



ACCIDENT CONSULTANTS

G.R. Greatrix

MSc, CPhys, MInstP, CEng, MIET, MITAI, FRAS FORENSIC INVESTIGATOR
12 Gillpark Grove, Hartlepool, TS25 1DT ☎ 01429 275954 📠 07762 943616

Our Ref: GRG/FosterC/Graingers
Your Ref: TY/WPA.100345
Date: 11th of August 2009

website: www.greatrix.co.uk

**A report on the accident that occurred
on Cromarty Road, South Lanark, on the
24th of May 2009**

Regina -v- Craig Foster



A report prepared for the Court by G.R.Greatrix, Accident Investigator

Report of: **Graham R Greatrix**
Specialist field: **Accident Investigation**
Case: **Regina -v- Craig Foster**
On behalf of: **Graingers, Solicitors, Walsall**



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PROFESSIONAL POSITION

- 1 My name is Graham Greatrix and I live at 12 Gillpark Grove, Seaton Carew, Hartlepool, Cleveland.

- 2 I hold the degrees of Bachelor of Science in Physics and Mathematics and Master of Science in Physics. I am a Member of the Institute of Physics, a Member of the Institute of Engineering and Technology, a Member of the Institute of Traffic Accident Investigators, a Chartered Physicist and a Chartered Engineer. I am listed as an Expert Witness by The Law Society and trained in the duties and responsibilities of a Single Joint Expert.

- 3 Until 1996 I was Head of Physics and Forensic Science at the University of Teesside. I maintain my links with the University by providing specialist lectures in accident investigation and in forensic medicine. I am also concerned with the supervision of research in accident investigation.

- 4 I have specialised in the areas of speed measurement and the forensic investigation and reconstruction of accidents for nearly forty years.

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INTRODUCTION

- 5 At about 7.30 pm on Friday the 24th of May 2009 an accident occurred on Cromarty Road at its junction with Harlow Road, South Lanark.
- 6 David Harley bought a Rover 420 motor car from a work colleague. It was his intention to drive the Rover to a friend's house where it would be sold on.
- 7 His journey involved travelling along the South Lanark bound carriageway of the Cromarty Road and then turning right into Harlow Road.
- 8 Turning right into Harlow Road involves passing through a gap in the exceptionally wide central reservation and then crossing the Borden bound carriageway. The gap is actually an extension of Harlow Road and carries two lanes.
- 9 As Mr Harley drove across the Borden bound carriageway his Rover was struck by a Vauxhall Vectra motor car being driven in the outside lane of the Borden bound carriageway by Craig Foster.
- 10 Unfortunately, Mr Harley was thrown out of the Rover during this collision and he received fatal injuries.
- 11 I have been instructed to consider the physical evidence in this case and advise upon its implications.

DOCUMENTS

- 12 I have seen copies of all the documents listed in the Statement Evidence List.

PHYSICAL EVIDENCE

- 13 An accident can often be reconstructed from the physical evidence present at the accident scene.
- 14 The physical evidence lies in the site details, the conditions which prevailed at the time of the accident, the marks and debris on the road, the damage sustained by the two cars, the physical characteristics of the cars, the police scale plan, the police photographs, and in the laws of physics which determine the movement of vehicles before, during and after an accident.
- 15 Secondary physical evidence comes from the statements of witnesses when they refer to times, distances, speeds and locations. However, the validity and interpretation of such statements are matters for the Court to determine.
- 16 Further physical evidence comes from the results of major research programmes concerned with road traffic matters.

