

REPORT NUMBER: 301R-CAL-19-004

**SAFETY COMPLIANCE TESTING FOR FMVSS 301R
FUEL SYSTEM INTEGRITY – REAR IMPACT**

**FCA US LLC.
2019 Jeep Cherokee**

NHTSA NUMBER: C20190301

**PREPARED BY:
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July 24, 2019

FINAL REPORT


**PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220
1200 New Jersey Avenue, SE
Washington, DC 20590**

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16. Abstract A compliance test was conducted on a 2019 Jeep Cherokee SUV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301R-02 for the determination of FMVSS 301R compliance. Test failures identified were as follows: None - The test vehicle appeared to comply with all requirements of FMVSS 301R "Fuel System Integrity – Rear Impact."			
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SECTION 1

PURPOSE AND TEST PROCEDURE

This rear impact test is part of the FMVSS 301R Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-16-D-00032. The purpose of this test was to determine if the subject vehicle, a 2019 Jeep Cherokee SUV, meets the performance requirements of FMVSS No. 301R "Fuel System Integrity – Rear Impact." The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-301R-02, dated January 17, 2007).

SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

A 1,849 kg 2019 Jeep Cherokee SUV was impacted from the rear by a 1362.2 kg moving barrier at a velocity of 79.47 kph (49.38 mph). The test was performed by Calspan Corporation on July 22, 2019.

The test vehicle was equipped with a 59.8 liter fuel tank which was filled to 93 percent capacity with stoddard fluid prior to impact. Additional ballast (63.5 kg) was secured on the vehicle's rear passenger seat footwell. Two ballast Part 572E 50th percentile male Anthropomorphic Test Devices (ATD) were placed in the front occupant seating positions.

The crash event was recorded by three high-speed cameras and one real-time camera. High-speed camera locations and other pertinent camera information can be found on page 3-7 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A.

There was no fuel system fluid spillage following the impact and including all portions of the static rollover test. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

SECTION 3

SUMMARY OF TEST RESULTS

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 – Test Vehicle Specifications

Data Sheet No. 2 – Pre-Test Data

Data Sheet No. 3 – Moving Deformable Barrier (MDB) Data

Data Sheet No. 4 – High Speed Camera Locations and Data Summary

Data Sheet No. 5 – Post-Test Data

Data Sheet No. 6 – FMVSS No. 301 Static Rollover Test Data

**DATA SHEET NO. 1
TEST VEHICLE SPECIFICATIONS**

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
 Test Date: 7/22/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	C20190301
Model Year	2019
Make	Jeep
Model	Cherokee
Body Style	4 Door SUV
Body Color	Black
Odometer Reading (mi)	22 miles
Engine Displacement (L)	2.4
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	9-Speed
Final Drive	FWD

Overdrive	Yes
Air Conditioning (AC)	Yes
All-Wheel Drive (AWD)	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADL)	Yes
Power Brakes	Yes
Power Seats	No
Power Steering	Yes
Power Windows	Yes
Stability Control (Auto-Leveling)	No
Sunroof/T-Top	No
Tilt Steering Wheel	Yes
Traction Control System (TCS)	Yes

DEALER AND DELIVERY INFORMATION FROM CERTIFICATION LABEL

Manufactured By	FCA US LLC
Date of Manufacture	5/18
VIN	1C4PJLCB2KD178241

GVWR (kg)	2291
GAWR Front (kg)	1273
GAWR Rear (kg)	1273

TIRE PLACARD & SIDEWALL INFORMATION

Tire Placard Location: Driver's Door Sill

Spare Tire Type: None

Measured Parameter	Front	Rear
Tire Manufacturer	Firestone	Firestone
Tire Name	Destination LE ²	Destination LE ²
Tire Type	All Season	All Season
Max. Tire Pressure (kPa)	300	300
Recommended Tire Size	225/60R17	225/60R17
Load Index/Speed Symbol	99J	99J
Recommended Cold Tire Pressure (kPa)	250	250
Tire Size on Vehicle	225/60R17	225/60R17
Treadwear/ Traction Grade/ Temperature Grade	520 / A / B	520 / A / B

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	-	5
Seat Type (Bench, Bucket, or Split Bench)	Bucket	Bench	-	
Capacity Weight (VCW) (kg)				408
DSC X 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				67.8

**DATA SHEET NO. 2
PRE-TEST DATA**

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
 Test Date: 7/22/2019

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	505	326		552	385	
Right	kg	485	318		535	377	
Ratio	%	60.6	39.4		58.8	41.2	
Totals	kg	990	644	1634	1087	762	1849

TARGET TEST WEIGHT CALCULATION (TTW)

Measured Parameter	Units	Value	
Total Unloaded Vehicle Weight (UVW)	kg	1634	(A)
Rated Cargo/Luggage Weight (RCLW)	kg	67.8	(B)
Weight of two P572E ATDS	kg	155.4	(C)
Target Vehicle Test Weight (TVTWT)	kg	1857.2	(A+B+C)

GENERAL TEST VEHICLE DATA

Measured Parameter	Units	Value
Vehicle Wheelbase	mm	2707
Vehicle Length (at Centerline)	mm	4655
Vehicle Width (B-Pillar)	mm	1837
Weight of Ballast Secured in Cargo Area ¹	kg	63.5
Type of Ballast		Lead Weight Bags
Method of Securing Ballast		Rear Passenger Footwell
Components Removed for Weight Reduction		0
Vehicle Width at Widest Point	mm	1859
Vehicle Width at Widest Point Location		C-Pillar
Centerline offset for impact line	mm	479
Filler neck side (left/right)		Right

¹ Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

TEST VEHICLE ATTITUDE AND CG

	Units	Left		Right		CG (aft of front axle)
		Front	Rear	Front	Rear	
As Delivered (UVW)	mm	761	811	762	815	1067
As Tested (ATW)	mm	750	796	750	798	1116

**DATA SHEET NO. 2 (Continued)
PRE-TEST DATA**

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

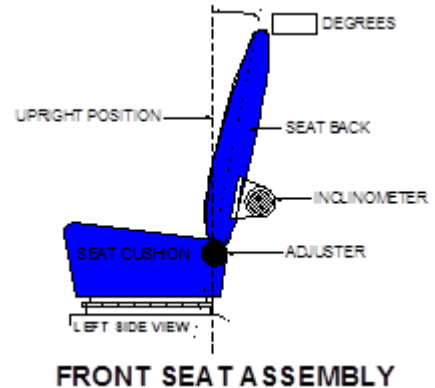
NHTSA No.: C20190301
 Test Date: 7/22/2019

SEATING

Nominal Design Riding Position (for adjustable driver and passenger seat backs). *Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.*

Driver Seat Instructions: The driver seat back was positioned according to the Nominal Design Riding position listed in FORM 1.

