

# Video Evidence for Highway Tort Trials

DANIEL S. TURNER

The hand-held video camera provides an easy way to obtain evidence for use in highway tort trials. The simple advantages and disadvantages of using video evidence is discussed. Several differences in how the human eye gathers information and how the process is performed by a video camera are reviewed. Simple hints are given for improving the quality of video evidence. Example cases involving video evidence are used to introduce the wide range of applications.

The primary purpose of this paper is to encourage the use of videotape as evidence for highway tort cases. Examples of good and bad practices are discussed, and introductory advice on shooting video for highway tort is offered. The author hopes that this article will inspire others to expand this topic to include detailed advice and case citations so that an effective library can be assembled on this emerging tool.

## SAMPLE USES OF VIDEO EVIDENCE

Almost all state highway agencies now have extensive videologs showing features along their roadways. Videologs are good sources of information, especially for the preliminary investigation of a site involved in a highway tort suit. The videolog may be reviewed to identify the general character of the roadway, geometric information such as the presence of curves, types, and locations of traffic control devices, the condition of shoulders, and similar information. The investigator must remember that conditions may have changed between the date of the videolog and the date of the traffic accident.

Another good use of videotape is to preserve evidence during an investigative visit to an accident site. Videotape can capture the types and locations of skidmarks, crushed vegetation, shoulder conditions, damage to vehicles, traffic control devices, and other features. The video may be reviewed later as needed to determine facts about the scene as the investigation proceeds.

The site of an accident may also be videotaped for use in court when the jury cannot travel to the scene for a firsthand observation. This provides the jurors with an overall perspective of the site and may aid greatly in their deliberations.

A video camera may be located in a vehicle to replicate what a driver saw as he or she drove toward the point of impact of a traffic accident. Such perspective may be especially important in determining whether the traffic control devices provided appropriate and adequate messages to the driver.

Another excellent use of videotape is to document construction zone work activities. Some highway agencies now make it standard practice to videotape an entire construction zone on a weekly or monthly basis. The tapes document the contractor's progress over time and may be used as evidence in tort claims actions.

Law enforcement officials have made excellent use of videotape in driving-under-the-influence cases. A tape showing the appearance and state of mind of the defendant at the time of arrest can be compelling evidence. This use does not involve highway tort, but it illustrates videotape's acceptance in court.

These are only a few of the possible ways to use videotape as evidence. They represent examples of good uses of a good tool, which will become even better as video technology improves.

## SHOOTING VIDEO

The quality of a videotape may be the most important factor in persuading a jury to accept it as compelling evidence in a case. Hiring a professional camera operator is a good investment. For the novice attorney or investigator planning to shoot video for the first time, several hints are offered from experiences.

Shooting tape at an accident site can be improved by the use of a tripod or other support. A tripod reduces bounce and vibration and produces a higher-quality and more satisfactory picture. Newer cameras with anti-bounce controls can help reduce the problem, especially if the camera is inside a moving vehicle.

In panning from one location to another, the camera operator must move slowly and smoothly so that the scene does not appear blurred or rushed to the observer. A camera mounted on a tripod is much easier to pan than a hand-held camera. An autofocus feature may have trouble keeping focused if the operator swings too quickly to the next view.

It is usually best to start each new scene with a broad view of the accident site or of the horizon, then slowly move to details of the site. This allows the viewer to become oriented to the site before examining the detail of the particular scene. This approach replicates the way a human eye works in becoming oriented to the whole scene before focusing on a detail; however, the eye and brain perform this process much more naturally and rapidly than a video camera.

Auto focus and auto exposure features make it easy to operate a video camera. However, manual operation may be better for moving the camera from light to dark areas or between objects at varying distances from the camera. This is particularly true for shots into the sun, items of drastically different color from the background, or moving objects. With a little training and some practice, manual operation can produce better video in these situations. When color is important, the camera should be "white balanced" before each use to provide truer and more consistent colors.

Care must be used when a scene is shot with the camera pointed into the sun. Important features will show up as silhouettes unless the camera operator compensates the exposure. Signs and signals shot into the sun may be difficult to read because they appear darker than in real life. Jurors may be led to believe that the sign or signal is always dark and hard to read. With careful planning, it may be possible to select the time of day or the camera location to minimize

the adverse effect of silhouettes, overexposure, glare, or obtrusive shadows. The presence of shadows becomes especially important when shooting shoulder drop-offs, pot holes, or steep side slopes. Shadows exaggerate heights and slopes.

