

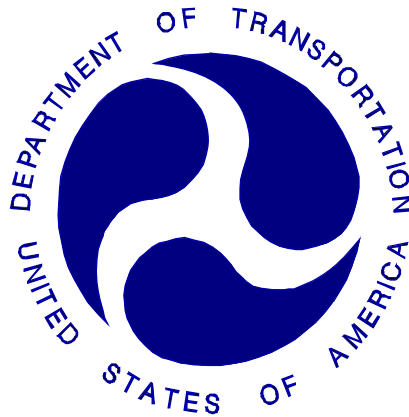
REPORT NUMBER: 301R-CAL-15-006

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

**Ford Motor Co.
2015 Ford F-150**

NHTSA NUMBER: C20150203

**PREPARED BY:
CALSPAN CORPORATION
TRANSPORTATION TEST OPERATIONS
P.O. BOX 400
BUFFALO, NEW YORK 14225**



January 9, 2016

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**

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-11-D-00243.

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Approval Date: January 9, 2016

FINAL REPORT ACCEPTANCE BY OVSC:

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Date: _____

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15. Supplementary Notes				
16. Abstract A compliance test was conducted on a 2015 Ford F-150 super crew 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."				
17. Key Words Compliance Testing Safety Engineering FMVSS 301R			18. Distribution Statement <u>Copies of this report are available from:</u> National Highway Traffic Safety Administration Technical Reference Division (TIS) (NPO-230) 1200 New Jersey Avenue, SE Washington, D.C. 20590 Telephone No. (202) 366-4946	
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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Purpose and Test Procedure	1-1
2	Compliance Test Results Summary	2-1
3	Data Sheets	3-1
<u>Data Sheet</u>		<u>Page</u>
1	Test Vehicle Specifications	3-2
2	Pre-Test Data	3-3
3	Moving Deformable Barrier (MDB) Data	3-6
4	High Speed Camera Locations and Data Summary	3-7
5	Post-Test Data	3-8
6	FMVSS No. 301 Static Rollover Test Data	3-10
<u>Appendix</u>		<u>Page</u>
A	Photographs	A-1

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. DTNH22-11-D-00243. The purpose of this test was to determine if the subject vehicle, a 2015 Ford F-150 super crew , 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 2,336 kg 2015 Ford F-150 super crew was impacted from the rear by a 1357.0 kg moving barrier at a velocity of 79.29 kph (49.27 mph). The test was performed by Calspan Corporation on January 7, 2015.

The test vehicle was equipped with a 90.85 liter fuel tank which was filled to 93 percent capacity with stoddard fluid prior to impact. Additional ballast (133.0 kg) was secured in the vehicle's rear passenger foot well. 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 maximum vehicle longitudinal crush was 604 millimeters of which the average was 570 millimeters. 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: 2015 Ford F-150 super crew
Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
Test Date: 01/07/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	C20150203	Overdrive	Yes
Model Year	2015	Air Conditioning (AC)	Yes
Make	Ford	All-Wheel Drive (AWD)	No
Model	F-150	Anti-Lock Brakes (ABS)	Yes
Body Style	Super Crew	Automatic Door Locks (ADL)	Yes
Body Color	Blue	Power Brakes	Yes
Odometer Reading (km/mi)	21.4 km / 13.3 mi	Power Seats	No
Engine Displacement (L)	3.5	Power Steering	Yes
Type/No. Cylinders	V6	Power Windows	Yes
Engine Placement	Inline	Stability Control (Auto-Leveling)	No
Transmission Type	Automatic	Sunroof/T-Top	No
Transmission Speeds	6-Speed	Tilt Steering Wheel	Yes
Final Drive	RWD	Traction Control System (TCS)	Yes

DEALER AND DELIVERY INFORMATION FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Co.	GVWR (kg)	2790
Date of Manufacture	02/15	GAWR Front (kg)	1429
VIN	1FTEW1C87FFA50783	GAWR Rear (kg)	1497

TIRE PLACARD & SIDEWALL INFORMATION

Tire Placard Location: Driver's Door Sill Spare Tire Type: 245/70R17 (Full)

Measured Parameter	Front	Rear
Tire Manufacturer	Michelin	Michelin
Tire Name	LTX M/S	LTX M/S
Tire Type	Passenger	Passenger
Max. Tire Pressure (kPa)	300	300
Recommended Tire Size	P245/70/R17	P245/70/R17
Load Index/Speed Symbol	110T	110T
Recommended Cold Tire Pressure (kPa)	260	260
Tire Size on Vehicle	P245/70/R17	P245/70/R17
Treadwear/ Traction Grade/ Temperature Grade	720 / A / A	720 / A / A

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	3	3	-	6
Seat Type (Bench, Bucket, or Split Bench)	Bucket	Split Bench	-	
Capacity Weight (VCW) (kg)				725
DSC X 68.04 (kg)				408.24
Cargo Weight (RCLW) (kg)				316.76

DATA SHEET NO. 2 PRE-TEST DATA

Test Vehicle: 2015 Ford F-150 super crew
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
 Test Date: 01/07/2016

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	589	435		671	506	
Right	kg	588	439		660	499	
Ratio	%	57.4	42.6		57.0	43.0	
Totals	kg	1177	874	2051	1331	1005	2336

TARGET TEST WEIGHT CALCULATION (TTW)

Measured Parameter	Units	Value	
Total Unloaded Vehicle Weight (UVW)	kg	2051	(A)
Rated Cargo/Luggage Weight (RCLW)	kg	136	(B)
Weight of two P572E ATDS @ 78 kg each	kg	156	(C)
Target Vehicle Test Weight (TVTWT)	kg	2343	(A+B+C)

*As tested Weight = (TVTWT - 10kg) <= ATW < (TVTWT - 5kg); TVTWT = Weight of Test Vehicle with 2 dummies and 136.0 kg of Cargo Weight

GENERAL TEST VEHICLE DATA

Measured Parameter	Units	Value
Vehicle Wheelbase	mm	3684
Vehicle Length (at Centerline)	mm	5894
Vehicle Width	mm	2020
Weight of Ballast Secured in Cargo Area ¹	kg	133
Type of Ballast		Lead Shot Bag
Method of Securing Ballast		Rear Foot well
Components Removed for Weight Reduction		0
Vehicle Width at Widest Point	mm	2026
Vehicle Width at Widest Point Location		Rear Wheel Axle
Centerline offset for impact line	mm	405
Filler neck side (left/right)		Left

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	924	974	919	977	1570
As Tested (ATW)	mm	903	958	898	958	1585

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

Test Vehicle: 2015 Ford F-150 super crew
Test Program: FMVSS 301R Compliance Rear Impact Test

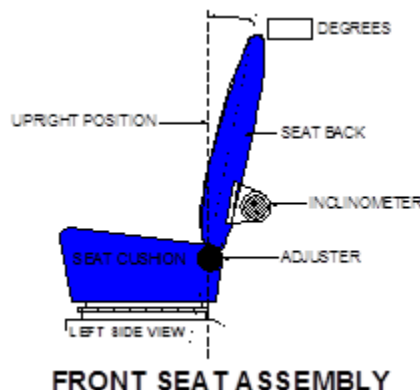
NHTSA No.: C20150203
Test Date: 01/07/2016

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.