Passenger Seat Instructions: The passenger seat back was positioned to the Nominal Design Riding position listed in FORM 1.

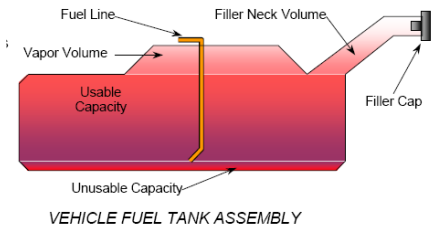


Measured Parameter	Deg.
Driver Seat Back Angle	0.6
Passenger Seat Back Angle	0.1

SEAT FORE/AFT POSITIONING

Driver Seat: Was positioned according to the Nominal Design Riding position listed in FORM1.
 Passenger Seat: Was positioned according to the Nominal Design Riding position listed in FORM1.

	Total Travel	Test Position
Driver Seat	22 (0-21)	11
Passenger Seat	20 (0-19)	10



FUEL TANK CAPACITY DATA

Measured Parameter	Reference	Liters
Fuel System Capacity (Standard Tank)	Owner's Manual	59.8
COTR Usable Capacity (Standard Tank)	Form No. 1	59.8
Test Volume Range	92-94% of Usable Capacity	55 – 56.2
Actual Test Volume (Solvent Used)	93% of Usable Capacity	55.61

FUEL SYSTEM DATA

Measured Parameter	Value
Test Fluid Type	Stoddard Solvent
Test Fluid Specific Gravity	0.764
Test Fluid Kinematic Viscosity (centistokes)	0.96
Test Fluid Color	Purple
Electric Fuel Pump?	Yes
Can Activate Electric Fuel Pump with Ignition Switch On but Engine Off?	Yes

Fuel Pump Comments : None

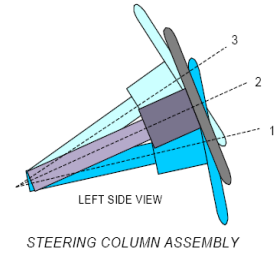
DATA SHEET NO. 2 (Continued)
PRE-TEST DATA

Test Vehicle: 2019 Jeep Cherokee SUV
Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
Test Date: 7/22/2019

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.



Operational Instructions: Tilt wheel was positioned to mid-range at 26.4 degrees and 20 mm.

SEAT BELT UPPER ANCHORAGE

Nominal design riding position

Operational Instructions: Seat belt anchorage was placed in its uppermost position

COMMENTS: None

**DATA SHEET NO. 3
MOVING DEFORMABLE BARRIER (MDB) DATA**

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
 Test Date: 7/22/2019

MDB Face Manufacturer: Plascore MDB Face Serial No. A0618028

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length of MDB (incl. honeycomb impactor face)	4120
Wheelbase of Framework Carriage	2583
Tread of Framework Carriage (Front & Rear)	1880
CG Location of Front Axle	1105.8

MDB WEIGHTS

	Units	Front	Rear	Total
Left	kg	392.0	293.3	685.3
Right	kg	387.1	289.8	676.9
Ratio	%	57.2%	42.8%	100.0%
Totals	kg	779.1	583.1	1362.2

MDB TIRE SIZE & PRESSURES

	Units	Requirement	Left Front	Right Front	Left Rear	Right Rear
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	207	207	207	207

