CRASH DATA RETRIEVAL

What is it? Why is the data recorded? How can it be used in disputed liability cases?

CRASH DATA RETRIEVAL

CDR IS THE BOSCH TOOL AND SOFTWARE FOR RETRIEVING CRASH DATA FROM A VEHICLE.

THE HARDWARE AND SOFTWARE ALLOW THE TECHNICIAN TO IMAGE, DOWNLOAD, AND RETRIEVE THE EVENT DATA STORED ON THE VEHICLE'S AIRBAG CONTROL MODULE.

THIS PROCESS DOES NOT RESET, REMOVE, MODIFY, OR CORRUPT ANY STORED DATA.

WHY IS THE DATA THERE?

The Airbag Control Module is the brain which controls many of the safety features in the vehicle (in conjunction with other modules) to protect the occupants on the inside.

Airbags, Seatbelts, ABS, Traction Control, etc.

The vehicle must know what is happening in real time in order to act when needed.

Therefore, speed, roll angle, yaw rate, braking, steering, seatbelt use, etc. are all being monitored all the time.

When an event occurs, the data is stored awaiting retrieval by a CDR Technician.

# How is the Data Accessed?

- OBD-II Connection
- Direct to Module
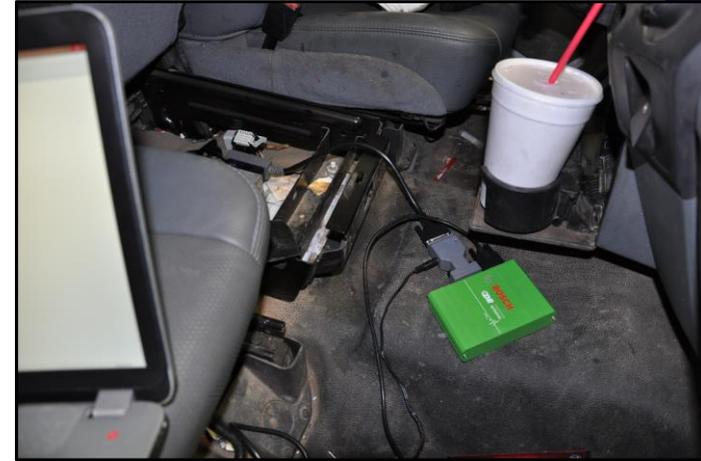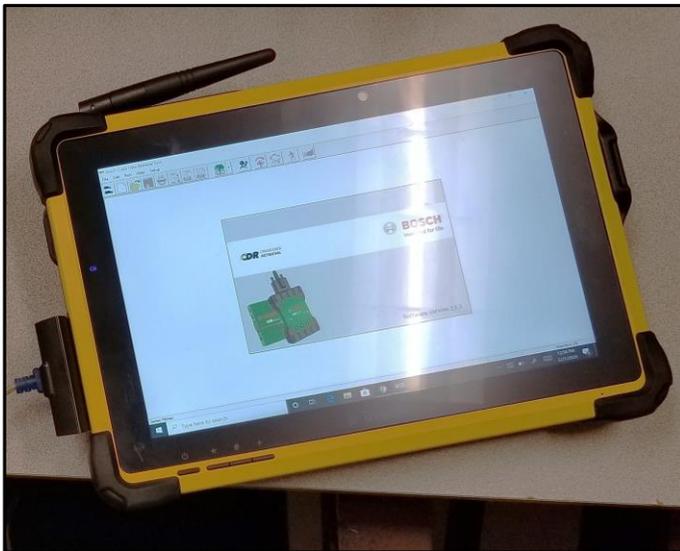
What type of Events are Recorded?

- Deployments
- Non-Deployments

Multi-Vehicle Rear-end Collision

- Who is telling the truth?

- Who hit whom first?

- Were there multiple crashes?
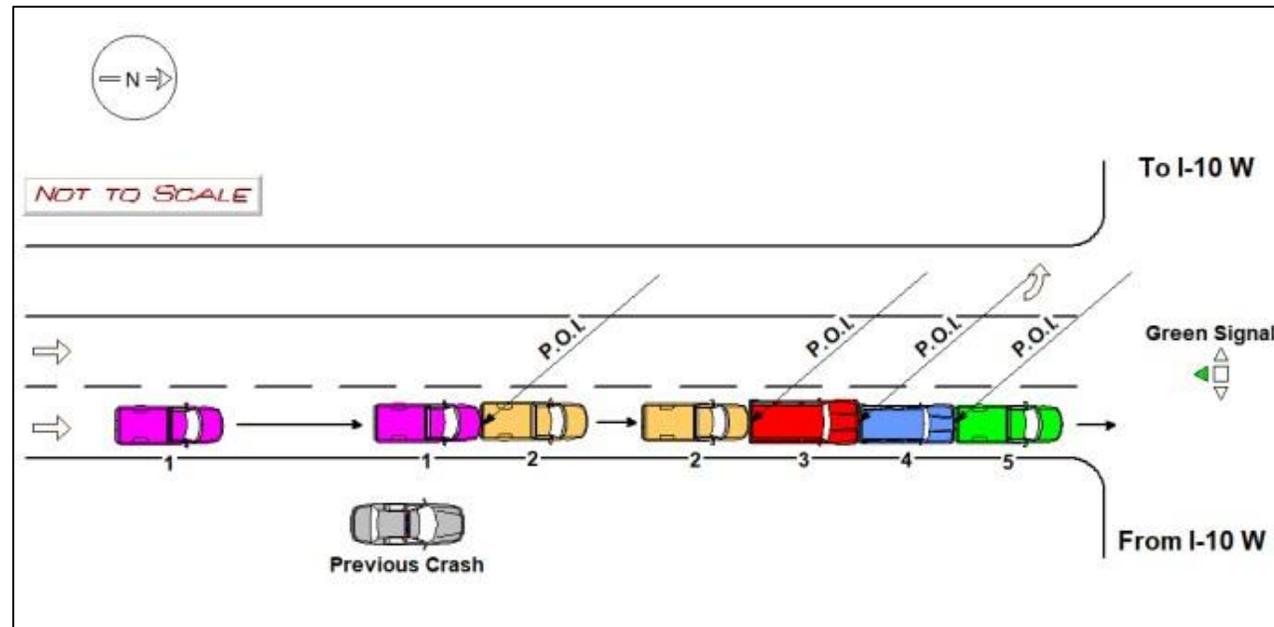
Driver Statements:

Driver 1 indicated he was traveling north on   behind Vehicle 2. He stated Driver 3 slammed on their brakes and Vehicle 2 rear ended Vehicle 3. Driver 1 indicated he then struck the rear of Vehicle 2.

Driver 2 indicated he was traveling north on   in the right lane behind Vehicle 3. He stated he was slowing to a stop when he was struck in the rear by Vehicle 1. Driver 2 indicated the impact pushed him into the rear of Vehicle 3.