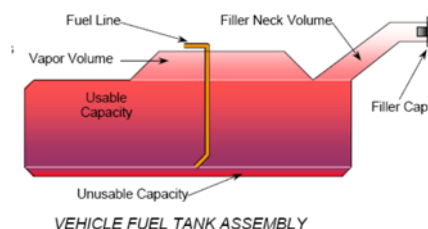
Measured Parameter	Deg.
Driver Seat Back Angle	2.7
Passenger Seat Back Angle	3.1

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 # of Positions	Placed in Position #
Driver Seat	37 (0-36)	18
Passenger Seat	37 (0-36)	18



FUEL TANK CAPACITY DATA

Measured Parameter	Reference	Liters
Fuel System Capacity (Standard Tank)	Owner's Manual	90.85
COTR Usable Capacity (Standard Tank)	Form No. 1	90.85
Test Volume Range	92-94% of Usable Capacity	83.6-85.4
Actual Test Volume (Solvent Used)	93% of Usable Capacity	84.5

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

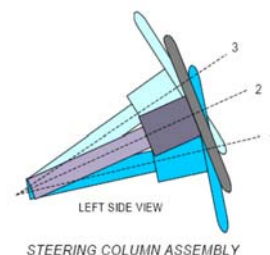
DATA SHEET NO. 2 (Continued)
PRE-TEST DATA

Test Vehicle: 2015 Ford F-150 super crew
Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
Test Date: 01/07/2016

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 14.2 degrees and mid fore/aft position at 20 mm

SEAT BELT UPPER ANCHORAGE

Nominal design riding position

Operational Instructions: Anchorage were set to one detent below the most upright position.

COMMENTS: None

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

Test Vehicle: 2015 Ford F-150 super crew
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
 Test Date: 01/07/2016

MDB Face Manufacturer: Plascore MDB Face Serial No. A0315045

MDB SPECIFICATIONS

Measurement Description	Units	Length
Overall Width of Framework Carriage	mm	1250
Overall Length of MDB (incl. honeycomb impactor face)	mm	4120
Wheelbase of Framework Carriage	mm	2591
Tread of Framework Carriage (Front & Rear)	mm	1880
CG Location of Front Axle	mm	1136

MDB WEIGHTS

Measurement Description	Units	Front	Rear	Total
Left	kg	358.0	322.0	680.0
Right	kg	404.0	273.0	677.0
Ratio	%	56.2	43.8	100.0
Totals	kg	762.0	595.0	1357.0

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

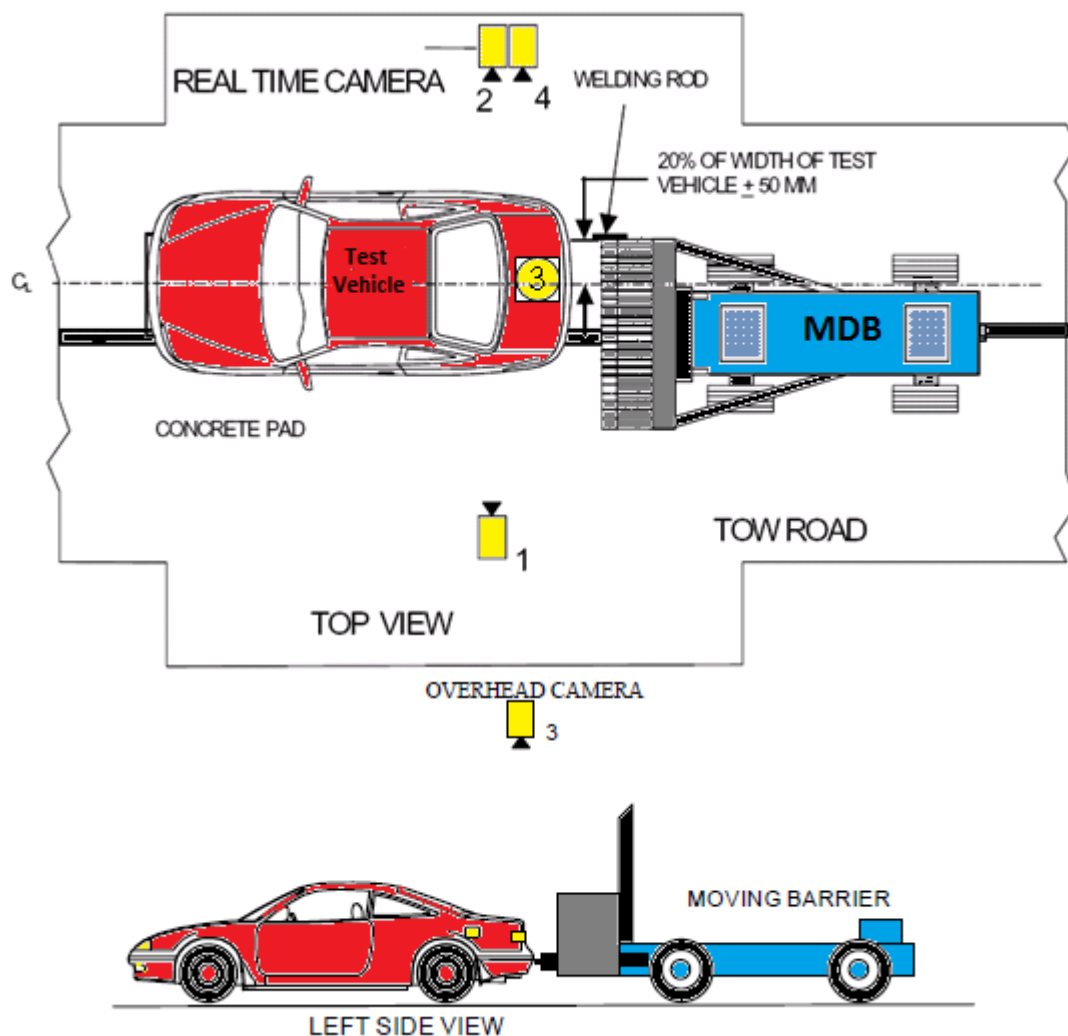
Brake Abort System? (Yes/No): Yes

Date of Last MDB Calibration: May 15, 2010

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

Test Vehicle: 2015 Ford F-150 super crew
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
 Test Date: 01/07/2016



No.	Camera View	Coordinates (mm)			Angle (Deg)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	-1102	-9425	-1134	-2.5	24	1000
2	Real-Time Camera						60
3	Overhead View	0	0	-5344	90	14	1000
4	Right Side View	-1114	-10192	-1198	-2.5	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: 2015 Ford F-150 super crew
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
 Test Date: 01/07/2016

