

TRUCK FALL PROTECTION ROPE SYSTEM DEFLECTION EVALUATION

SCOPE OF WORK:

ROPE SYSTEM DEFLECTION EVALUATION PER CLIENT REQUEST AND OSHA 1910.29 SECTION 1910.29(B)(4),
DATED JUNE,17, 2022, ON 1 NOFALLS UNIT ON A FLATBED TRAILER

REPORT NUMBER:

105015784DET-001

ISSUE DATE:

JULY/13/2022

PAGES:

50

DOCUMENT CONTROL NUMBER

RT-L-AMER-005 (05/03/17)

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ROPE SYSTEM DEFLECTION EVALUATION

Truck Fall Prevention
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TRUCK FALL PROTECTION
Intertek Report No.: 105015784DET-001
Client PO No.: 102621

SAMPLE DISPOSITION:

The test samples were returned to the client at the end of testing.

ROPE SYSTEM DEFLECTION EVALUATION:

Date Received: MAR/14/2022
Dates Tested: APR/13/2022 and APR/26/2022
Location Tested: Intertek – Plymouth, Michigan

DESCRIPTION OF SAMPLES:

Part Description: NoFalls Unit on Flatbed Trailer

TEST EQUIPMENT:

ASSET #	DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	CAL DUE
160692	LOAD CELL	LEBOW	3173-500	3136	MAY/19/2022
373-289	DATA ACQ/SWITCH UNIT	KEYSIGHT	34972A	MY49016855	SEP/14/2022
373-491	DC POWER SUPPLY	VOLTEQ	HY3030EX	161203235	VBU*
373-879	STRING POT	MICRO-EPSILON	WDS-2000-P96-SR-U	32082	VBU*
374-009	TRUE RMS MULTIMETER	FLUKE	117	22831919	OCT/07/2022
168005	DIGITAL CALIPER	MITUTOYO	500-193	1024339	SEP/01/2022
162371	DIGITAL PROTRACTOR	MITUTOYO	PRO 360	07090144	SEP/24/2022
373-471	20 Channel Multiplexer	KEYSIGHT	34901A	MY51200829	RO**

*VBU = Verified Before Use, **RO = Reference Only

ROPE SYSTEM DEFLECTION EVALUATION

TRUCK FALL PROTECTION
Intertek Report No.: 105015784DET-001
Client PO No.: 102621

TEST PROCEDURE:

Test Method: Per client request and OSHA 1910.29 Section 1910.29(b)(4), dated JUN/17/22
Number of Samples: One NoFalls Unit on a Flatbed Trailer

- NoFalls Unit

The NoFalls Unit was setup on a flatbed truck by the client to ensure proper setup and orientation of straps and posts.

The truck was then placed inside of the building and all testing was performed at lab-ambient temperature and humidity.

Per client instruction, and with the client present, multiple pulls were performed in numerous locations on the straps of the no falls unit. Pulls were conducted by using a servo motor to pull a strap that was attached to a shackle around one strap of the NoFalls unit. A load cell was in line of this setup to measure the force of the pulls, and a string pot was used to measure the displacement of the strap. During the pulls, the clearance between the NoFalls Unit Strap being pulled and the deck of the truck bed was measured with a tape measure. Both the tape measure and string pot were verified with a caliper.

Pulls were performed by pulling to a force of at least 200 pounds on the top straps of the NoFalls unit. Pulls were also performed where the middle strap of the unit was pulled to a force of at least 150 pounds. These pulls took place at various angles as directed by the client. The angle of the pulls was set using a digital protractor.

Multiple configurations of the NoFalls unit were tested by placing additional posts at various locations on the straps as directed by the client.

ACCEPTANCE CRITERIA:

When the 200-pound (890-N) test load is applied in a downward direction, the top rail of the guardrail system must not deflect to a height of less than 39 inches (99cm) above the walking-working surface.

RESULTS:

The top rail of the guardrail system did not deflect to a height of less than 39 inches (99cm) above the walking-working surface when the 200-pound (890-N) test load was applied.

APPENDICES:

Appendix A – Photographs
Appendix B – Force Vs. Time Data
Appendix C – Force Vs. Displacement Data

ROPE SYSTEM DEFLECTION EVALUATION

TRUCK FALL PROTECTION
Intertek Report No.: 105015784DET-001
Client PO No.: 102621

REPORT AUTHORIZED PER ISO 17025:2005

When signed with physical or electronic signature, the contents of this report have been prepared and approved per Intertek's quality process in accordance with ISO 17025.



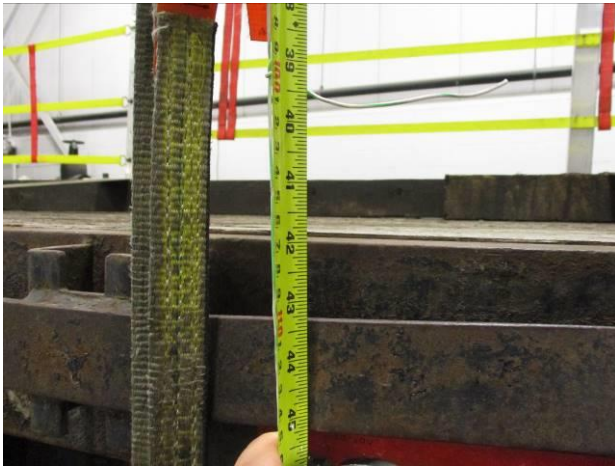
Patrick Dani
Associate Engineer



Douglas Berlin
Engineer, Team Leader

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APPENDIX A – PHOTOGRAPHS



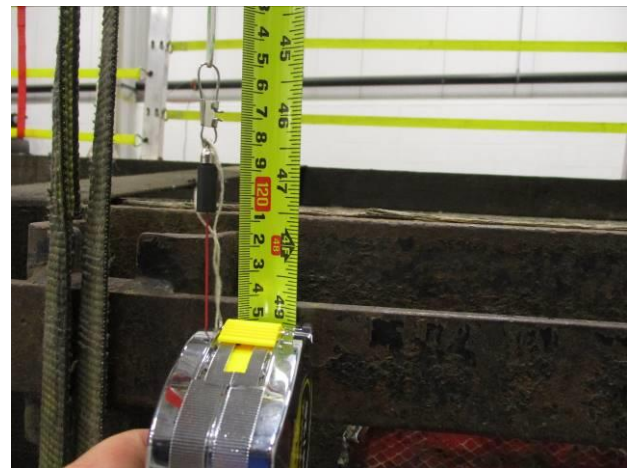
Photograph 1: Middle Front Top Strap Height to Deck with 200lb Applied



Photograph 2: Middle Front Top Strap Resting Height to Deck



Photograph 3: Middle Middle Top Strap Height to Deck with 200lb Applied



Photograph 4: Middle Middle Top Strap Resting Height to Deck

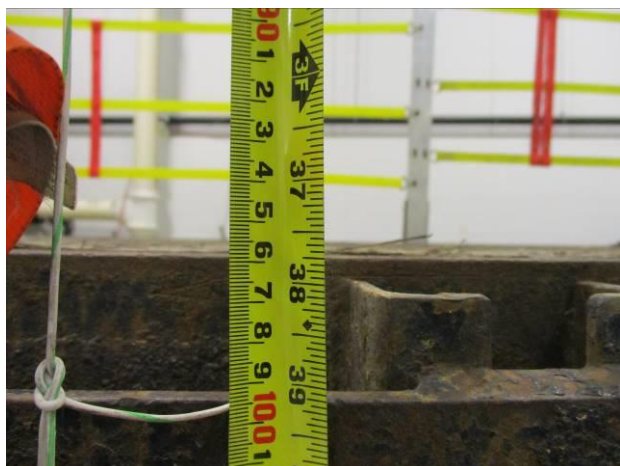


Photograph 5: Middle Rear Top Strap Height to Deck with 200lb Applied



Photograph 6: Middle Rear Top Strap Resting Height to Deck

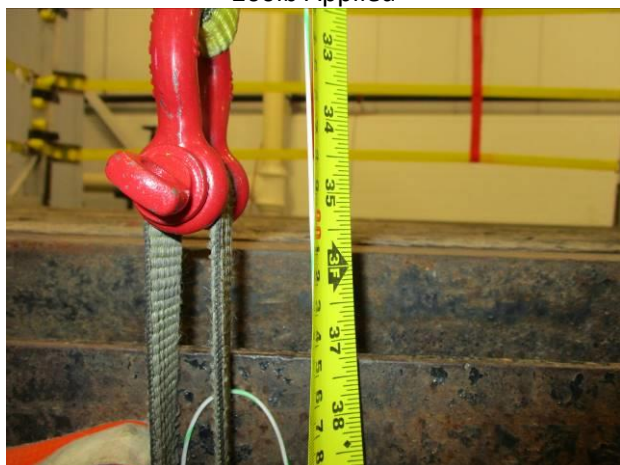
APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 7: Rear Front Top Strap Height to Deck with 200lb Applied



Photograph 8: Rear Front Top Strap Resting Height to Deck



Photograph 9: Rear Middle Height to Deck with 200lb Applied



Photograph 10: Rear Middle Strap Outboard Pull (2)



Photograph 11: Rear Middle Strap Outboard Pull (3)



Photograph 12: Rear Middle Strap Outboard Pull during Pull

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 13: Rear Middle Top Strap Resting Height to Deck



Photograph 14: Rear Rear Top Strap Height to Deck with 200lb Applied



Photograph 15: Rear Rear Top Strap Pull Downward



Photograph 16: Rear Rear Top Strap Resting Height to Deck



Photograph 17: Rear Top Height at 90degree Pull to 200lbs with Extra Strap



Photograph 18: Rear Top Strap 90degree Pull Setup (1)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 19: Rear Top Strap 90 degree Pull Setup (2)



Photograph 20: Rear Top Strap 90 degree Pull Setup (3)



Photograph 21: Rear Top Strap 90 Degree Pull Setup (4)



Photograph 22: Rear Top Strap Height at 200lbs with Extra Post



Photograph 23: Rear Top Strap Height during 90 Degree Pull



Photograph 24: Rear Top Strap Height with 200lb Applied at 70 Degree Pull with Extra Post

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 25: Rear Top Strap Outboard Pull during Pull



Photograph 26: Rear Top Strap Outboard Pull Setup (1)



Photograph 27: Rear Top Strap Outboard Pull Setup (2)



Photograph 28: Rear Top Strap Pull at 50 Degree Angle (1)



Photograph 29: Rear Top Strap Pull at 50 Degree Angle (2)



Photograph 30: Rear Top Strap Pull at 50 Degree with Extra Post (1)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 31: Rear Top Strap Pull at 50 Degree with Extra Post (2)



Photograph 32: Rear Top Strap Pull at 50 Degree with Extra Post (3)



Photograph 33: Rear Top Strap Pull at 70 Degree Angle (2)



Photograph 34: Rear Top Strap Pull at 70 Degree Angle (3)



Photograph 35: Rear Top Strap Pull at 70 Degree with Extra Post (1)



Photograph 36: Rear Top Strap Pull at 70 Degree with Extra Post (2)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 37: Rear Top Strap Pull at 70degrees with Extra Post (3)



Photograph 38: Rear Top Strap Pull at 90 Degree with Extra Post (1)



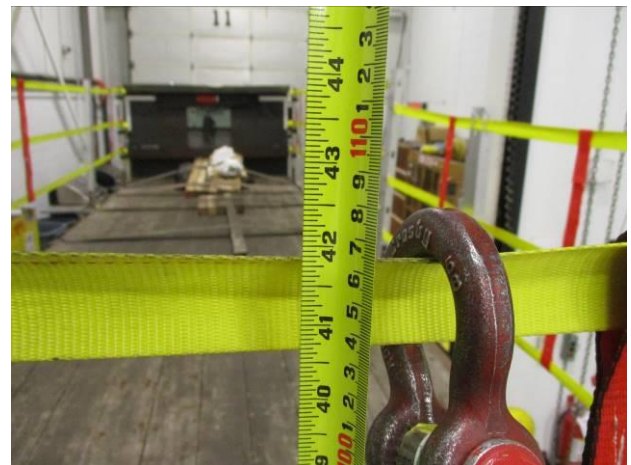
Photograph 39: Rear Top Strap Pull at 90degrees with Extra Post (2)



Photograph 40: Rear Top Strap Resting Height (2)



Photograph 41: Rear Top Strap Resting Height with Extra Post



Photograph 42: Rear Top Strap Resting Height

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 43: Rear Top Strap with 200lb Applied at 50 Degree Angle



Photograph 44: Rear Top Strap with 200lb Applied at 70 Degree Angle



Photograph 45: Servo Pull Rig



Photograph 46: Side Middle Front Middle Strap Outboard Pull Setup (1)

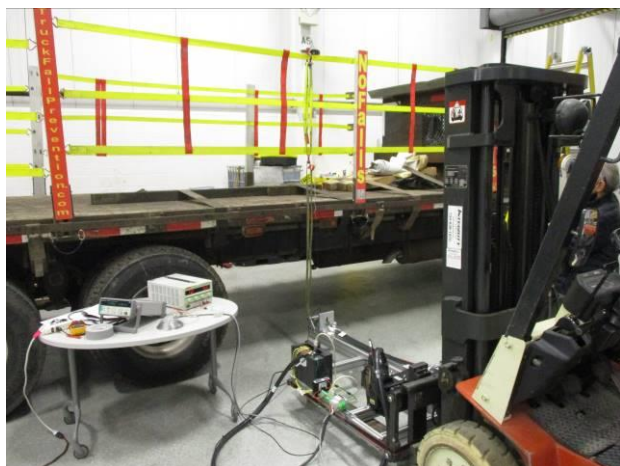


Photograph 47: Side Middle Front Middle Strap Outboard Pull Setup (2)

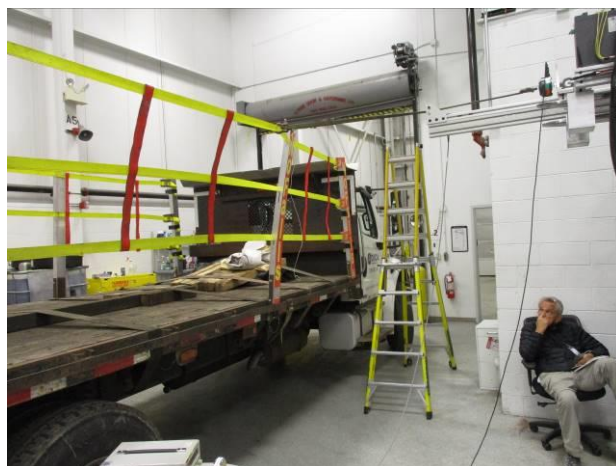


Photograph 48: Side Middle Front Top Strap Downward Pull Setup (1)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 49: Side Middle Front Top Strap Downward Pull Setup (2)



Photograph 50: Side Middle Front Top Strap during Outboard Pull



Photograph 51: Side Middle Front Top Strap Outboard Pull Setup (1)



Photograph 52: Side Middle Front Top Strap Outboard Pull Setup (2)



Photograph 53: Side Middle Middle Middle Strap during Outboard Pull



Photograph 54: Side Middle Middle Middle Strap Outboard Pull Setup (1)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 55: Side Middle Middle Middle Strap Outboard Pull Setup (3)