A professional camera operator will be familiar with the effects of sun angle and will know how to exaggerate or minimize the effects of distance and slope through the video camera lens. The quality of the tape is enhanced by a professional operator, and the attorney may save the cost of a second trip to the site to reshoot a tape of inferior quality.

Zoom lenses are handy, but they may change the perspective. The apparent closeness of objects and the relationship between objects can be drastically altered by zooming. If a zoom lens is used, the camera operator should be prepared to testify about the extent and effect.

Narration may be helpful or harmful. If well done, it might describe the location of the scene and provide useful background information. On the other hand, wind noise, vehicle noise, or poor enunciation could diminish the quality of the tape. Some judges routinely require that narration be removed before admission into evidence. The basis for this decision is that videotape, like a photograph, should speak for itself if it fairly and accurately depicts a scene. If additional explanation is desired, it may be given at trial by a properly qualified expert.

For some uses of video, a proper foundation is necessary before it can be admitted. If so, the attorney should treat the videotape as a photograph or other piece of evidence. If it is material and relevant and is not likely to mislead or confuse a jury, a tape is generally admissible. A video may be easy to admit into evidence if it duplicates the essential conditions of the scene, or qualification may be necessary only for those aspects that do not replicate the accident site. Another option is to use the video only as demonstrative evidence.

## DRIVER'S VIEW

It is frequently important to indicate what a driver saw while approaching a collision site. If so, the camera should be located toward the windshield and away from the rearview mirror. This removes obstructions from the video and encourages the viewer to concentrate on events in the center of the video. In some instances the exact view of the driver must be replicated. If so, the camera should be placed at the position and height of the driver's eyes, and the vehicle should be located laterally within the traffic lane at the same place as the vehicle involved in the collision. To provide foundation for admission of the evidence, the camera operator may have

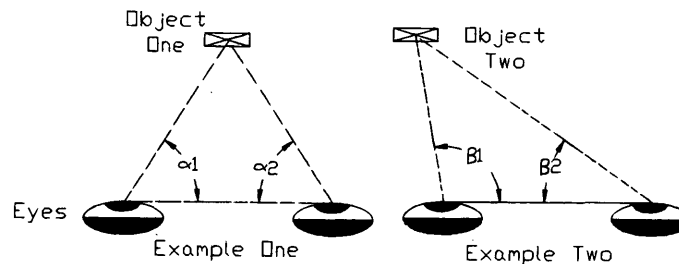
to testify about eye height measurement of the driver sitting in the vehicle and how this was replicated with the camera position. Testimony that the speed and type of vehicle were the same as involved in the collision may also be appropriate. Although such detail is rarely necessary, there are instances when it is essential. For example, eye height may be crucial in determining how far a driver could see over the crest of a vertical curve. A second example is that the camera's lateral and vertical placement inside the vehicle would be important in determining the adequacy of viewing angles for traffic control devices.

If possible, the video should be shot at the same time of day as the accident. For some positions of the sun, this may produce shadows or glares similar to those seen by a driver. The video camera does not necessarily treat this glare in the same manner as the human eye does. It is helpful to cover the dashboard with a black cloth during shooting to reduce reflection and glare.

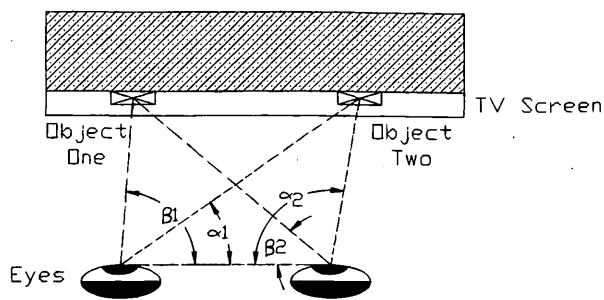
Water or dust on the windshield, particles in the air, fog, or other substances may cause poor focus or blurry pictures. It may be necessary to shoot the scene several times to produce a tape that reasonably depicts the scene. If so, the court may require that all of the tapes be admitted. Opposing counsel may point out to the jury that the very worst tape might represent actual conditions during the collision.