VIN: 1FTEW1C87FFA50783

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	79.29
Trap No. 2	km/h	79.39

WELDING ROD IMPACT POINT

Measurement Description	Tolerance	Units	Value
Vertical distance from target center (+ is above)	±40 mm	mm	-2
Horizontal distance from target center (+ is right)	±50 mm	mm	+10

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: 2015 Ford F-150 super crew
Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
Test Date: 01/07/2016

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE CRUSH MEASUREMENTS: LENGTH

Measurement	Units	Left Side	Centerline	Right Side
Pre-Test	mm	5834	5894	5835
Post-Test	mm	5230	5340	5282
Crush	mm	-604	-554	-553

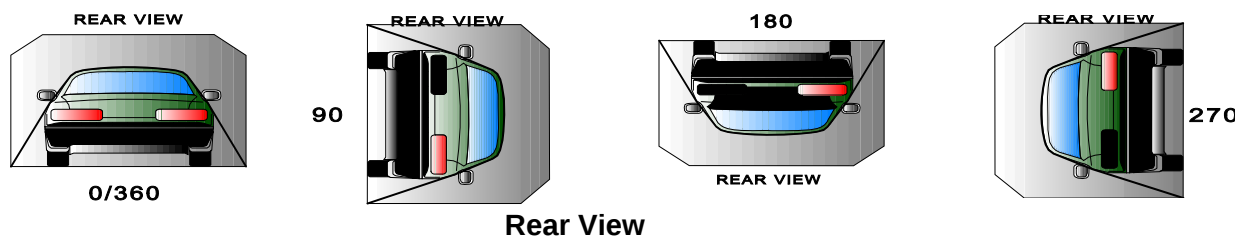
VEHICLE CRUSH MEASUREMENTS: WHEELBASE

Measurement	Units	Left Side	Right Side
Pre-Test	mm	3682	3687
Post-Test	mm	3485	3668
Crush	mm	-197	-19

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

Test Vehicle: 2015 Ford F-150 super crew
 Test Program: FMVSS 301R Compliance Rear Impact Test

NHTSA No.: C20150203
 Test Date: 01/07/2016



ROLLOVER SOLVENT COLLECTION TIME TABLE

Test Phase	Rotation Time (spec. 1 -3 min)		Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds		Minutes	Seconds	
0° to 90°	1	12	5	6	12	7
90° to 180°	1	8	5	6	08	7
180° to 270°	1	4	5	6	04	7
270° to 360°	1	7	5	6	07	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	None
270° to	None

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	Vehicle Certification Placard	A-3
2	Vehicle Tire Placard	A-3
3	Pre-Test Front View	A-4
4	Post-Test Front View	A-4
5	Pre-Test Left Side View	A-5
6	Post-Test Left Side View	A-5
7	Pre-Test Right Side View	A-6
8	Post-Test Right Side View	A-6
9	Pre-Test Left Front 3/4 View	A-7
10	Post-Test Left Front 3/4 View	A-7
11	Pre-Test Right Front 3/4 View	A-8
12	Post-Test Right Front 3/4 View	A-8
13	Pre-Test Left Rear 3/4 View	A-9
14	Post-Test Left Rear 3/4 View	A-9
15	Pre-Test Right Rear 3/4 View	A-10
16	Post-Test Right Rear 3/4 View	A-10
17	Pre-Test Rear View	A-11
18	Post-Test Rear View	A-11
19	Pre-Test MDB Front View	A-12
20	Post-Test MDB Front View	A-12
21	Pre-Test MDB Left Side View	A-13
22	Post-Test MDB Left Side View	A-13
23	Pre-Test MDB Right Side View	A-14
24	Post-Test MDB Right Side View	A-14
25	Pre-Test MDB Top View	A-15
26	Post-Test MDB Top View	A-15
27	Pre-Test Overhead Vehicle and MDB View	A-16
28	Post-Test Impact Target View	A-16
29	Pre-Test Front Underbody View	A-17
30	Post-Test Front Underbody View	A-17
31	Pre-Test Mid Underbody View	A-18
32	Post-Test Mid Underbody View	A-18
33	Pre-Test Rear Underbody View	A-19
34	Post-Test Rear Underbody View	A-19
35	Pre-Test Fuel Filler Cap View	A-20
36	Post-Test Fuel Filler Cap View	A-20
37	Impact View	A-21
38	Speed Trap View	A-21
39	Rollover 90° View	A-22
40	Rollover 180° View	A-22
41	Rollover 270° View	A-23
42	Rollover 360° View	A-23