Photograph 56: Side Middle Middle Top Strap Downward Pull Setup



Photograph 57: Side Middle Middle Top Strap Outboard Pull Setup (1)



Photograph 58: Side Middle Middle Top Strap Outboard Pull Setup (2)



Photograph 59: Side Middle Middle Top Strap Outboard Pull Setup (3)



Photograph 60: Side Middle Rear Downward Strap Pull Setup

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 61: Side Middle Rear Middle Strap during Outboard Pull



Photograph 62: Side Middle Rear Middle Strap Outboard Pull Setup (1)



Photograph 63: Side Middle Rear Middle Strap Outboard Pull Setup (2)



Photograph 64: Side Middle Rear Middle Strap Outboard Pull Setup (3)



Photograph 65: Side Middle Rear Middle Strap Outboard Pull Setup (4)



Photograph 66: Side Middle Rear Top Strap during Outboard Pull

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 67: Side Middle Rear Top Strap during Downward Pull



Photograph 68: Side Middle Rear Top Strap Outboard Pull Setup (1)



Photograph 69: Side Middle Rear Top Strap Outboard Pull Setup (2)



Photograph 70: Side Middle Rear Top Strap Outboard Pull Setup (3)



Photograph 71: Side Middle Rear Top Strap Outboard Pull Setup (4)



Photograph 72: Side Rear Front Middle Strap Outboard Pull Setup (2)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 73: Side Rear Front Middle Strap Outboard Pull Setup (3)



Photograph 74: Side Rear Front Middle Strap Outboard Pull Setup (4)



Photograph 75: Side Rear Front Top Strap Downward Pull Setup



Photograph 76: Side Rear Front Top Strap during Downward Pull



Photograph 77: Side Rear Front Top Strap Outboard Pull Setup (2)



Photograph 78: Side Rear Front Top Strap Outboard Pull Setup (3)

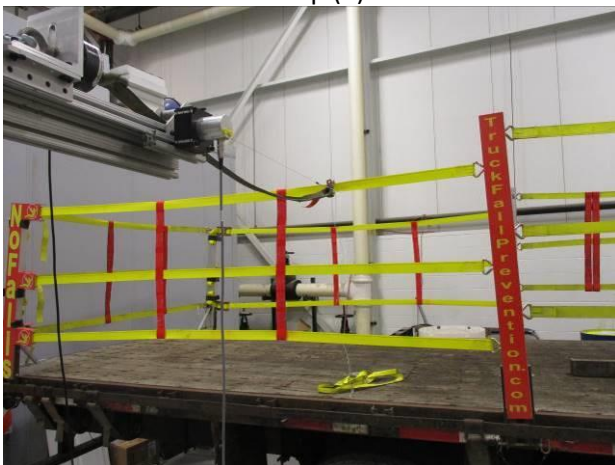
APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 79: Side Rear Front Top Strap Outboard Pull Setup (4)



Photograph 80: Side Rear Front Top Strap Outboard Pull Setup (5)



Photograph 81: Side Rear Front Top Strap Outboard Pull Setup (6)



Photograph 82: Side Rear Middle Middle Strap Outboard Pull Setup (1)



Photograph 83: Side Rear Middle Middle Strap Outboard Pull Setup (2)



Photograph 84: Side Rear Middle Middle Strap Outboard Pull Setup (3)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 85: Side Rear Middle Middle Strap Outboard Pull Setup (4)



Photograph 86: Side Rear Middle Middle Strap Outboard Pull with Load



Photograph 87: Side Rear Middle Top Strap 70 degree Pull with Extra Post (1)



Photograph 88: Side Rear Middle Top Strap 70 degree Pull with Extra Post (2)



Photograph 89: Side Rear Middle Top Strap 70 degree Pull with Extra Post



Photograph 90: Side Rear Middle Top Strap 70 Pull with Extra Strap

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 91: Side Rear Middle Top Strap Downward Pull Setup (1)



Photograph 92: Side Rear Middle Top Strap Downward Pull Setup (2)



Photograph 93: Side Rear Middle Top Strap during Downward Pull



Photograph 94: Side Rear Middle Top Strap Height at 70 Degree 200lb pull



Photograph 95: Side Rear Middle Top Strap Height at 70 Degree Pull with Extra Post



Photograph 96: Side Rear Middle Top Strap Height at 70 Degree Pull

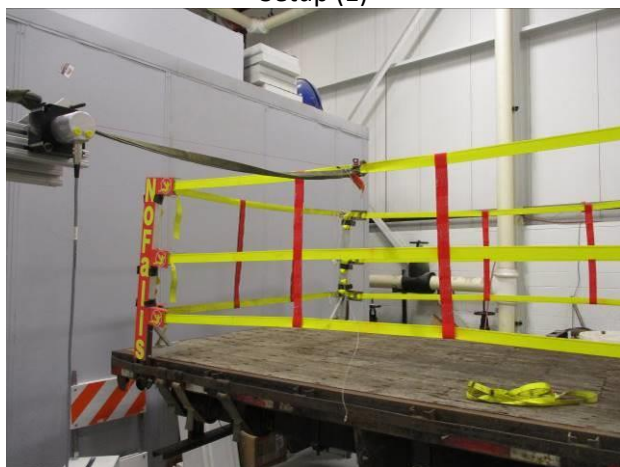
APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 97: Side Rear Middle Top Strap Outboard Pull Setup (1)



Photograph 98: Side Rear Middle Top Strap Outboard Pull Setup (2)



Photograph 99: Side Rear Middle Top Strap Outboard Pull Setup (3)



Photograph 100: Side Rear Middle Top Strap Pull at 70 Degrees (1)



Photograph 101: Side Rear Middle Top Strap Pull at 70 Degrees (2)

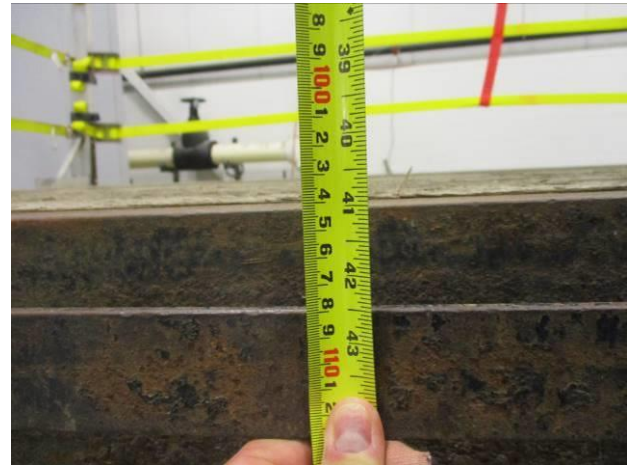


Photograph 102: Side Rear Middle Top Strap Pull at 70 Degrees (3)

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 103: Side Rear Middle Top Strap Pull at 70 Degrees (4)



Photograph 104: Side Rear Middle Top Strap Height to Deck



Photograph 105: Side Rear Rear Middle Strap Outboard Pull Setup (1)



Photograph 106: Side Rear Rear Middle Strap Outboard Pull Setup (2)



Photograph 107: Side Rear Rear Middle Strap Outboard Pull Setup (3)



Photograph 108: Side Rear Rear Top Strap Downward Pull Setup

APPENDIX A – PHOTOGRAPHS (cont'd)



Photograph 109: Side Rear Rear Top Strap Outboard Pull Setup (1)



Photograph 110: Side Rear Rear Top Strap Outboard Pull Setup (4)



Photograph 111: Side Rear Rear Top Strap Outboard Pull Setup (5)

APPENDIX B – FORCE VS. TIME DATA

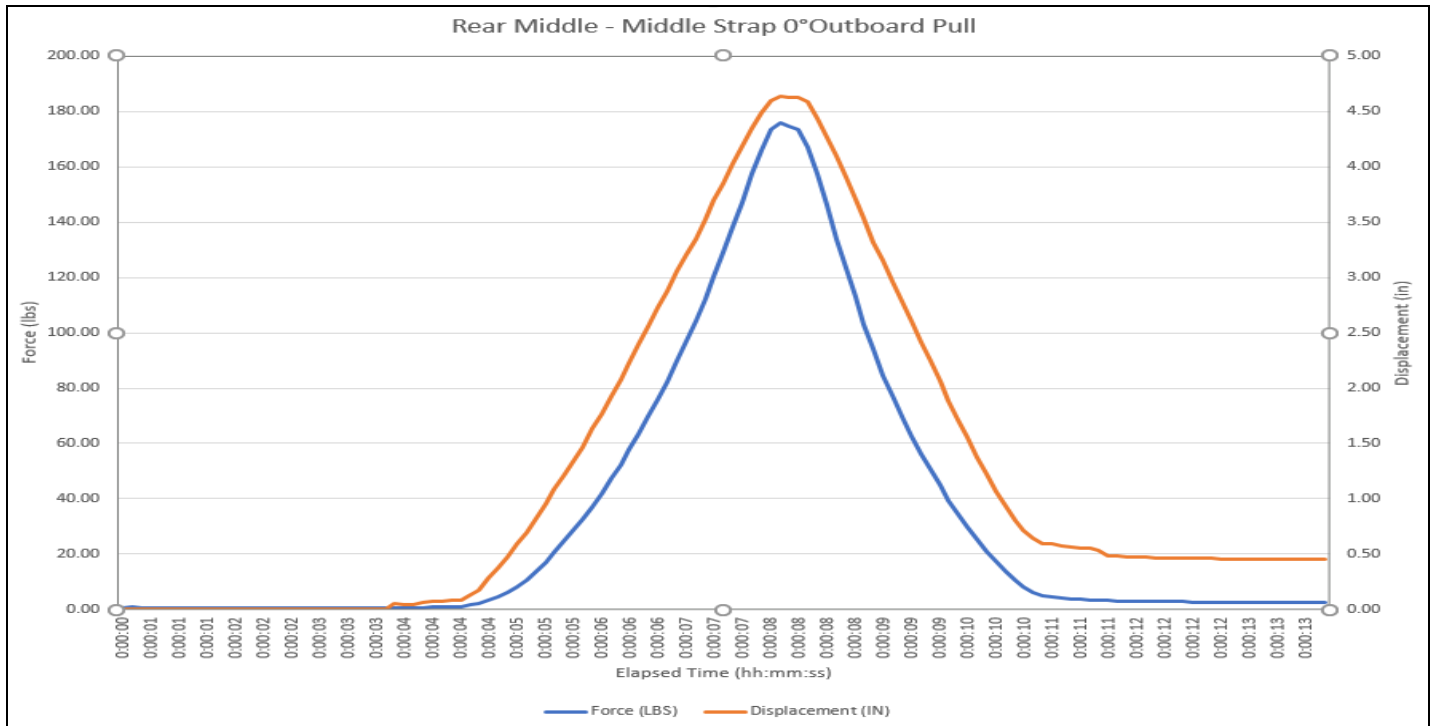


Figure 1: Rear Middle Middle Strap Outboard Pull

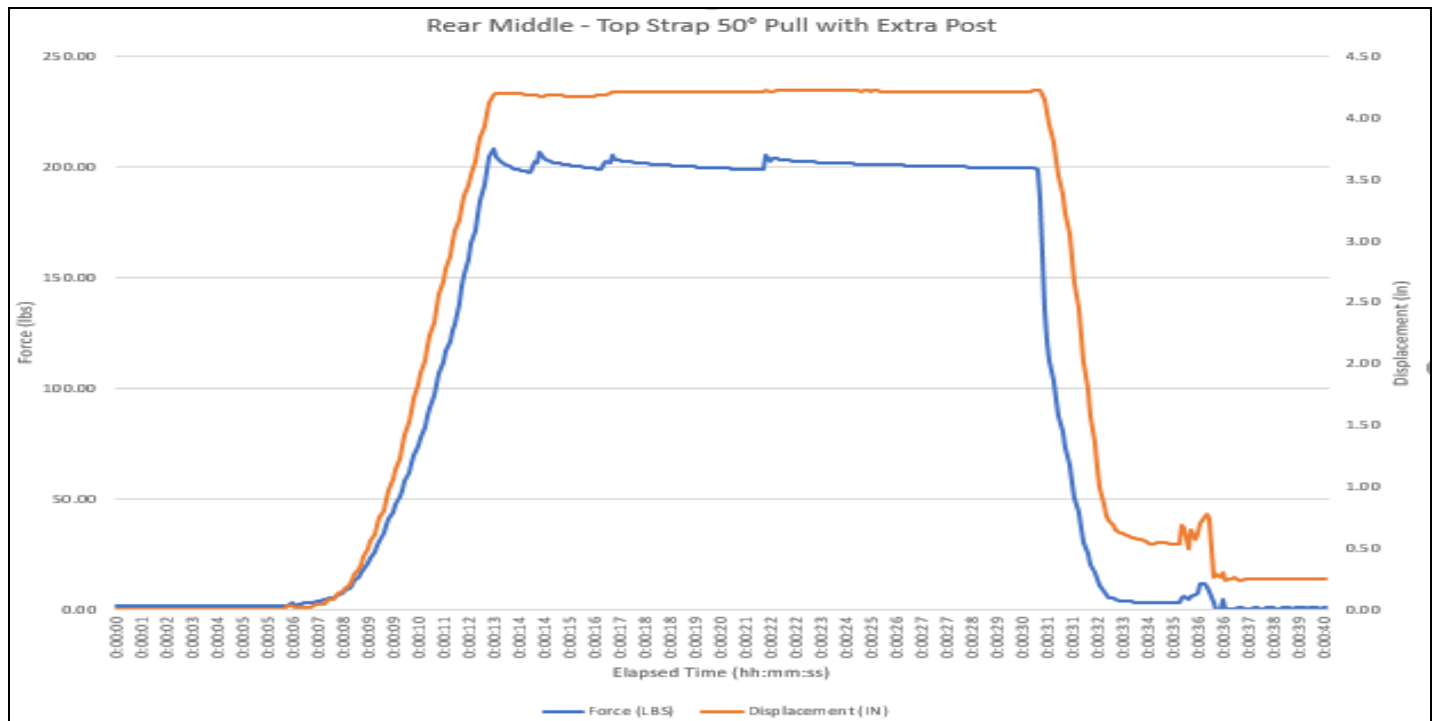


Figure 2: Rear Middle Top Strap 50 Degree Pull with Extra Post

APPENDIX B – FORCE VS. TIME DATA (cont'd)