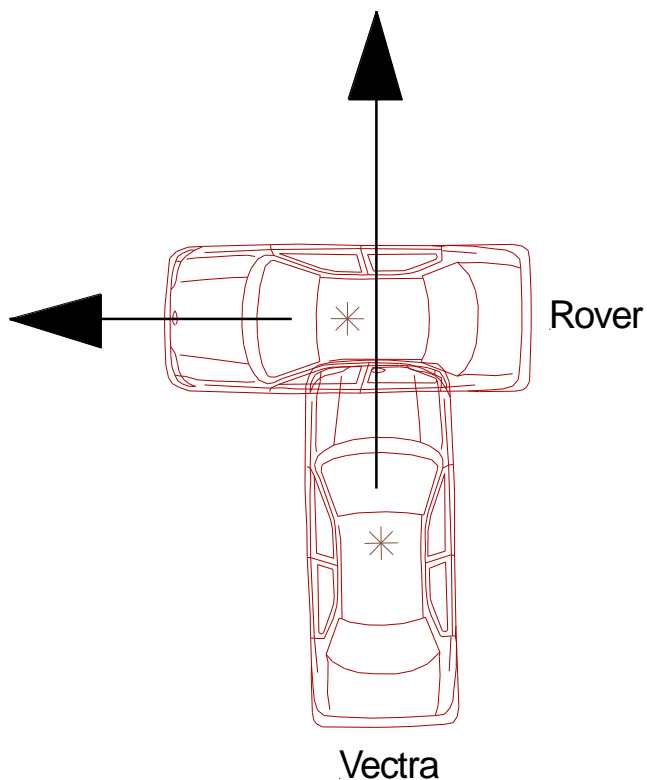
ACCIDENT RECONSTRUCTION

- 17 Shortly after the accident had occurred, the police investigators surveyed the scene using a total station precision theodolite. The

survey data was later downloaded into a dedicated computer from which a scale plan has been produced.

- 18 The scale plan has been prepared by Police Constable Colin Newhall who is a forensic collision investigator of the Lanark Police.
- 19 I have been supplied with an original computer printout of the scale plan. The scale of the plan has been preserved so that accurate scene dimensions can be determined.
- 20 The post collision movement of the Vauxhall Vectra can be determined from the tyre marks that it deposited on the road.
- 21 Diagram 1, appended to this report, is an electronically traced extract taken from the police scale plan. Diagram 1 is furnished with a scale bar to aid measurements if the extract is enlarged or diminished in size.
- 22 I have considered all possible movements of the Vauxhall Vectra that might have given rise to the tyre marks. My final assessment of the Vectra's movement is shown in Diagram 2, also appended to this report.
- 23 Usually a car that is rotating in the road will continue to rotate in the same direction until it comes to rest. However, if the car should strike something, its direction of rotation can be changed. Additionally, if some sharp steering action is applied at some stage, that too could change the rotational direction.
- 24 The initial collision took the form shown in the diagram below. The arrows show the pre-collision travel directions.

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- 35 On impact, the front of the Vectra penetrated into the nearside of the Rover. The two cars became locked together. The Vectra pushed the Rover along the road. At the same time, the pre-collision movement of the Rover turned the front of the Vectra to its left. That turn started the Vectra rotating in an anticlockwise direction.
- 36 With two cars momentarily locked together, the Rover also started to rotate in an anticlockwise direction.
- 37 The Rover was subjected to two movement directions. Firstly there was its initial movement towards Harlow Road and secondly there was the movement along the Borden bound carriageway imposed by the impact from the Vectra.

- 38 It was the resultant of those two movements that caused the Rover to move diagonally across the A194 to its final resting place on the corner of Harlow Road..
- 39 If the Rover had been stationary at impact or had been moving very slowly, it would have been pushed along the Borden bound carriageway and there would have been no significant post-impact diagonal movement and the two cars would not have spun round in the road.
- 40 In my opinion, the anticlockwise rotation of the two cars was caused almost wholly by the speed of the Rover as it was crossing the path of the Vectra.
- 41 Additionally, the diagonal movement of the Rover towards the corner of Harlow Road was also the result of the Rover's speed across the path of the Vectra. If the Rover had been travelling very slowly, there would have been virtually no diagonal movement.
- 42 The speed of the Rover as it crossed the path of the Vectra was not necessarily high but it is my opinion that it must have been high enough to make it unlikely for the Rover to have stopped at the give way lines separating the gap in the central reservation from the main carriageway.
- 43 It is clear that the initial direction of rotation of the Vectra was anticlockwise.
- 44 However, the tyre marks cease in the vicinity of the pedestrian crossing and then re-appear. On their re-appearance, the Vectra must have

been rotating clockwise in order that the Vectra came to rest as shown on the police plan.

