

Investigating the Aggravated Vehicular Homicide Case

A Guide for Wyoming Prosecutors

Presented by:

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Aggravated Vehicular Homicide is a CRIME!

- ◆ We must put the same effort into solving this case as any other homicide.
- ◆ The traffic crash scene is a CRIME scene, and must be treated as such.
- ◆ Our priority, after health and safety concerns are addressed, is the detailed investigation of the scene.
- ◆ We must preserve the evidence of WHAT happened.
- ◆ This will enable us to determine HOW it happened, and WHO is responsible.
- ◆ Is the intoxication of a living driver the proximate cause of this traffic crash?
- ◆ Is the reckless driving of a living driver the proximate cause of the crash?
- ◆ Is the death of someone the result of this traffic crash?
- ◆ Finally, is the person we are charging actually the driver of the vehicle causing the crash?

How can the Wyoming Prosecutor Help?

- ◆ We have limited resources in Wyoming.
- ◆ How can we make the best of our limited resource situation?
- ◆ The best investigations are a result of team work, often between several different agencies in a County.
- ◆ Someone needs to be in overall charge of the scene and the investigation.
- ◆ This person will be responsible for the overall work product and report.
- ◆ Enough people need to be delegated to the investigation task to ensure evidence is not lost.
- ◆ We must ensure ALL relevant evidence is gathered. The lead investigator may not be able to interpret all of the gathered evidence.
- ◆ This is not a problem! It is most important to HAVE the evidence. Once we have it, we can find additional help for analysis!
- ◆ Without the evidence, we don't have a case!

What are we going to do?

- ◆ We will look at some of the kinds of evidence we may find at traffic crash scenes.
- ◆ We will look at ways we can gather and preserve this evidence.
 - Roadway evidence
 - Evidence from the vehicle
 - Evidence from the crash victims
 - How can we begin putting it together?

Let's Start with Roadway Evidence

- ◆ We will begin with some examples of tire marks.
- ◆ The following photos do not include every type of tire mark, but are only a guide.
- ◆ Tire marks show direction and position of the vehicle making the marks.
- ◆ The photo illustrates locked wheel skid marks, which start light and go dark.
- ◆ A vehicle may leave such marks prior to the crash
- ◆ These marks are seldom seen post crash, at least in this form



ABS Brake Marks

Treated the same way as locked wheel skids



Tire Spackling

- ◆ Short lived evidence
- ◆ Is road material transferred to the tire tread under high shear forces.
- ◆ Must be preserved at the scene by photography
- ◆ Gather this evidence BEFORE the vehicles are moved!
- ◆ Indicates maximum braking!
- ◆ Tells the investigator to look for the ABS type mark, which is a deceleration scuff.
- ◆ This spackling is on a car tire.



Spackling, Cont'd.

◆ Truck Tire Spackling



Spackling, Cont'd.

- ◆ Motorcycle Front tire
- ◆ Indicates the rider is braking the front tire to maximum.



Yaw Marks (Scuffs)

- ◆ Tire is sliding and rotating
- ◆ A yaw results when the velocity vector and heading of the vehicle are not co-linear.
- ◆ If the yaw is the result of inappropriate steering input, then the yaw may be a “Critical Speed Yaw”, and may be used for speed analysis in a simple, straightforward manner.
- ◆ This photo illustrates a critical speed yaw. Notice the rear tires track outside the corresponding front tires.



Yaw Marks, Cont'd.

- ◆ This crash began with critical speed yaw marks on the shoulder



Yaw Marks, Cont'd.

- ◆ The Yaw begins to transition to a side skid. We may no longer treat it as a critical speed yaw.



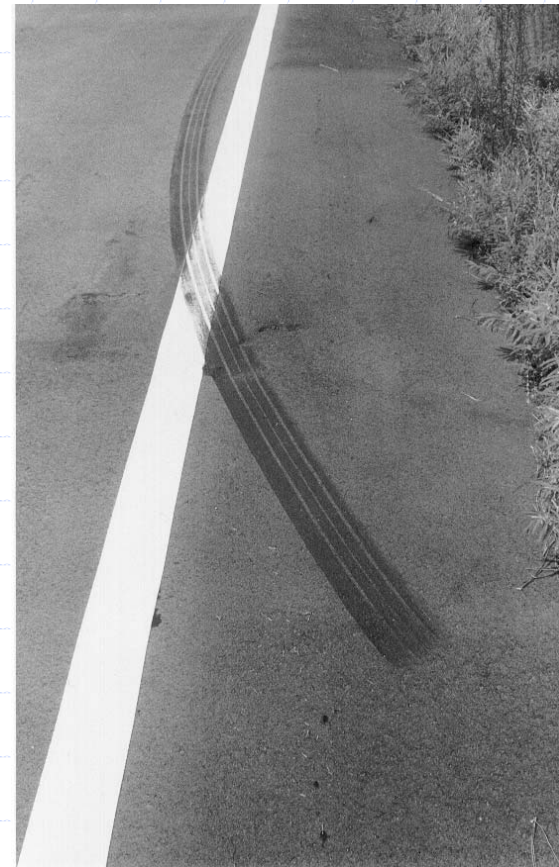
Yaw Marks, Cont'd.