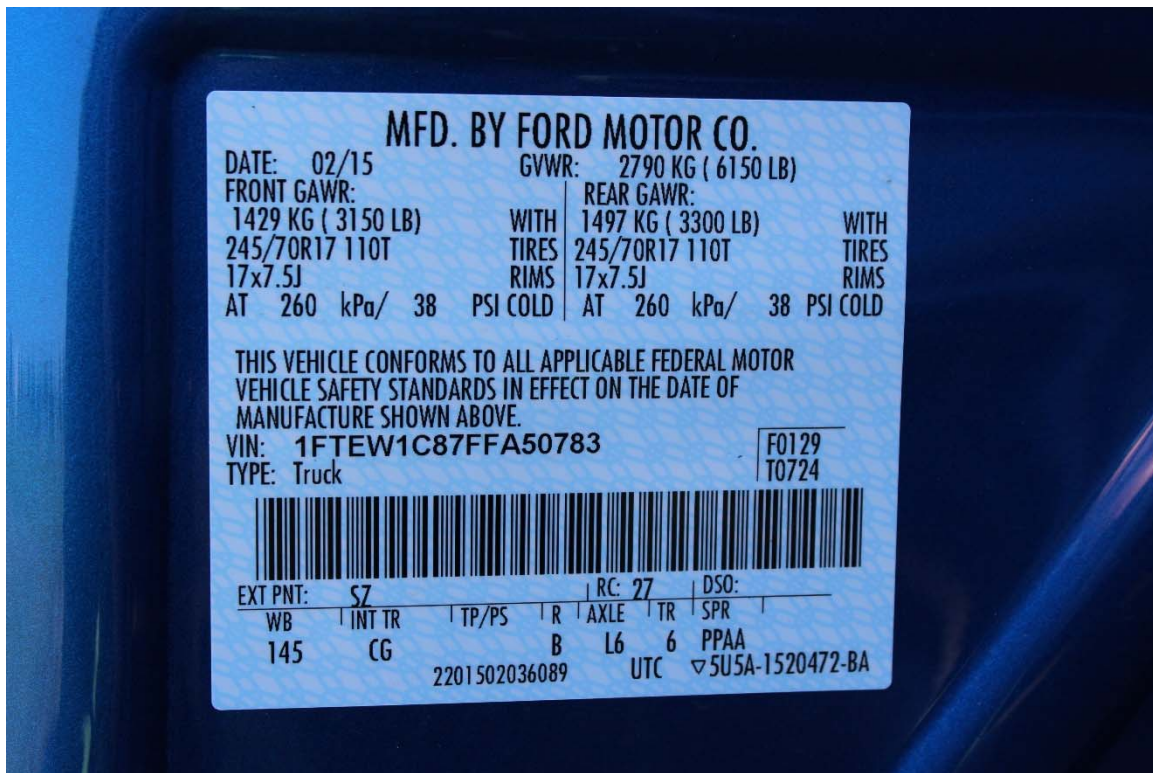


Figure A-1: Vehicle Certification Placard

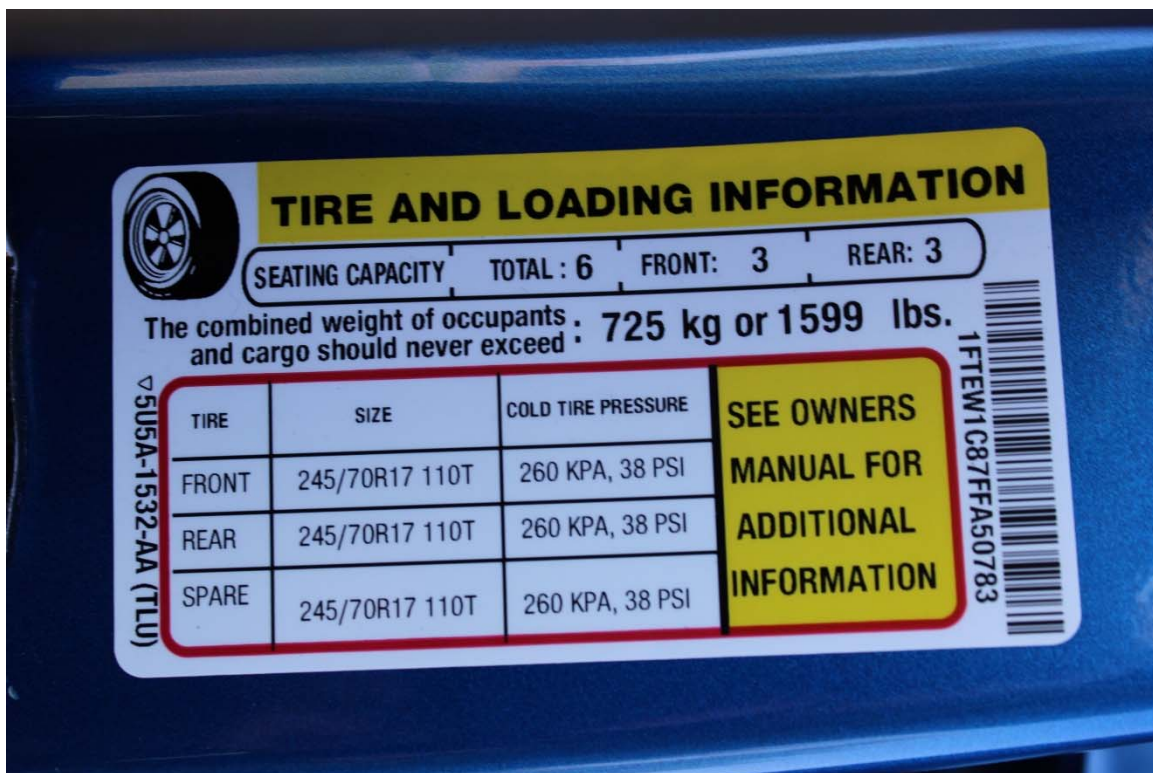


Figure A-2: Vehicle Tire Placard



Figure A-3: Pre-Test Front View

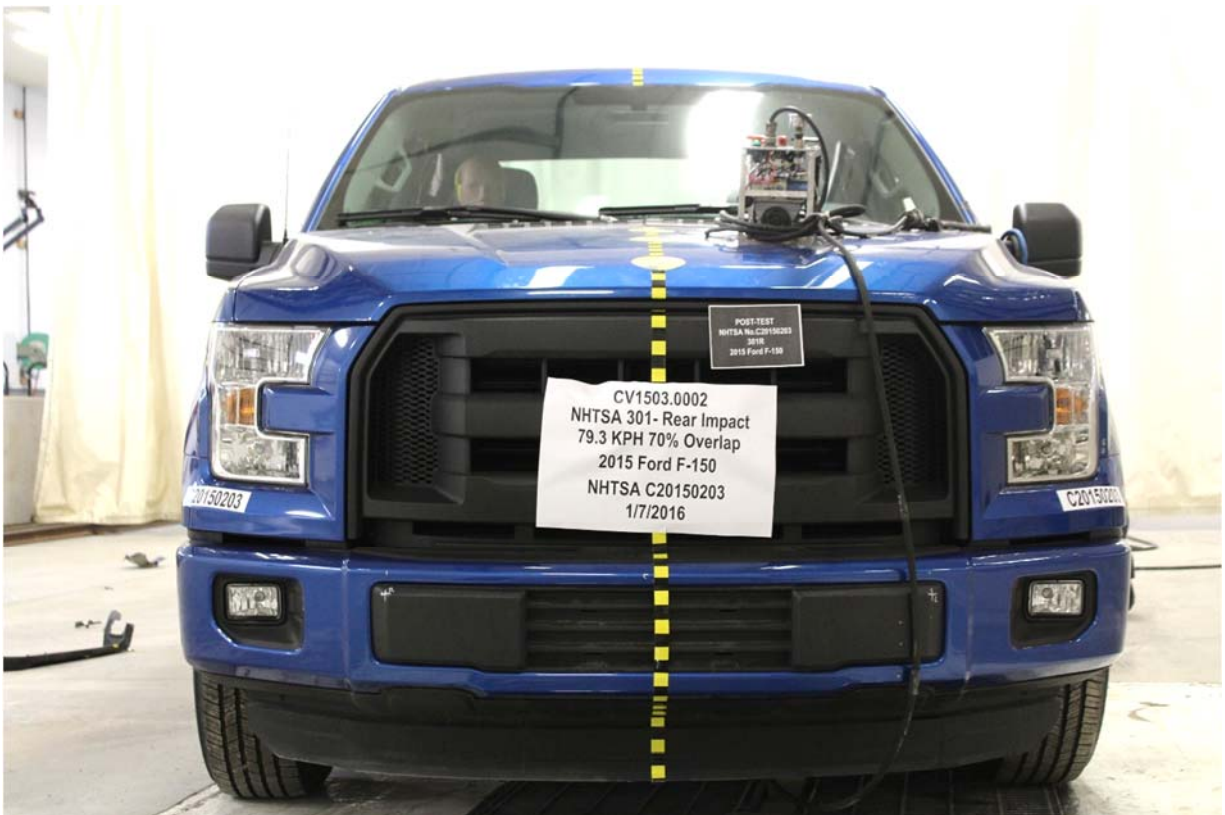


Figure A-4: Post-Test Front View