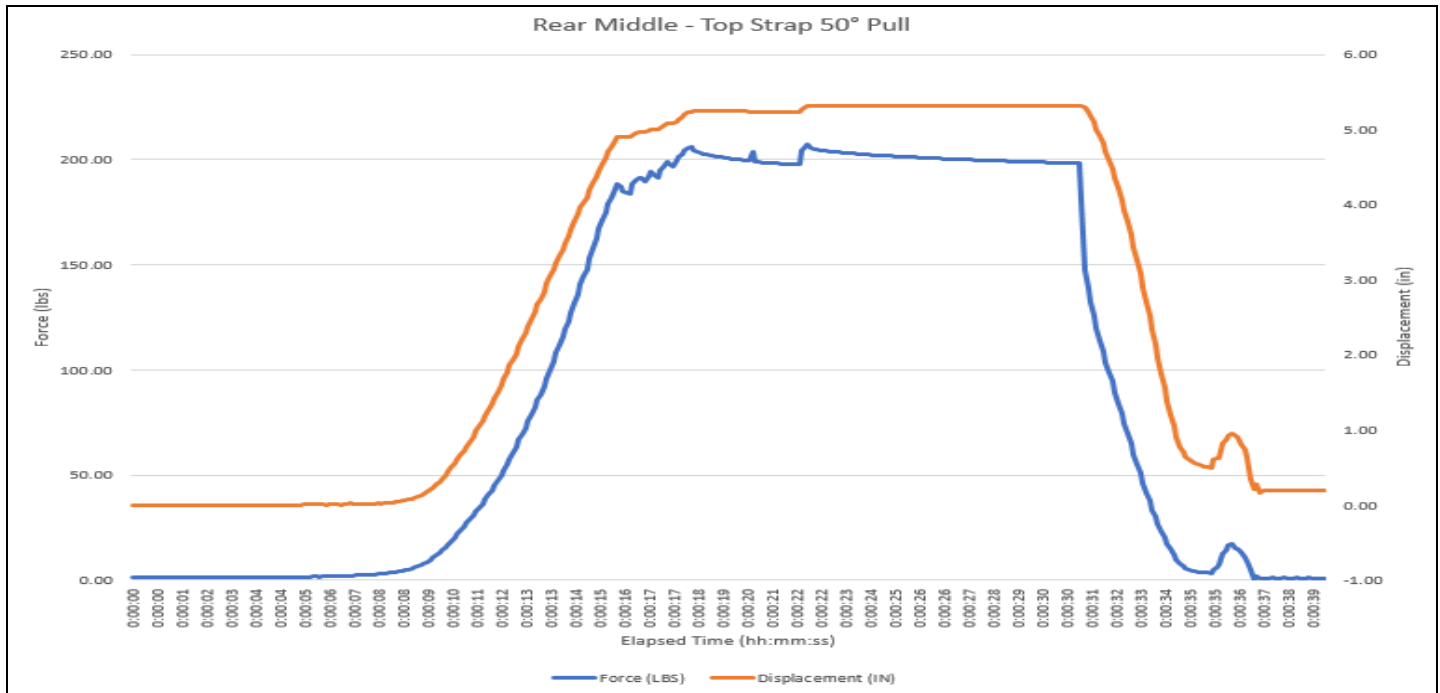


Figure 3: Rear Middle Top Strap 50 Degree Pull

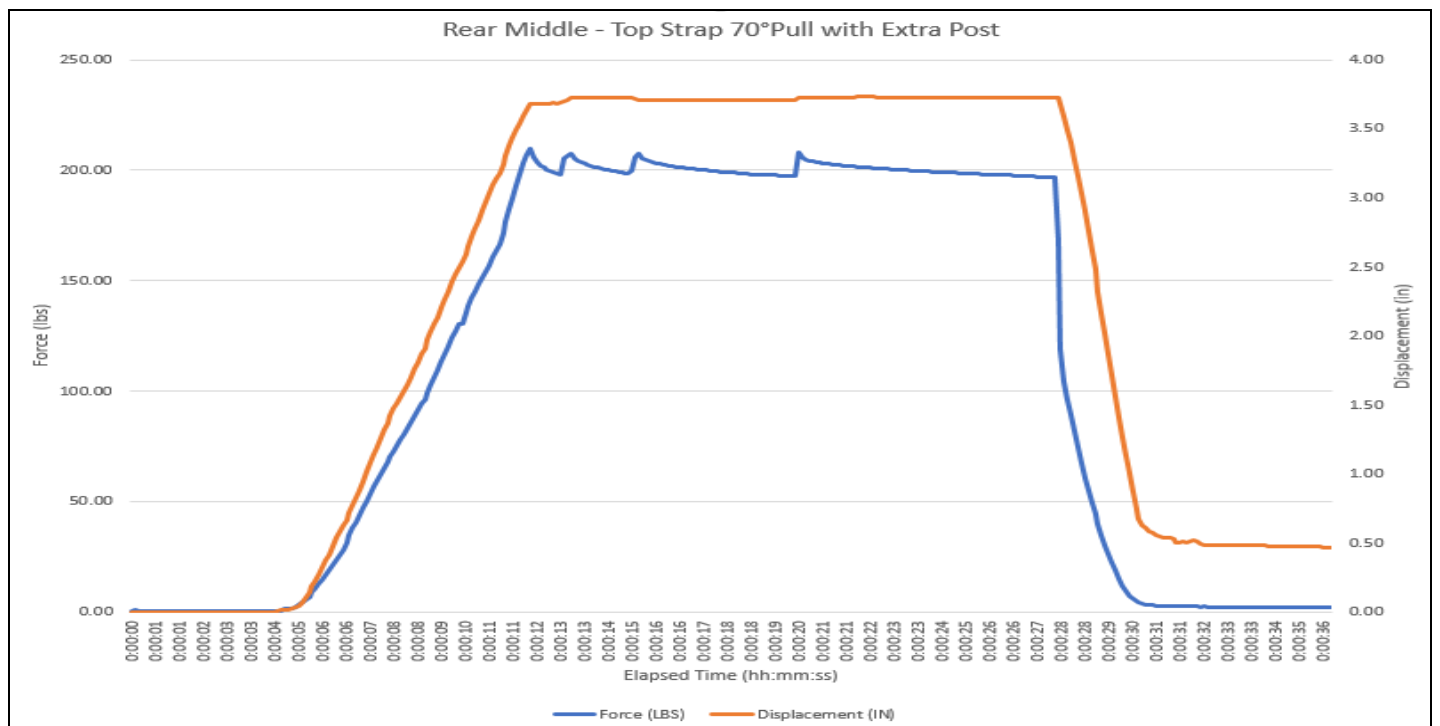
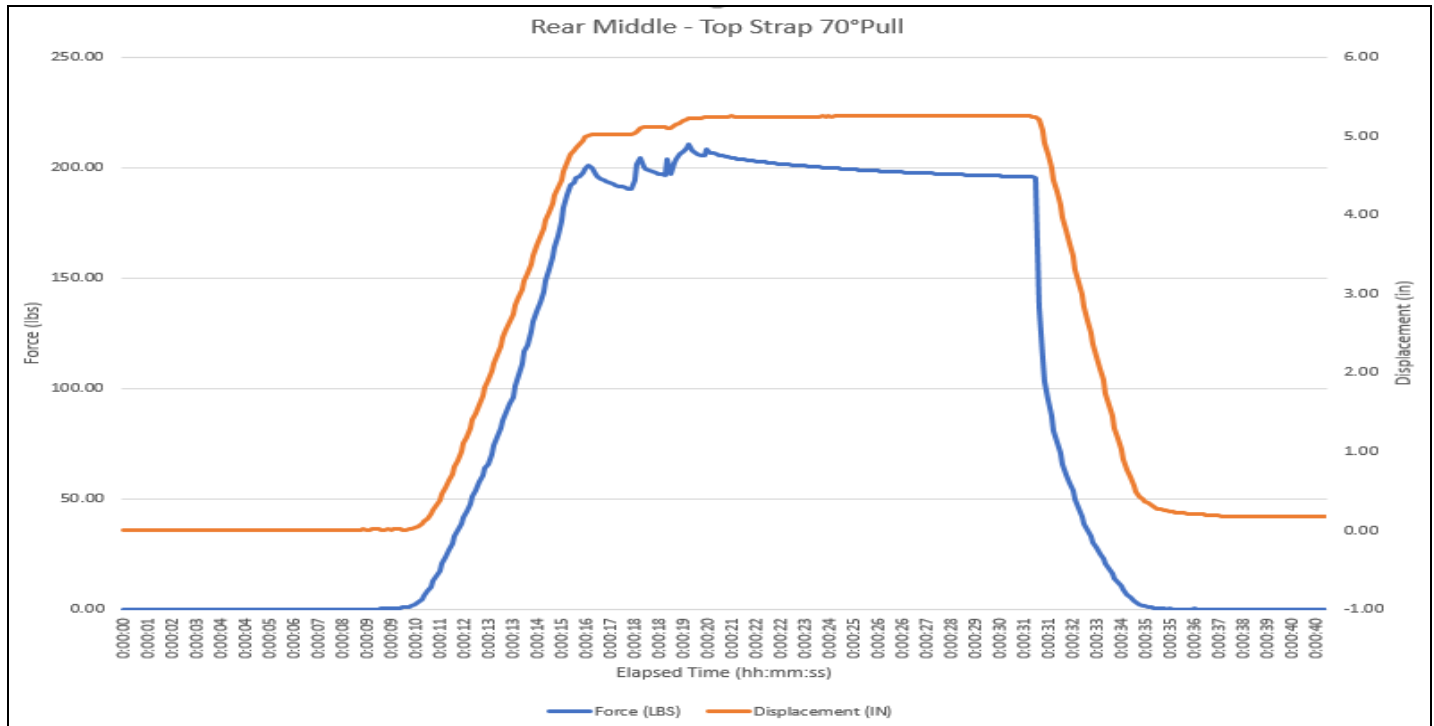


Figure 4: Rear Middle Top Strap 70 Degree Pull with Extra Post

APPENDIX B – FORCE VS. TIME DATA (cont'd)



APPENDIX B – FORCE VS. TIME DATA (cont'd)

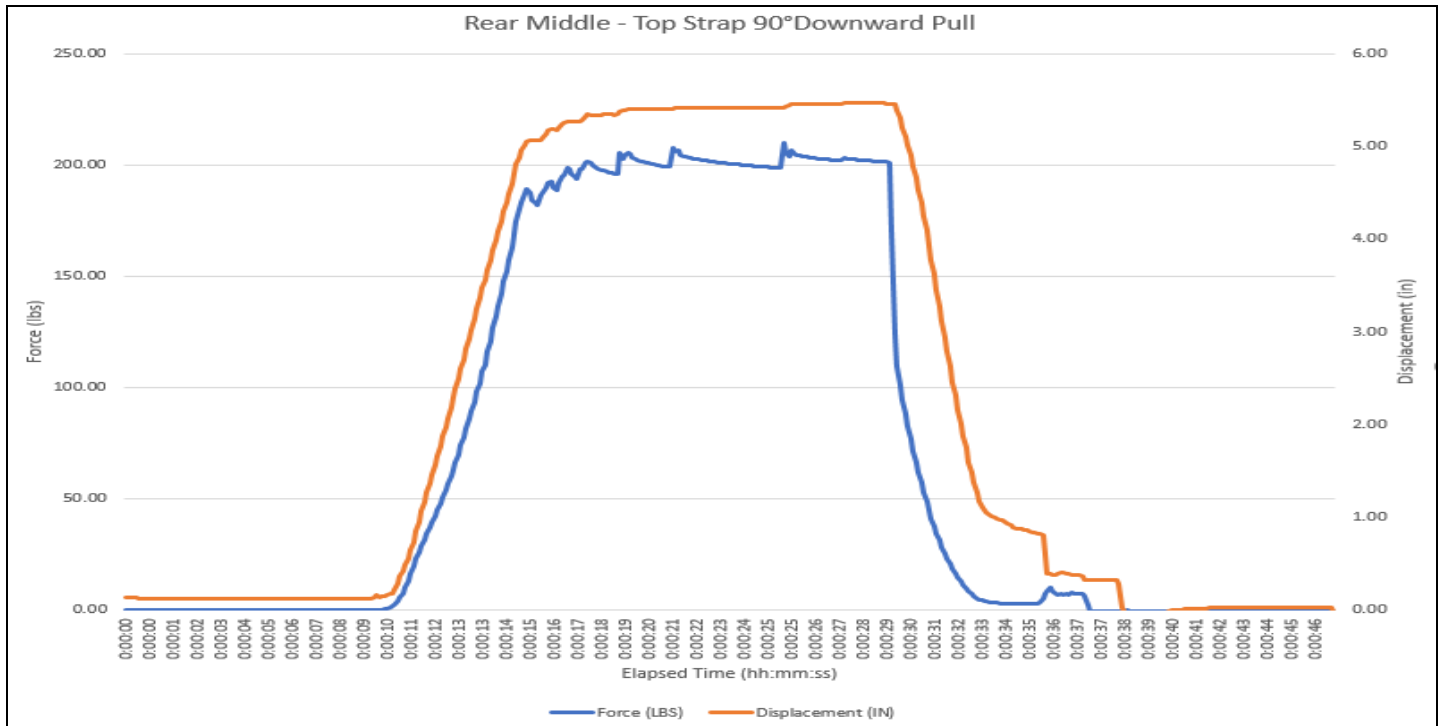


Figure 7: Rear Middle Top Strap Downward Pull

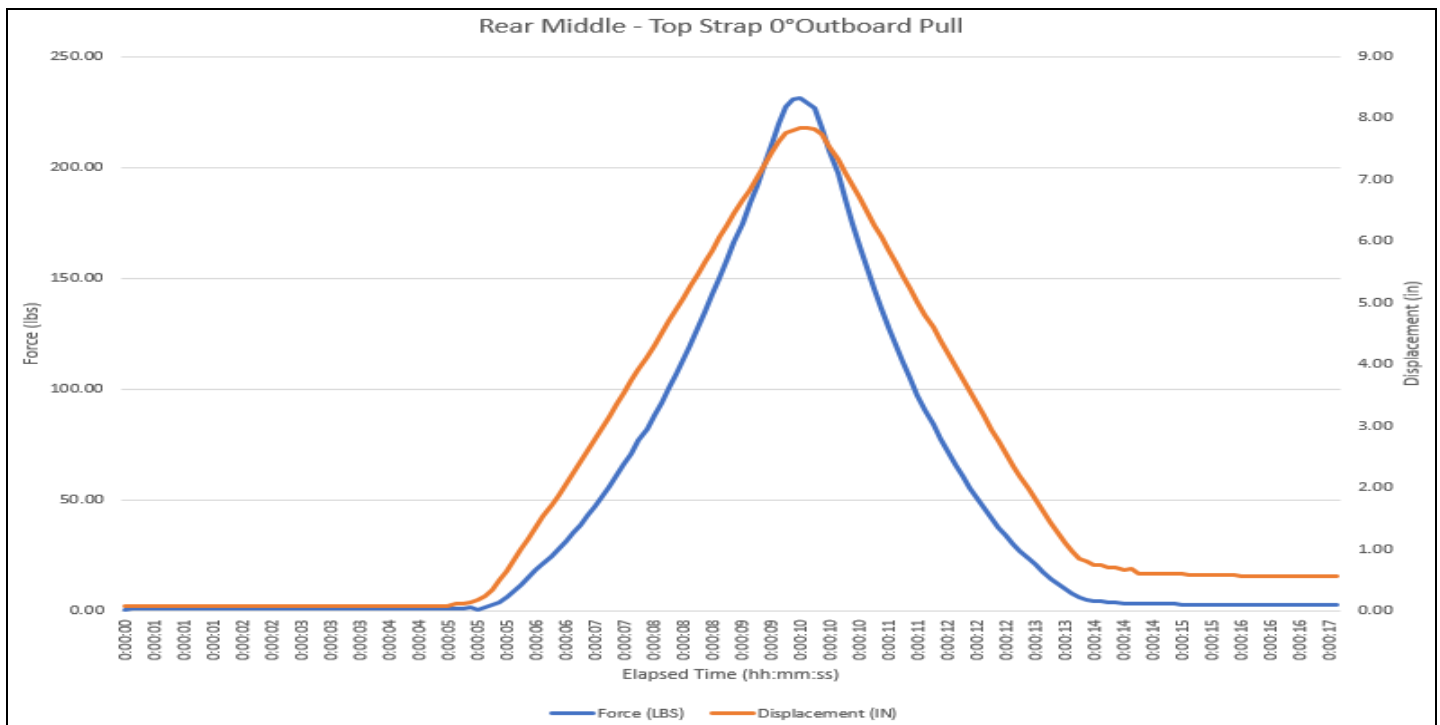


Figure 8: Rear Middle Top Strap Outboard Pull

APPENDIX B – FORCE VS. TIME DATA (cont'd)