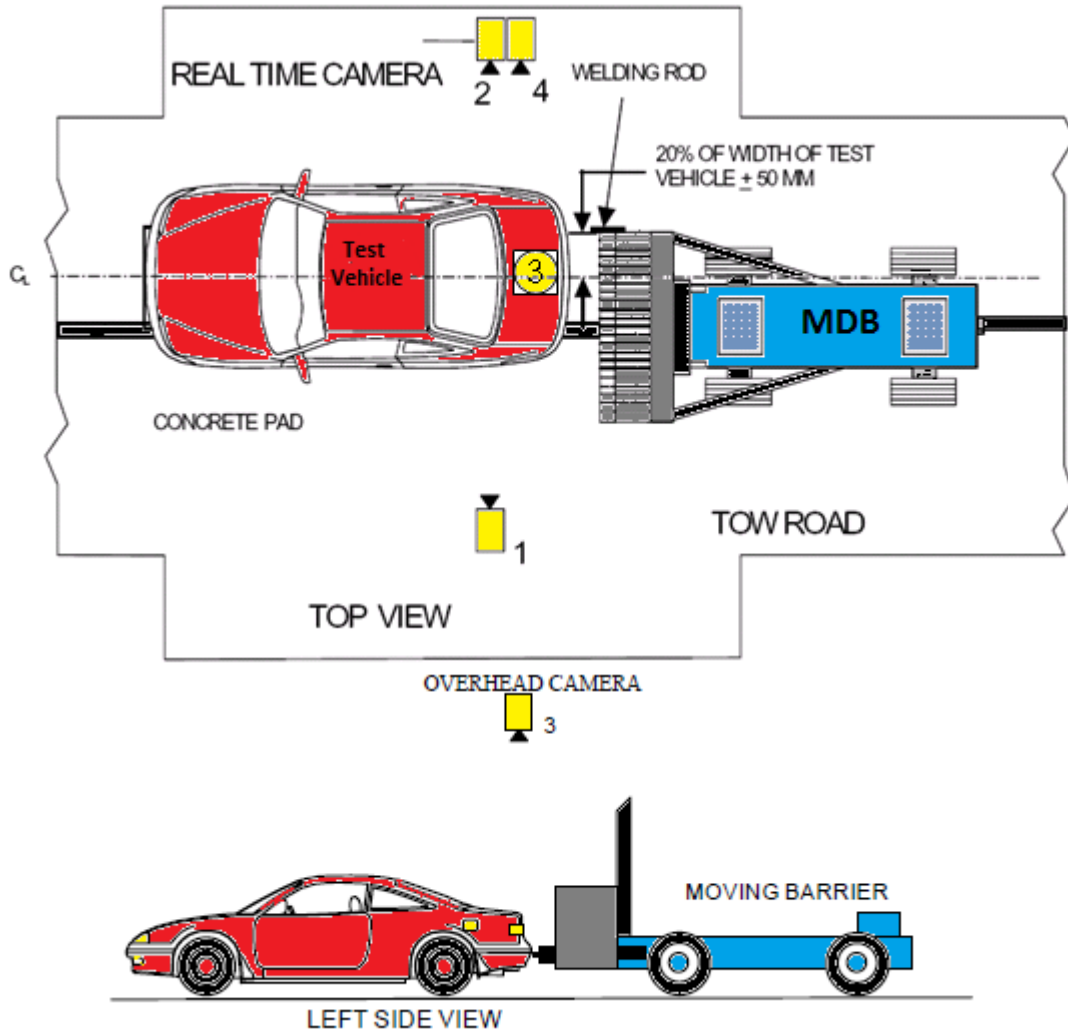
Brake Abort System? (Yes/No): Yes

Date of Last MDB Calibration: July 8, 2019

DATA SHEET NO. 4
HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
 Test Date: 7/22/2019



No.	Camera View	Coordinates (mm)			Angle (Deg)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	1762	10737	1319	1.4	24	1000
2	Real-Time Camera						60
3	Overhead View	727	0	9370	90	12.5	1000
4	Right Side View	1799	10448	1204	1.6	24	1000

* Reference (from point of impact); all measurements accurate to within ±6 mm.

X = (Impact Point) + Forward
 Y = (Impact Point) + To Right
 Z = (Ground Level) + Down

**DATA SHEET NO. 5
POST-TEST DATA**

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
 Test Date: 7/22/2019

VIN: 1C4PJLCB2KD178241

REQUIRED IMPACT VELOCITY RANGE: 78.5 to 80.1 km/h

ACTUAL IMPACT VELOCITY (WITHIN 1.5 M OF IMPACT PLANE)

Measurement Description	Units	Speed
Trap No. 1	km/h	79.47
Trap No. 2	km/h	79.33

WELDING ROD IMPACT POINT

Measurement Description	Tolerance	Units	Value
Vertical distance from target center (+ is above)	±40 mm	mm	0
Horizontal distance from target center (+ is right)	±50 mm	mm	+1

STODDARD SOLVENT SPILLAGE MEASUREMENT:

A. From impact until vehicle motion ceases:
 (Maximum allowable is 28 grams) 0 grams

B. For the 5-minute period after motion ceases:
 (Maximum allowable is 28 grams) 0 grams

C. For the next 25 minutes:
 (Maximum allowable is 28 grams/minute) 0 grams

D. Spillage Details: No Spillage Occurred

**DATA SHEET NO. 5
POST-TEST DATA (Continued)**

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
 Test Date: 7/22/2019

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Closed & Operational	Closed & Operational
Rear Door Opening	Closed & Operational	Closed & Operational
Seat Track Shift (mm)	0	0
Seat Back Failure	Reclined	Reclined
Glazing Damage	None	None

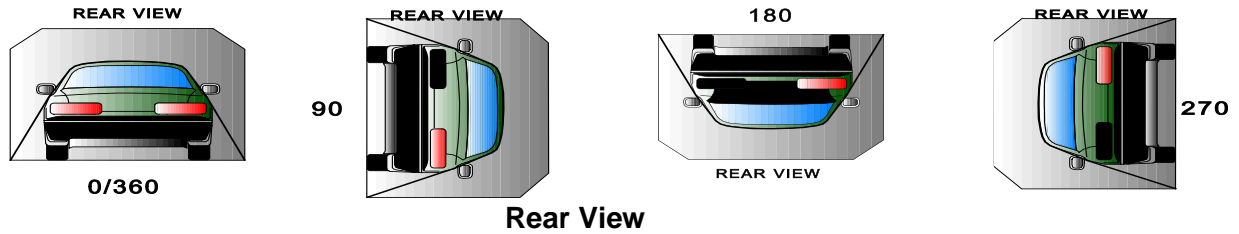
POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	None
Window Damage	Rear Windsheild Shattered
Other Notable Effects	None

**DATA SHEET NO. 6
FMVSS NO. 301 STATIC ROLLOVER TEST DATA**

Test Vehicle: 2019 Jeep Cherokee SUV
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20190301
 Test Date: 7/22/2019



ROLLOVER SOLVENT COLLECTION TIME TABLE

Test Phase	Rotation Time (spec. 1 -3 min)		Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	10	5	6	10	7
90° to 180°	1	5	5	6	5	7
180° to 270°	1	5	5	6	5	7
270° to 360°	1	7	5	6	7	7

FMVSS 301 REQUIREMENTS TABLE (Maximum allowable solvent spillage)

First 5 Minutes (grams)	6th Minute (grams)	7th Minute (grams)	8th Minute (grams)
142	28	28	28

ACTUAL TEST VEHICLE STODDARD SOLVENT SPILLAGE TABLE

Test Phase	First 5 Minutes (grams)	6th Minute (grams)	7th Minute (grams)	8th Minute (grams)
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

ROLLOVER STODDARD SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

APPENDIX A
PHOTOGRAPHS

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Figure A-1: Vehicle Certification Placard