- ◆ Another example of transitioning yaw marks-



Yaw Marks, Cont'd.

- ◆ This is a curving tire mark, but does not indicate a yaw.
- ◆ This is a curving acceleration scuff.



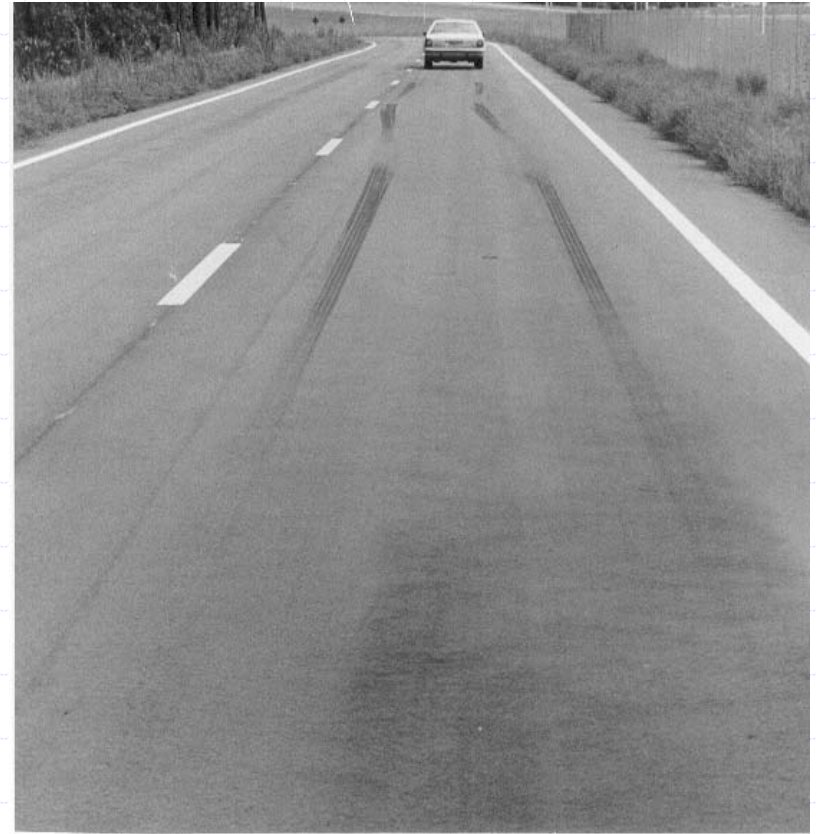
Flat Tire Scuff

- ◆ This is a flat tire scuff
- ◆ Should not be confused with a skid mark!
- ◆ May go on for a long distance
- ◆ Indicates tire failure



Gap Skid Marks

- ◆ Gap skids are produced when the driver applies and then releases the brakes, followed by a re-application.
- ◆ We use only the actual mark distance for speed computation



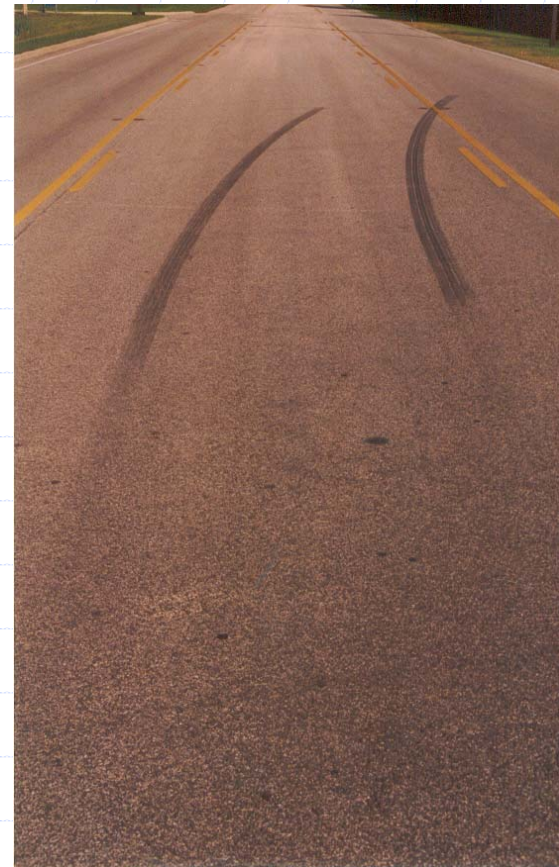
Offset Skid Marks

- ◆ Offsets in the skid marks will assist in determining the area of impact.
- ◆ Large forces are necessary to cause the abrupt change in direction



Uneven Braking

- ◆ These curving marks are caused by uneven braking.
- ◆ The right front and left rear brake are locked.
- ◆ The vehicle pulls to the right because the front brake force is higher.



Emergency Brake Spin

- ◆ If the emergency brake only is used, the vehicle will tend to spin around.



Gouge Marks

- ◆ Gouge marks are made when relatively strong vehicle parts are forced into the road by the crash.
- ◆ These may assist in determining the vehicle positions during the crash.
- ◆ In this example, a southbound pickup hit a northbound car.
- ◆ Can we prove the gouge marks came from one of the vehicles?