Driver 3 stated she was stopped for congestion in the right lane of   northbound. She indicated she was struck in the rear by Vehicle 2 which caused her to be pushed into the rear of Vehicle 4.

Driver 4 indicated he was stopped on   northbound in the right lane. He stated he heard tires squealing and was struck in the rear by Vehicle 3. Driver 4 indicated he felt another impact after the first one.

Driver 5 stated he was stopped for a red signal on   and Interstate 10 in the right lane. He indicated the light turned green and he began to accelerate. Driver 5 indicated he was then struck in the rear by Vehicle 4.

EDR DATA TO THE RESUCE!!

Vehicle 5:	No Event Recorded	Vehicle 4:	Not Downloadable (too old)

Vehicle 3:	One Frontal and One Rear Event	Vehicle 2:	Three Front/Rear Events

Vehicle 1:	One Frontal Event
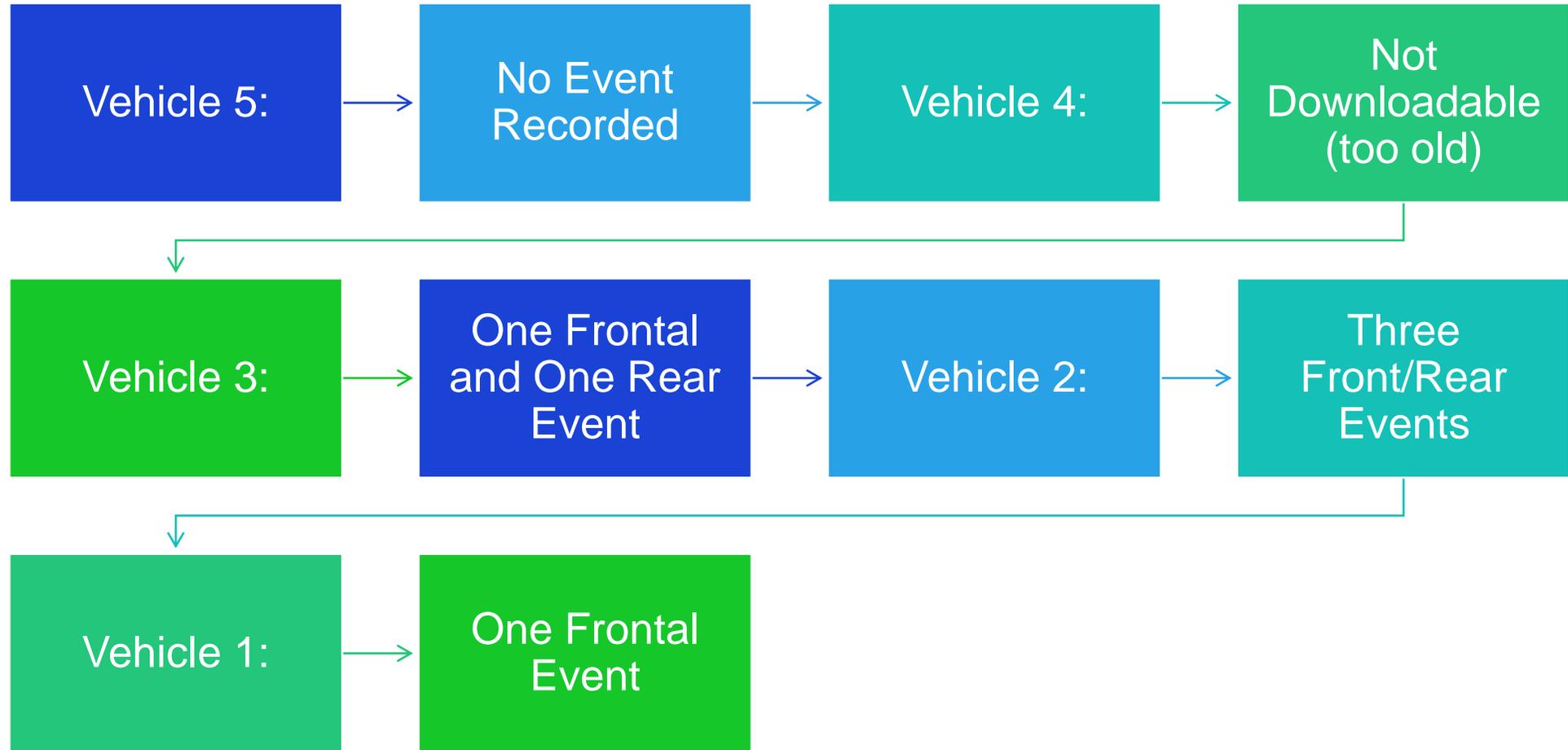
Vehicle 3 Data, Event 1

System Status at Event (Event Record 1)

|	
Event Record Type	Non-Deployment
OnStar Deployment Status Data Sent	Yes
Complete file recorded (Event Recording Complete)	Yes
Crash Record Locked	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	0
Multi-Event, Number of Events (Event Counter)	1
OnStar Notification Event Counter	1
Time From Event 1 to 2 (Time Between Events) (seconds)	Data Not Available
Ignition Cycle, Crash (Ignition Cycles at Event)	13659
Algorithm Active: Frontal	Yes
Algorithm Active: Side	Yes
Algorithm Active: Rollover	No
Algorithm Active: Rear	Yes
Concurrent Event Flag Set	No
Event Severity Status: Frontal Pretensioner	No
Event Severity Status: Frontal Stage 1	No
Event Severity Status: Frontal Stage 2	No
Event Severity Status: Left Side	No
Event Severity Status: Right Side	No
Event Severity Status: Rear	Yes
Event Severity Status: Rollover	No
Safety Belt Status, Driver (Driver Belt Switch Circuit Status)	Buckled
Safety Belt Status, Right Front Passenger (Passenger Belt Switch Circuit Status)	Not Buckled

Vehicle 3 Pre-Crash Data, Event 1

Pre-Crash Data -5.0 to -0.5 sec (Event Record 1)

Times (sec)	Accelerator Pedal, % Full (Accelerator Pedal Position)	Service Brake (Brake Switch Circuit State)	Engine RPM (Engine Speed)	Engine Throttle, % Full (Throttle Position)	Speed, Vehicle Indicated (Vehicle Speed) (MPH [km/h])
-5.0	18	Off	1280	26	16 [26]
-4.5	0	On	1472	10	17 [27]
-4.0	0	On	1280	13	17 [27]
-3.5	0	On	1088	11	15 [24]
-3.0	0	On	960	12	13 [21]
-2.5	0	On	768	10	11 [17]
-2.0	0	On	640	9	9 [14]
-1.5	0	On	576	10	7 [11]
-1.0	0	On	576	10	5 [8]
-0.5	0	On	576	10	4 [6]

- 5 seconds of Pre-Crash Data
- 4 MPH 0.5 seconds before Event 1 occurred.
- Braking at 0.17g (Normal to Light Application)
- Calculating the last 0.5s = 2 MPH at Event
- Vehicle 3 was not stopped.