Figure A-2: Vehicle Tire Placard

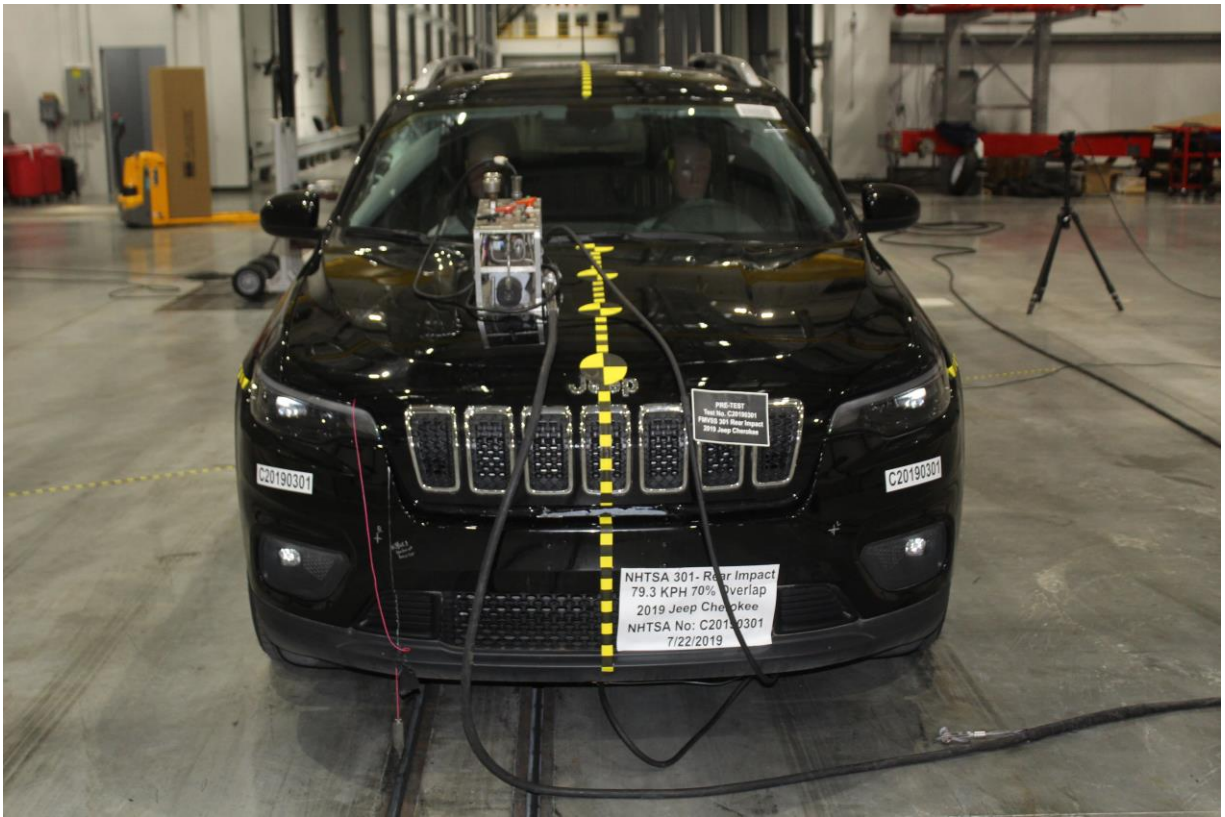


Figure A-3: Pre-Test Front View



Figure A-4: Post-Test Front View



Figure A-5: Pre-Test Left Side View



Figure A-6: Post-Test Left Side View



Figure A-7: Pre-Test Right Side View



Figure A-8: Post-Test Right Side View



Figure A-9: Pre-Test Left Front 3/4 View



Figure A-10: Post-Test Left Front 3/4 View



Figure A-11: Pre-Test Right Front 3/4 View