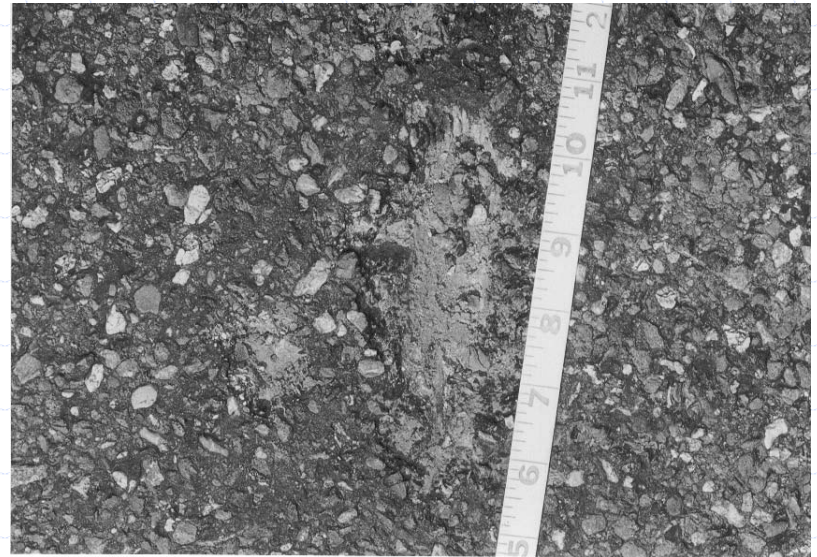
Gouge Marks, cont'd.

- ◆ We examine and measure the location of the gouge marks at the scene.
- ◆ Is there any detail in the marks we can use?



Gouge Marks, cont'd.

- ◆ We locate and examine this particular gouge mark.
- ◆ Notice the defined ridges toward the upper end of the mark



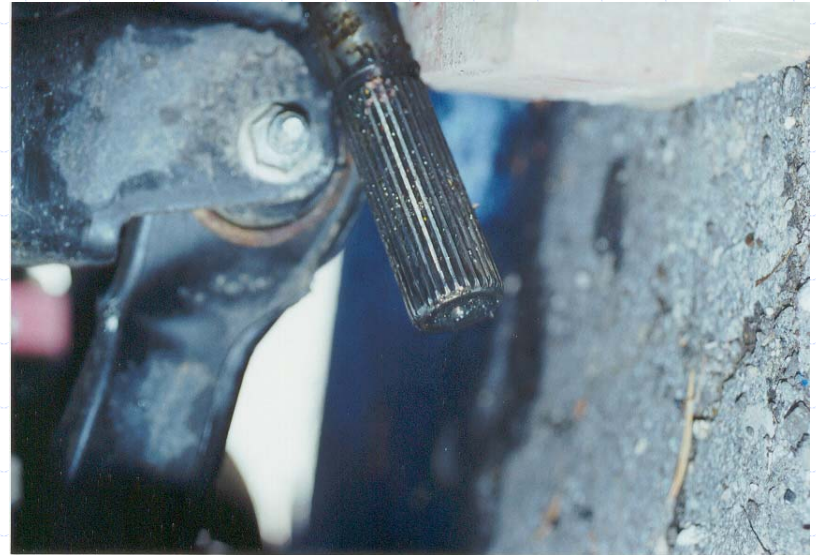
Gouge Marks, cont'd.

- ◆ Yet a closer view of the gouge.
- ◆ Let's examine the vehicle to see if there is anything of similar form.



Gouge Marks, cont'd.

- ◆ The front drive shaft was popped out of the differential of the pickup.



Gouge Marks, cont'd

- ◆ The end of the front drive shaft looks damaged. Notice the deformation in the end, along with the scratches.
- ◆ This would happen to the end of the shaft if it were driven hard into the pavement.
- ◆ We will remove the shaft and return it to the scene.



Gouge Marks, cont'd.

- ◆ The match is identical.
- ◆ This allows us to position the front drive shaft on the road, and hence the pickup on the road during the crash.



Gouge Marks, cont'd.

- ◆ The drive shaft illustrates the location and orientation of the pickup at collision.
- ◆ The driver, who was intoxicated, plead guilty straight up to the homicide charge.



Summary of Roadway Evidence

- ◆ This was not an all encompassing list of evidence from the roadway.
- ◆ Anything the vehicles or people leave behind on the roadway may be evidence, even if not on this short list.
- ◆ Fluid spills, blood, tissue, debris, glass, or anything else not normally on the road should be examined for its evidentiary value.

Next Let's Look at Evidence from the Vehicle

- ◆ If two vehicles come together, they will leave signs of that contact on each other.
- ◆ If a vehicle and an unprotected person come together, there will be material transfer both ways.
- ◆ Evidence from the vehicle may help us determine who was driving if that is in question.
- ◆ This evidence will be used in conjunction with victim injury pattern.
- ◆ Don't forget evidence from inside the passenger compartment.