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

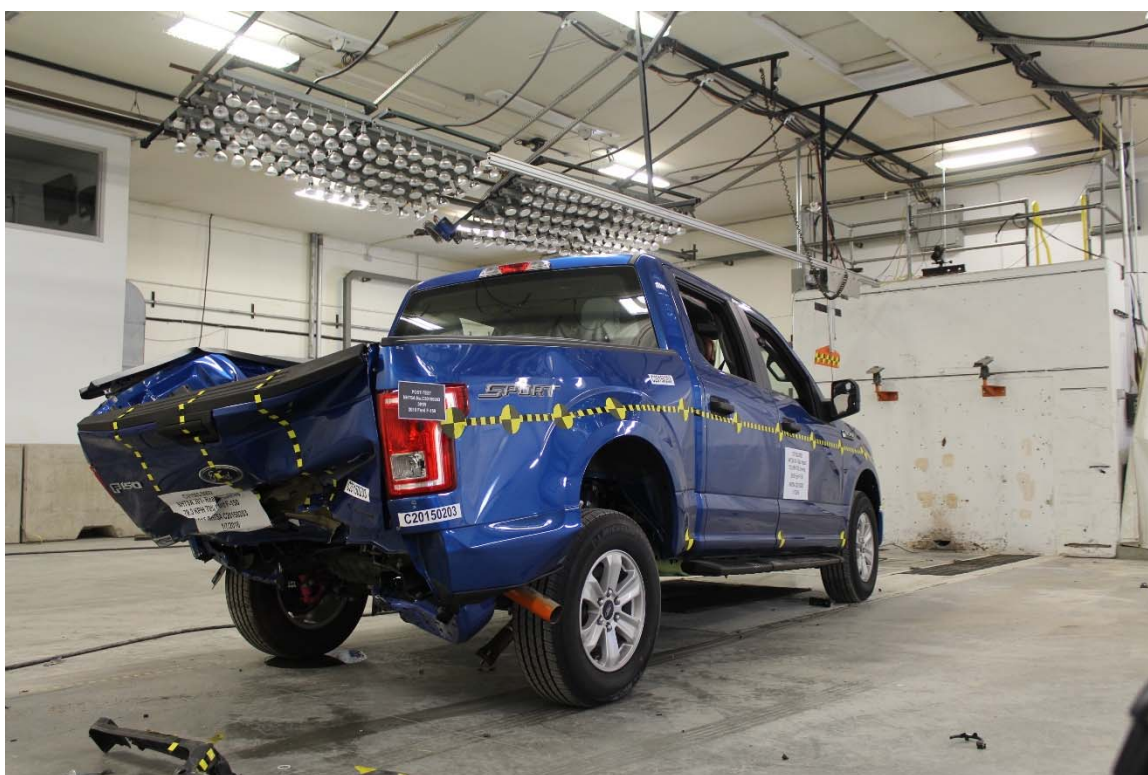


Figure A-16: Post-Test Right Rear 3/4 View



Figure A-17: Pre-Test Rear View



Figure A-18: Post-Test Rear View



Figure A-19: Pre-Test MDB Front View

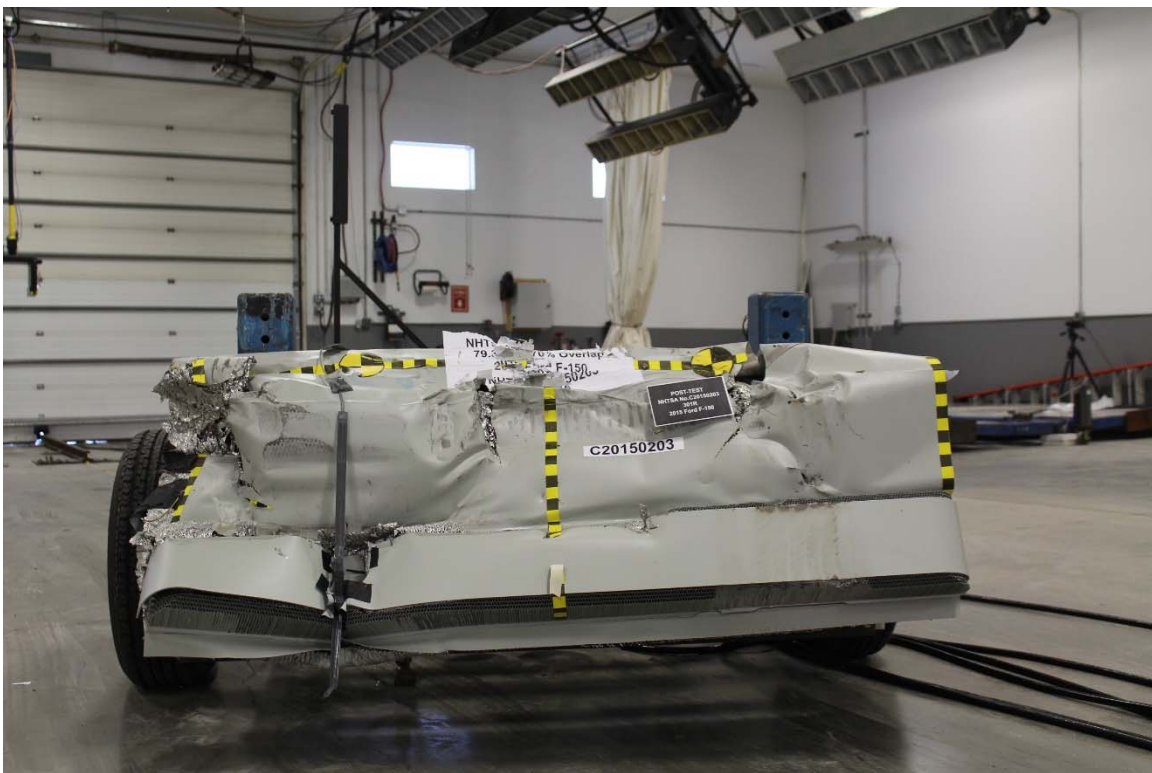