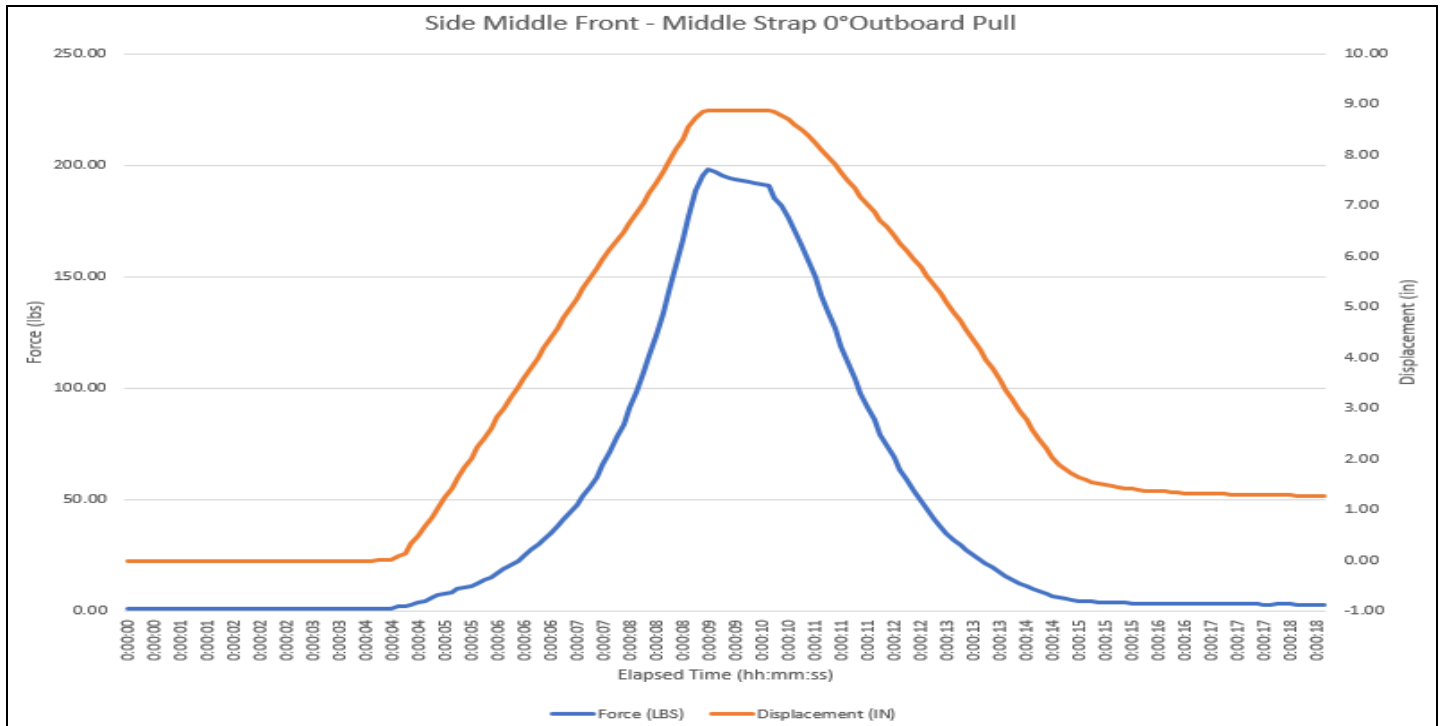
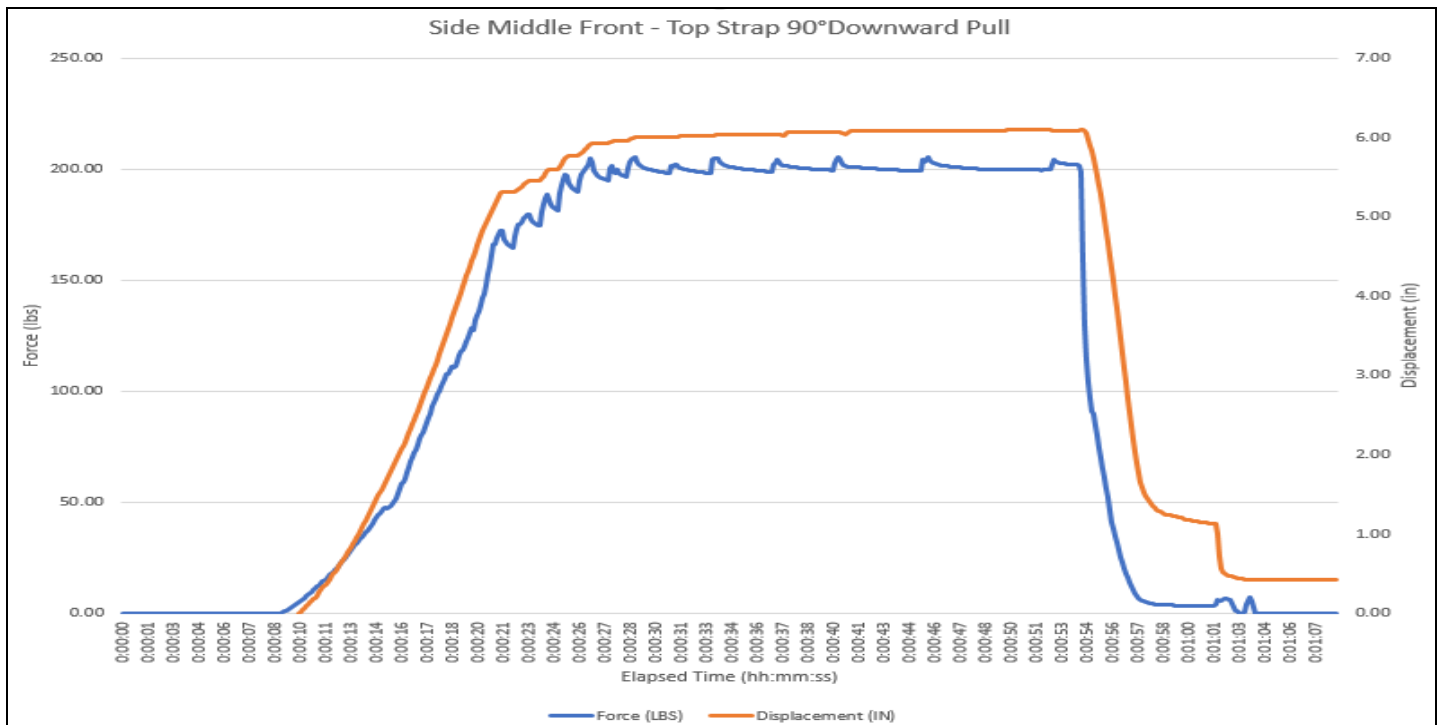


Figure 9: Side Middle Front Middle Strap Outboard Pull



APPENDIX B – FORCE VS. TIME DATA (cont'd)

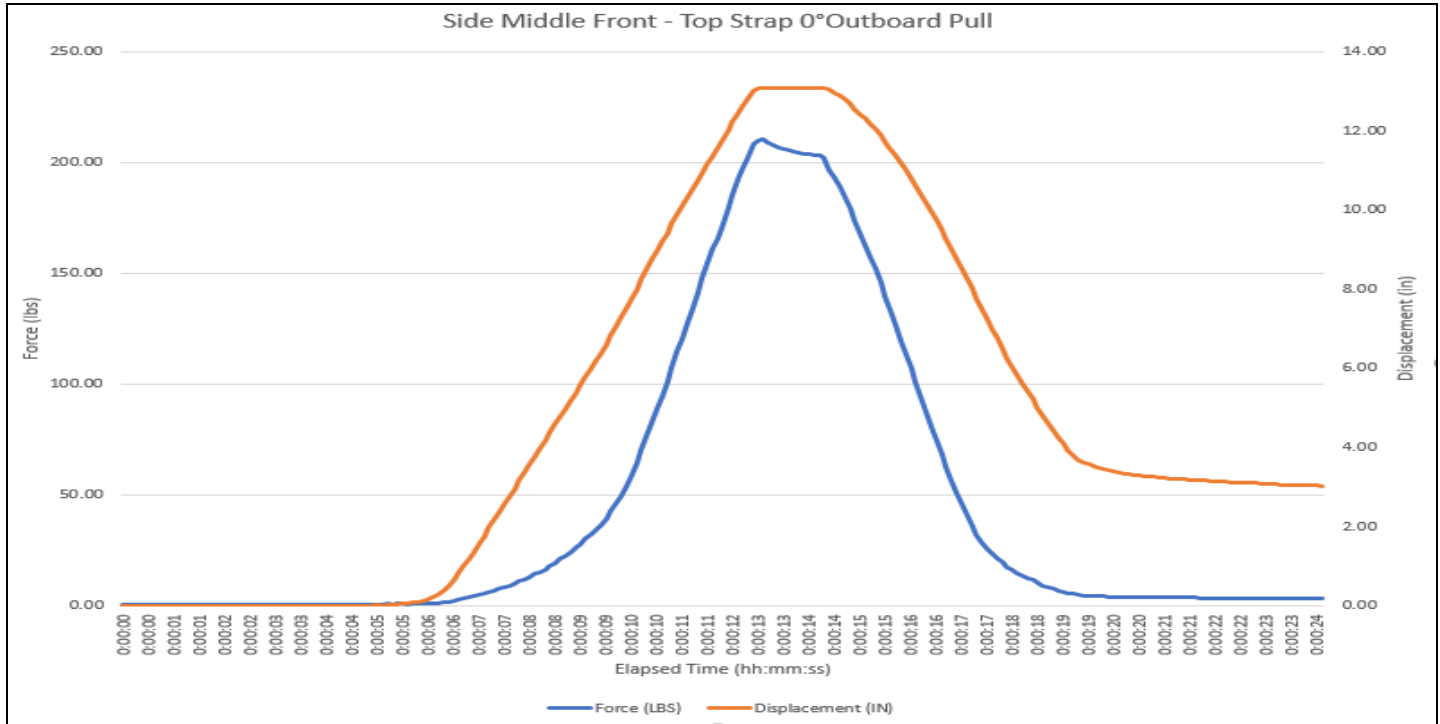


Figure 11: Side Middle Front Top Strap Outboard Pull

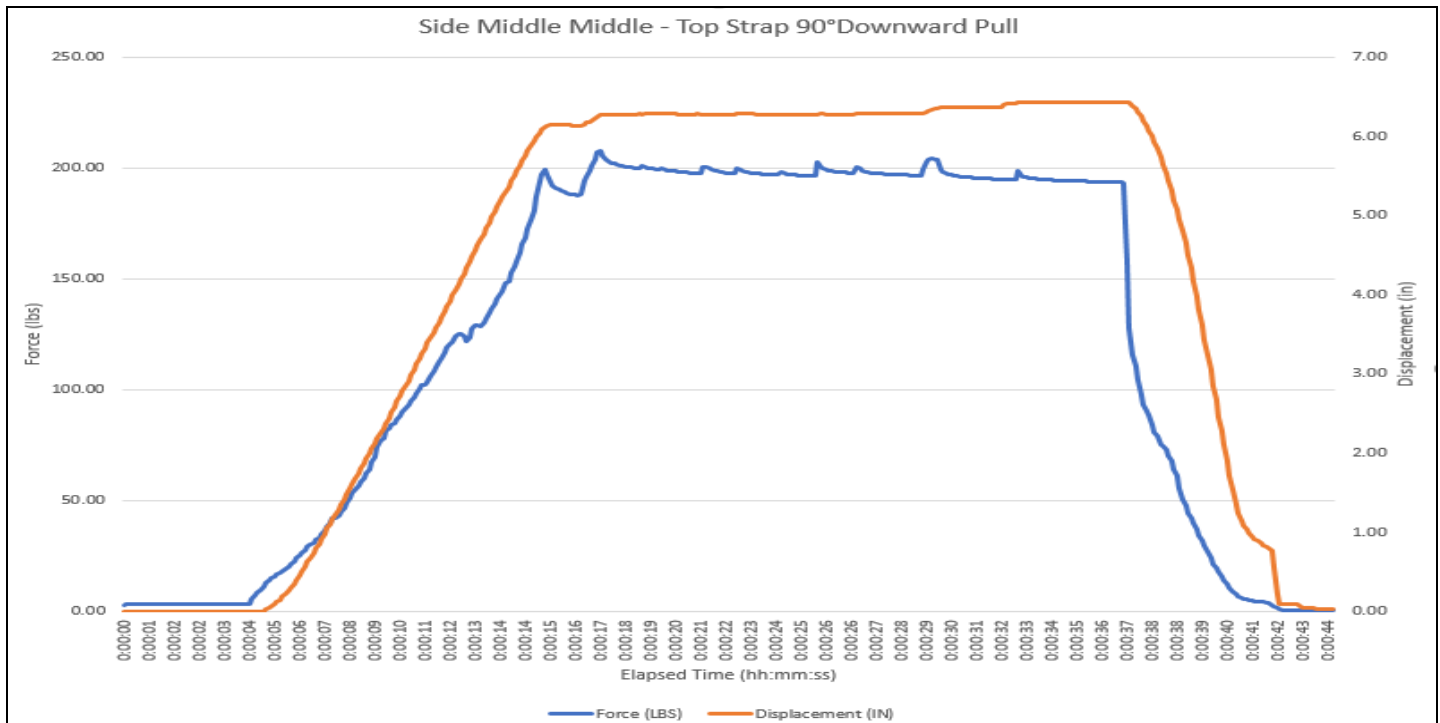


Figure 12: Side Middle Middle Top Strap Downward Pull

APPENDIX B – FORCE VS. TIME DATA (cont'd)