The human eye can dart quickly toward a point of interest and then dart back to another location. Typically the eye requires 0.25 to 0.67 sec to move and focus. Additional time is then spent as the eye absorbs the new information. This speed cannot be achieved with the video camera without producing a blur on the TV screen. Another limitation is that the camera cannot see over the horizon or around a curve or glance quickly at signs on the side of the roadway. The human eye normally sees a wide periphery. The video camera cannot duplicate this; a portion of the top, bottom, and sides of the scene will be lost through the video camera. The video observer in the courtroom will have a limited view of the site. Because of this, the effects of speed, horizontal curves, and hills are usually exaggerated on a videotape. What the video camera operator may have thought was a casual drive along the road can appear jerky, rapid, or disconcerting on videotape.

The human eye judges distance through stereo vision. The brain measures the minute angles between the right and left eyes as they focus on a distant object. This angular measurement is converted into an estimate of distance by the brain. This concept is illustrated in Figure 1. This calculation is not possible when viewing videotape. The plane of focus is always that of the video screen or monitor, no matter what object the eyes are focused on. Therefore, calculations based on observed angles will yield the same distance between the eyes and the screen (see Figure 2). The brain can some-



**FIGURE 1** How eyes measure angles to objects so brain can "calculate" objects' location and distance.



**FIGURE 2** All objects on video screen are same distance from eyes, making them appear equal distances from viewer.

times overcome this limitation and obtain clues about distances by comparing object sizes, through perspective by watching lane stripes come together in the distance, or by noting that buildings get smaller toward the horizon. Because of the difficulty in establishing perspective, videotapes or photographs may not be good for estimating distances.

In a video picture the focus is normally very good in the center of the screen and less clear at the periphery. When a video is shot from a moving vehicle, objects near the edge of the screen will not be in focus. They also appear to pass very quickly while those in the center move more slowly. Consequently, reading signs or determining the condition of traffic control devices along the periphery is difficult. A 35 mm photograph of a traffic sign may more accurately depict color and condition than a videotape.

The human eye can distinguish contrast better than a video camera can. This is important in night video and in trying to read signs from a passing vehicle. Black and white contrast is much sharper on a videotape than are some other colors. Even with these limitations there are times when videotape evidence is very effective in the courtroom. The examples discussed later provide useful illustrations.

## PITFALLS OF USING VIDEOTAPE AS EVIDENCE

The attorney may have to work hard to have the tape admitted into evidence. The camera operator may have to testify about how the tape was shot, the capabilities of the camera, and whether the tape replicated what the human eye saw at the scene. The court may also require the testimony of others who assisted in the planning, shooting, or editing of the tape.

The court may rule that all tapes shot at the site must be admitted into evidence. The initial tape of a site may not be of good quality or may not emphasize the items the attorney sought. When this happens, a second tape is often made. If the judge rules that both tapes must be admitted, the jury may have trouble deciding which tape to believe.

There have also been instances in which the court refused to admit a tape that had been edited to remove pieces of information the attorney wished to withhold from the jury. If an edited tape is admitted, the jury may be entitled to know what material was removed and why. If the opposing attorney can extract this information, it may cloud the usefulness of the edited tape.

It is often appropriate to practice shooting the videotape before actually going to the site of the accident. This should be done at a

scene similar to the one where the collision occurred. If the practice tape is of poor quality, it does not have to be admitted because it was not shot at the collision scene.

It is difficult and time consuming to shoot night video that replicates what the eye saw. Any lights pointed at the camera can produce glare, halos, spots, and streaks that move within the camera lens barrel. The video camera cannot distinguish contrast as well as the human eye can, especially at night. Things that can be seen by the eye may not be discernable on videotape. On the other hand, traffic signs that were not visible at a scene can reflect enough light to produce glare on the videotape and sometimes can become unreadable. The tape may have to be shot several times at different light exposure levels to obtain a version close to what the observer saw.

## EXAMPLE VIDEOS

Several videotapes used in highway tort cases will be discussed as examples of good and bad practices. Because most of the example cases were settled before trial, there were no judge's rulings on admissibility or other issues. The examples do, however, illustrate some of the grounds for objecting to use of video.