Vehicle 3 Data (continued)

- Positive Value is a Forward Acceleration.

- This +10 mph Delta-V means Vehicle 3 was struck from the rear and accelerated Forward.

- There is still another Event to Consider for this vehicle.

Longitudinal Crash Pulse (Event Record 1)

Delta-V, Longitudinal
(SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event)
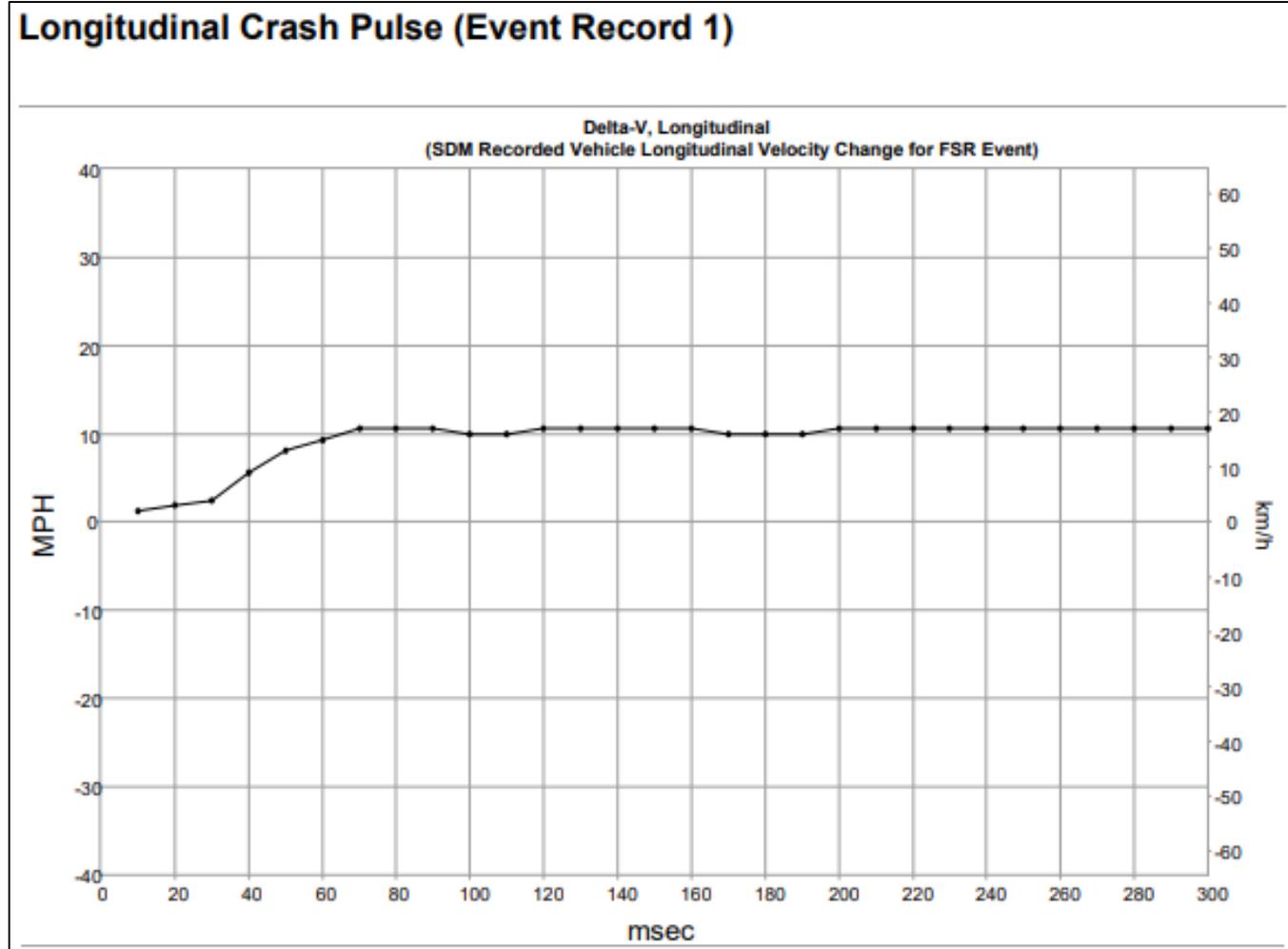
Vehicle 3 Data (continued)

- Negative value is indicative of a frontal collision, negative acceleration.

Longitudinal Crash Pulse (Event Record 2)
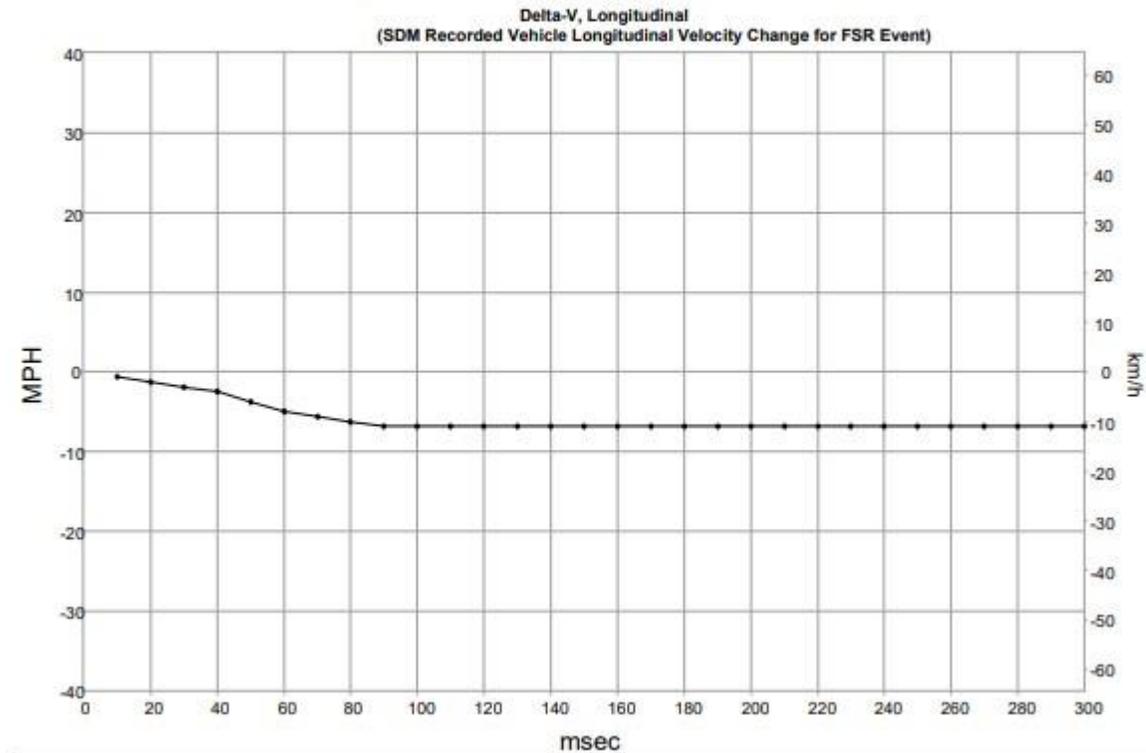
Vehicle 3 Data, Event 2