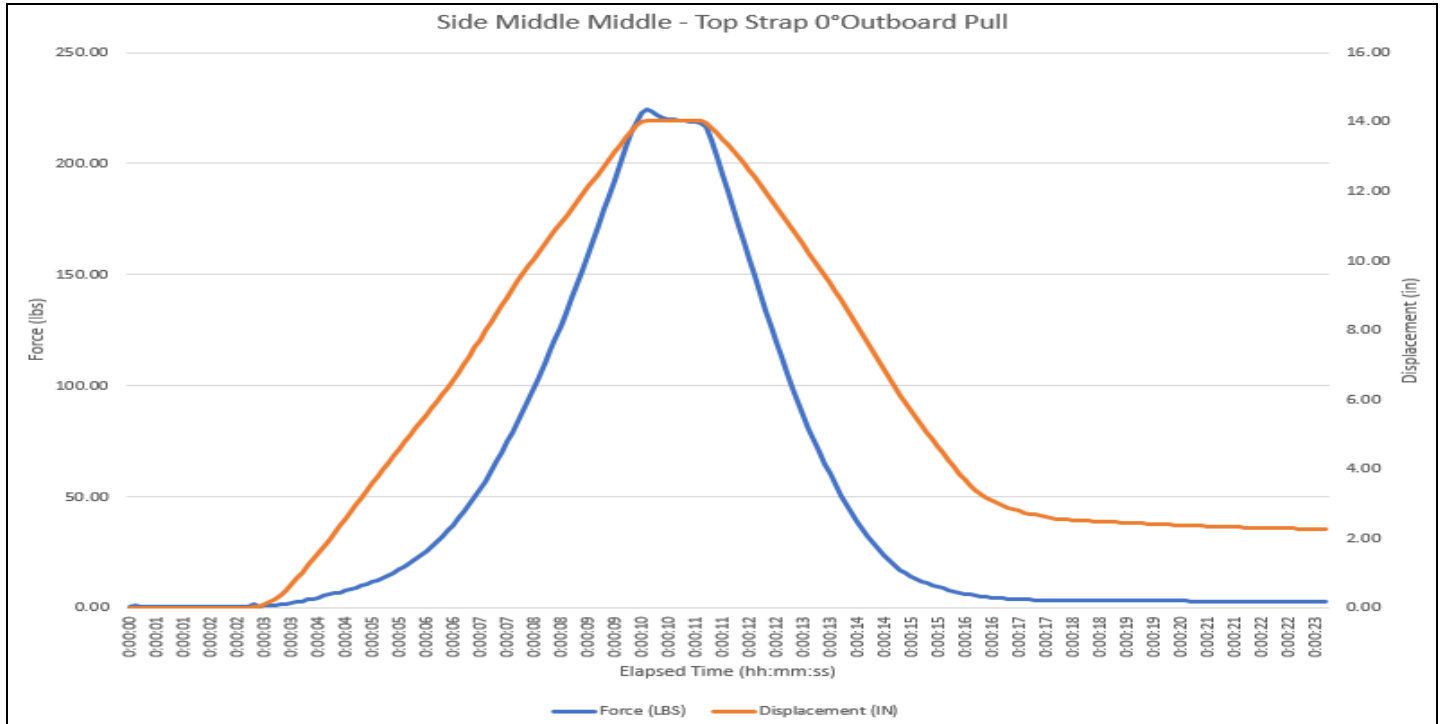


Figure 13: Side Middle Middle Top Strap Outboard Pull

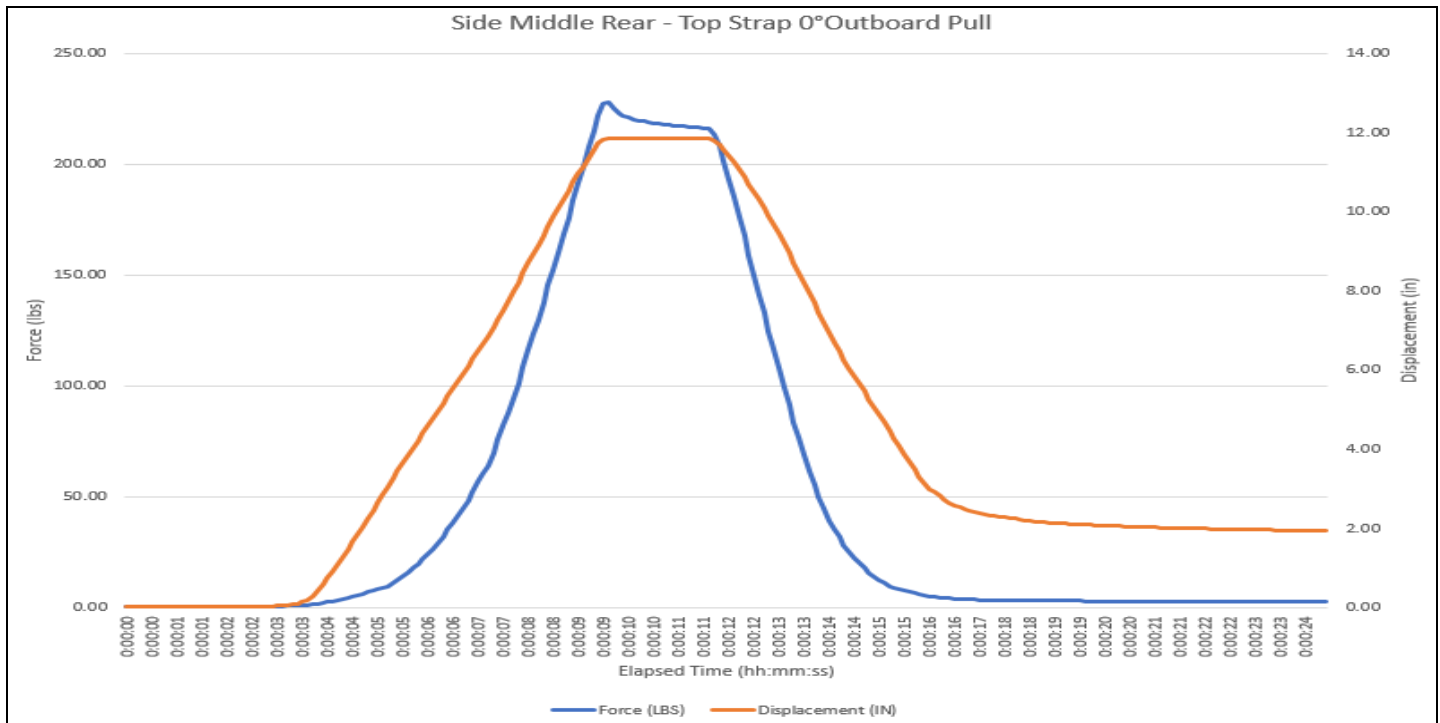


Figure 14: Side Middle Rear Top Strap Outboard Pull

APPENDIX B – FORCE VS. TIME DATA (cont'd)

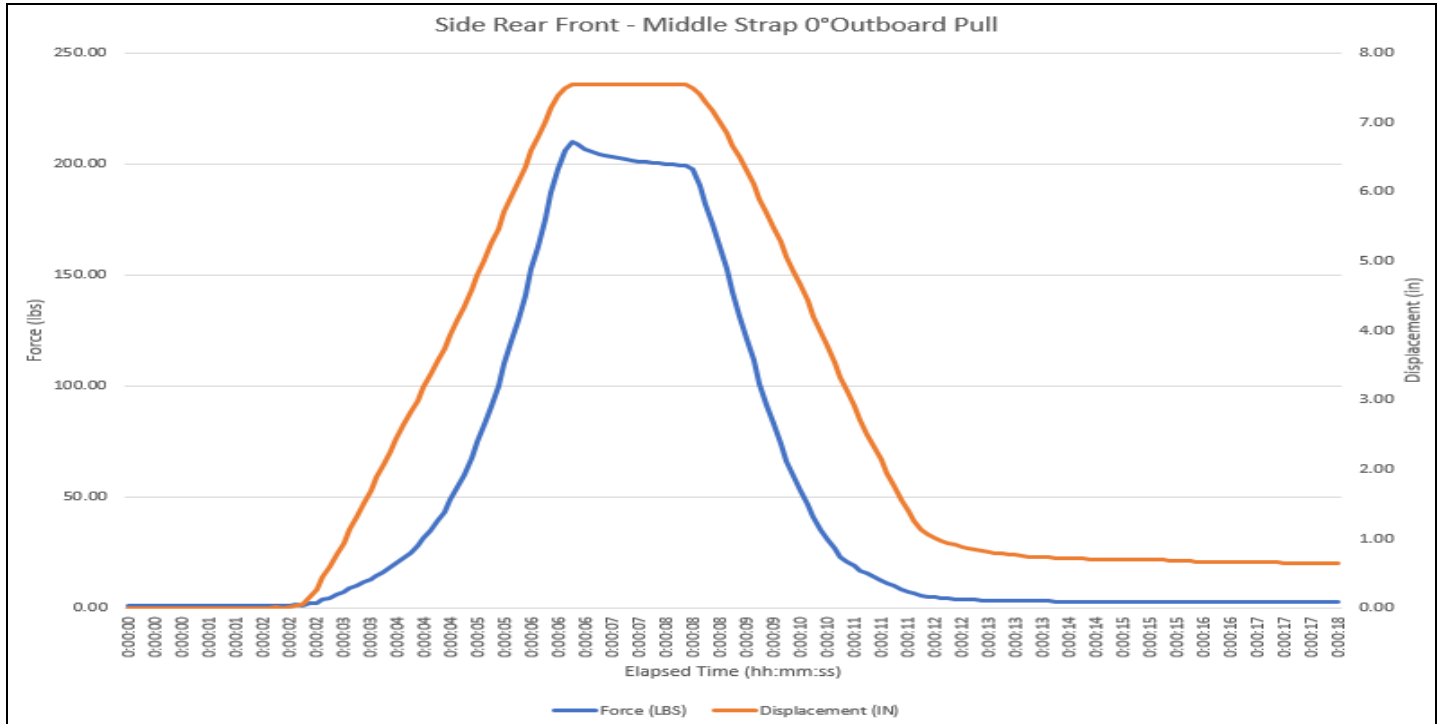


Figure 15: Side Rear Front Middle Strap Outboard Pull

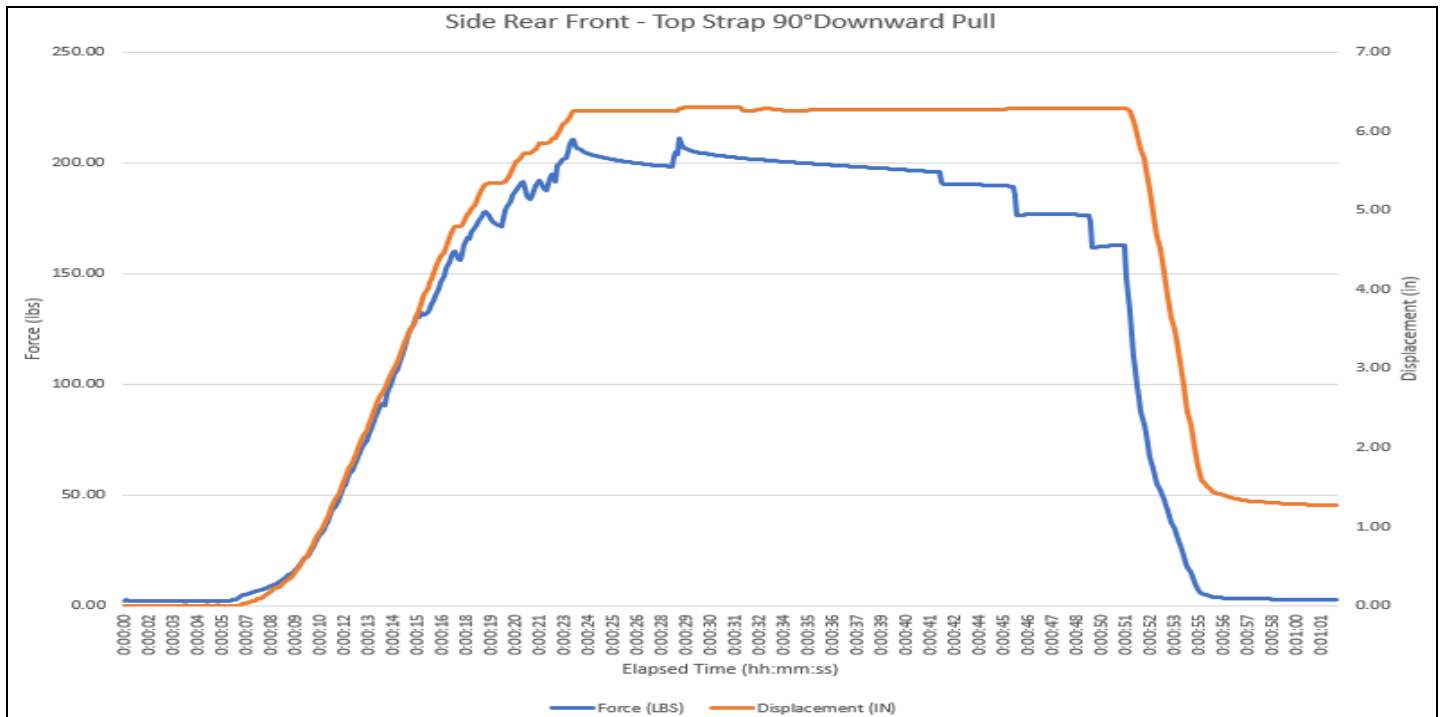


Figure 16: Side Rear Front Top Strap Downward Pull

APPENDIX B – FORCE VS. TIME DATA (cont'd)