Figure A-12: Post-Test Right Front 3/4 View



Figure A-13: Pre-Test Left Rear 3/4 View



Figure A-14: Post-Test Left Rear 3/4 View

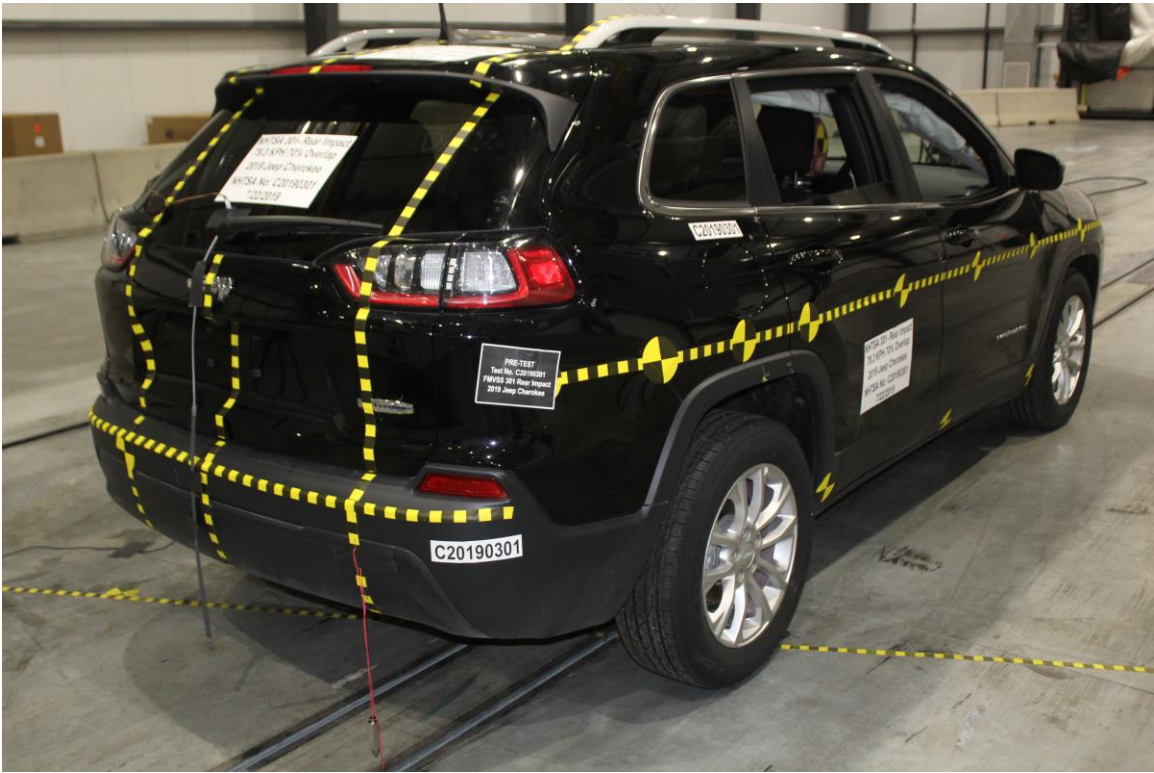


Figure A-15: Pre-Test Right Rear 3/4 View



Figure A-16: Post-Test Right Rear 3/4 View



Figure A-17: Pre-Test Rear View



Figure A-18: Post-Test Rear View

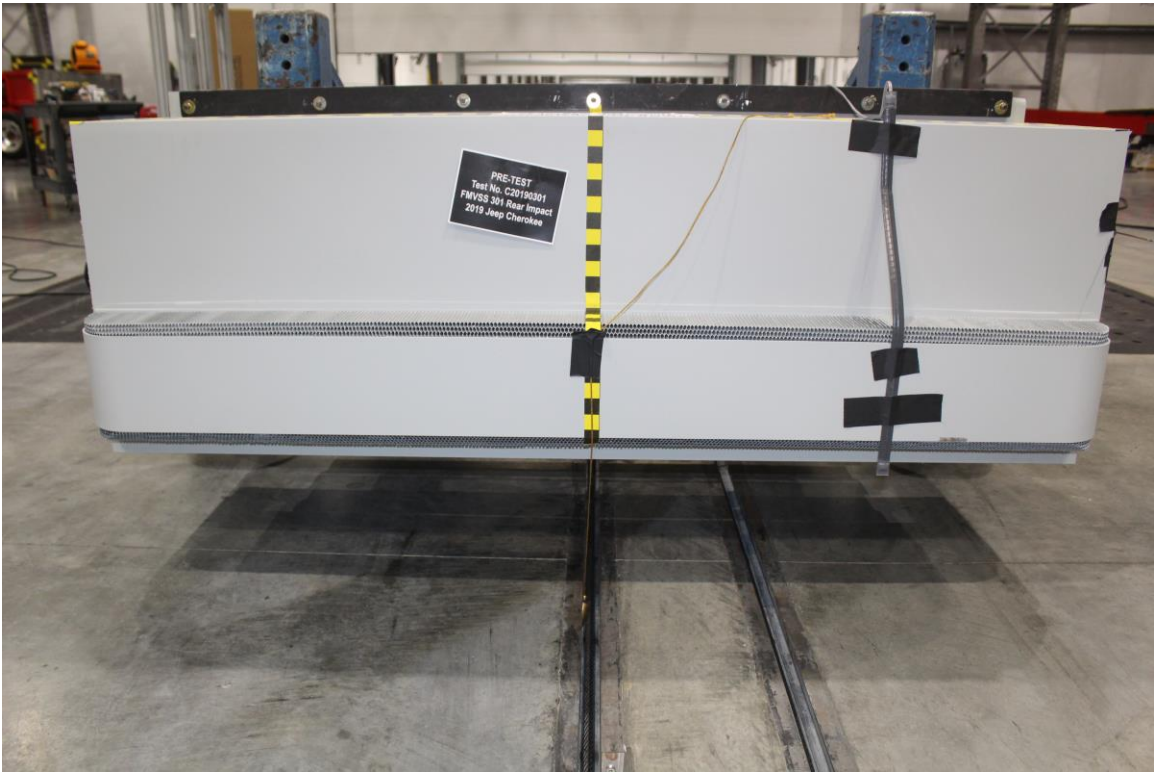


Figure A-19: Pre-Test MDB Front View



