NEW YORK STATE TRUCK SAFETY AND EDUCATION SYMPOSIUM PRESENTS

‘COLLISION RECONSTRUCTION’

Saratoga City Center
522 Broadway
Saratoga, NY
April 9, 2019
‘WHY’
Objectives

1. Laws
2. NYSP CRU Overview
3. Define Evidence
4. Reconstructing the Scene
5. Crash Examination
6. Summary
Laws — What CDL Drivers Need to Know

- 1991 US Congress passed Omnibus Transportation Employee Testing Act
  - Requires DOT agencies to implement drug and alcohol testing of safety-sensitivity transportation employees
  - 49 CFR Part 40 states how to conduct testing & return employees after violate regulation
  - Each DOT agency specific regulation defines who is subject to testing, when, and in what situations

- Since early 1990s, FMCSA defined drug & alcohol testing rules & regs for CDL drivers
  - Who is tested?
  - Which substances are tested?
  - When does testing occur?
  - What are the testing procedures?
  - What if I fail or refuse a test?
  - What resources are available to drivers?

§392.4 Drugs and other substances - regs prohibiting drug and alcohol impairment:

(a) No driver shall be on duty and possess, be under the influence of, or use, any of the following drugs or other substances:
   ◦ (1) Any 21 CFR 1308.11 Schedule I substance;
   ◦ (2) An amphetamine or any formulation thereof (including, but not limited, to “pep pills,” and “bennies”);
   ◦ (3) A narcotic drug or any derivative thereof; or
   ◦ (4) Any other substance, to a degree which renders the driver incapable of safely operating a motor vehicle.

(b) No motor carrier shall require or permit a driver to violate paragraph (a) of this section.

(c) Paragraphs (a) (2), (3), and (4) do not apply to the possession or use of a substance administered to a driver by or under the instructions of a licensed medical practitioner, as defined in §382.107 of this subchapter, who has advised the driver that the substance will not affect the driver's ability to safely operate a motor vehicle.

(d) As used in this section, “possession” does not include possession of a substance which is manifested and transported as part of a shipment.
§392.5 Alcohol prohibition

(a) No driver shall—

- (1) Use alcohol or be under the influence of alcohol within 4 hours before going on duty or operating, or having physical control of, a CMV; or
- (2) Use alcohol, be under the influence of alcohol, or have any measured alcohol concentration or detected presence of alcohol, while on duty, or operating, or in physical control of a commercial motor vehicle; or
- (3) Be on duty or operate a commercial motor vehicle while the driver possesses wine of not less than one-half of one per centum of alcohol by volume, beer as defined in 26 U.S.C. 5052(a), of the Internal Revenue Code of 1954, or distilled spirits as defined in section 5002(a)(8), of such Code. However, this does not apply to possession of wine, beer, or distilled spirits which are:
  - (i) Manifested and transported as part of a shipment; or
  - (ii) Possessed or used by bus passengers.

(b) No motor carrier shall require or permit a driver to—

- (1) Violate any provision of paragraph (a) of this section; or
- (2) Be on duty or operate a commercial motor vehicle if, by the driver's general appearance or conduct or by other substantiating evidence, the driver appears to have used alcohol within the preceding four hours.
§392.5 Alcohol prohibition – cont’d

(c) Any driver who is found to be in violation of the provisions of paragraph (a) or (b) of this section shall be placed out-of-service immediately for a period of 24 hours.
   ◦ (1) The 24-hour out-of-service period will commence upon issuance of an out-of-service order.
   ◦ (2) No driver shall violate the terms of an out-of-service order issued under this section.

(d) Any driver who is issued an out-of-service order under this section shall:
   ◦ (1) Report such issuance to his/her employer within 24 hours; and
   ◦ (2) Report such issuance to a State official, designated by the State which issued his/her driver’s license, within 30 days unless the driver chooses to request a review of the order. In this case, the driver shall report the order to the State official within 30 days of an affirmation of the order by either the Division Administrator or State Director for the geographical area or the Administrator.

(e) Any driver who is subject to an out-of-service order under this section may petition for review of that order by submitting a petition for review in writing within 10 days of the issuance of the order to the Division Administrator or State Director for the geographical area in which the order was issued. The Division Administrator or State Director may affirm or reverse the order. Any driver adversely affected by such order of the Regional Director of Motor Carriers may petition the Administrator for review in accordance with 49 CFR 386.13.

https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&ty=HTML&h=L&mc=true=&PART=n=pt49.5.382
Overview of NYSP Collision Reconstruction Unit

90 Members Statewide – 20 Full-time – 3 Supervisors

2018 – 438 Responses
- 81 Vehicular crimes (18%)
- 178 Outside Agency Assists (41%)
- 33 Commercial Vehicle (8%)
- 74 Pedestrian/Bicycle (17%)
- 34 Motorcycle (8%)

436 Responses – 2014-2018 average

10,877 Responses since 1995
Overview of NYSP
Collision Reconstruction Unit

Mission

Conduct in-depth vehicular crime investigations based on the presence of physical evidence.