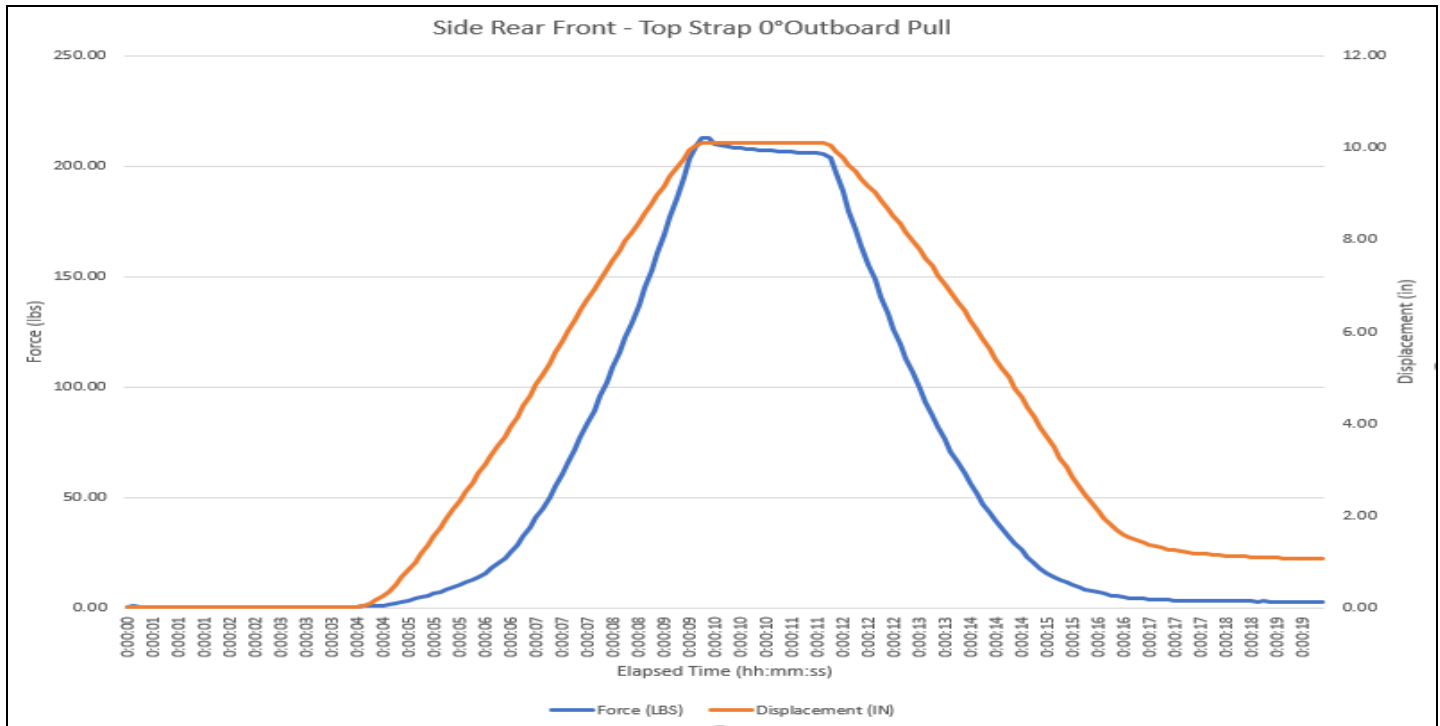


Figure 17: Side Rear Front Top Strap Outboard Pull

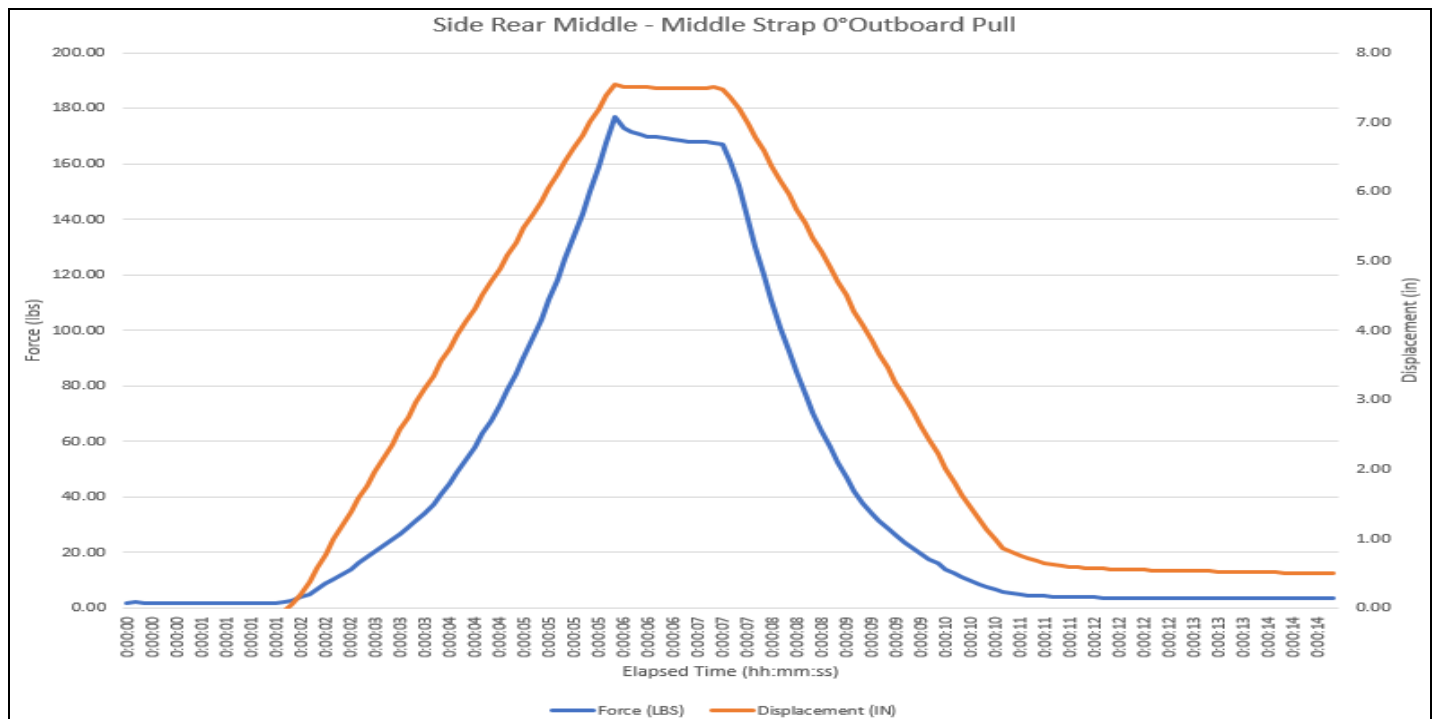


Figure 18: Side Rear Middle Middle Strap Outboard Pull

APPENDIX B – FORCE VS. TIME DATA (cont'd)

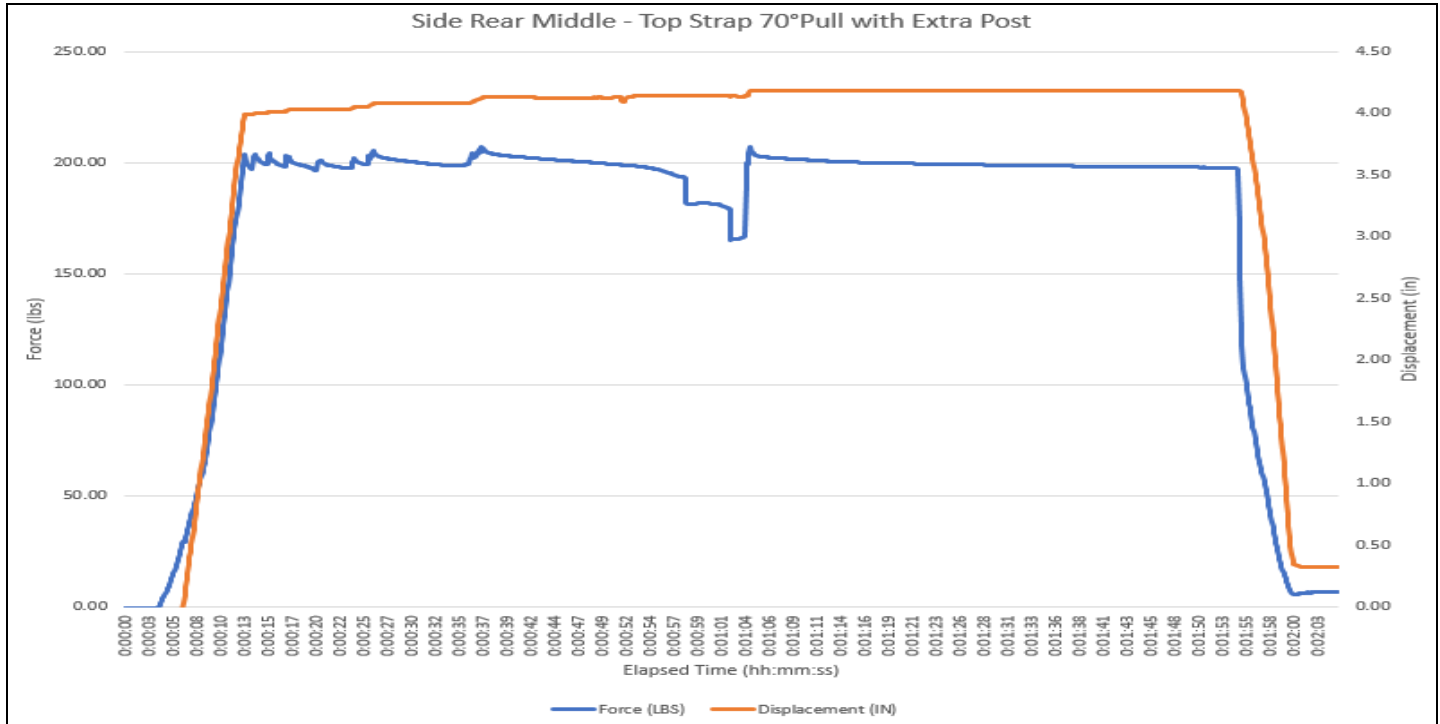
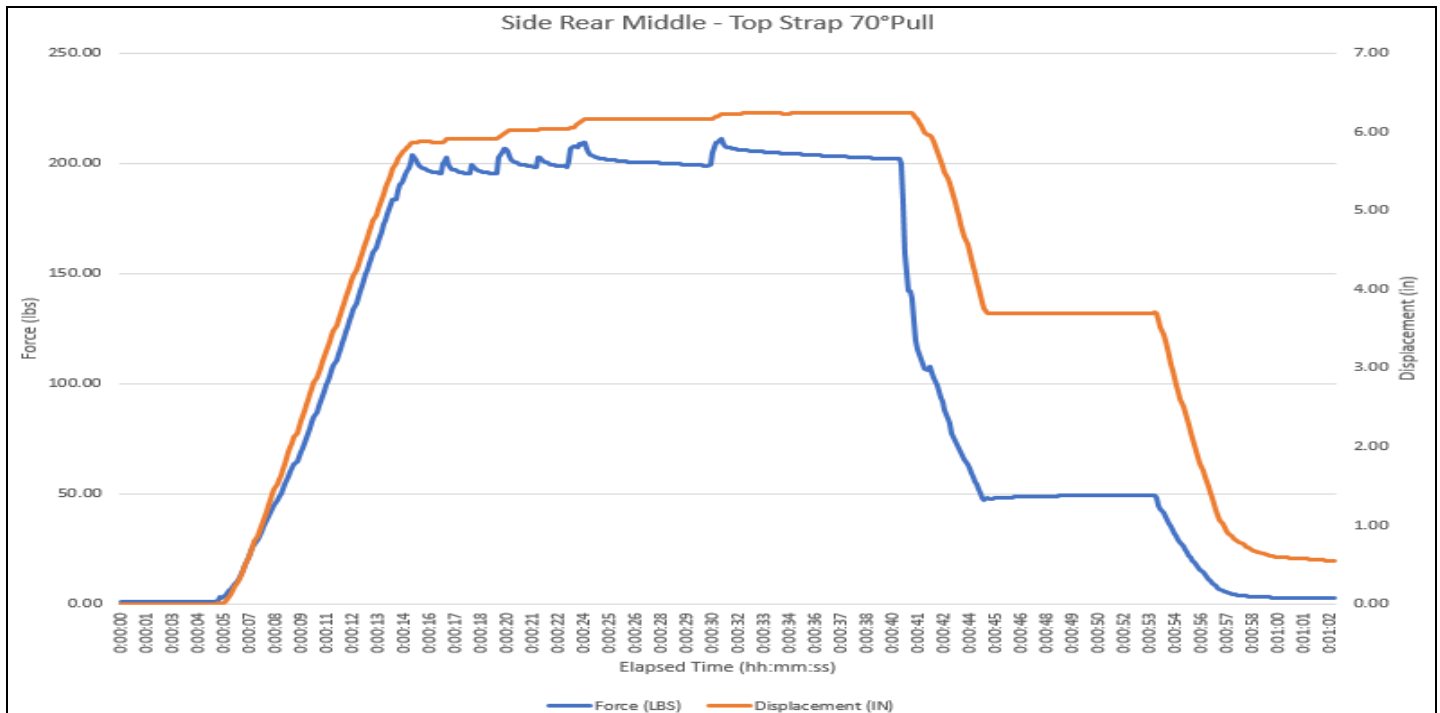


Figure 19: Side Rear Middle Top Strap 70 Degree Pull with Extra Post



APPENDIX B – FORCE VS. TIME DATA (cont'd)