Figure A-20: Post-Test MDB Front View



Figure A-21: Pre-Test MDB Left Side View



Figure A-22: Post-Test MDB Left Side View

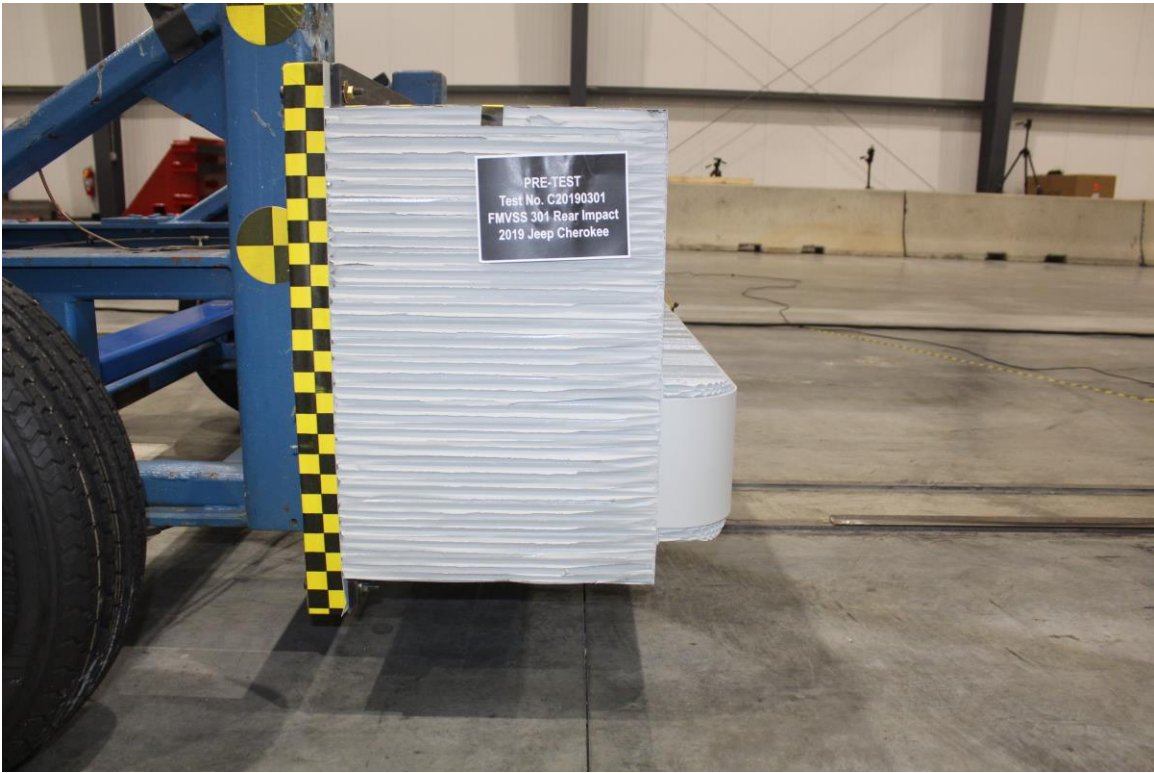


Figure A-23: Pre-Test MDB Right Side View



Figure A-24: Post-Test MDB Right Side View

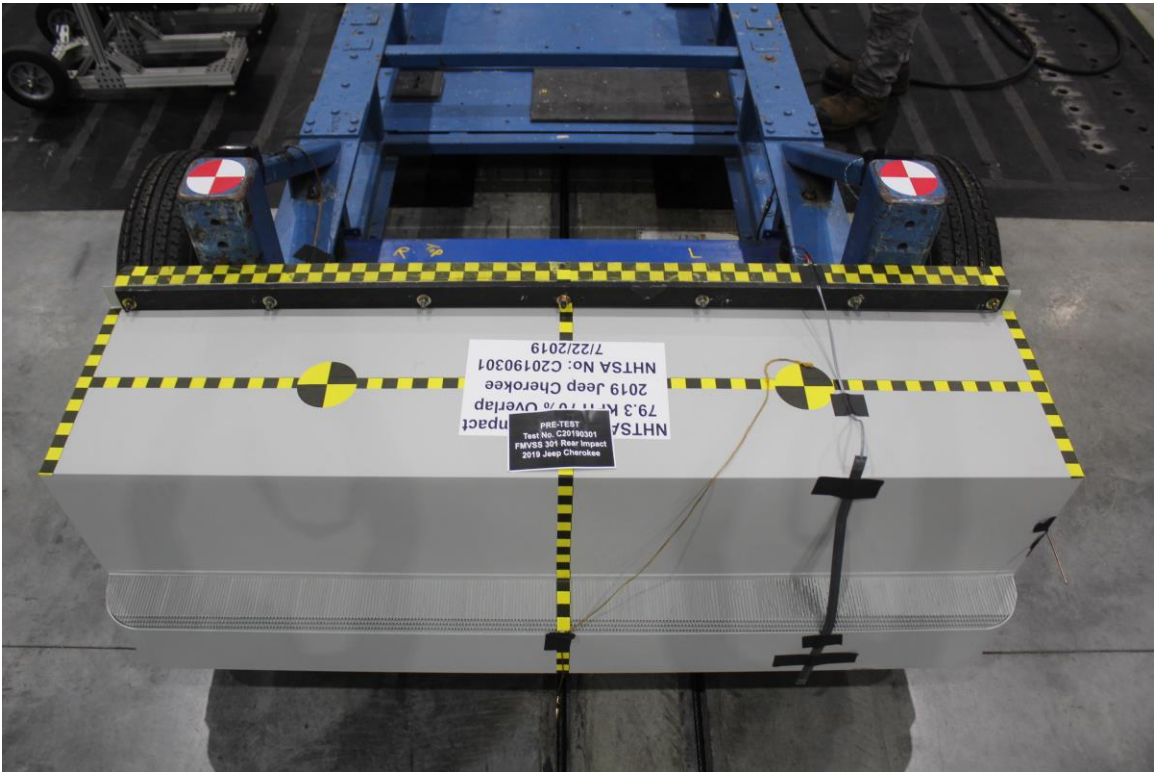


Figure A-25: Pre-Test MDB Top View



Figure A-26: Post-Test MDB Top View

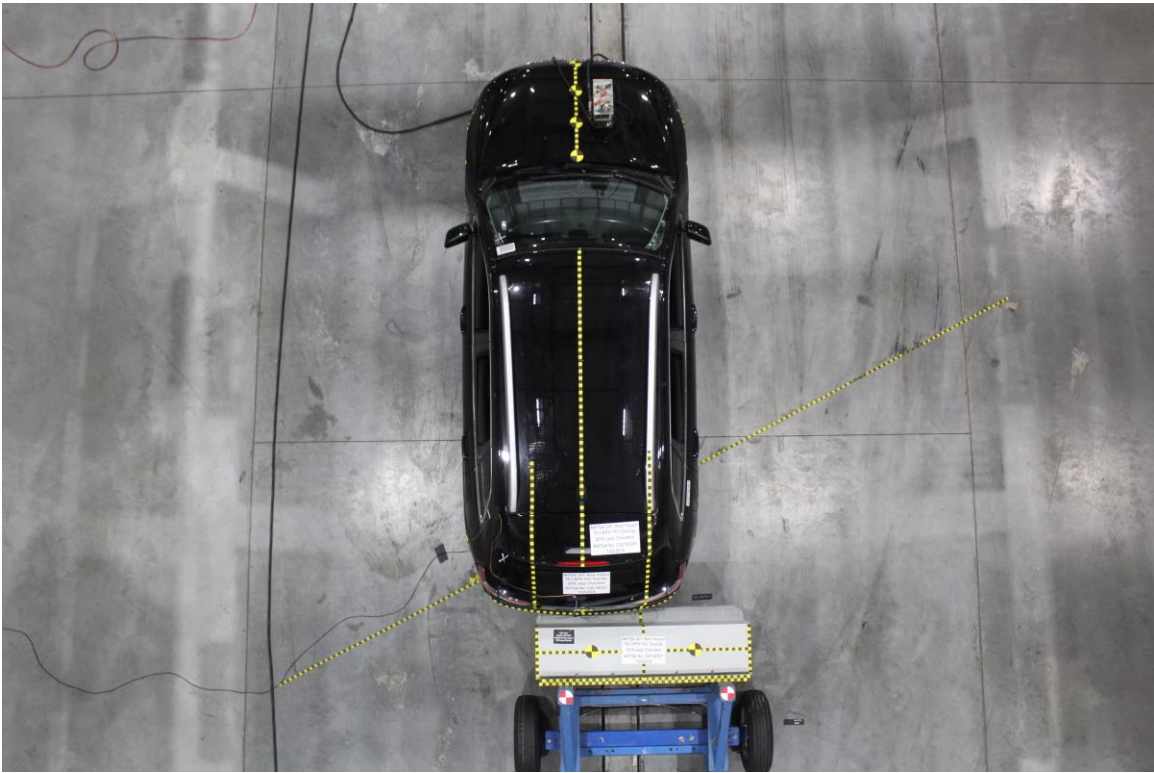