Vehicle Evidence

- ◆ We will examine a simple case of a collision between a car and a large truck.
- ◆ The car was struck in the rear and damaged.
- ◆ There were tire prints left on the rear of the car.
- ◆ The car driver said, long after the fact, that the damage had been done by a particular large truck.



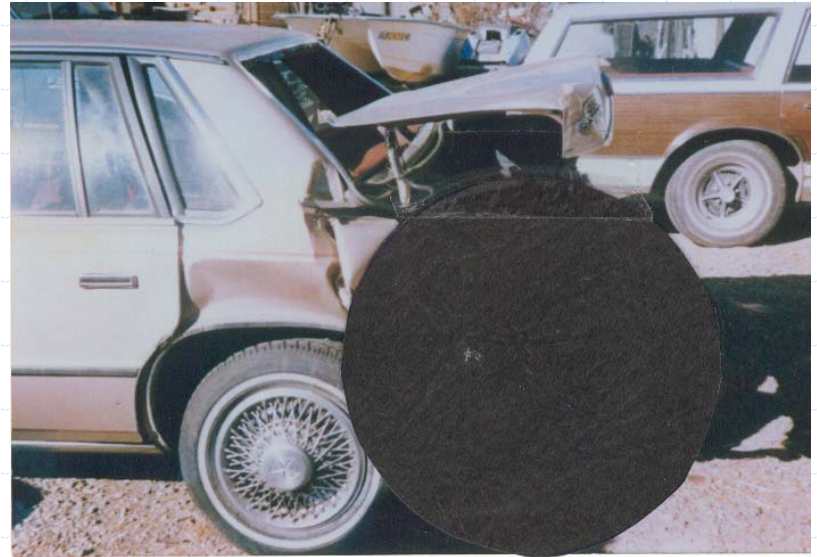
Vehicle Evidence, cont'd.

- ◆ This is the truck that was accused of hitting the back of the car.
- ◆ Is the material transfer in the right place?
- ◆ Is the damage to the car consistent with such an impact?



Vehicle Evidence, cont'd.

- ◆ We will take the photo of the car and superimpose a scaled truck tire to the impact area of the car.
- ◆ In this case, the evidence clearly shows this impact never happened!



Vehicle Evidence, cont'd.

- ◆ This pickup drove off the road and hit squarely an immovable object.
- ◆ The speed change was obviously quite high.
- ◆ There is too much damage to apply a CRASH III type of analysis.
- ◆ From examining the damage to the vehicle, we see the collision force was virtually straight back.



Vehicle Evidence, cont'd.

- ◆ We will look inside the vehicle for evidence of speed.
- ◆ Specifically, we will be looking for both speedometer and tachometer slap.
- ◆ In certain limited cases of this type, such evidence may be viable.
- ◆ It is best if the two instruments will corroborate each other.
- ◆ The speedometer shows about 57 mph.



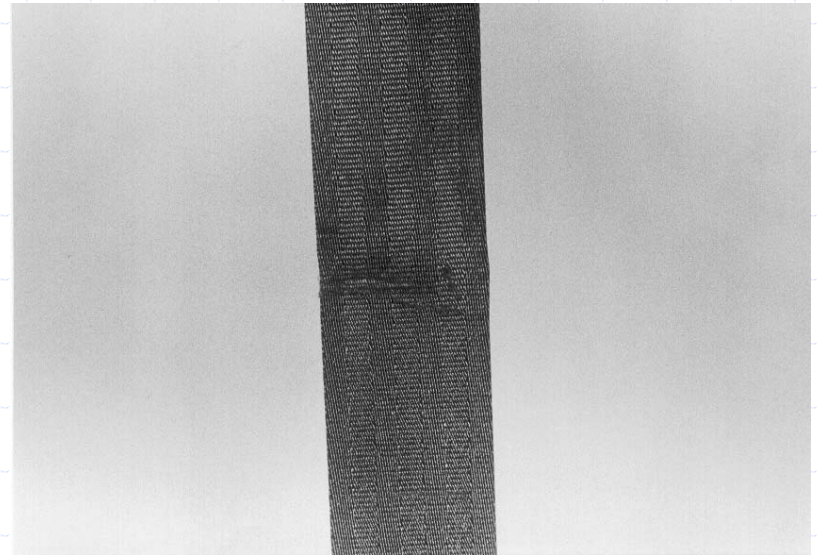
Vehicle Evidence, cont'd.

- ◆ The tachometer shows paint transfer from the needle slap at about 2400 rpm.
- ◆ This is consistent with the speedometer reading of 57 mph.



Vehicle Evidence, cont'd.

- ◆ Lap-Shoulder belts may show characteristic load marks if they are being worn at the moment of collision.
- ◆ This stretching and abrasion of the material occurs where the belt goes through the D-ring mounted on the B-Pillar.
- ◆ Is definitive evidence if present.



Vehicle Evidence, cont'd.

- ◆ Material or patterns may be transferred in collisions.
- ◆ This is fabric transfer onto the front bumper of a pickup.
- ◆ The fabric was from pants being worn by the occupant of an ATV.
- ◆ In addition to collecting and photographing the bumper, the clothing should be taken and preserved.
- ◆ A sworn officer should accompany the victim to the hospital or morgue to ensure all clothing and appropriate body fluids are gathered for evidence.