- 45 It follows that, at some stage, the direction of rotation has changed.
- 46 In my opinion, this change in the direction of rotation has been brought about when the tyres regained their frictional grip on the road and with the front wheels turned hard to the left. That situation would occur when the car was moving directly backwards in the vicinity of the pedestrian crossing.
- 47 The two cars have almost the same mass. In this collision, the two cars probably acquired the same post-impact velocity in the direction of the main carriageway before they separated. The Rover had a zero velocity component along the main carriageway at impact. In those circumstances, the pre-impact velocity of the Vectra would have been halved in this collision.
- 48 The Vectra moved roughly 26 metres along the main carriageway after the collision with its tyres scuffing on the road. There is then a gap of about 8 metres during which the wheels were pointing approximately in their direction of travel. The deceleration rate over those 8 metres would be very small.
- 49 Finally, the Vectra's tyres scuffed a further 11 metres before the car came to rest.
- 50 The total post-impact movement of the Vectra was about $(26+8+11) = 45$ metres of which 37 metres would have been subject to significant deceleration due to the tyres scuffing on the road.

- 51 When the car is moving fully sideways, the deceleration rate will be the same as when the car is travelling forwards under full braking.
- 52 When the car is moving directly forwards or directly backwards with no brakes applied, the deceleration rate will be minimal.
- 52 At any other angle of travel, the deceleration rate will be intermediate between these two extremes.
- 53 A simplistic approach would be to assume that the deceleration rate during rotation is about half of that of full braking or about 0.35g. Such an assumption would tend to yield a speed estimate that is below the true speed.
- 54 Decelerating to rest at 0.35g over a distance of 37 metres yields an initial post-impact speed of 35.6 mph.
- 55 The impact speed is then about twice that at approximately 71 mph.
- 56 Raising the deceleration to 0.4g yields an impact speed of about 76 mph.
- 57 Bearing in mind the uncertainties involved in these estimates, I suggest that the physical evidence is consistent with the Vectra travelling at a speed between 70 mph and 80 mph when it struck the Rover.

THE ROVER

- 58 In my view Mr Harley did not stop at the give way lines as he approached the main Borden bound carriageway.
- 59 Setting off from rest at the give way lines and reaching the position of the Rover at impact would involve a movement of about 6 metres.
- 60 Under normal acceleration of about 1.5 ms^{-2} the speed achieved would be 9.5 mph and the time taken would be 2.8 seconds.
- 61 With a perfectly elastic collision, the Rover would move at an angle of 7.2 degrees to the road direction. With a plastic collision, as would be the case in this accident, the angle would be less than 7.2 degrees.
- 62 In the accident, the Rover moved at an angle of 27 degrees or more.
- 63 Additionally, the spin induced by the collision has been mainly caused by the speed at which the Rover was moving at the time of the collision.
- 64 Although it is unlikely that the Rover set off from rest at the give way lines, it is not possible to determine the actual speed at which it crossed the give way lines.
- 65 If the speed of the Rover was say 10 mph, the movement of 6 metres from the give way lines to the collision point would occupy a time of 1.34 seconds.
- 66 The reaction times of drivers who are faced with real road situations have been investigated by the Transport Research Laboratory. The

results of the work on reaction times appears in TRRL Laboratory Report 1004, 1981, "*Human factors and driving performance*", A.R.Quimby and G.R.Watts.

67 The investigations found that reaction times vary with the age of the driver. Young drivers and elderly drivers have the longest reaction times. Middle aged drivers, because of their experience, have the shortest reaction times.