Figure A-27: Pre-Test Overhead Vehicle and MDB View

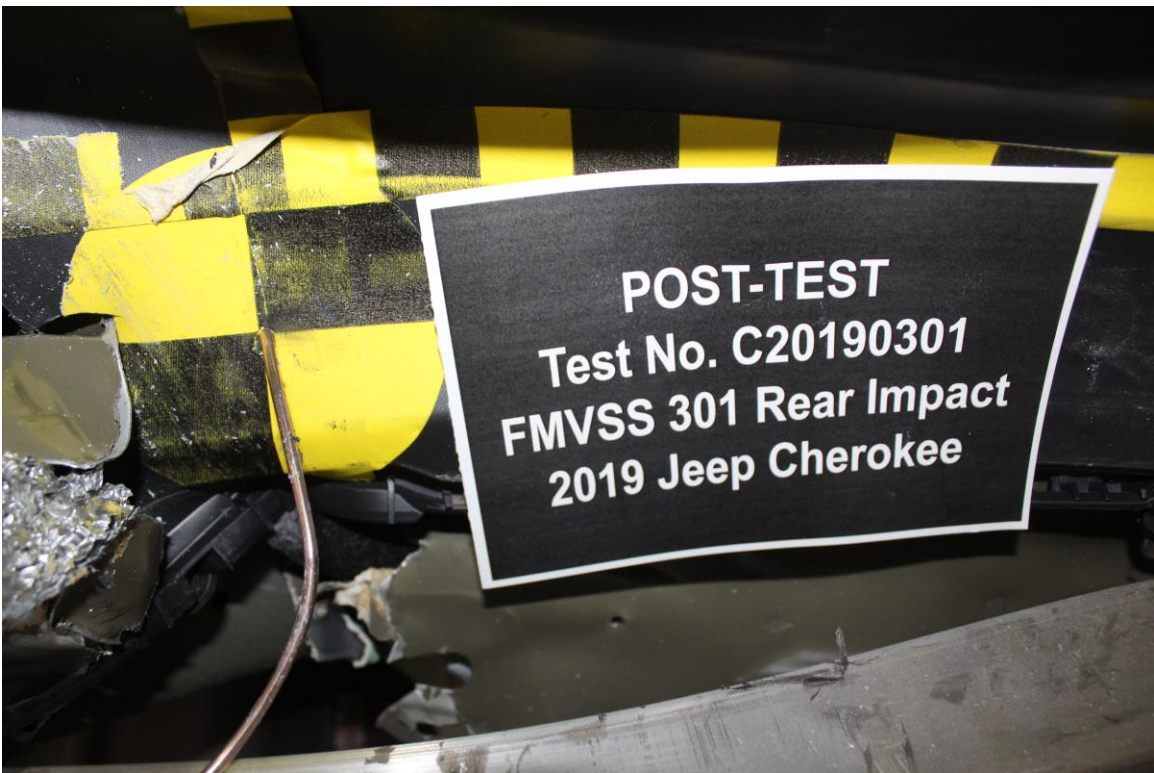


Figure A-28: Post-Test Impact Target View



Figure A-29: Pre-Test Front Underbody View

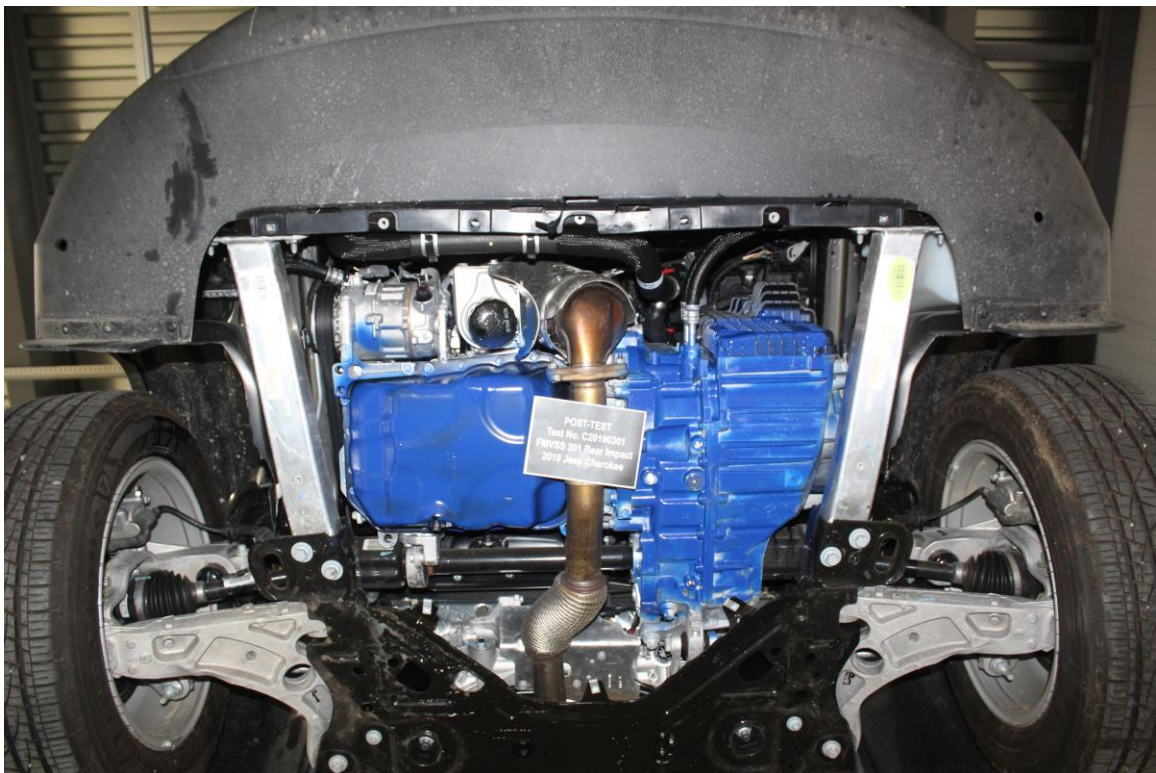


Figure A-30: Post-Test Front Underbody View



Figure A-31: Pre-Test Mid Underbody View



Figure A-32: Post-Test Mid Underbody View



Figure A-33: Pre-Test Rear Underbody View