System Status at Event (Event Record 2)

|	
Event Record Type	Non-Deployment
OnStar Deployment Status Data Sent	No
Complete file recorded (Event Recording Complete)	Yes
Crash Record Locked	No
OnStar SDM Recorded Vehicle Velocity Change Data Sent	No
Deployment Event Counter	0
Multi-Event, Number of Events (Event Counter)	2
OnStar Notification Event Counter	1
Time From Event 1 to 2 (Time Between Events) (seconds)	0.58
Ignition Cycle, Crash (Ignition Cycles at Event)	13659
Algorithm Active: Frontal	Yes
Algorithm Active: Side	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Rear	Yes
Concurrent Event Flag Set	No
Event Severity Status: Frontal Pretensioner	No
Event Severity Status: Frontal Stage 1	No
Event Severity Status: Frontal Stage 2	No
Event Severity Status: Left Side	No
Event Severity Status: Right Side	No
Event Severity Status: Rear	No
Event Severity Status: Rollover	No
Safety Belt Status, Driver (Driver Belt Switch Circuit Status)	Buckled
Safety Belt Status, Right Front Passenger (Passenger Belt Switch Circuit Status)	Not Buckled

Vehicle 3 Pre-Crash Data, Event 2

- Overlapping Data from Event 1

- -1.0 Second Mark 3 MPH

- -0.5 Second Mark 13 MPH

- Remember the +10 MPH Delta-V from Event 1.

- Vehicle 3 was struck from behind 1st.

- Then Vehicle 3 struck Vehicle 4 0.58 seconds later.

Pre-Crash Data -5.0 to -0.5 sec (Event Record 2)

Times (sec)	Accelerator Pedal, % Full (Accelerator Pedal Position)	Service Brake (Brake Switch Circuit State)	Engine RPM (Engine Speed)	Engine Throttle, % Full (Throttle Position)	Speed, Vehicle Indicated (Vehicle Speed) (MPH [km/h])
-5.0	0	On	1472	10	17 [27]
-4.5	0	On	1280	13	17 [27]
-4.0	0	On	1088	11	15 [24]
-3.5	0	On	960	12	13 [21]
-3.0	0	On	768	10	11 [17]
-2.5	0	On	640	9	9 [14]
-2.0	0	On	576	10	7 [11]
-1.5	0	On	576	10	5 [8]
-1.0	0	On	576	10	3 [5]
-0.5	0	On	576	8	13 [21]

Vehicle 1 Event Data

- Frontal collision based on the negative Delta-V recorded.

- -5 MPH Delta-V

Longitudinal Crash Pulse (First Record)
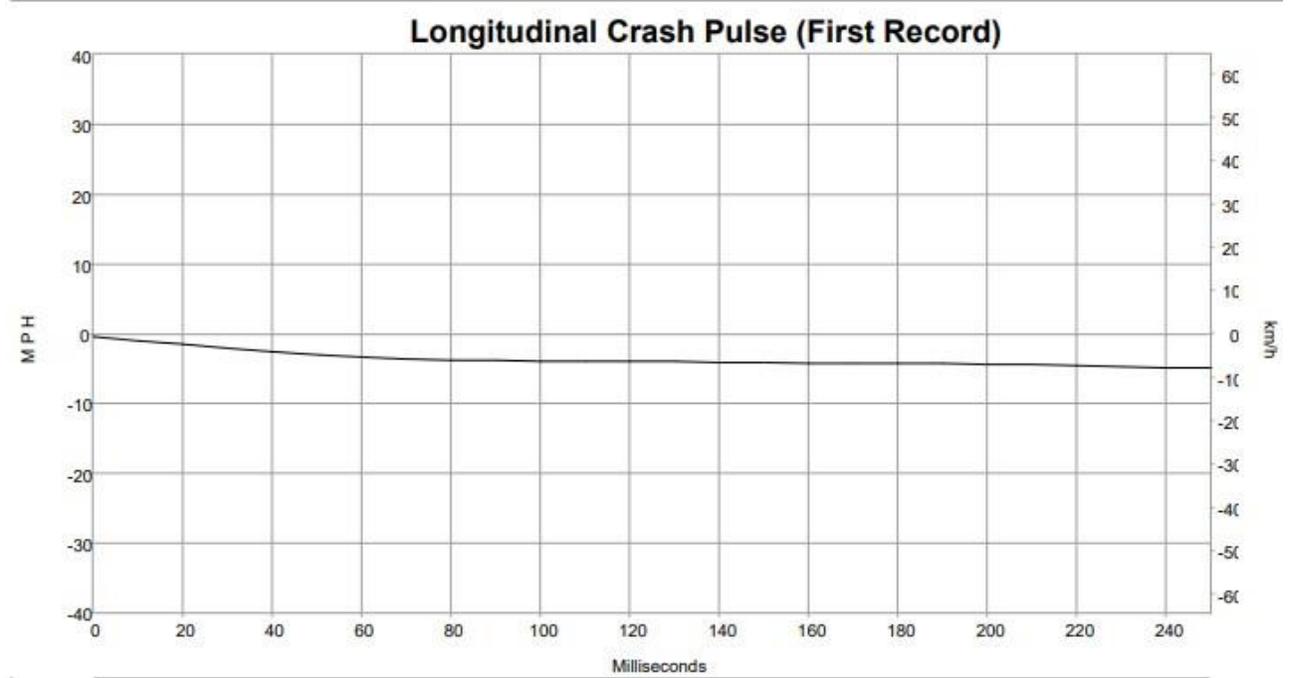
Vehicle 1 Event Data (continued)

Pre-Crash Data -5 to 0 sec [2 samples/sec] (First Record) - Table 1 of 2

Time (sec)	Speed, Vehicle Indicated (MPH [km/h])	Speed, Vehicle Indicated, Quality Factor	Accelerator Pedal, % Full	Accelerator Pedal, % Full, Quality Factor	Service Brake, On/Off	Service brake, Quality Factor	Engine RPM	ABS Activity (Engaged, Non-Engaged)
- 5.0	12.8 [21]	OK	4.4	OK	Off	OK	926	Non-engaged
- 4.5	13.0 [21]	OK	5.1	OK	Off	OK	896	Non-engaged
- 4.0	13.2 [21]	OK	10.0	OK	Off	OK	974	Non-engaged
- 3.5	13.6 [22]	OK	11.5	OK	Off	OK	1,234	Non-engaged
- 3.0	14.3 [23]	OK	13.2	OK	Off	OK	1,256	Non-engaged
- 2.5	15.2 [24]	OK	15.1	OK	Off	OK	1,418	Non-engaged
- 2.0	16.4 [26]	OK	22.2	OK	Off	OK	1,614	Non-engaged
- 1.5	18.0 [29]	OK	22.2	OK	Off	OK	1,752	Non-engaged
- 1.0	17.9 [29]	OK	0.0	OK	On	OK	1,258	Engaged
- 0.5	11.7 [19]	OK	0.0	OK	On	OK	954	Engaged
0.0	7.0 [11]		0.0	OK	On	OK	816	Engaged

- Vehicle was accelerating prior to crash.
- -1.0s Mark, brakes applied, ABS engaged.
- Slows to 7 MPH at time of impact.