Figure A-20: Post-Test MDB Front View



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

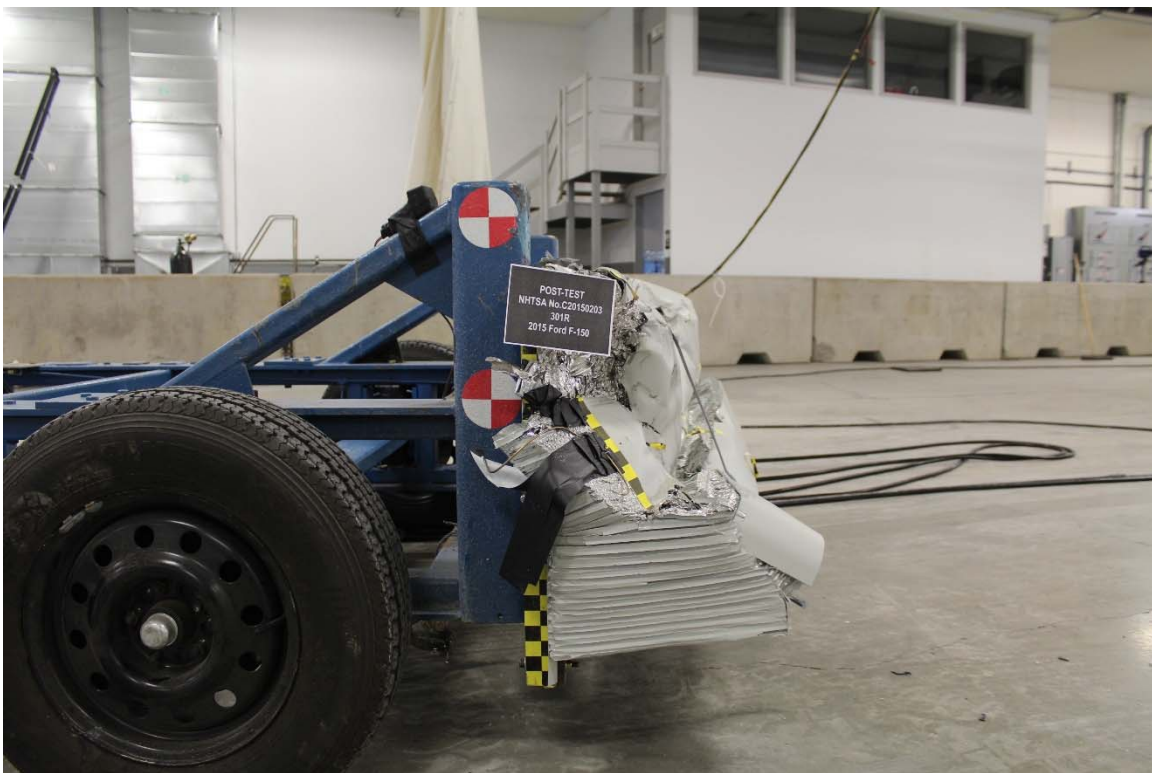


Figure A-24: Post-Test MDB Right Side View



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

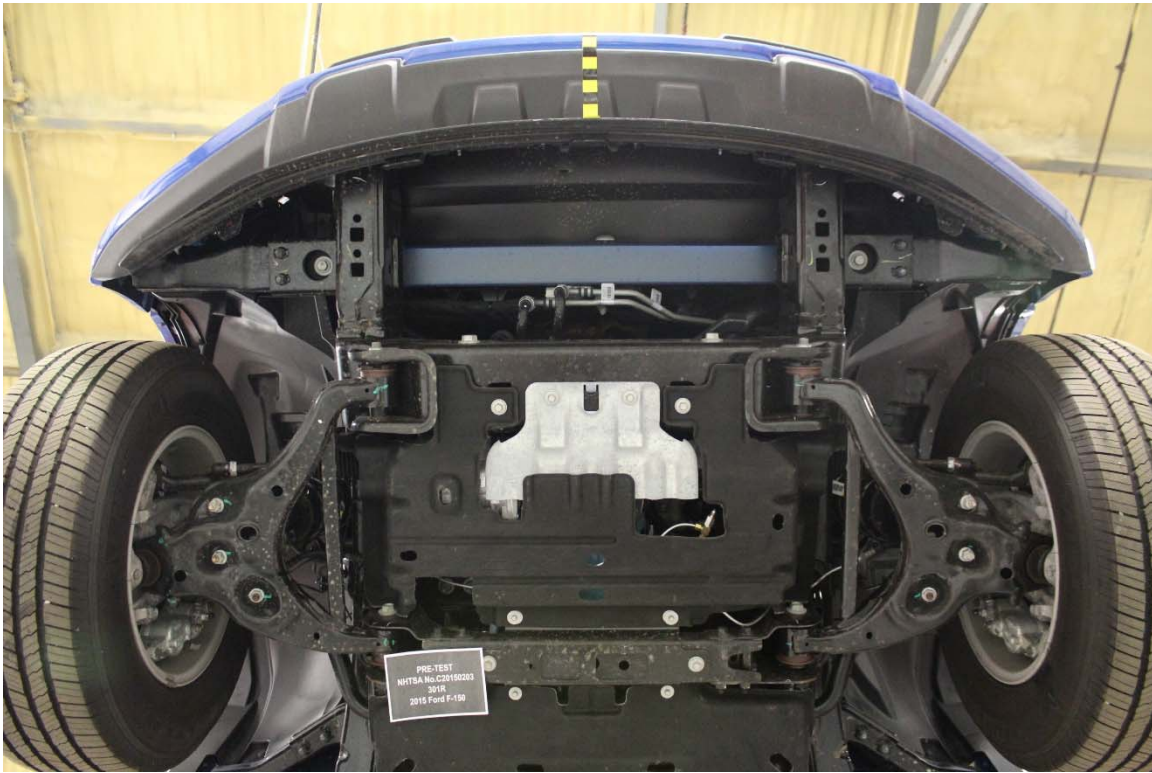