Vehicle Evidence, cont'd.

- ◆ This material transfer is from shoes worn by one of the two occupants of the ATV.
- ◆ The shoes need to be gathered as evidence so the material and transfer patterns may be compared.



Vehicle Evidence, cont'd.

- ◆ The shoe shows black material transfer from the engine case.
- ◆ The cut in the shoe toward the back is consistent with the nipple through which the recoil starter rope passes.



Vehicle Evidence, cont'd.

- ◆ Blood and tissue transferred to the ATV by one of the injured occupants.
- ◆ This biological material should be taken as evidence.
- ◆ It may be compared to blood samples taken from each occupant.
- ◆ Similar evidence may be found inside the passenger compartments of vehicles when looking at the issue of who was driving.



Vehicle Evidence, cont'd.

- ◆ Blood and tissue transferred to the pickup from ATV occupant.
- ◆ This material should be collected for comparison to known samples taken from ATV occupants.



Vehicle Evidence, cont'd.

- ◆ Blood spatter on the left front fender of the pickup.
- ◆ Medium velocity spatter – consistent with impact velocity under about 100 feet per second.
- ◆ Probably came from body part not covered by clothing, as pattern is unencumbered.
- ◆ A sample of this blood may be preserved to compare with the known samples.



Vehicle Evidence, cont'd.

- ◆ Tire material and tread pattern transferred from ATV to front bumper of pickup.
- ◆ This evidence will assist us in putting the two vehicles together.
- ◆ Once the vehicles are together, we may place the occupants on the ATV and then use injury patterns and kinematics to determine who was the operator.



Putting the Evidence Together

- ◆ We will take both vehicles to the scene.
- ◆ We will use material transfer one to the other to place the vehicles as they were positioned at impact.
- ◆ Here paint transfer is being matched.



Putting the Evidence Together, cont'd.

- ◆ The tread on the ATV tire is being matched to the transfer on the front bumper of the truck.
- ◆ Note the bend in the rear axle of the ATV and the rear wheel conformity with the front pickup bumper.



Putting the Evidence Together, cont'd.

- ◆ All damage and material transfer have been matched.
- ◆ Enough space is left to place exemplar riders on the ATV.



Putting the Evidence Together, cont'd.

- ◆ Exemplar riders are placed on the ATV.
- ◆ They have the same build and stature as the riders involved in the crash.
- ◆ Their injury patterns are consistent with this rider placement.
- ◆ Overhead photography can be a powerful tool when used to reconstruct traffic crashes.

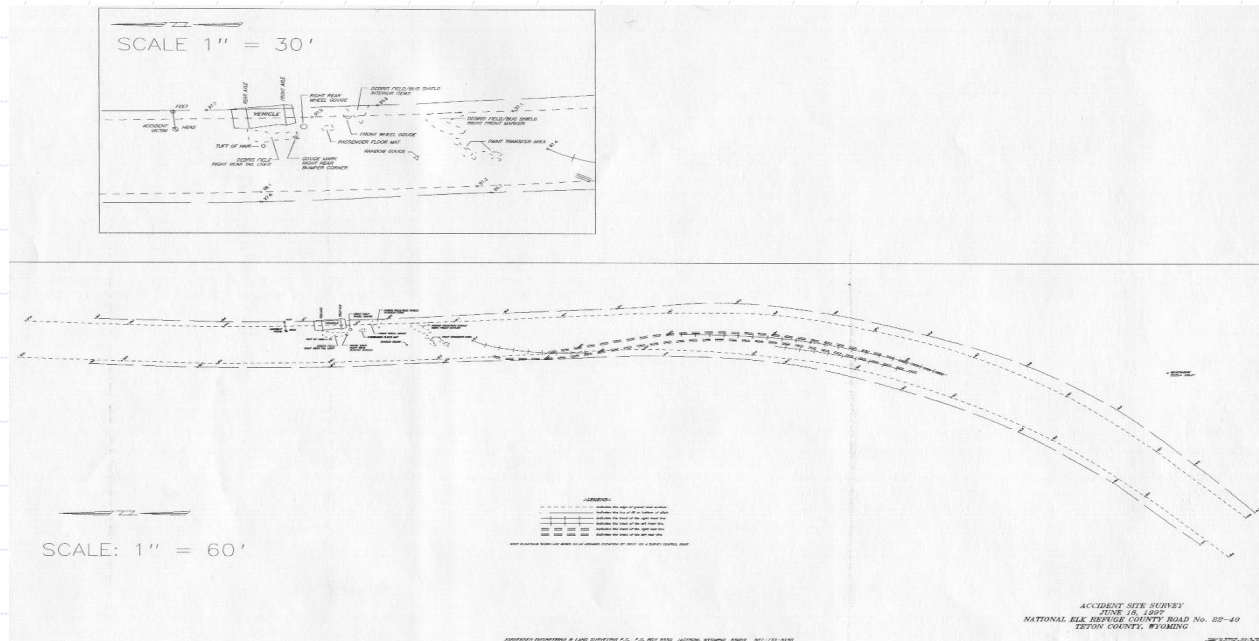


Memorializing the Evidence

- ◆ There are three primary ways to record and preserve the evidence.
- ◆ Clearly, photography is a very important tool to be used by the investigator.
- ◆ Scale Diagrams are invaluable tools for recording the traffic crash scene and surroundings.
- ◆ The written report will tie everything together.