Vehicle 1 Data (continued)

- With Vehicle 1 we have Steering Wheel Angle recorded.

- Right-hand steering begins at the -1.3s Mark.

- This corresponds to when the driver removed his foot from the accelerator and began braking.

- This would be the beginning of the reaction to the impending hazard.

Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record)

Time (sec)	Stability Control Lateral Acceleration (g)	Stability Control Longitudinal Acceleration (g)	Stability Control Yaw Rate (deg/sec)	Stability Control Roll Rate (deg/sec)	Steering Wheel Angle (deg)
-5.0	-0.04	0.01	0.13	0.52	0.8
-4.9	-0.05	0.02	0.01	1.91	1.0
-4.8	-0.01	0.01	0.06	1.99	0.8
-4.7	0.00	0.00	-0.42	-0.36	0.7
-4.6	0.00	0.01	-0.26	-1.91	0.6
-4.5	-0.04	0.01	0.36	-1.59	0.6
-4.4	-0.06	0.02	0.31	2.12	0.3
-4.3	-0.01	0.01	-0.03	1.80	0.3
-4.2	0.01	0.00	-0.08	0.31	0.2
-4.1	0.01	0.01	-0.19	-0.39	0.2
-4.0	-0.02	0.03	0.03	-0.15	0.7
-3.9	-0.02	0.02	0.01	-0.68	0.8
-3.8	-0.01	0.06	0.61	0.84	0.8
-3.7	0.01	0.05	0.00	-0.39	0.8
-3.6	-0.03	0.05	-0.33	1.08	0.7
-3.5	-0.02	0.06	0.01	-0.47	0.8
-3.4	-0.01	0.08	0.19	1.11	0.6
-3.3	-0.03	0.08	-0.10	-0.11	0.5
-3.2	-0.02	0.06	-0.01	-0.60	0.5
-3.1	-0.02	0.07	-0.13	-0.60	0.3
-3.0	-0.05	0.06	0.31	2.59	0.3
-2.9	0.00	0.07	-0.17	0.76	0.0
-2.8	0.04	0.08	-0.36	-0.60	-0.2
-2.7	0.01	0.09	-0.29	-1.32	-0.7
-2.6	-0.02	0.10	-0.10	-0.11	-0.8
-2.5	-0.05	0.10	0.65	2.64	
-2.4	0.02	0.11	-0.56	0.87	
-2.3	0.03	0.10	-1.02	-0.07	
-2.2	-0.01	0.12	0.03	-1.16	
-2.1	-0.01	0.16	0.68	0.31	
-2.0	0.01	0.15	0.01	1.32	
-1.9	0.03	0.15	-0.54	0.39	
-1.8	0.01	0.17	0.00	0.11	
-1.7	0.00	0.17	0.22	0.71	
-1.6	-0.01	0.18	0.29	0.71	
-1.5	0.02	0.18	-0.06	-1.03	
-1.4	0.00	0.17	-0.01	-0.52	0.1
-1.3		0.19	-1.32		-1.5
-1.2	0.01	-0.34	0.29	-1.00	-3.5
-1.1	0.01	-0.58	-0.58	-1.11	-3.9
-1.0	0.01	-0.41	-0.77	-0.39	-5.8
-0.9	-0.01	-0.29	-1.02	-0.23	-5.7
-0.8	-0.03	-0.64	-1.04	-0.07	-5.3
-0.7	-0.01	-0.56	0.17	1.32	-7.8
-0.6	-0.03	-0.50	0.29	-0.28	-10.7
-0.5	-0.02	-0.43	-1.20	0.00	-10.7
-0.4	-0.03	-0.52	-0.52	1.72	-6.9
-0.3	-0.02	-0.46	-0.01	1.75	-8.2
-0.2	0.00	-0.24	-0.65	-1.43	-9.4
-0.1	0.06	-0.53	-0.72	0.55	-6.7
0.0	0.03	-0.63	-0.08	2.31	-13.8
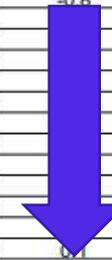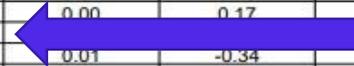
Vehicle 2 Event Data

- Frontal collision based on the negative Delta-V recorded.