Figure A-29: Pre-Test Front Underbody View

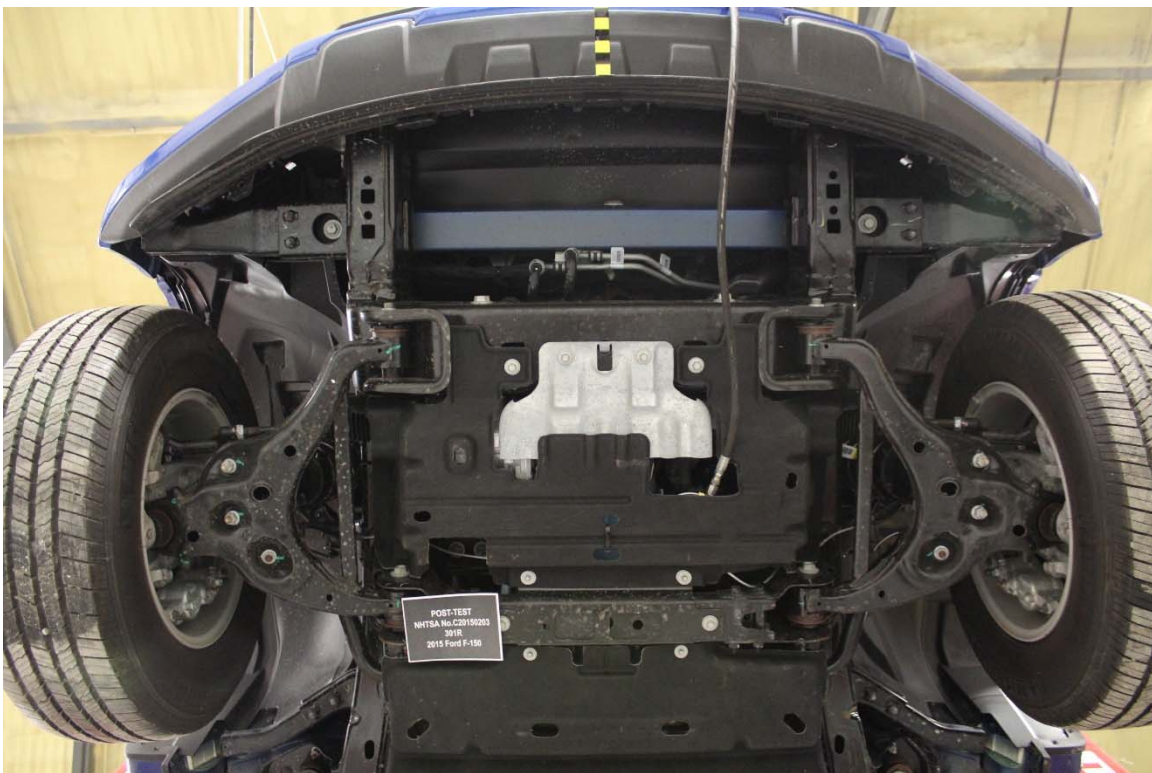


Figure A-30: Post-Test Front Underbody View



Figure A-31: Pre-Test Mid Underbody View

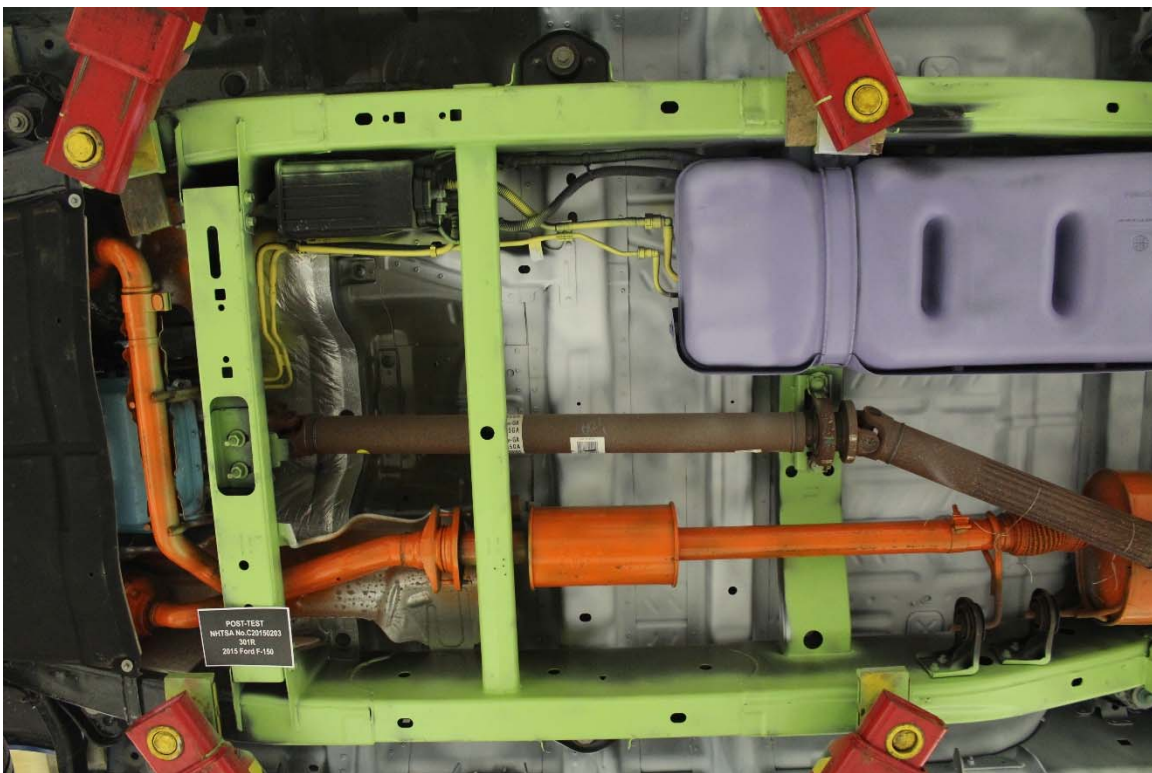


Figure A-32: Post-Test Mid Underbody View

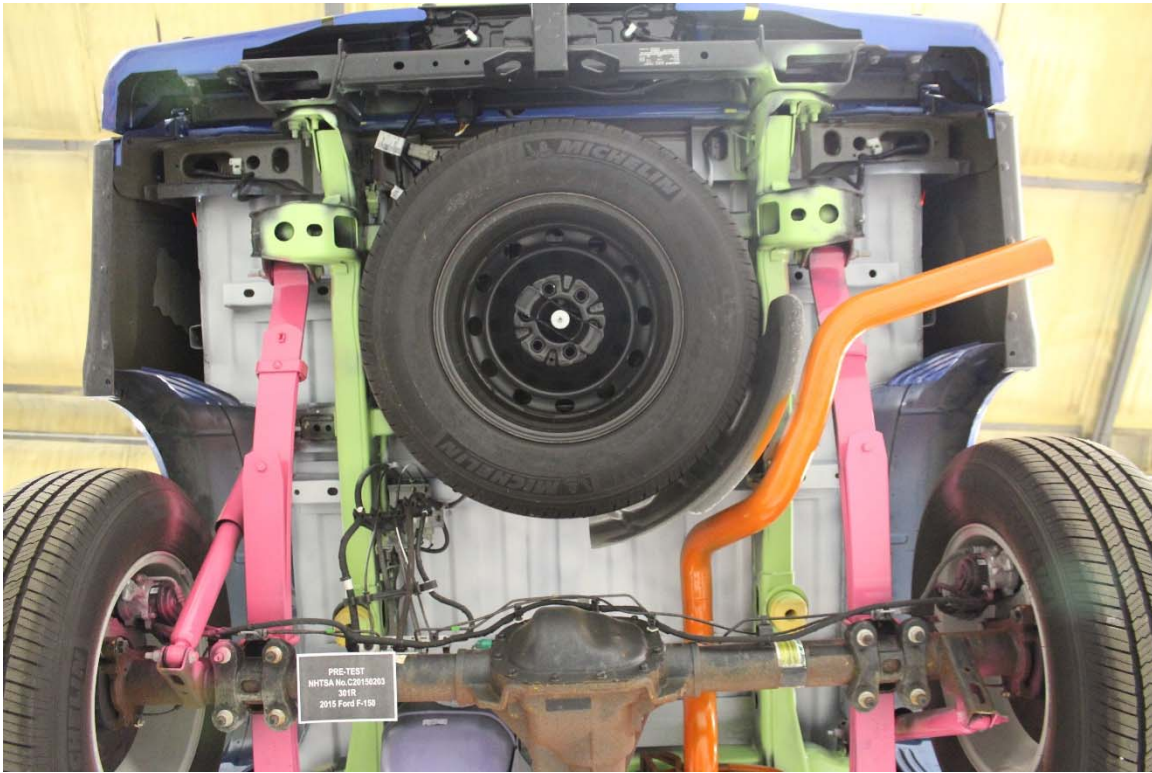