Figure A-34: Post-Test Rear Underbody View



Figure A-35: Pre-Test Fuel Filler Cap View



Figure A-36: Post-Test Fuel Filler Cap View



Figure A-37: Impact View



Figure A-38: Speed Trap View*



Figure A-39: Rollover 90° View

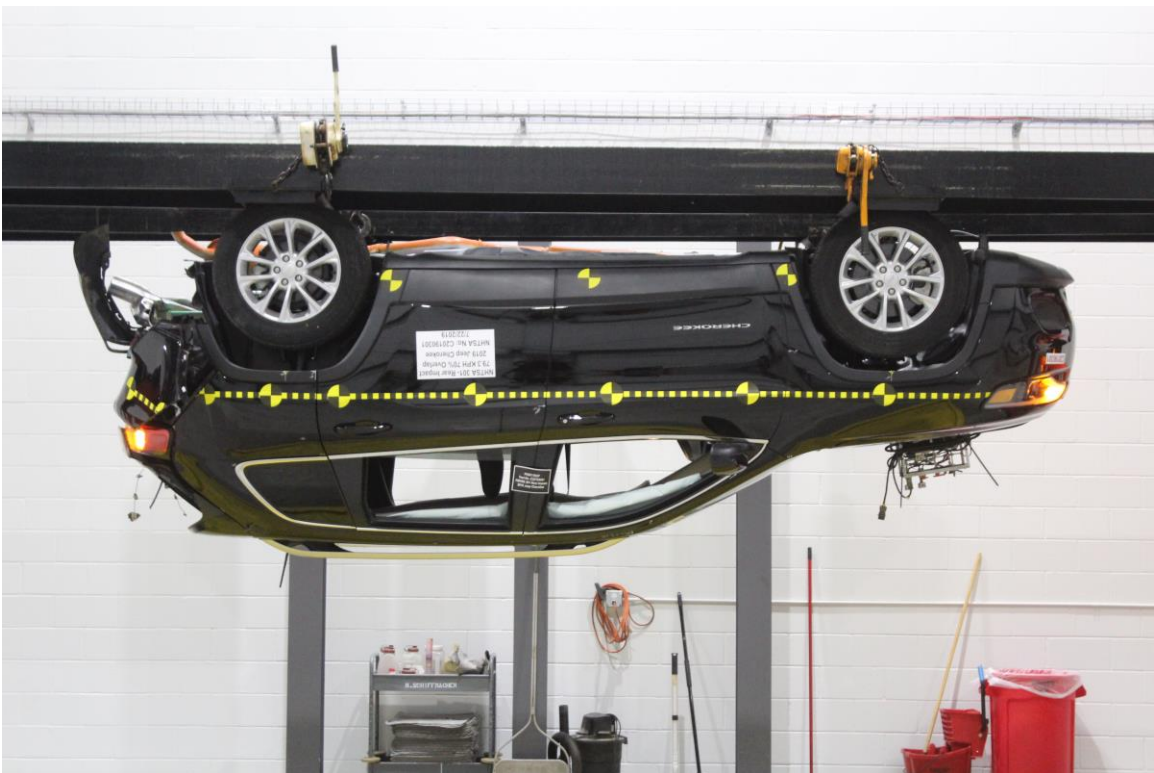


Figure A-40: Rollover 180° View

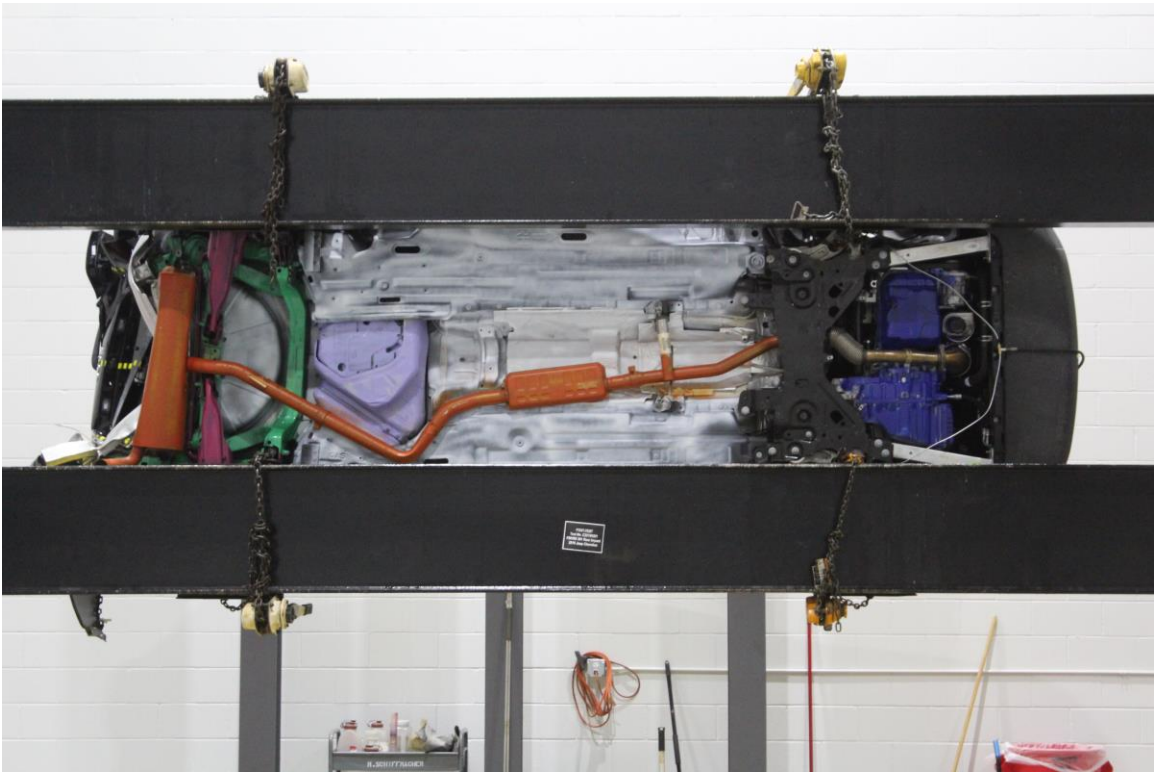


Figure A-41: Rollover 270° View



Figure A-42: Rollover 360° View