68 The following table shows the TRRL results:

Age	15%ile time	50%ile time	85%ile time
<25 yrs	1.76 seconds	1.88 seconds	2.00 seconds
25 to 34	1.54 seconds	1.62 seconds	1.70 seconds
35 to 44	1.45 seconds	1.52 seconds	1.59 seconds
45 to 54	1.33 seconds	1.40 seconds	1.47 seconds
55 to 64	1.67 seconds	1.86 seconds	2.05 seconds
>64 yrs	1.69 seconds	1.96 seconds	2.15 seconds

69 The average reaction time of drivers in the same age group as Mr Foster is 1.62 seconds.

70 Reaction times at night tend to be longer. Reaction times tend to be longer still when alcohol is present in the blood.

71 It is quite feasible that the Rover could have crossed the give way lines and reached its position at impact in a time that was less than Mr Foster's reaction time discounting the effect of night time and the effect of alcohol. In those circumstances, Mr Foster would not have been able to initiate any evasive action prior to the collision.

DRIVING AT 40 MPH ?

- 72 What would have happened if Mr Foster had chosen to drive at 40 mph?
- 73 The answer to this question depends on what assumptions are made about the various parameters involved such as:
- (a) The average speed of the Rover as it travelled the 6 metres across the main carriageway.
 - (b) The position of the Vectra, travelling at 75 mph, at the time that the Rover started to cross the give way lines.
 - (c) The reaction time of Mr Foster.
 - (d) It is also assumed that Mr Foster should have started to react at the moment that the front of the Rover started to cross the give way lines.
- 74 The average speed of the Rover is not known. However, it seems highly likely that the Rover did not stop at the give way lines. I shall therefore consider several low average speeds such as 5 mph, 10 mph and 15 mph.
- 75 The position of the Vectra is based on an actual travelling speed in the region of 75 mph and the time it took for the Rover to travel the 6 metres to the point at which it was struck by the Vectra. The latter value will vary with whatever average speed is being considered for the Rover.
- 76 I shall adopt a reaction time that is average for drivers in the same age range as Mr Foster's age and for which no account is taken of any

lengthening of the reaction time because it is night time or because of alcohol in the blood. That average reaction time is 1.62 seconds. However, the range of reaction times for 70% of drivers is from 1.54 seconds to 1.70 seconds.

- 77 The following table shows the time that it would take for the Rover to move 6 metres at various average speeds. Assuming an actual speed in the accident of 75 mph and an average reaction time of 1.62 seconds, the table also shows what the impact speed would have been if Mr Foster had chosen to drive at 40 mph.

Rover's average Speed	Time to move 6 metres	Distance at 75 mph	Impact speed from 40 mph
5 mph	2.68 seconds	89.9 metres	no impact
10 mph	1.34 seconds	44.9 metres	22.5 mph
15 mph	0.90 seconds	30.0 metres	39.1 mph
>15 mph	<0.90 seconds	<30.0 metres	40.0 mph

- 78 Thus, even at 40 mph it is still quite likely that Mr Foster would have been unable to initiate any evasive action prior to an inevitable collision. With a collision speed of 40 mph, the outcome would still have been serious although obviously not so devastating as occurred in this accident.

THE REPORT OF POLICE CONSTABLE COLIN NEWHALL

- 79 At paragraph 8.2 of his report, Police Constable Newhall says that at 40 mph, Mr Foster would have had the junction in view for at least 4.5 seconds.

- 80 However, it is not a view of the junction that matters, it is whether the Rover could be seen entering or about to enter the main carriageway.
- 81 Since it would take far less than 4.5 seconds for the Rover to appear and reach its position at impact, the Rover would not have been in view 4.5 seconds prior to the collision. That assumes that the Rover was not stationary for an appreciable time at the give way lines.
- 82 Until the Rover appeared and until it became obvious that the Rover was going to move across the carriageway, there would be no reason for Mr Foster to react in any way.
- 83 I suggest that if Mr Harley had looked, he would have been able to see Mr Foster's car approaching on the main carriageway. Obviously, if he had given way as required this accident would not have occurred.
- 84 Except for the above comment, I agree fully with Police Constable Newhall's analysis of the physical evidence.