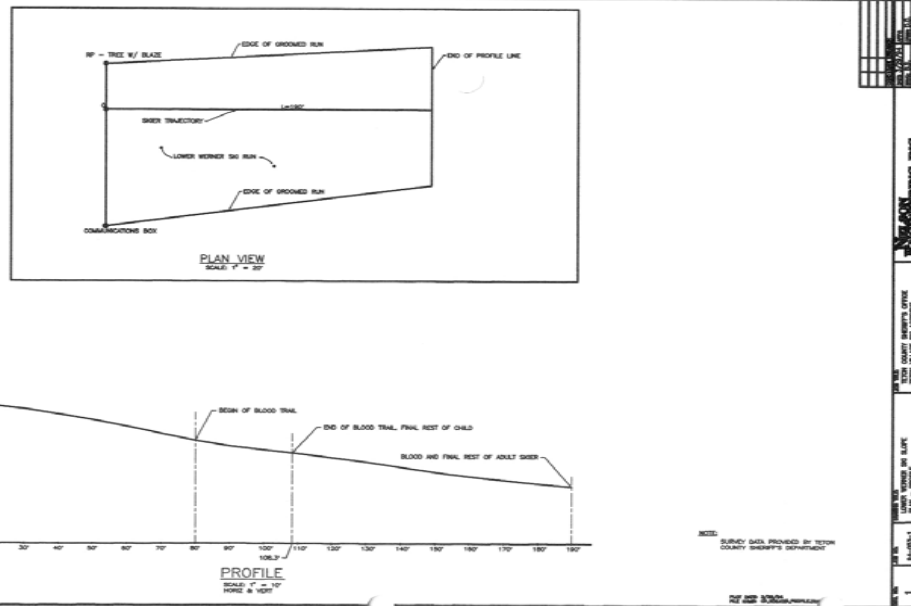
Scale Diagrams

- ◆ Scale diagrams show the proper relationship between all evidence connected with the crash.
- ◆ This diagram shows a single vehicle fatal on a County road.



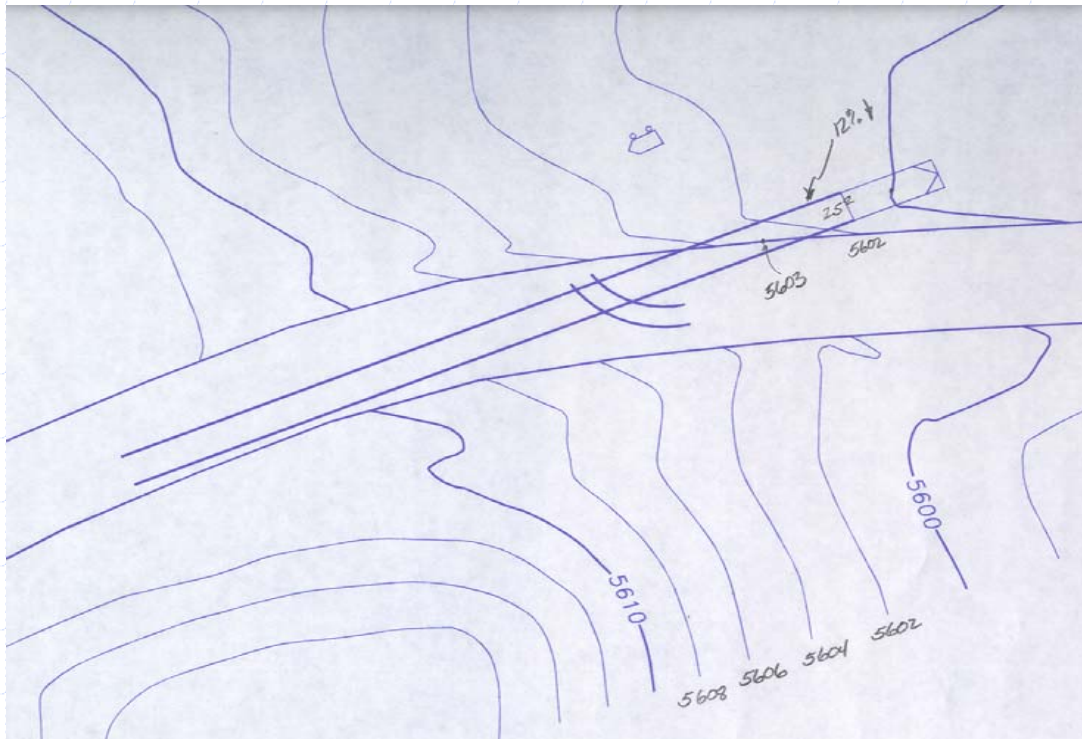
Scale Diagrams, cont'd.

- ◆ This diagram is of a fatal ski crash
- ◆ The principles of traffic crash reconstruction may be applied to any collision where objects are in motion.