- -9 MPH Delta-V

Longitudinal Crash Pulse (1st Prior Frontal/Rear Event, TRG 3 - table 1 of 2)
Max Longitudinal Delta-V (MPH [km/h]) — -9.1 [-14.7]
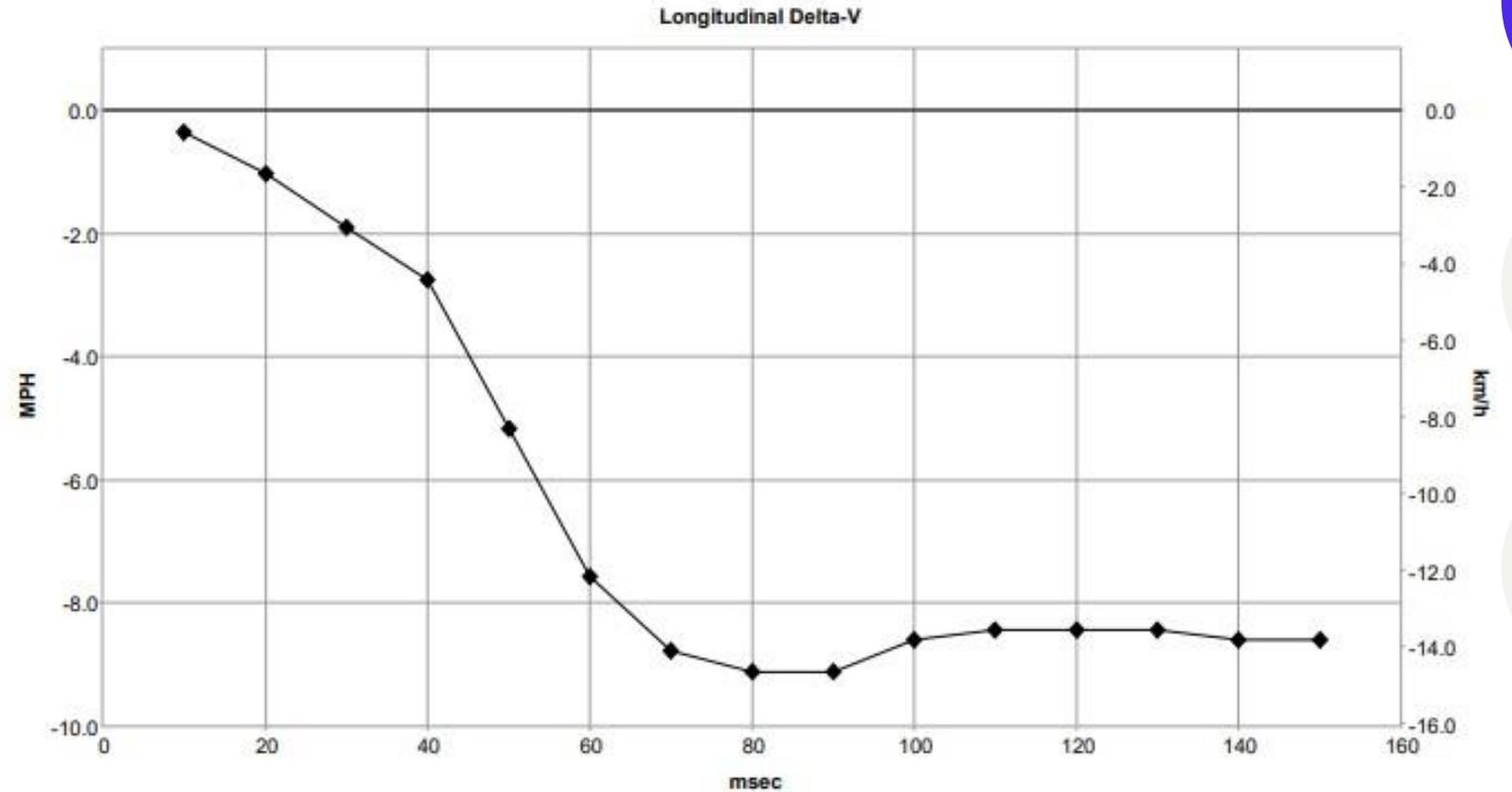
Vehicle 2 Event Data (continued)

Pre-Crash Data, -5 to 0 seconds (1st Prior Frontal/Rear Event, TRG 3)

Time (sec)	-4.1	-3.1	-2.1	-1.1	-0.1	0 (TRG)
Vehicle Speed (MPH [km/h])	13.7 [22]	13.7 [22]	14.9 [24]	16.2 [26]	17.4 [28]	17.4 [28]
Brake Switch	OFF	OFF	OFF	OFF	OFF	OFF
Accelerator Rate (V)	0.78	1.13	1.25	1.21	0.90	0.90
Engine RPM (RPM)	800	800	1,200	1,200	800	800
Pre-Crash Data Status *	Valid	Valid	Valid	Valid	Valid	Valid

- Vehicle 2 accelerating prior to collision.

- Driver 2 never applies brakes before collision.

- Vehicle 2 struck Vehicle 3 at 17.4 MPH, causing chain reaction collision ahead.

- Vehicle 1 then struck Vehicle 2 as a result.

- Police Report is incorrect in the that Vehicle 1 caused the entire crash event.

- Vehicle 2 was the catalyst for the entire collision event.

Who Disregarded the Traffic Signal?

- Conflicting Statements

- No Video Evidence

- No Independent Witnesses

What's Going on Here??
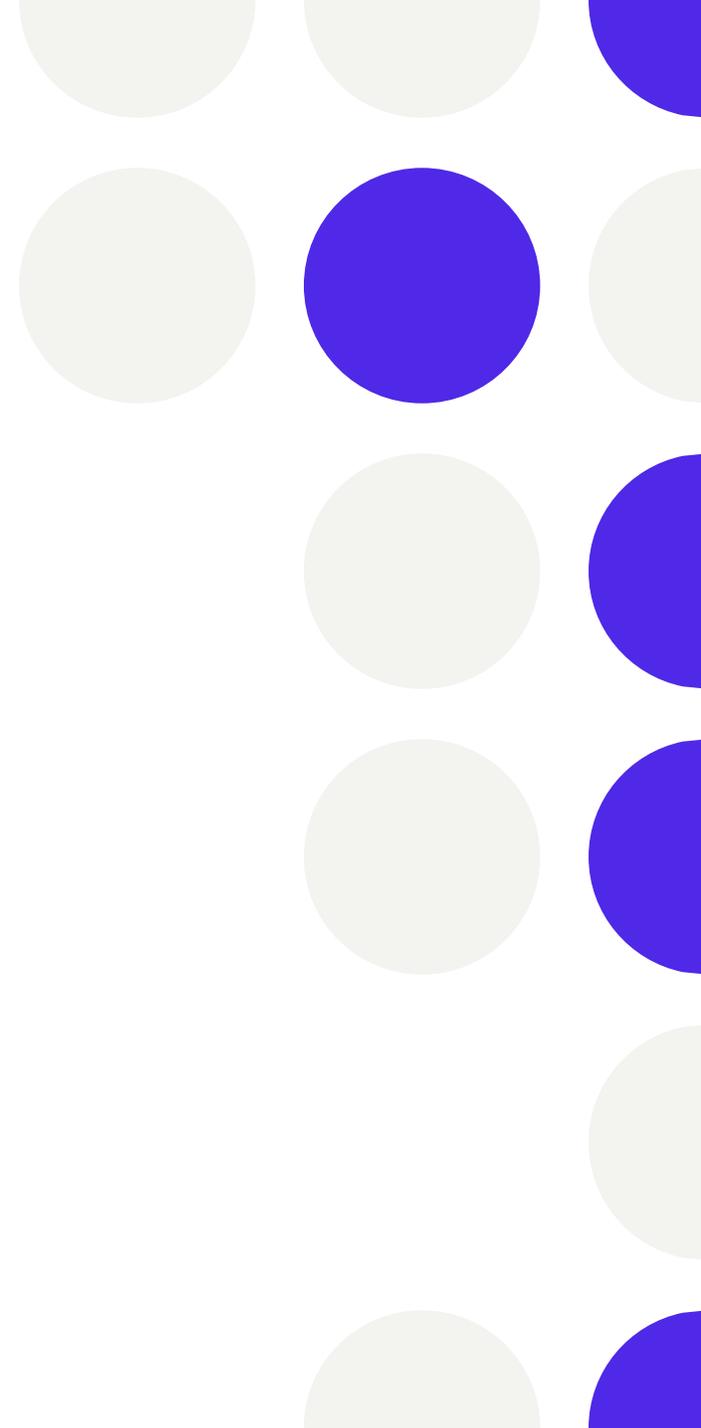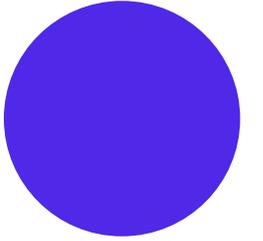
Driver 1 Statement

I was headed straight in the right lane on Fifth Street. I was at the red Traffic light at the intersection of 5th & Florida going north. My light turned green for me to proceed. Continuing north. The vehicle that hit me ran the red light going east on Florida hitting me on the driver side.