CONCLUSIONS

- 85 It is highly likely that Mr Harley did not stop at the give way lines separating the gap in the central reservation from the main carriageway. This conclusion is based on the post-impact diagonal direction of movement of the Rover towards its final rest place and also on the degree of spin imposed on the Vectra. (¶35 to ¶42, ¶58 to ¶63)
- 86 Prior to Mr Harkey starting to cross the main carriageway, Mr Foster's car must have been in his view had he looked.

- 87 The evidence of the tyre marks suggests that the Vauxhall Vectra was travelling between 70 mph and 80 mph when it struck the Rover. (¶57)
- 88 Discounting the effect of night time and the effect of alcohol, it is quite feasible that the Rover could have crossed the give way lines and reached its position at impact in a time that was less than Mr Foster's reaction time. Thus, this collision was probably inevitable. ¶65 to ¶71)
- 89 If Mr Foster had chosen to drive at 40 mph, it is probable that he would not have had sufficient time or sufficient distance to have been able to initiate any evasive action. The collision would still have been serious at 40 mph. (¶72 to ¶78)
- 90 Until the Rover appeared and until it became obvious that the Rover was going to move across the carriageway, there would be no reason for Mr Foster to react in any way even though the junction was in his view. (¶80 to ¶83)
- 91 Except for the above comment, I agree fully with Police Constable Newhall's analysis of the physical evidence. (¶85)

DECLARATION

I, Graham Rowland Greatrix, declare that:

- 1 I understand that my duty in providing written reports and giving evidence is to help the Court and that this duty overrides any obligation to the party by whom I am engaged or the person who has paid or is liable to pay me. I confirm that I have complied and will continue to comply with my duty.
- 2 I confirm that I have not entered into any arrangement where the amount of payment of my fees is in any way dependent on the outcome of the case.
- 3 I know of no conflict of interest of any kind, other than any which I have disclosed in my report.
- 4 I do not consider that any interest which I have disclosed affects my suitability as an expert witness on any issues on which I have given evidence.
- 5 I will advise the party by whom I am instructed if, between the date of my report and the trial, there is any change in circumstances which affect my answers to points 3 and 4 above.

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- 6 I have shown the sources of any information I have used.
- 7 I have exercised reasonable care and skill in order to be accurate and complete in preparing this report.
- 8 I have endeavoured to include in my report those matters, of which I have knowledge or of which I have been made aware, that might adversely affect the validity of my opinion, I have clearly stated any qualifications to my opinion.
- 9 I have not, without forming an independent view, included or excluded anything which has been suggested to me by others, including those instructing me.
- 10 I will notify those instructing me immediately and confirm in writing if, for any reason, my existing report requires any correction or qualification.
- 11 I understand that:
- 11.1 my report will form the evidence to be given under oath or affirmation,
 - 11.2 questions may be put to me in writing for the purposes of clarifying my report and that my answers shall be treated as part of my report and covered by my statement of truth,
 - 11.3 the Court may at any stage direct a discussion to take place between experts for the purpose of identifying and discussing the expert issues in the proceedings, where possible reaching an agreed opinion on those issues and identifying what action, if any, may be taken to resolve any outstanding issues between the parties,
 - 11.4 the Court may direct that following a discussion between the experts that a statement should be prepared showing issues that are agreed, and those issues which are not agreed, together with a summary of the reasons for disagreeing,
 - 11.5 I may be required to attend Court to be cross-examined on my report by a cross-examiner assisted by an expert,
 - 11.6 I am likely to be the subject of public adverse criticism by the Judge if the Court concludes that I have not taken reasonable care in trying to meet the standards set out above.
- 12 I have read Part 33 of the Criminal Procedure Rules and I have complied with its requirements.
- 13 I confirm that I have acted in accordance with the Code of Practice for Experts.

STATEMENT OF TRUTH

I confirm that the contents of this report are true to the best of my knowledge and belief and that I make this report knowing that , if it is tendered in evidence, I would be liable to prosecution if I have wilfully stated anything which I know to be false or that I do not believe to be true.