This is done by assisting in the investigation of

- Personal Injury Collisions
- Fatal Collisions
- Expert Testimony
- Criminal Prosecutions – 100s of criminal convictions
- Civil Litigation – nullified over $240M since 1995
Overview of NYSP
Collision Reconstruction Unit

Recall Procedure

- Authorized by a Commissioned Officer after a BCI Member or Sergeant responds to the scene and recommends deployment

- Members are then contacted and requested to respond to the scene
  - This could take 1 or 2 hours

- Average Time on Scene – 3 to 6 hours
  - This time has been greatly reduced with the use of drones

- CRU members generally work in teams of at least 2
Overview of NYSP Collision Reconstruction Unit

CRU members document scene evidence and conduct vehicle “autopsies” and inspections.

They are looking for:

- Scene Evidence
- Vehicle Damage
- Vehicle Control Positions (gear, cruise control, wipers, head lights, etc.)
- Seatbelt Position and Damage
- Interior Damage vs. Occupant Injuries
- Airbag Control Module Data (black box)
- Forensic Evidence
Evidence

What is Evidence???

It’s going to be different at every scene!
Evidence

Evidence is defined as: Anything that tends to prove or disprove something. When found, we protect it without altering it or its surroundings.

Types of On-scene Evidence:
1. Tire Marks
2. Metal Scars to Pavement and Furrows on the soft shoulder
3. Indications of Vehicle Flips, Falls and Vaults
4. Damage to Fixed Objects
5. Debris (Vehicle, Roadway or Personal Property)
6. Final Rest Locations of Vehicles, Pedestrians, Occupants
7. Forensic Evidence (DNA and Fingerprints)
Evidence

Other types of Evidence include:

Tire Marks

Accurate measurements of tire marks allow us to determine:
- Speed loss of a vehicle over a certain distance
- Vehicle travel direction and orientation
- Identify possible mechanical failures

Final Rest Location of Vehicles, Occupants, Pedestrians, Bicycles, etc.

It took a certain amount of energy to move an object to its final rest location. That energy can be calculated and turned into a speed.
Evidence

Other types of Evidence include:

Metal Scars to Pavement

These include gouges, scratches, scrapes, chips, and chops from vehicle components interacting with the pavement.

They can indicate the area of impact and the direction of travel for the vehicles.

Forensic Evidence – DNA & Fingerprints
Reconstructing the Scene

One of our primary duties is to create a scale diagram of the scene. This is used for:

- Mathematical Calculations – to determine speeds
- Show vehicles path of travel through the scene
- Show the crash phases of each vehicle
- Court Presentations
Reconstructing the Scene

In order to complete a scaled diagram, a reconstructionist uses an **Electronic Total Work Station**

This is a precision instrument used to measure angles and distances. The total station uses an infrared beam to measure the distance between the total station and the prism.

In order for this to work, there needs to be an uninterrupted path from the total station to the prism.

The total station needs to be set up in a location where it will be able to “see” the roadway and all pieces of evidence. This is usually right in the middle of the scene. Consequently, this is also where everyone tends to congregate.
What is a Drone?

A Drone is an **Unmanned Aerial System (UAS)**, which means it is an aircraft without a human pilot aboard.

Drones are navigated by a ground-based controller using a GPS tracking system.

Most are equipped with a camera that is capable of capturing video and still pictures.

This is a DJI Phantom 4 Pro with 20 mp camera. This is currently the UAS that is carried and used by NYSP CRU members.
The use of Drones in Reconstruction

Police agencies all over the US have incorporated the use of Drones in the field of Collision Reconstruction.

Drones use photogrammetry technology to take several hundred photographs in just a few minutes. These photographs are then downloaded into a computer program that is able to “stitch” the photographs together and create an Orthomosaic image based on common points. The result is a geometrically correct image that can be used to measure true distances. (Similar to Google Earth)

Drones have cut our time on scene down drastically. A typical drone flight will take approximately 15 mins.
The use of Drones in Reconstruction

The Drone utilizes Google Earth to create a “fence” around the area you want mapped.