Driver 2 Statement

I was headed down Florida blvd eastbound and about 3/4 through the intersection of Florida blvd and fifth street and was hit on the Passenger side.

Vehicle 1
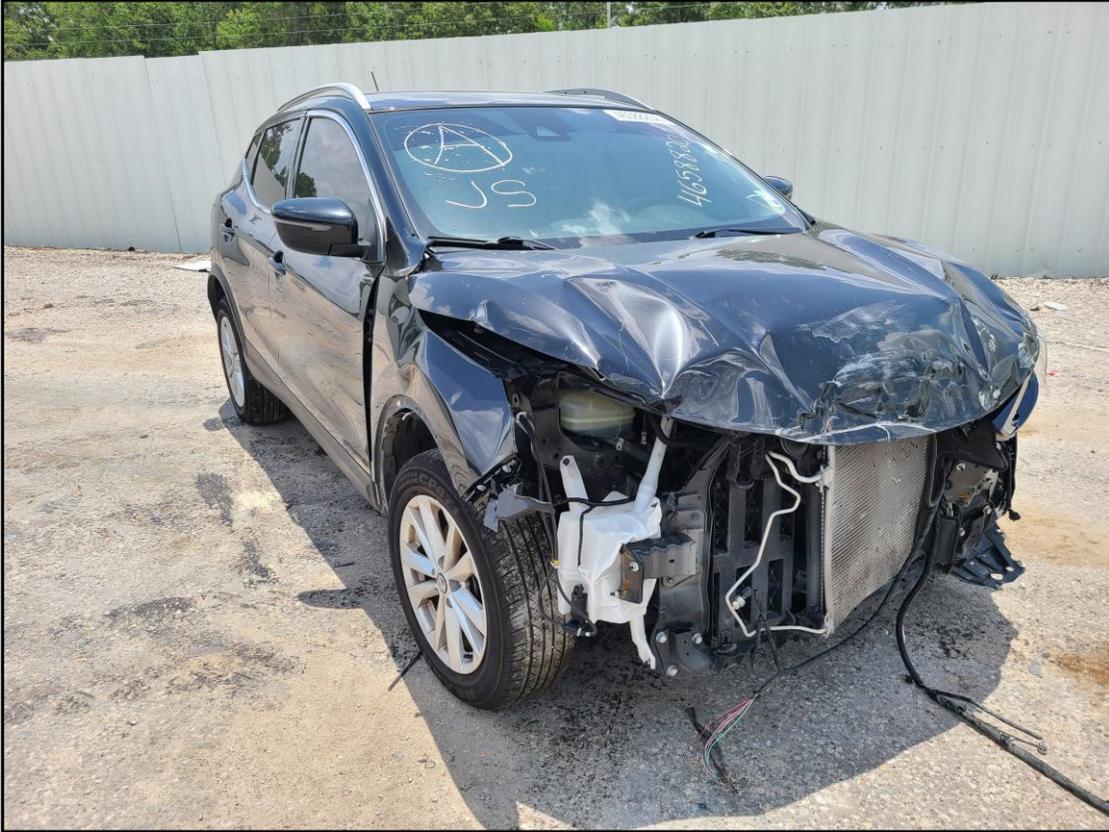
Vehicle 2

Vehicle 1--Pre-Crash Data

Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % full	Engine RPM	Motor RPM	Service Brake (On, Off)	Steering Input (deg)
-5.0	19 [30]	0	1100	1100	Off (Brake Not Activated)	0
-4.5	19 [30]	2	1100	1100	Off (Brake Not Activated)	-2.5
-4.0	19 [30]	8	1200	1200	Off (Brake Not Activated)	-2.5
-3.5	19 [30]	11	1300	1300	Off (Brake Not Activated)	0
-3.0	19 [31]	10	1400	1400	Off (Brake Not Activated)	2.5
-2.5	20 [32]	10	1400	1400	Off (Brake Not Activated)	2.5
-2.0	21 [34]	10	1400	1400	Off (Brake Not Activated)	2.5
-1.5	22 [35]	9	1300	1300	Off (Brake Not Activated)	2.5
-1.0	22 [36]	9	1300	1300	Off (Brake Not Activated)	0
-0.5	22 [35]	0	1200	1000	On (Brake Activated)	0
0.0	17 [27]	0	1000	800	On (Brake Activated)	0

Vehicle 2--Pre-Crash Data

Time (sec)	-4.75	-4.25	-3.75	-3.25	-2.75	-2.25	-1.75	-1.25	-0.75	-0.25	0 (TRG)
Vehicle Speed (MPH [km/h])	24.9 [40]	25.5 [41]	25.5 [41]	26.7 [43]	27.3 [44]	27.3 [44]	28 [45]	28.6 [46]	29.2 [47]	29.2 [47]	12.4 [20]
Accelerator Pedal, % Full (%)	22.0	22.0	21.5	21.5	20.0	20.0	19.5	20.0	20.0	0.0	0.0
Percentage of Engine Throttle (%)	8.5	8.5	9.0	9.0	8.0	8.0	8.0	8.5	8.5	2.5	2.5
Engine RPM (RPM)	1,400	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,400	1,300	1,200
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Brake Oil Pressure (Mpa)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Longitudinal Acceleration , VSC Sensor (m/sec^2)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Yaw Rate (deg/sec)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Steering Input (degrees)	4.5	4.5	4.5	1.5	4.5	3.0	1.5	-1.5	-1.5	54.0	-16.5

Distance Based on CDR Data

- Vehicle 1 is 147 feet from POI.

- Vehicle 1 Driver said she was stopped at a red light.

- Vehicle 2 is 186 feet from POI.

- Vehicle 2 Driver said he was ¾ of the way through the intersection when he was hit.