Report ends



Graham R Greatrix
11th of August 2007

Diagrams follow . . .

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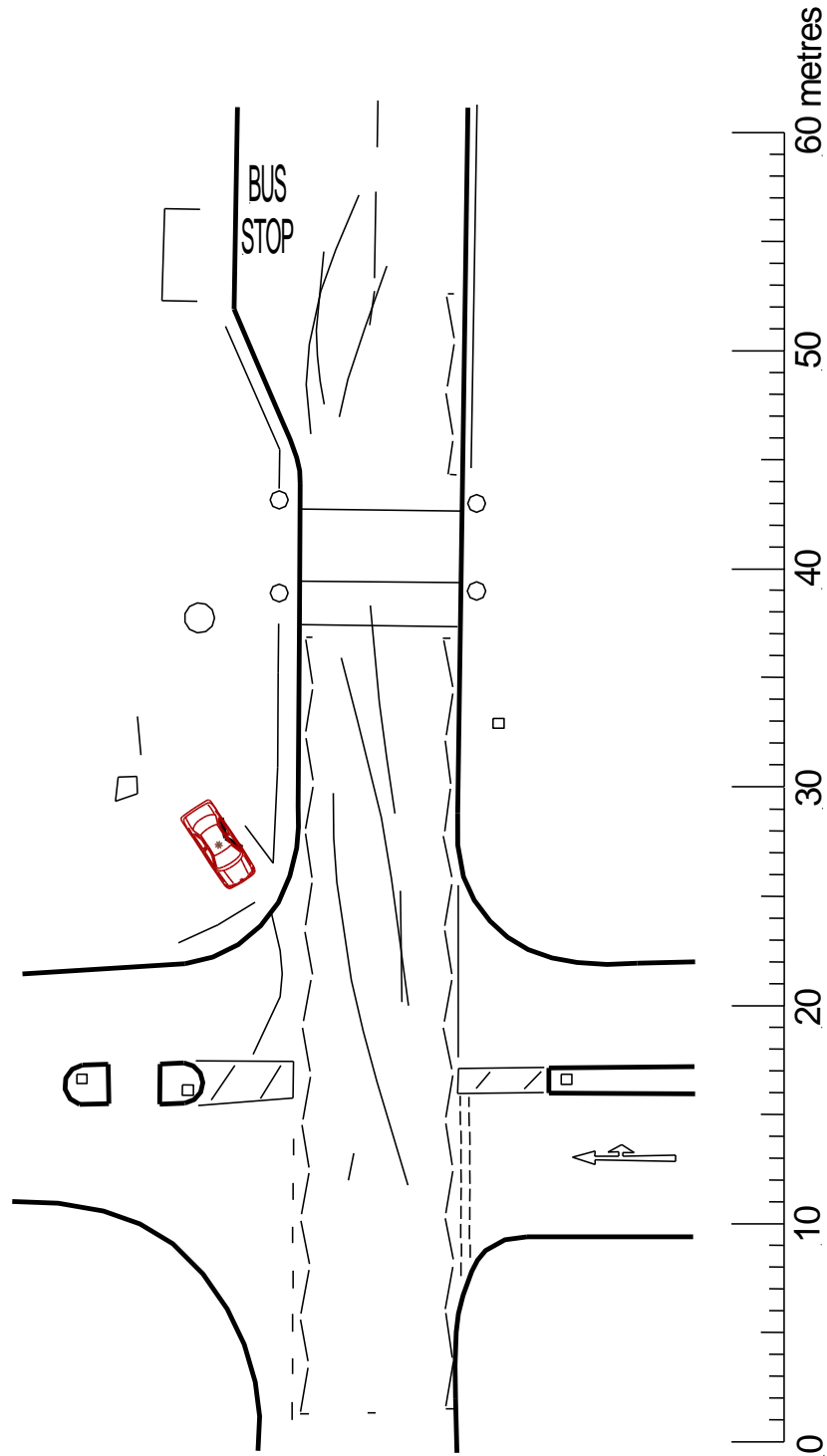