Once the “fence” is created, the Drone will fly autonomously in a grid pattern while capturing hundreds of photos.

Each of the red dots represent the Drone’s location when at least one photo was captured.
The use of Drones in Reconstruction

After the images are stitched together, and the Orthomosaic image is created, a point cloud can be activated that creates a 3D model.

This is a 3D image that you can navigate through and view from different angles. And since this image is to scale, you can take measurements from it the same as you could from a CAD diagram.
The use of Drones in Reconstruction

Just like with the Electronic Total Work Station, the Drone needs to be able to “see” the evidence in order to be able to capture it.

When the Drone is in the air and mapping a scene, we ask that everyone exit the scene. Vehicles need to be moved back and people need to avoid moving in and around the scene.

This will allow the Drone to capture the scene unobstructed.

Total cost > $10K per package. Legally fly 400 feet max. Typical scene 90-130 feet.

Flight time: 20-25 minutes max. Speed 35+ mph. Distance > 1 mile.

No night flying. No over people. No restricted airspace w/o permission.
3 Vehicle 2x Fatal – August 19, 2005

- 11:54 AM I-90 eastbound & westbound lanes, 0.3 mi east of Exit 9 (SR-4), T/East Greenbush, Rensselaer County
- V-1 2005 Kenworth T-800B 3x axle w/ tag rollback conventional truck w/ 1989 Hatch utility flatbed 2x axle trailer
- V-2 1997 Pontiac Sunfire 2DS, V-3 2002 Oldsmobile Alero 2DS
- 6-lane controlled access highway w/ 65 mph speed limit
- W/B traffic had ascended 1.2% grade w/ gradual curve to left
- E/B traffic descended 1.4% grade w/ gradual curve to the right
- No view obstructions
- East & Westbound lanes are separated by a 39-foot wide grass center median strip
- Woods lined adjacent property off road on both sides
- Op V-2 & V-3 deceased
- Op V-1 James P. Bailly had minor injuries
3 Vehicle 2x Fatal – August 19, 2005

- Roadway evidence led to uncontrolled final rest of V-1, V-2 & V-3
- V-1 was a roll-off frame truck resting on passenger side & roof off south shoulder of E/B drive lane
- V-1’s roll-off container was partially detached from its rear
- V-1 located against bowed box-beam guiderail (11’) & detached 31 support posts facing east
- V-1’s upright trailer w/ tongue off ground was detached & 8.8 ft from rear of V-1 facing southwest
- Trailer was empty from detached roll-off garbage container, adjacent to LF side of trailer, on south shoulder
- V-2 was demolished and located 14.7 ft in front of V-1 on south shoulder split in 2 pieces at firewall
- V-3 faced s/w & found partially under Rt half of V-1’s trailer straddling E/B fog line & rumble strip
- V-3 entire top sheared off from crash
- V-1 was transporting 22x8x8 roll-off garbage container
V-1 Vehicle Exam

- Vehicle autopsy of V-1 revealed condition to be new & in sound mechanical condition
- V-1 had numerous changes to internal engine computer settings prior to collision
- Factory-designed parameter capturing quick stop data (panic braking) was not changed from 0 mph & therefore did NOT record any data specific to this crash
- Electronic Control Module (ECM) had been reprogrammed
- V-1’s trailer safety chains/hooks, emergency brake system, & load securement devices didn’t function properly
- V-1’s trailer was free standing & its landing gear pads were damaged
Collision Phases

1\textsuperscript{st} Event

- **Pre-Impact:** W/B V-1 Kenworth towing trailer w/b btwn driving & middle lanes had steering input to LF
- V-1 moves LF causing wt shift to RT as it crosses diagonally toward grass median
- V-1 rolls through median & enters E/B lanes. E/B V-2 moves from passing to middle
- **Impact:** V-1 struck V-2 btwn E/B passing & middle lanes. V-1 pass side front struck driver’s side front V-2
- V-2 wraps around V-1 front and V-2 fails at firewall. V-2 undercarriage gouges pavement. V-1 re-directs V-2 backward toward south shoulder. Contact causes V-1 weight shift right & counter-clockwise rotation w/ trailer
- V-1 sideslips to right (west), passenger side rear dual rims gouge pavement. This starts V-1 trip & overturn
- Both halves of V-2 are re-directed southwest toward south shoulder. V-2 front was connected but behind V-2 rear
- Op V-2 & dog were ejected off south shoulder while V-1 rotated & overturned passenger side first
Collision Phases cont’d