Figure A-33: Pre-Test Rear Underbody View

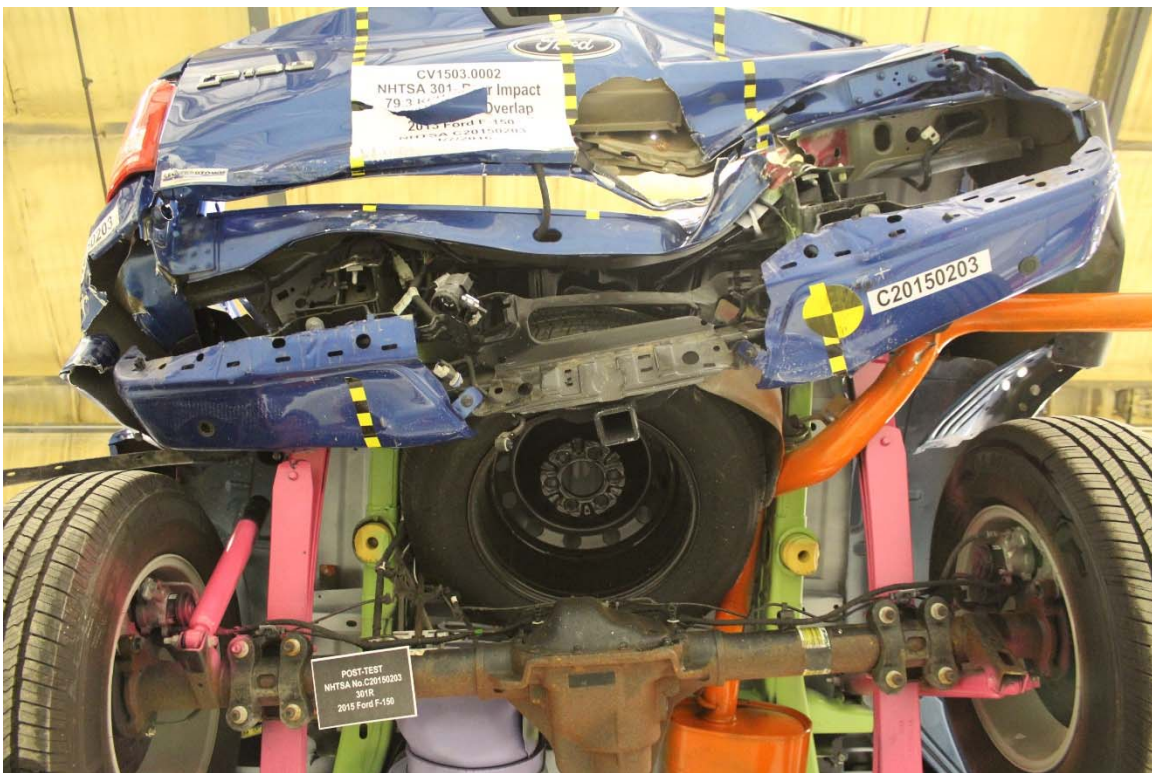


Figure A-34: Post-Test Rear Underbody View



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

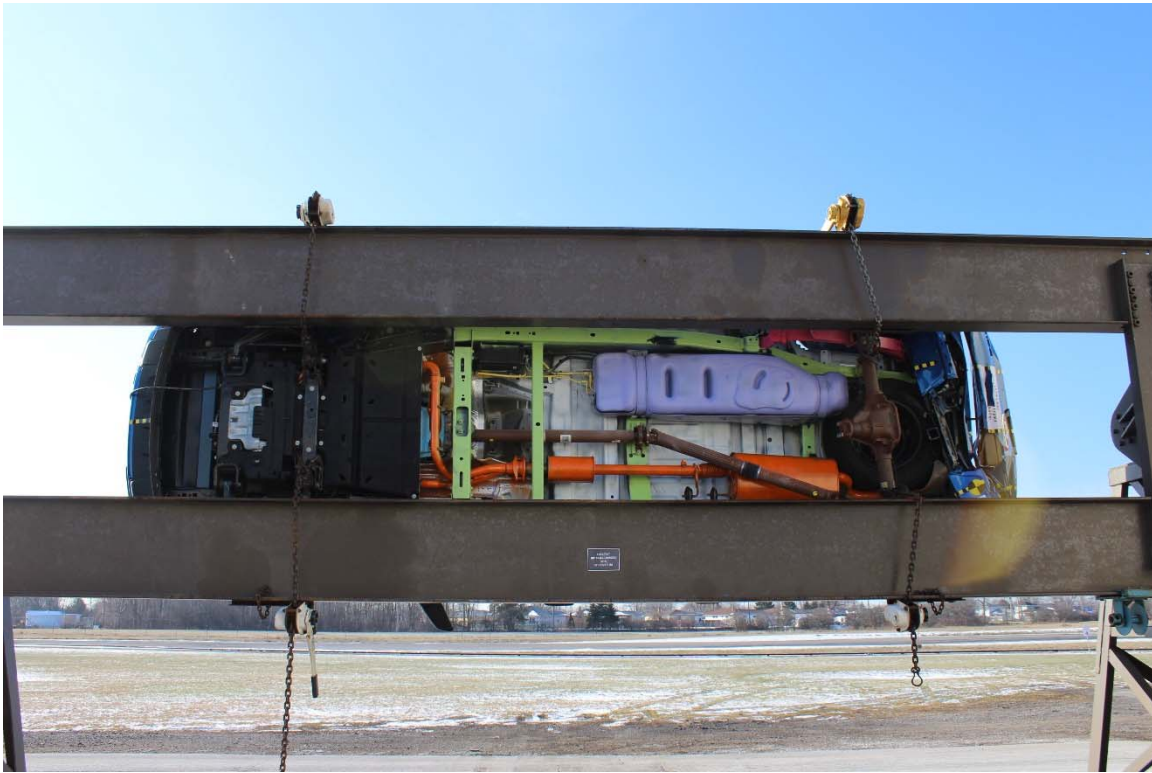


Figure A-41: Rollover 270° View



Figure A-42: Rollover 360° View