### Example One—Construction Zone Signing

This case centered on the adequacy of a detour and construction zone traffic control devices. An accident occurred on a short two-lane detour that connected a four-lane bypass to a two-lane roadway. The plaintiff crossed over the center line in a reverse curve at the end of the detour and was involved in a head-on collision. A passenger in the plaintiff's vehicle died later, allegedly from complications resulting from the accident.

A videotape was prepared by the plaintiff's investigator 2 weeks after the collision, to illustrate the difficulty in using the detour. The investigator drove through the site several times, at 32 km/hr (20 mph) and then at 56 km/hr (35 mph). The exact speeds of the vehicles involved in the collision sequence were unknown, but the speed limit was 32 km/hr (20 mph) and the investigating officer estimated the speed of both vehicles to be 56 km/hr (35 mph). Additional footage was shot at the accident site to show roadway geometrics, visibility, traffic control devices, and other details.

It was raining when the collision occurred. In the first sequence on the videotape, the plaintiff's investigator simulated this by sprinkling water on the windshield. In later sequences, the vehicle's windshield wipers were operated as water was periodically sprayed on the windshield. For reasons discussed later, neither method replicated the effects of rain. In addition, with little water on the windshield, the wipers produced a grating sound that probably would have been distracting and irritating to a jury.

Several types and colors of signs were posted throughout the work zone. It was obvious that some sign colors offered higher contrast and more visibility than others. For example, a black-and-white speed limit sign was much easier to read at the edge of the screen than an orange-and-black construction zone sign was.

The final sequence on this tape illustrated one of the differences between the eye and the video camera. As the vehicle drove through the site, the camera was turned toward one sign, pointed at it for several seconds, then turned back to view the roadway. When the camera was pointed directly toward this sign, it was crisp, clear, and easy to read. The contrast between the orange background and the

black wording was much sharper than when the camera pointed straight ahead and the sign was on the periphery.

### *Positive Effects*

The video documented the traffic control devices and locations for the day of the videotaping. The state's expert used the videotape to estimate the distance between signs by using a stopwatch to measure elapsed time at given speeds. It was also possible to draw preliminary conclusions about the size, color, lateral clearance, spacing, clarity, and other aspects of each sign from the video.

### *Negative Aspects*

The video was intended to represent the driver's view of the construction zone signs, but the location of the camera within the vehicle did not correspond to the driver's eye location. The camera was mounted to the right of the driver. It was aimed too low and sometimes showed major portions of the dashboard but only a partial view of the site through the lower part of the windshield. This did not correspond to the view of the driver. The camera was pointed straight ahead and focused at infinity. As the vehicle passed a sign, the sign was at the edge of the picture and out of focus. This lack of focus made it very difficult to read the sign from the video screen and would not have represented the driver's ability to read the sign.

Because the camera was not in the same position as the driver's eyes, it was not possible for the observer to experience the view from the driver's perspective. Depth perception, alignment of barrels, and visibility of signs were all affected by improper location of the camera. These were important issues because the adequacy of the detour and control devices was under dispute.

An attorney could have raised several objections against the admission of this tape. The location of the camera within the vehicle would serve as grounds for an objection. In addition, the water sprayed on the windshield did not replicate the effects of rain—for example, the pavement was not wet. Visibility of pavement markings would be much different during rain. A second difference is that sunlight shining through water on the windshield produced a glare and interfered with the driver's vision, but the sun was probably not shining during the rain at the time of the collision. It is hard to believe that the essential conditions affecting the driver's vision were accurately replicated by squirting water on the windshield.

### **Example Two—Visibility Of Pedestrian At Dusk**

In this case, the plaintiff received debilitating injuries as a pedestrian. Issues in doubt included the exact time of the evening when the collision occurred, the amount of daylight available to an oncoming driver, the design of the intersection, and the presence of a phantom vehicle that blinded the oncoming driver with its lights.

Short video segments were shot at time intervals on the first anniversary of the accident. These video segments showed the light available to an oncoming driver at the time in question.

The plaintiff's brother wore the same clothes the plaintiff wore on the evening of the collision. The brother was approximately the same size as the plaintiff and stood in the roadway at dusk at the approximate location of the collision.

