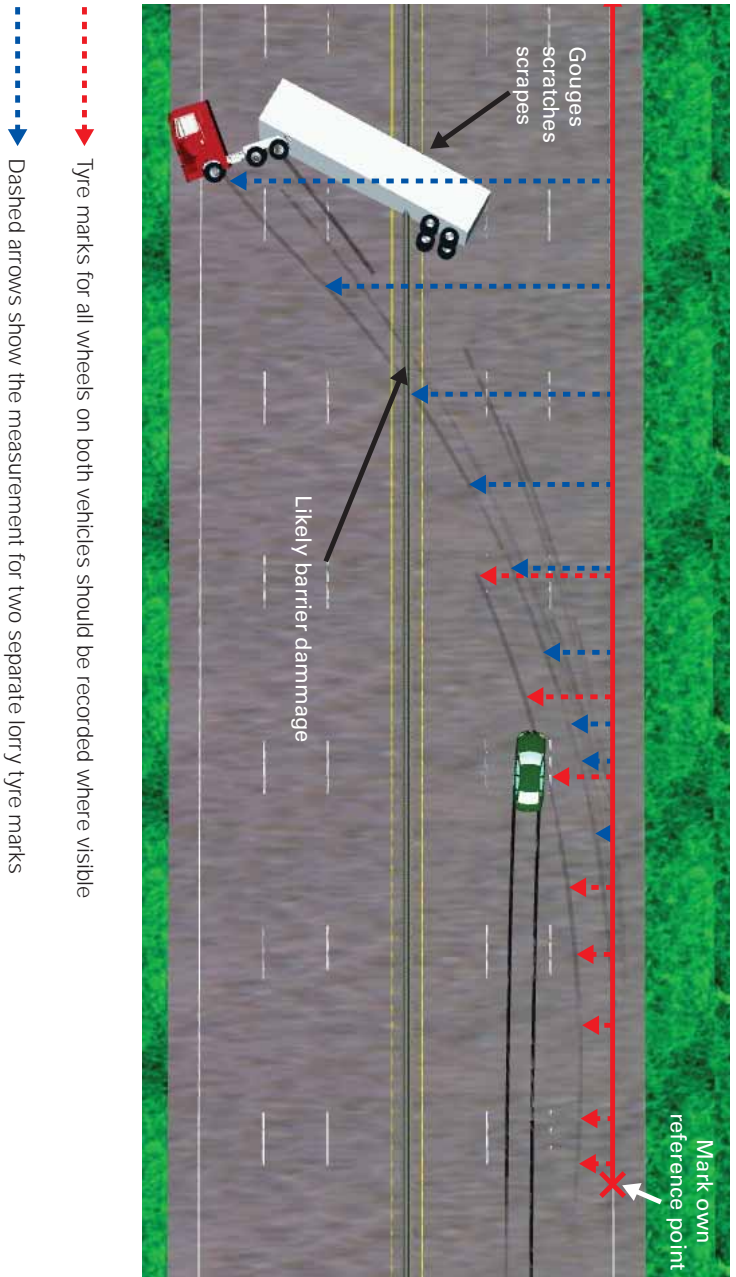




Key points:

- Lorry closely following a car that begins to brake heavily. Lorry swerves right, then left to avoid leaving road. Rapid steering causes lorry to roll over, and to cross onto the opposite carriageway.
- Since lorry went onto opposite side of the road, there should be damage to the central barrier. Note the location of this damage.
- Measure positions of marks and vehicles. If there are no fixed points, make your own reference point so that you can measure the scene.
- Once the lorry has rolled over, there will be gouges where the trailer struck the ground, and scratches/ scrapes along the road where it slid to rest.
- The loss of control of the lorry generates lots of curved tyre marks. Identify each mark separately and measure its location at several points, including the start and end (see below).

5 Case Studies



This document and the accompanying checklist provide advice to health safety professionals who are required to collect evidence at the scene or site of a road traffic accident. The advice is intended to provide general guidance for basic data collection only, including the identification and recording of physical evidence which is normally relevant in road traffic accident investigation. The procedures described in this advice may involve working in road environments with live traffic lanes. Extreme care should be taken at all times in such conditions, and appropriate high-visibility and protective clothing and equipment should be worn at all times. Any personnel using this booklet should adhere to the health and safety guidance of their own employer or organisation at all times. If no such guidance exists then a risk assessment of each incident site should be undertaken before undertaking any of the procedures described above.

TRL do not accept any responsibility for the quality of information collected by personnel using this advice, or the safety of non-TRL personnel using this advice.

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