Diagram 1

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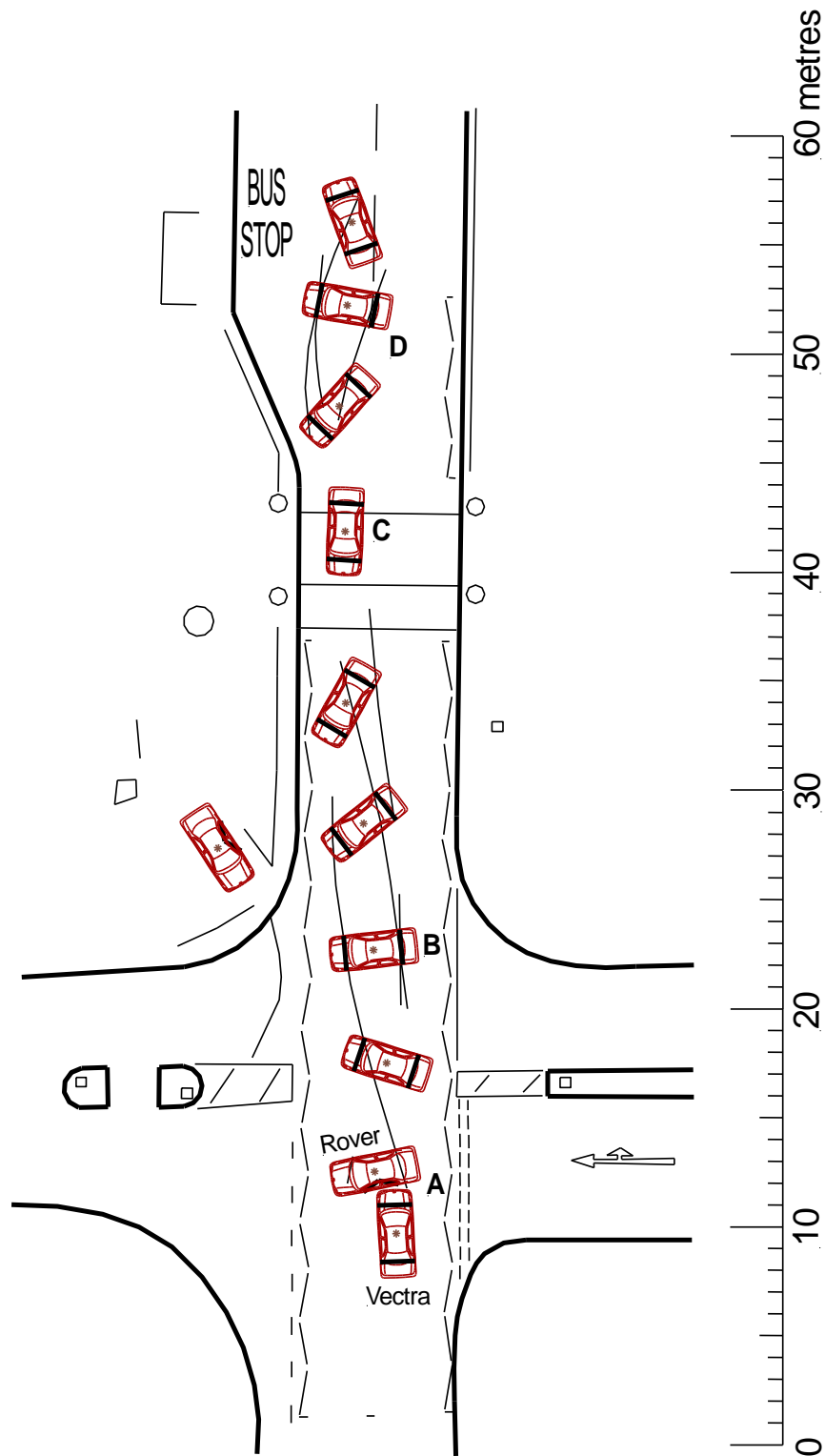


Diagram 2

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