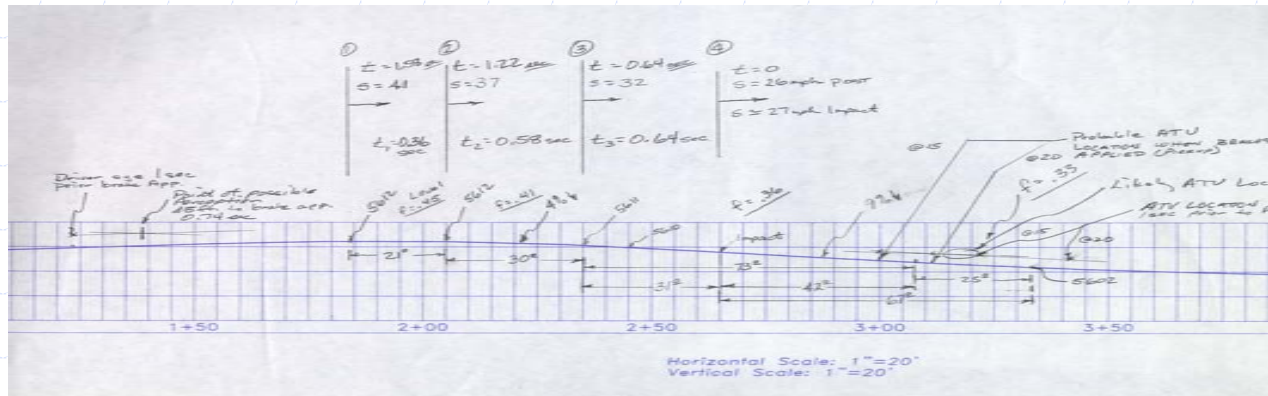
Scale Diagrams, cont'd.

- ◆ This diagram is a view of the pickup-ATV crash
- ◆ The ATV was moved by bystanders before measurements



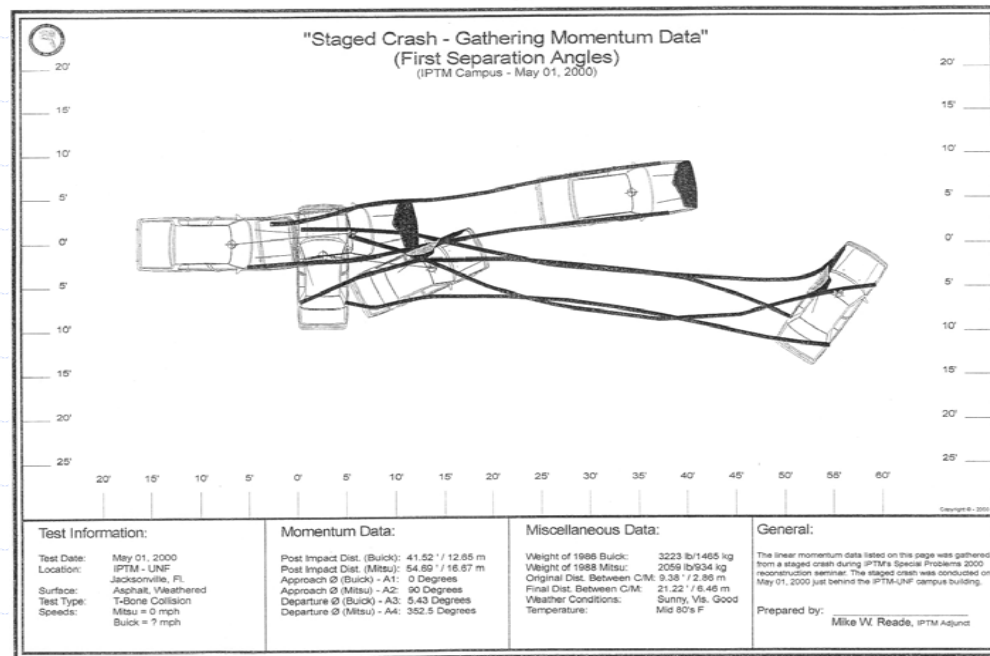
Scale Diagrams, cont'd.

- ◆ Sometimes a profile in one to one scale is necessary for proper scene analysis.
- ◆ This is the profile drawing from the pickup-ATV crash.