- **Driver 1 Ran the Red Light.**
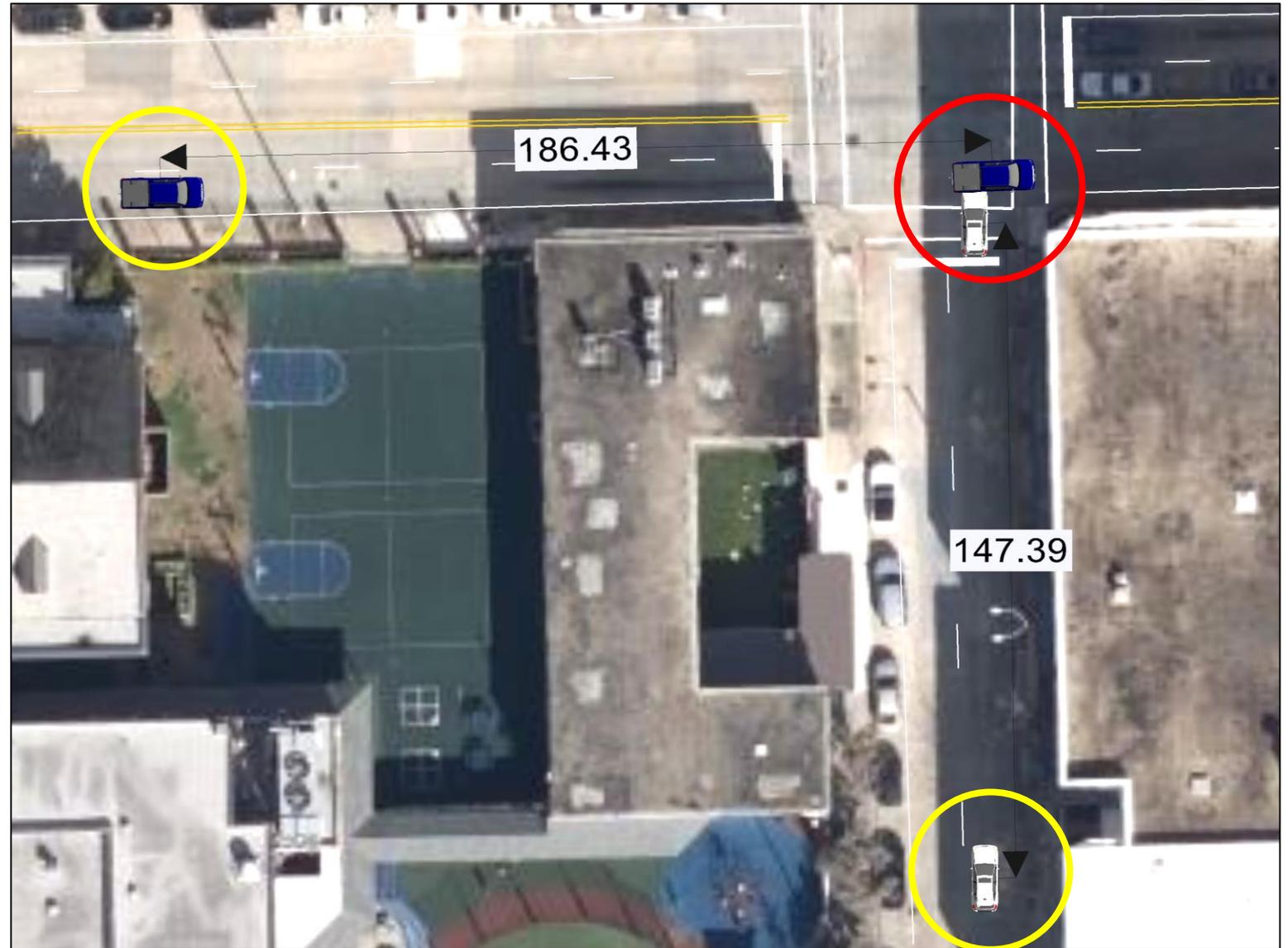
The Vehicle was Sold at Auction

System Status at Time of Retrieval

ECU Part Number	89170-0T070
EDR Generation	13EDR
Complete File Recorded	Yes
Freeze Signal	ON
Freeze Signal Factor	Front Airbag Deployment
Diagnostic Trouble Codes Exist	No
Ignition Cycle ,Download (times)	7685
Multi-event, number of events (times)	2 or greater
Time from event 1 to 2 (s)	0.022
Time from Previous Pre Crash TRG (msec)	16381 or greater
Latest Pre-Crash Page	0
Contains Unlinked Pre-Crash Data	No

Event Record Summary at Retrieval

Events Recorded	TRG Count	Crash Type	Time (msec)	Pre-Crash & DTC Data Recording Status	Event & Crash Pulse Data Recording Status
Most Recent Event	2	Side Crash	0	Complete (Page 0)	Complete (Side Page 0)
1st Prior Event	1	Front/Rear Crash	-22	Complete (Page 0)	Complete (Front/Rear Page 0)

Pre-Crash Data, 1 Sample (Most Recent Event, TRG 2)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	350
TRG Count when Pre-crash TRG was Established (times)	1
Safety Belt Status, Driver	OFF
Safety Belt Status, Front Passenger	OFF
Occupant Size Classification, Front Passenger	Not Occupied
Frontal Airbag Suppression Switch Status, Front Passenger	SNA
RSCA Disable Switch	SNA
Seat Track Position Switch, Foremost, Status, Driver	No
Airbag Warning Lamp, On/Off	OFF
Ignition Cycle ,Crash (times)	7684

Vehicles--Pre-Crash Data

Pre-Crash Data, -5 to 0 seconds (Most Recent Event, TRG 2)

Time (sec)	-4.85	-4.35	-3.85	-3.35	-2.85	-2.35	-1.85	-1.35	-0.85	-0.35	0 (TRG)
Vehicle Speed (MPH [km/h])	90.7 [146]	90.1 [145]	88.2 [142]	87.6 [141]	87 [140]	87.6 [141]	87.6 [141]	83.3 [134]	73.9 [119]	63.4 [102]	57.8 [93]
Accelerator Pedal, % Full (%)	0.0	0.0	0.0	0.0	67.0	81.5	71.0	0.0	0.0	0.0	0.0
Percentage of Engine Throttle (%)	0.0	0.0	0.0	0.0	65.5	87.5	81.5	0.0	0.0	0.0	0.0
Engine RPM (RPM)	2,700	2,700	2,600	2,600	3,300	4,700	4,700	4,200	3,700	3,100	2,600
Motor RPM (RPM)	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Brake Oil Pressure (Mpa)	0.00	0.14	1.63	0.00	0.00	0.00	0.00	6.38	10.08	12.14	12.14
Longitudinal Acceleration , VSC Sensor (m/sec^2)	-0.359	-0.502	-2.369	-0.718	-0.072	0.790	0.861	-7.250	-7.968	-8.973	-8.973
Yaw Rate (deg/sec)	2.44	3.42	1.95	4.39	7.81	2.93	2.44	0.98	0.49	1.46	1.46
Steering Input (degrees)	7.5	9.0	6.0	13.5	19.5	7.5	7.5	1.5	4.5	-6.0	13.5

Where was the vehicle when the other driver began entering traffic?

1400 feet Away!!

Best Practice

- Always download when available.
- Download a close to the incident as possible.
- Document mileage during initial inspection.
- Maintain the digital .cdrx file.
- When requesting downloads from others, request the .cdrx file.

Questions??

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