The video camera's internal clock was set at the same time as the U.S. Naval Observatory. An automobile entered the roadway from a side drive and turned directly toward the camera, in the same sequence as a phantom vehicle that was alleged to have blinded the oncoming driver. The intent was to show the range of visibility over a 30-min period at dusk and to document the effects of headlights.

### *Positive Effects*

The video provided a good overview of the scene of the collision. Jurors could have obtained an impression of whether an oncoming driver should have seen a pedestrian on or near the roadway. The video also illustrated that light was available even after the official time of sunset. The video did a good job of imparting to viewers a perspective of how headlights might have blinded an approaching motorist and how long this blindness might have lasted.

Overall, the video served its purpose well. It provided evidence that could not have been obtained through the testimony of witnesses or through photographs.

### *Negative Effects*

This example illustrates the advantages of practicing the video session at another site before the actual taping. During the taping, time passed very quickly and it was difficult to reset the automobile and the pedestrian for succeeding shots. If a practice session had been made the night before the taping, procedures could have been worked out for smoother shooting, and a better camera could have been used to minimize stray beams of light from bouncing into the camera barrel. As it was, glowing dots and tracers of light moved around the picture as the vehicle entered from the side road and turned toward the camera.

The difference between the automobile's high beam and low beam lights was dramatic on the videotape. A practice session would have provided knowledge of this difference, and the scene could have been shot with high and low beams during each of the planned time periods.

The video could have been improved if the camera had been mounted on a tripod instead of held by hand. Annoying jolts and bounces of the picture could have been prevented and the quality of the presentation would have been enhanced.

There was a major difficulty with using this videotape. The tape included a drive through of the accident scene. Because the camera would be pointed into the sun during part of the time, the camera operator elected to use manual focus and manual exposure instead of autofocus to minimize the silhouette effect when the camera pointed into the sun. The camera operator also sat outside the vehicle instead of inside, so that the dashboard, windshield wipers, and hood would not dominate the shot. Unfortunately, the operator did not have a secure seat on the vehicle and slipped back and forth on the hood during the drive through. Consequently, the picture was often overexposed and it bounced and swayed. As a result, this portion of the videotape resembled a bad ride on a roller coaster and imparted a negative effect to the viewer. The failure to secure proper exposure during this portion of the videotape cast doubts about whether the exposure at dusk was accurate.

Possible objections to the video were that (a) it was not shot from the height and location of the driver's eyes as the vehicle approached the pedestrian; (b) the camera might not have replicated the actual

light conditions during dusk; (c) the phantom vehicle's position and orientation on the roadway were never documented, and the video may not have accurately demonstrated how its lights shone toward the approaching driver; and (d) the camera was stationary during the sequence in which the approaching driver (which the video was trying to replicate) traveled a great distance down the roadway.

### Example Three—Vehicle Leaving Roadway

The third example video was used to show the scene of an accident that occurred in a southwestern state. The accident involved a pickup truck that failed to negotiate a low-water crossing when it hit a bump 23 m (75 ft) before the low point of the crossing. The driver lost control, the truck overturned, and an occupant was killed. The speed limit was 72 km/hr (45 mph), but the crossing was posted with a 32 km/hr (20 mph) warning sign. The plaintiff's witness testified that the pickup truck became airborne when it hit the bump at low speed, but the state contended that the speed was more like 96 km/hr (60 mph). The videotape was shot to provide a view through the windshield of a similar pickup as the vehicle navigated the low water crossing and of vehicles proceeding through the crossing at various speeds.

The video camera was set up on a tripod beside the road to record a small pickup truck, similar to that driven by the plaintiff, moving through the crossing. The speed was varied in 8 km/hr (5 mph) increments to show the effect of the low-water crossing and a slight bump over a culvert as the truck passed through the scene. The plaintiff alleged that at 40 km/hr (25 mph) the truck became airborne and produced a fatal collision. The videotape illustrated complete control of the truck at this speed with no hint of difficulty. The scene provided an excellent overview of the site and allowed the observer to draw conclusions about the circumstances surrounding the accident.

Shooting sites like the one in this case requires care not to exaggerate slopes or distances with the use of a zoom lens. The person shooting the video may be asked to testify about the use of zoom lenses to ensure that the appearance of the video matched that observed in real life.