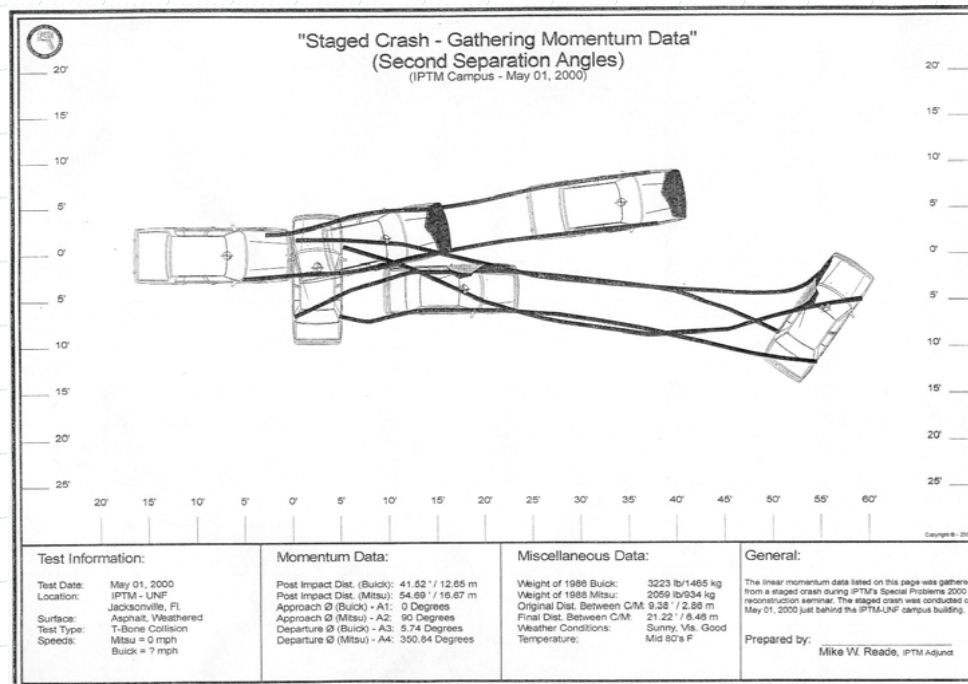
Scale Diagrams, cont'd.

- ◆ Scale diagrams may be used to show vehicle trajectories before and after collision.



Scale Diagrams, cont'd.

- ◆ As we follow the vehicles to final rest, we observe where and how secondary slap occurred.
- ◆ We must use a scale diagram to do this.



Evidence from Vehicle Occupants

- ◆ Photographing, measuring, and recording occupant injuries may be an important step in the evidence gathering process.
- ◆ The person called upon to analyze the traffic crash will be able to use this information to match injuries to specific parts of the vehicle.
- ◆ The nature of the injury itself may tell us something about how the injury occurred and where the occupant was seated to get the injury.
- ◆ Pattern injuries on crash victims may help us identify vehicle type in hit and run cases.
- ◆ Anthropometric information should also be gathered. With adults, the information will likely be obtained from driver's license information.
- ◆ In the case of children, stature and weight should be measured, along with any specific information needed, such as seated height.
- ◆ If seating positions are in question, hair samples should be taken from all occupants using standard forensic techniques.

Evidence from Vehicle Occupants, cont'd.

- ◆ Evidentiary blood samples should be obtained from all occupants if seating position is an issue in the investigation.
- ◆ When seating positions are at issue, clothing from all occupants should be gathered.
- ◆ Chain of evidence is important to maintain.
- ◆ A sworn law enforcement officer should accompany occupants to where ever they may be taken in order to gather the evidence and maintain the chain of custody.
- ◆ Although not occupants per se, deployed air bags should be taken as evidence and treated in the same way as occupant clothing.
- ◆ Finally, let the facts of the case guide the decision as to what other evidence should be sought from the vehicle occupants.

The Written Report

- ◆ The State of Wyoming provides traffic accident investigation forms to the Wyoming Highway Patrol as well as to local and County agencies.
- ◆ These forms are NOT sufficient to record and interpret all evidence associated with a traffic crash!
- ◆ At best, the supplied forms are reporting documents, designed to allow quick information entry into a data base.
- ◆ These reporting forms are required, but **MUST** be supplemented in serious traffic crash cases.

The Written Report, cont'd.

- ◆ The written report should include observations concerning the traffic crash scene and the vehicles at the scene.
- ◆ The report should contain a reasonably detailed description of vehicle damage and roadway evidence.
- ◆ The report will describe all evidence gathered and will show chain of custody of that evidence.
- ◆ The report will describe what was done to analyze the evidence, be it skid marks for speed, blood and tissue forensics, or whatever else needs to be said about the case analysis.
- ◆ The report will have to show, in a clear and concise manner, that the person accused of Aggravated Vehicular Homicide was truly the driver, that he/she was intoxicated or driving recklessly, and these actions were the proximate cause of death of another.

The Written Report, cont'd.

- ◆ If we have done our homework, and have done a proper job of dynamics analysis, we can do this:

-8.00





-8.00



The Written Report, cont'd.

- ◆ Animations courtesy of
 - ◆ Cal Haines
- ◆ Arizona Reconstruction Engineering
 - ◆ 4911 E. Scarlett St.
 - ◆ Tucson, AZ 85711

Conclusions – for the Investigator and Prosecutor

- ◆ As crash investigators and reconstructionists, we need to keep several things in mind–
- ◆ Those of us who are crash investigators are NOT advocates – we are detectives and analysts, the finders of fact.
- ◆ We need to collect all of the evidence as soon as it is practical.
- ◆ We need physical evidence to corroborate witness statements.
- ◆ We need to understand the significance of the evidence we do collect.
- ◆ If we are too close to a case, we need to find another competent investigator to work it.
- ◆ We should always remember in criminal cases that someone's freedom depends on the **accuracy** and **integrity** of our work.
- ◆ We **MUST** do our best!