

**Caught on Camera!
Defending Your Liability Claim through Video Enhancement & Analysis**

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The Hospitality Law Conference

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Barbara Worsham is a Vice President at Rimkus Consulting Group, Inc., with more than 25 years of experience in forensic animation, graphics, and video services. She graduated from the Art Institute of Houston in 1987 with emphasis in Visual Communication. Barbara's expertise includes enhancing security video using state-of-the-art computer software.

She has more than 100 hours of forensic enhancement training plus an advanced level security camera course. Her video enhancement projects have included security video footage, cell phone, digital camera videos, and YouTube videos. She has developed animations, graphics, and enhanced security videos for mediations, arbitrations and trials.

Barbara has testified in depositions and trials at the state and federal levels, regarding the methods used to create forensic animations or enhance evidentiary videos.

Rimkus Consulting Group, Inc. is a full-service, forensic engineering consulting firm established in 1983. We offer a wide array of technical consulting services worldwide. Over the years Rimkus has investigated thousands of losses within the hospitality industry. We advise our clients in the resolution of complex claims, incidents, and disputes.

Rimkus employs professionals whose broad range of expertise assists clients in understanding the complex issues that led to a catastrophic event. Our in-depth site investigations and consistent analysis enable our professional staff to render opinions and conclusions based on scientific facts.

The Rimkus team is fully prepared to advise clients throughout the litigation process when necessary, whether in mediation, arbitration, or by giving expert witness testimony.

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I. Enhancement in Movies and TV

A. The CSI Effect

1. Unrealistic expectations of image quality.

II. Why Doesn't Security video show the detail that is in TV and Movies?

A. \$\$\$\$ Quality vs. Storage costs.

III. Storage Costs are Lowered – at the expense of video clarity. Hint: storage costs win.

A. Record a Smaller size image

1. 320 x 240 resolution-enlargements are not possible

IV. Compress the Video – Lossy Compression

A. Detail is lost

B. More pixels equals more information

C. Compression artifacts can lead to incorrect conclusions

1. Close up of compression artifacts –
“blocking” or “quilting”

V. Record full frame then discard half of the scan lines – 2CIF

A. Storage cost cut in half

VI. Lower the frame rate

- A. Additional storage savings
- B. Frame Rate (How many frames are displayed in 1 second of video) Frame Rate Pros/Cons
 - 1. Low frame rate (1 fps) – may miss detail - slip/fall
 - 2. High frame rate (30 fps) – costly storage
 - 3. 5-10 fps good for most scenes
 - 4. 15+ fps for best fast moving object (cars)

VII. Cameras set on Motion Detection. Camera records only when it detects movement

- A. Many times the incident is not recorded due to sensitivity settings.

VIII. If CSI enhancement is not real, what can I expect from enhancement?

- A. Common Video Enhancement Filters
 - 1. Resolution
 - 2. De-blur
 - 3. De-interlace
 - 4. Contrast
 - 5. Noise
 - 6. Stabilization

IX. Security video VHS and low quality digital video can benefit from enhancement

- A. Slow Motion
- B. Still Images
- C. VHS video - Real Time – may Miss details

- D. Still Image exported from video
- E. Mark and compare spill area on floor with slip area.

X. How security video can aid the engineer's analysis

- A. Speed and Location of vehicles
- B. Slip and fall or ankle roll?
- C. What caused subject to fall?

XI. License Plate Identification Issues

- A. Cameras that aren't set to capture license plates rarely capture license plates.
- B. Cell phone video was able to capture license plate – video held on license plate for several seconds

XII. Case Study - Security video captured fall

- A. Was subject reaching for the handrail when she fell?
- B. Unique stone pattern
- C. Outline of Stone pattern over video
- D. Location of subject
- E. Location of subject in 3D

XIII. Crosswalk Case

- A. Security Camera Captured Accident

- B. Computer camera matched to Security camera view. Computer humanoids location matched to security camera
- C. Computer overhead view
- D. Truck Driver's View

XIV. Best Practices to Provide Video for Enhancement

- A. Review recordings = verify time and camera that captured the incident. Verify that incident is in exported video. Verify that DVR was set to correct time.
- B. Get ALL camera views available for any and every incident
- C. ½ hour to 2 hours before through ½ hour to 2 hours after the incident
- D. Collect native file with proprietary player (least compressed)
- E. Don't save video to a Different File Format - (AVI to MOV or DVD/VOB file format)
- F. Don't change the frame rate (original 7 frames per second changed to 30 frames per second)
- G. NOTE: (Videotaping the computer monitor with your cell phone does not count as retrieving the video.) If your only choice is to video screen, keep image full screen for at least one recording and then zoom in to incident.
- H. Operator may be Untrained. Does not know how to export best quality
 - 1. Many default export settings are set for low quality.
 - 2. If operator unsure of export procedure, suggest that they call the supplier to retrieve best quality. Most DVR manuals can be found online.

XV. Documenting Video Enhancement/Enhanced Video in the Courtroom

- A. Enhancement process must be thoroughly documented
- B. Type of video, codec, player, MD5 Hash (digital signature)

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- C. Report from Enhancement software shows all settings used in enhancement
- D. Replicate the results 100% of the time

XVI. How enhanced video can be presented in the courtroom

- A. Original unenhanced video
- B. Can show the enhancement process step by step
- C. Enhanced video shown side by side with original
- D. Enhanced video only

XVII. Summary

- A. Security Cameras and Cell Phone Cameras are everywhere – there is a good chance of retrieving video of incident
- B. Many security cameras are not set correctly or designed to correctly capture event – enhancement and analysis required
- C. Check YouTube –video of incident may be uploaded
- D. Don't judge enhancement possibilities on how the video appears on your screen
- E. The "CSI" enhancement is for movies and television
- F. Enhancement and analysis can provide valuable information beneficial to the case.

XVIII. Additional Best Practices

FBI Best Practices -<https://www.fbi.gov/news/videos/caught-on-camera>
SWGIT - Scientific Working Group Imaging Technology, Recommendations and Guidelines for Using Closed-Circuit Television Security Systems in Commercial Institutions <https://www.swgit.org/>

- A. Correct Backlit Lighting Issues

- B. Lighting setup – capture clear images both day and night? Lights that are on timers must be checked. Are lights coming on at correct time?
- C. Resolution – enough for facial recognition? For ID = subject’s head should fill 15% of screen
- D. Camera position – clear view of subject? Camera height = close to eye level as possible.
- E. Recorder – setup for the best image detail? Many default settings are set to save storage space NOT for video clarity.
- F. Maintenance – is the system maintained so that it can do its job when it is really needed? Is the camera still in focus? Is the camera pointed in the right direction?
- G. Minimum resolution = 640 x 480. Majority security video is 320 x 240.
- H. Line of sight critical = make sure there are no obstructions. Banners and seasonal decorations have blocked many key events.
- I. Site plan of camera positions and coverage. Verify that there is Good camera overlay with No blind spots where someone is not visible.