The first sequence on this tape showed the state's expert driving through the site in a pickup truck similar to the one driven by the plaintiff. The sequence shot through the windshield illustrated the peril of video work. The camera was too low and focused on the windshield wiper instead of the outside scene. The roadway and surroundings were out of focus. Signs could not be read easily. A viewer could not draw conclusions about the suitability of the roadway, the signs, or the traffic control devices.

Viewers are particularly sensitive to windshield shots of curves and hills shot by means of hand-held video photography. This site was in rolling terrain with hills and curves. The tape suggested that a driver could not see around the curves or over the hills, and jurors viewing the tape might have been led to believe that the road was hazardous.

### Positive Aspects

This video included a detailed examination of the accident site and showed the perspective from both approaches. It also contained a narrated close-up examination of the roadway edge, the low-water crossing, and other features that might have contributed to the collision.

The most positive aspect of this video was the taping of the pickup truck moving through the low-water crossing at various speeds. It would be difficult for a viewer of the tape to conclude that a 40 km/hr (25 mph) trip through the crossing would result in an accident if the driver was operating the vehicle properly.

### Negative Aspects

Major portions of this tape were shot by the daughter of the state's expert. Most of the tape featured the expert and daughter driving toward the accident scene, describing the approach road. Unfortunately, the video camera was aimed directly at the windshield wiper. The autofocus feature of the camera caused the windshield wiper to stay in sharp focus and all else to be out of focus. Important signs beside the roadway were visible only briefly and were out of focus. The camera operator bounced as the truck hit bumps. Unfortunately, she lost control of the camera completely as the truck passed over the low-water crossing. This loss of control and the resulting wild swinging of the camera substantially offset any positive effects the video might have had.

### Example Four—Computer Animation Prepared From Photographs

Another good use of video involves computer animation of accident sequences. Better software has become available, making it easier to make these videos, improving their capabilities, and enhancing their quality. As a consequence, the price of production has fallen and their use in court has become more frequent. Typically, a professional laboratory produces the animation from maps, measurements, and photographs of the site. For example, the laboratory may digitize aerial photographs to create a three-dimensional computer database. The database yields animated versions of the sites, which can be viewed from any perspective desired by the observer. This technique produces high-quality, convincing evidence.

Animation allows a realistic view of the sequence of events in an accident, which can seldom be obtained through other methods. Certain events may be difficult for a juror to understand from looking at scattered drawings. In particular, the juror may not grasp the intermediate events between drawings. One example case involved an accident that was animated to show the driver's view of a vehicle moving through a roadway construction zone, then striking a tree. Another accident was computer animated to show two vehicles hitting a third vehicle in the roadway. The camera then zoomed in on a front seat passenger in the first vehicle, to show what happened in the separate impacts with the two other vehicles.

### Example Five—Modeling a Train Collision

Another example video involved a scale model duplication of vehicle movements in a train-car collision. The basic data for the video were gathered by a reconstructionist who had the train crew return to the site. With the locomotive stopped at various spots on the approach, a vehicle was driven down the highway and through the grade crossing until train crew members could independently identify the approximate speed of the vehicle involved in the collision. The train was moved to several locations and the vehicle's speeds were established at each point. With these data, the reconstructionist calculated the appropriate speeds and angles of vision.

A table top model was constructed on the basis of measurements taken at the site. Scale models of the train and the car were fitted to the model. They were configured to move up and down the track and road by means of fine wires strung through pulleys. With positions calculated from the field observations, testimony, and measurements, the model train and model car were aligned at starting points and one frame of videotape was shot. Next, the wires were moved in small increments to relocate the train and car to the exact scale distance they would have traveled in one-thirtieth of a second, then another single frame of videotape was shot. This process was repeated until the collision sequence was completed.

The collision sequence was repeated several times and taped from various camera locations, even from a platform moving alongside the model car. The method produced reasonable reproductions of what happened during typical scenarios related to the accident.

The resulting video gave the jury an excellent idea of the relative speeds of the vehicles and how the collision could have happened.

## SUMMARY

This paper was prepared to encourage the use of videotape as evidence in highway tort trials and to encourage the documentation of such uses. Discussions about the differences in how the eye and the video camera gather information, hints on improving the quality of video, and good and bad uses of video were included. Example videos from actual cases were discussed to illustrate the main points of the paper.

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