2nd Event

- **Pre-Impact:** V-1 overturned to passenger side as it crossed E/B lanes. V-3 was E/B in middle lane & steered LF
- As V-1 rotated & overturned, its pintle hook twisted & separated from trailer. Both safety chains failed.
- **V-1** trailer traveled independently southwest across E/B lanes
- **Impact:** Occurs in E/B middle lane. V-1’s top corner load struck V-3 above its doors shearing off roof & supports
- V-1’s trailer continued S/W independently w/ RT side striking V-3 front. Trailer overrode V-3 w/ its load travelling forward off the front end of trailer & partially across V-3’s top
- **V-1** lands on passenger side on south shoulder facing east. V-1’s load partially disconnects bowing guiderail out
- V-1’s trailer & V-3 stay connected moving S/W on south shoulder. V-1’s trailer traveled 143 ft after separation. The container on trailer struck ground & rotated counter-clockwise 180 degrees stopping on pavement adjacent to trailer’s LF side, over-turned on its right side, parallel to trailer facing N/E.
- **V-3** was under RT front side of V-1’s trailer. V-3 was straddling fog line btwn driving lane & south shoulder
Guilty Plea

- Op V-1 James Bailly possessed a valid MA Class A CDL with proper endorsement
- There were multiple witness accounts
- No evidence of any braking, corrective steering input, acceleration or other reaction by Op V-1
- Sealed indictment of Bailly: 2 cts Manslaughter-2\textsuperscript{nd} (C-Felony) & Crim Possess Forged Instrument-3\textsuperscript{rd} (Amisd)
- 11/9/07 The Daily Gazette reports Bailly killed 2 people (and dog) after he had a seizure while driving
- “He admitted he had been diagnosed w/ a seizure disorder and forged a medical certificate required to get his CDL. He also admitted in court that he recklessly caused the deaths of operators V-2 & V-3.”
- Bailly pled guilty to 2 counts of Criminally Negligent Homicide (D-Felony) and served 2 concurrent terms of 2-6 years in State prison in lieu of all State & Federal charges (interstate transport)
2 Vehicle Fatal – December 12, 2009

- 11:20 AM I-90 westbound, ½ mi west of SR-77 overpass, Town of Pembroke, Genesee County

- V-1 2007 Nissan Altima, V-2 2010 Kenworth with 2007 Great Dane semi-trailer

- Evidence
  - Gouges
  - Tire marks
  - Pool of blood from dead deer struck by V-1
  - Tire prints
  - V-1 @ uncontrolled stop facing northwest against guiderail straddling north shoulder and travel lane 150’ from impact
  - V-1 damage: PDOF driver’s side rear, left of center, pushed fwd th driver’s compartment
  - V-1’s LR tire off rim & rear axle broken
  - V-2 @ controlled stop facing west along the south shoulder 730’ from impact
  - V-2 damage: Rt side corner & hood, metal grill & radiator, Rt front tire deflated & dislodged, lower Rt fairing & foot step
  - V-2 Trailer damage: none
  - No braking on V-2
  - Laptop ‘on’ in vicinity of V-2 driver’s seat
Guilty Plea

- Investigation revealed Op V-2 Thomas Wallace kept fictitious log books, was sleep-deprived with no more than 4 hours sleep over 27 hours, and was streaming pornography on his laptop computer when crash occurred.

- Op V-2 arrested for multiple charges including Manslaughter-2nd (C-Felony)

- Wallace accepted full responsibility & recognized this tragedy has devastated 2 families.

- On May 26, 2010 Judge Robert Noonan took 15 min to accept plea of guilty to original charge.

- The Buffalo News reported, “The admission of guilt today in no way diminishes the pain our family is enduring, as it in no way brings Julie back to us,” the family said. “The last couple of weeks have been especially difficult, as Julie’s two sons spent Mother’s Day without their mother, and she has not been there to celebrate birthdays and her son Benjamin’s first steps.” “Every day, the boys are asking about where their mother is, and are looking for answers about her passing.”

- 9/1/10 Wallace was sentenced to 5-15 years in State prison.
Collision Reconstruction investigations are a love v hate relationship

We are Investigators who work behind the scenes w/o fanfare or limelight

Continual training is required and stress attention to detail

Key: Presences of physical evidence

CRU members are a meticulous, dedicated group that enjoy solving puzzles

The evidence creates the diagrams, speed calculations, & determines causative factors that reconstruct a cohesive picture of what occurred

We provide unbiased ‘expert opinion’ testimony in criminal and civil litigation limiting the liability of all involved.

Lastly, we attempt to speak for those who can not longer speak for themselves
Thank You

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