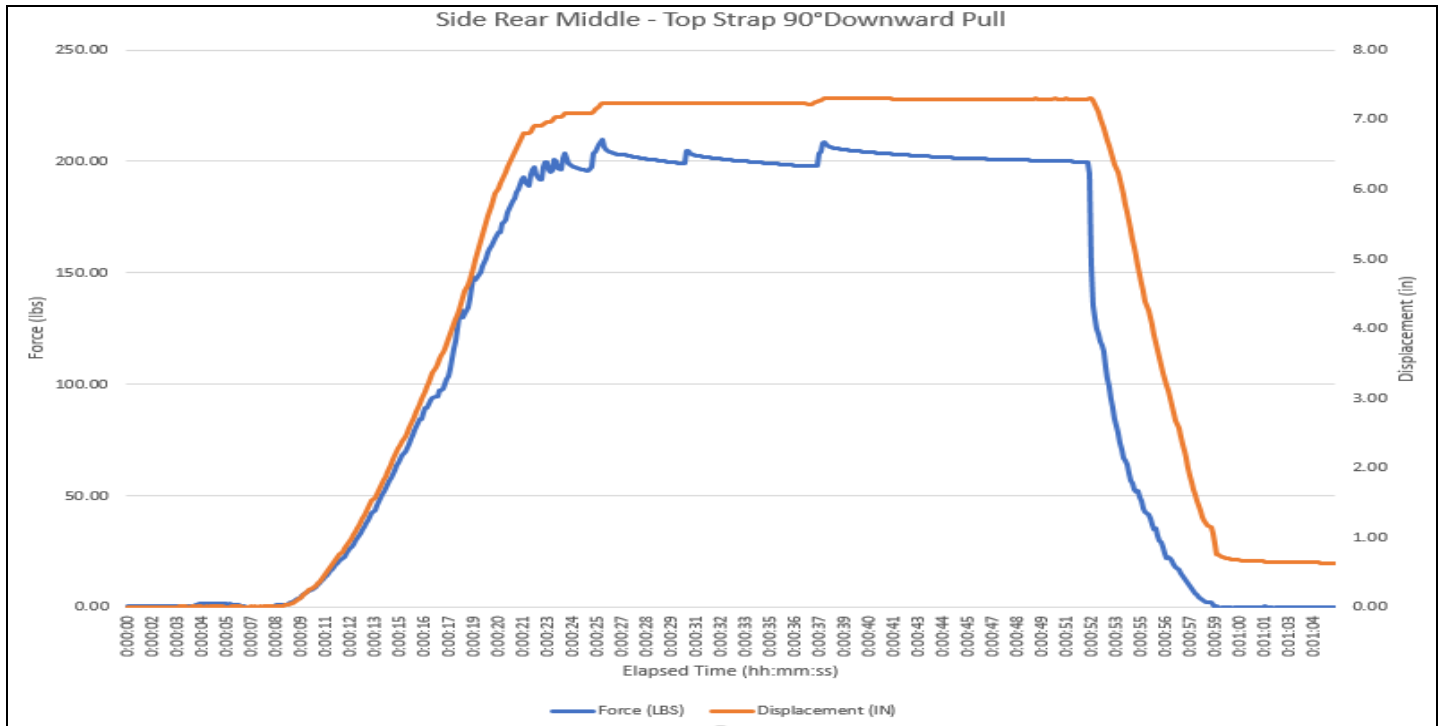


Figure 21: Side Rear Middle Top Strap Downward Pull

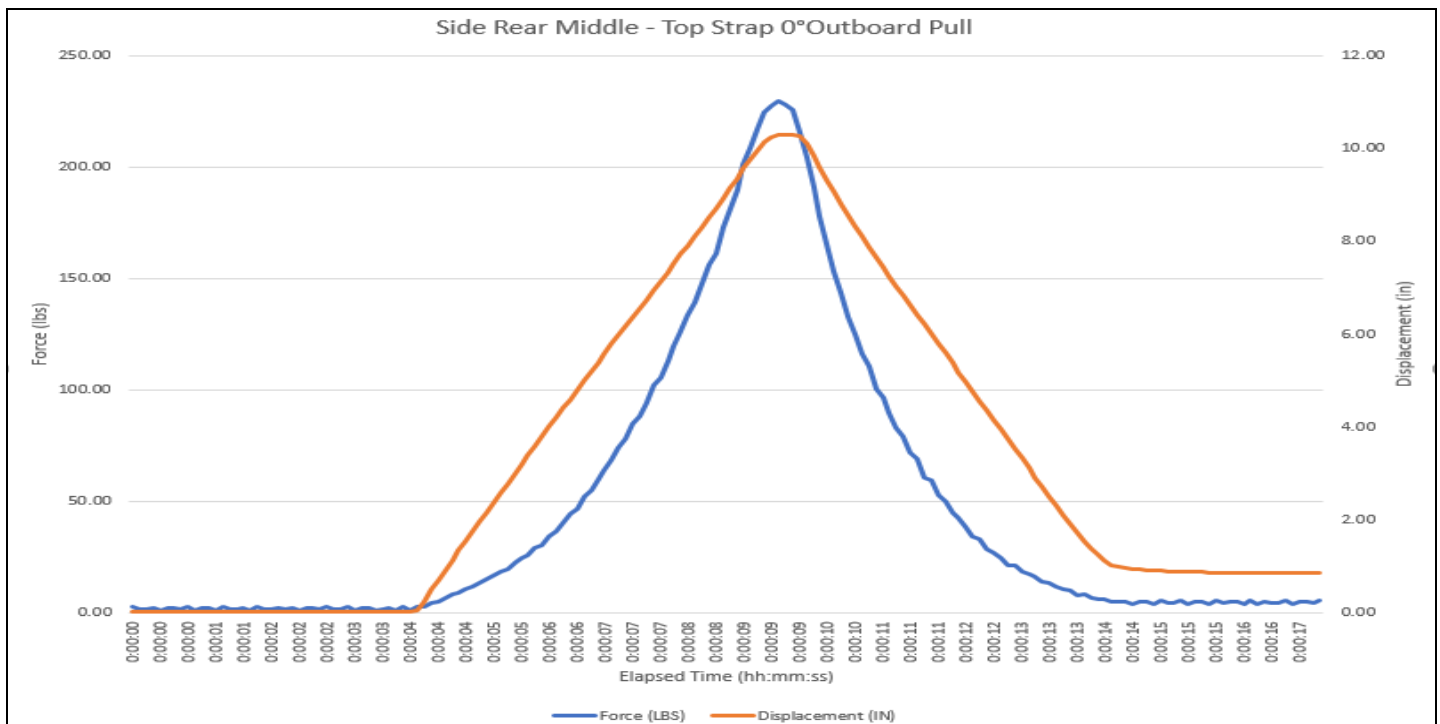


Figure 22: Side Rear Middle Top Strap Outboard Pull

APPENDIX B – FORCE VS. TIME DATA (cont'd)

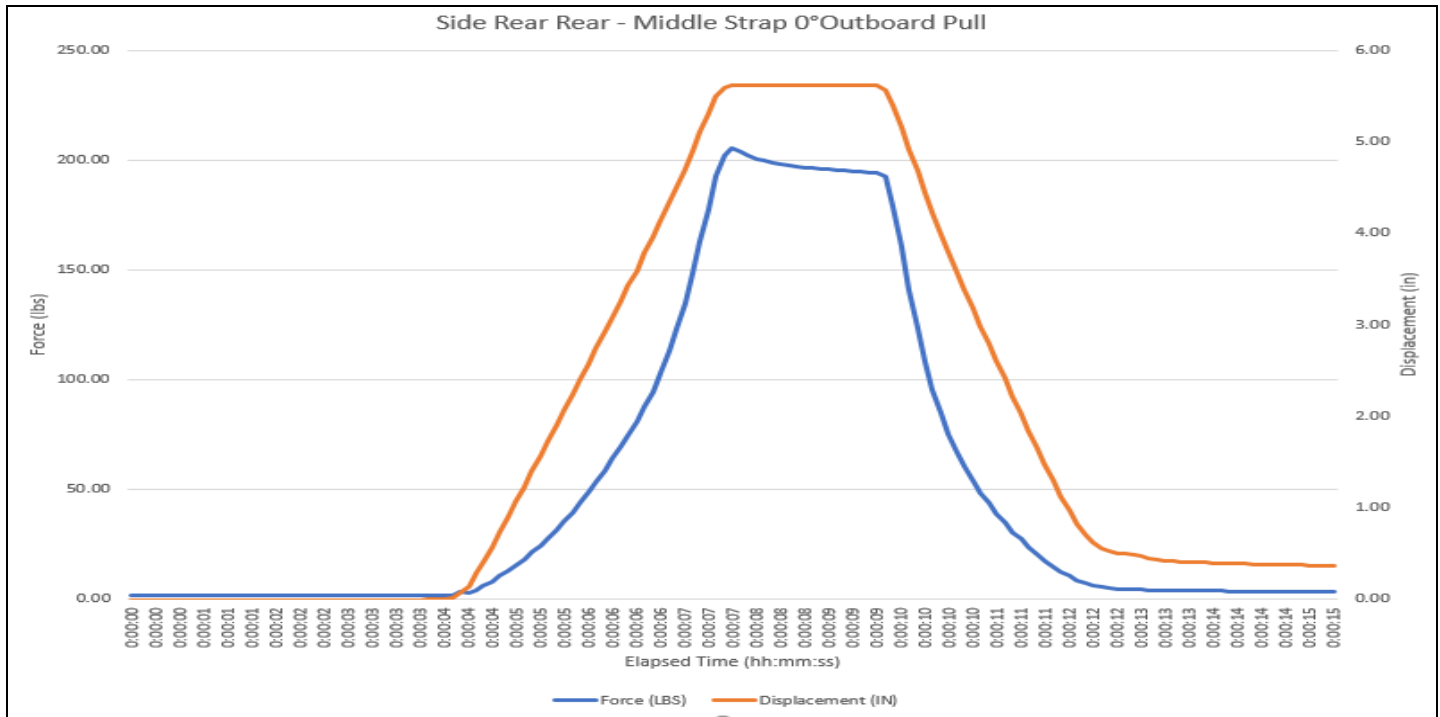


Figure 23: Side Rear Rear Middle Strap Outboard Pull

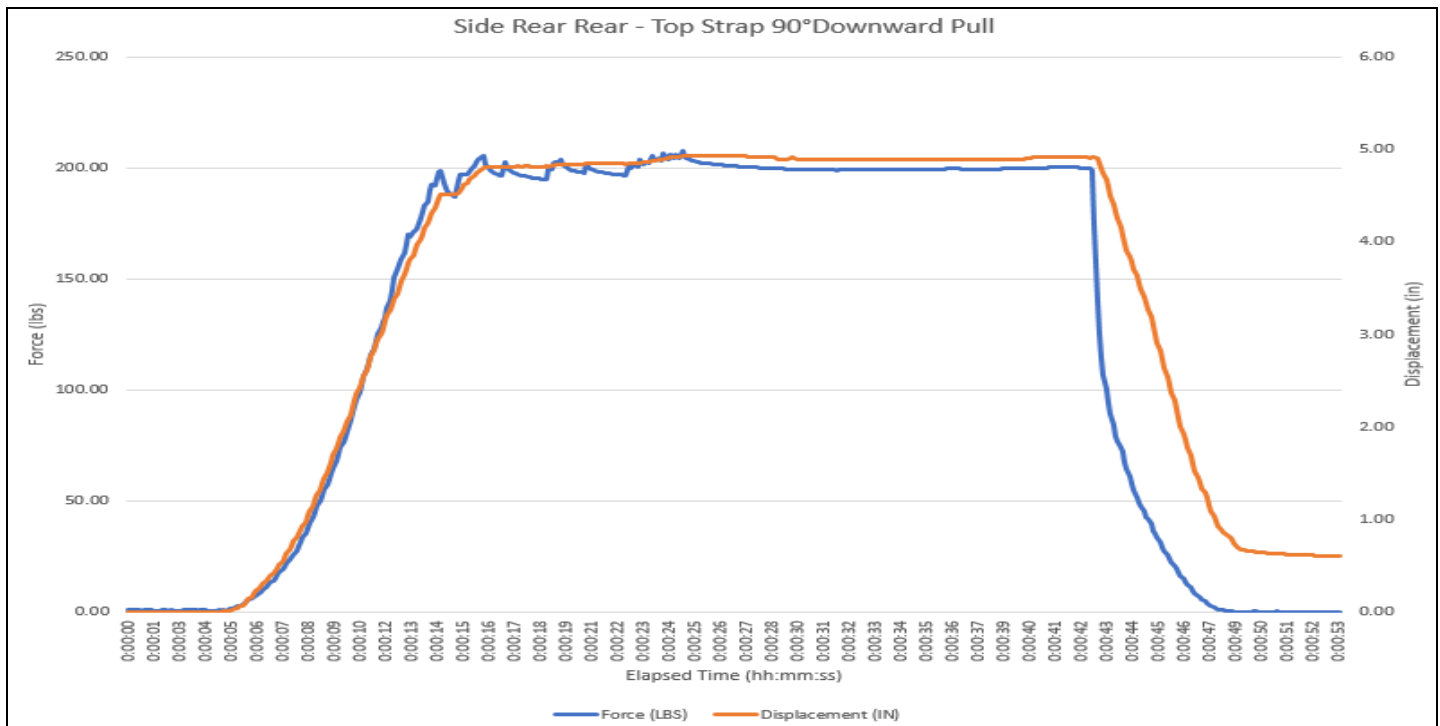


Figure 24: Side Rear Rear Top Strap Downward Pull

APPENDIX B – FORCE VS. TIME DATA (cont'd)

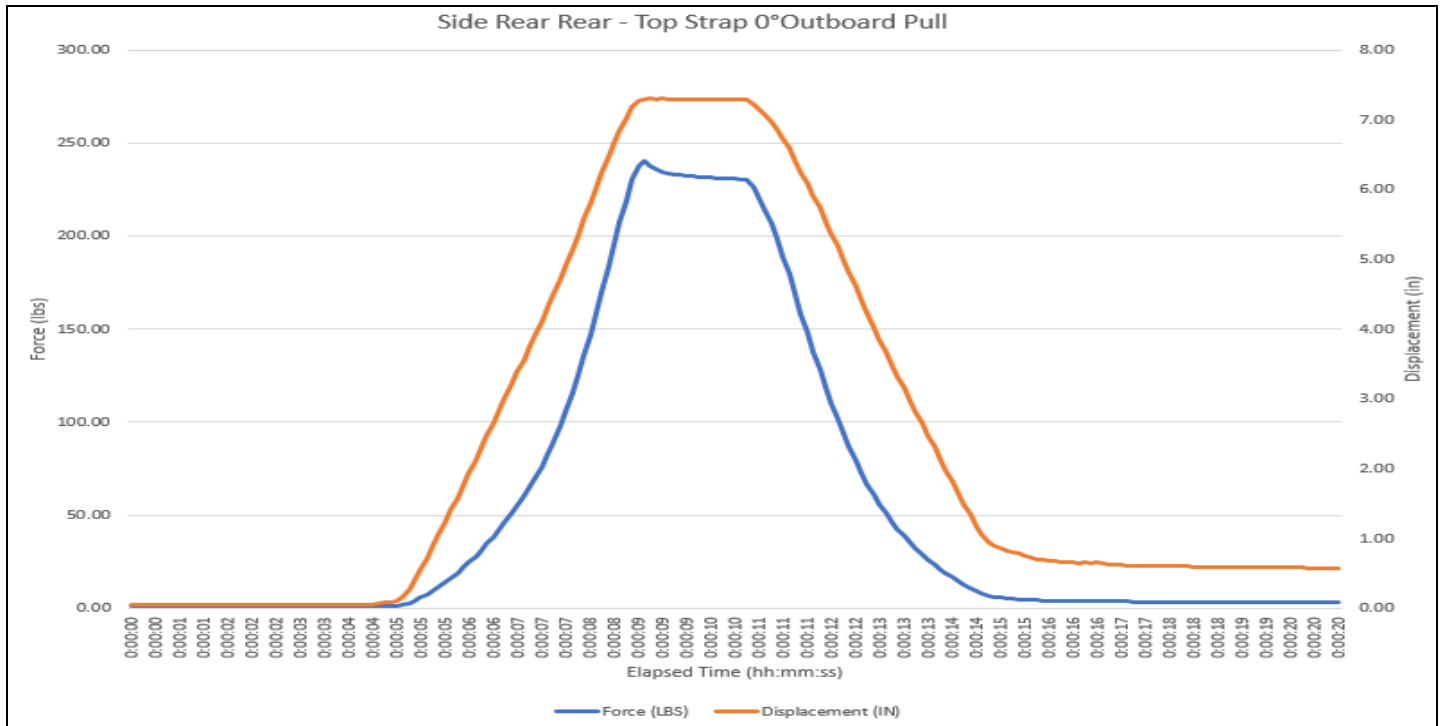


Figure 25: Side Rear Rear Top Strap Outboard Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA

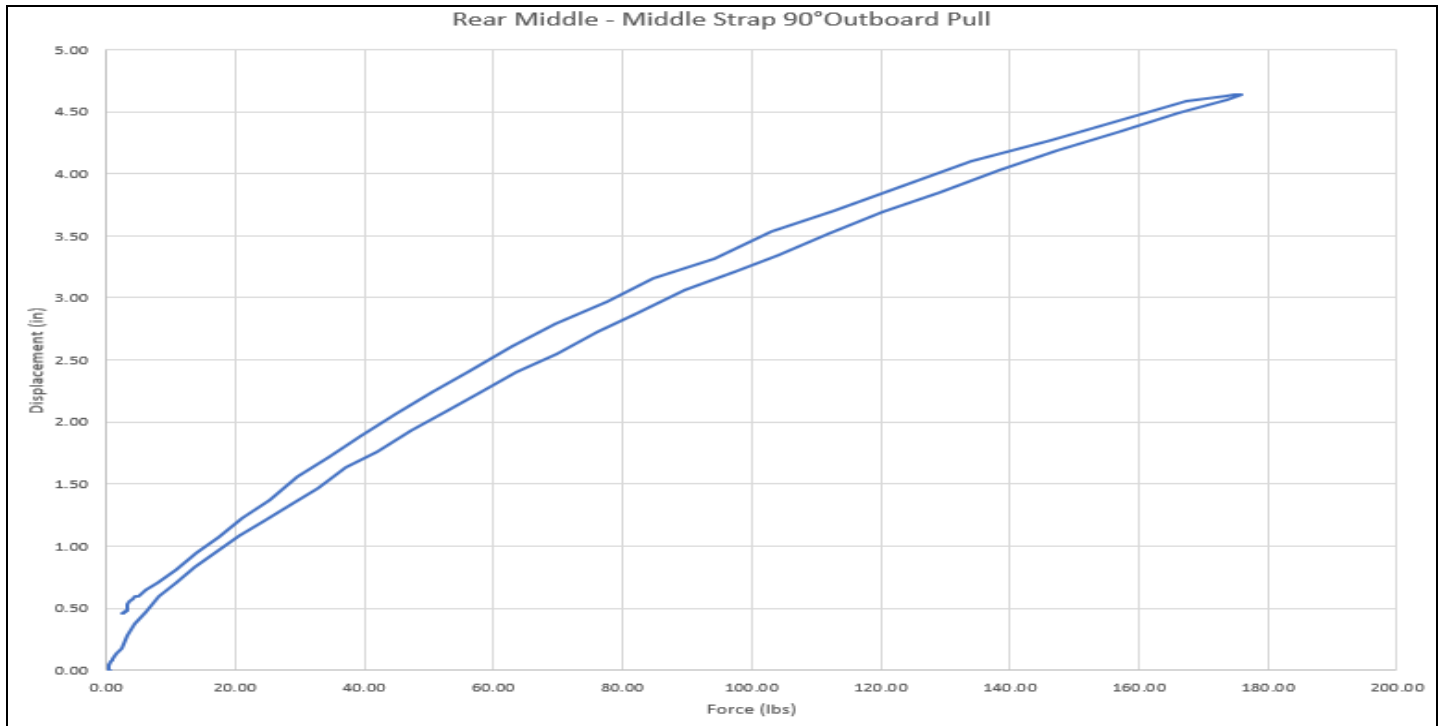


Figure 26: Rear Middle Middle Strap Outboard Pull

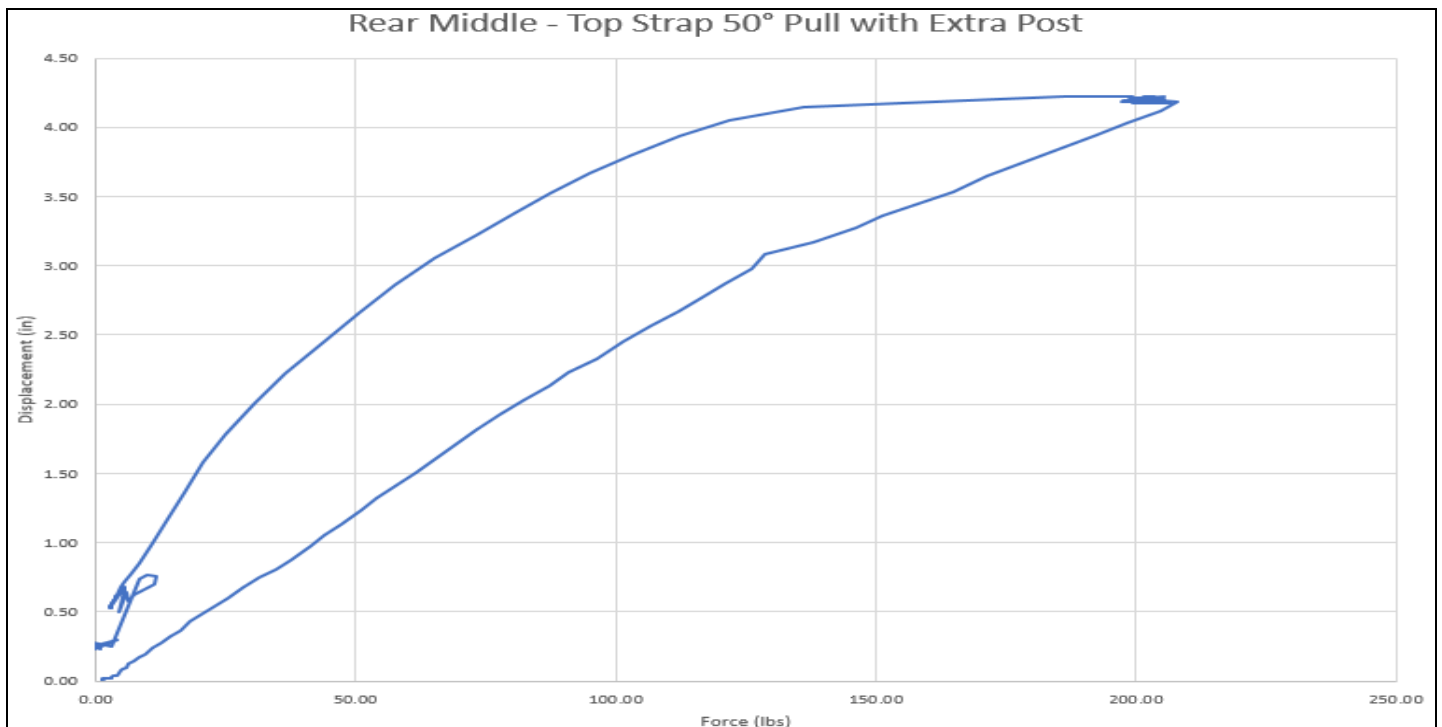


Figure 27: Rear Middle Top Strap 50 Degree Pull with Extra Post

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

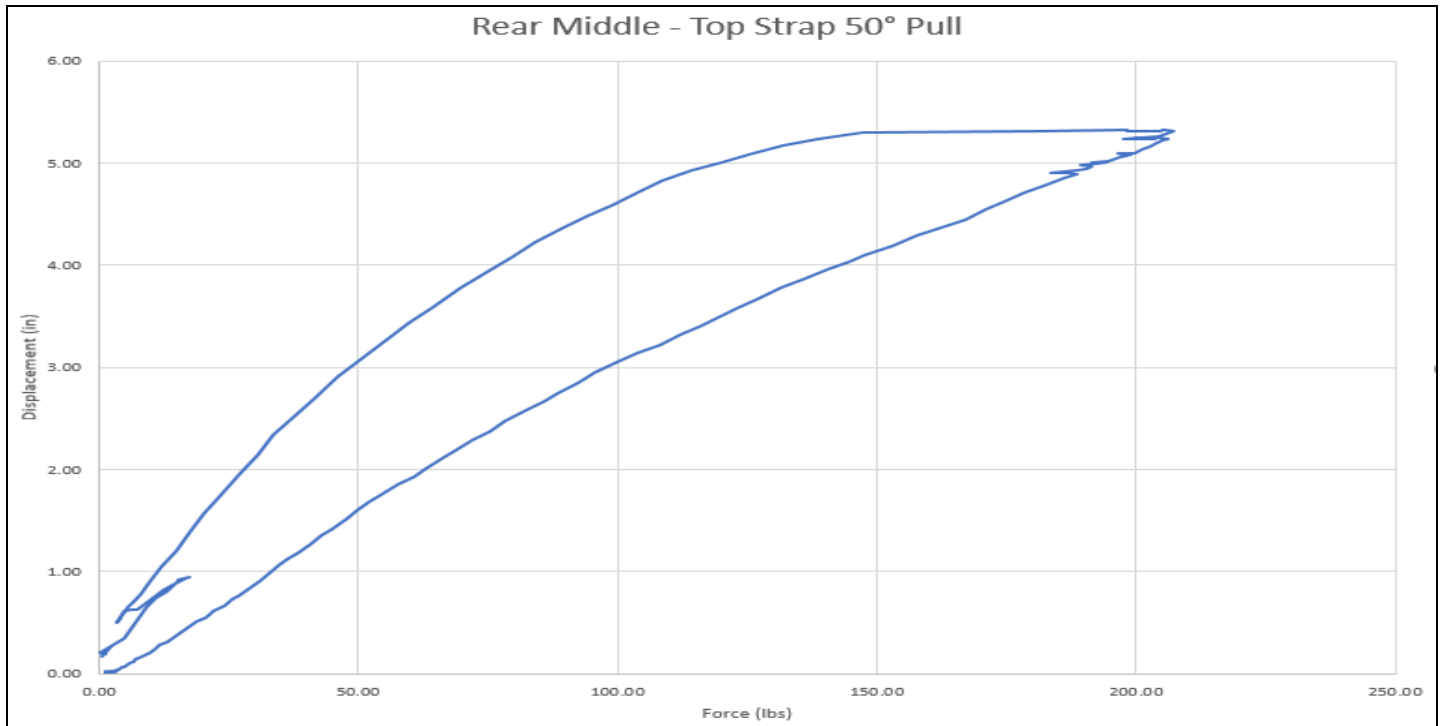


Figure 28: Rear Middle Top Strap 50 Degree Pull

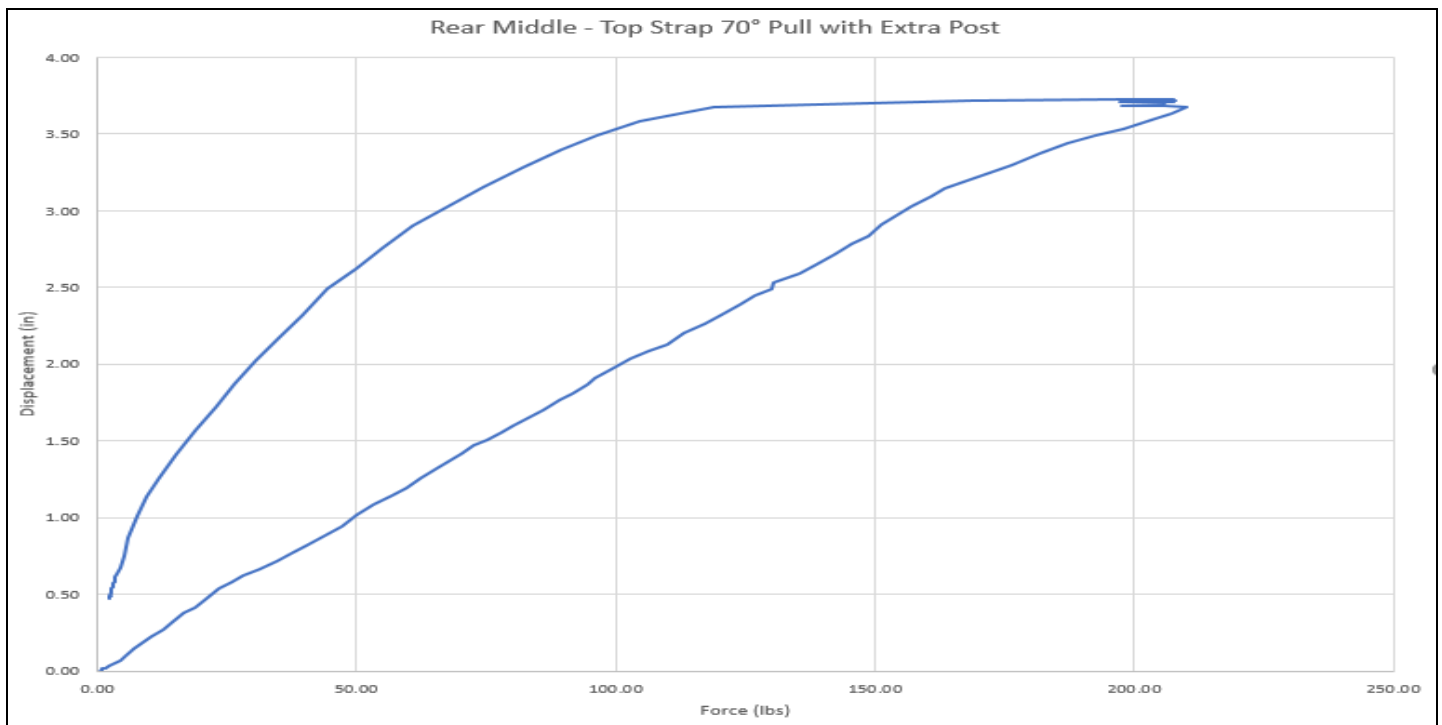


Figure 29: Rear Middle Top Strap 70 Degree Pull with Extra Post

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

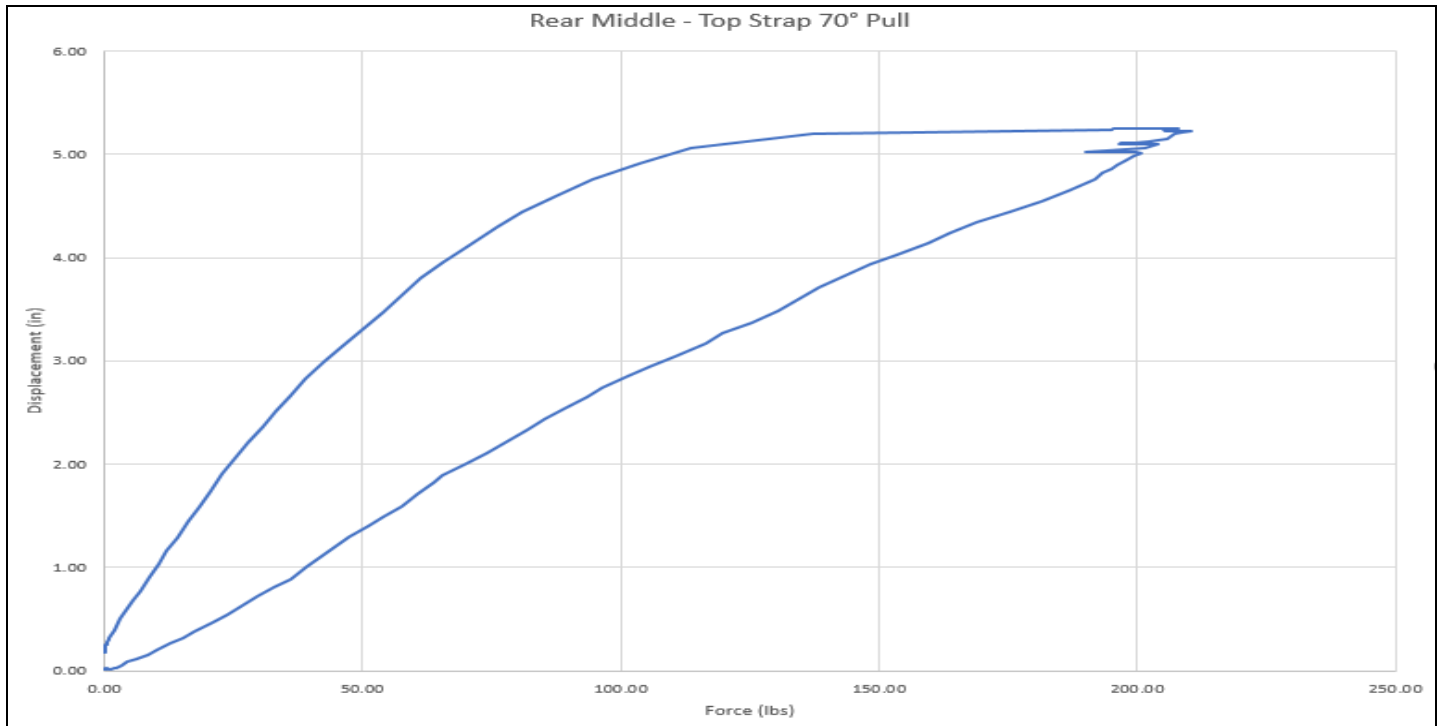


Figure 30: Rear Middle Top Strap 70 Degree Pull

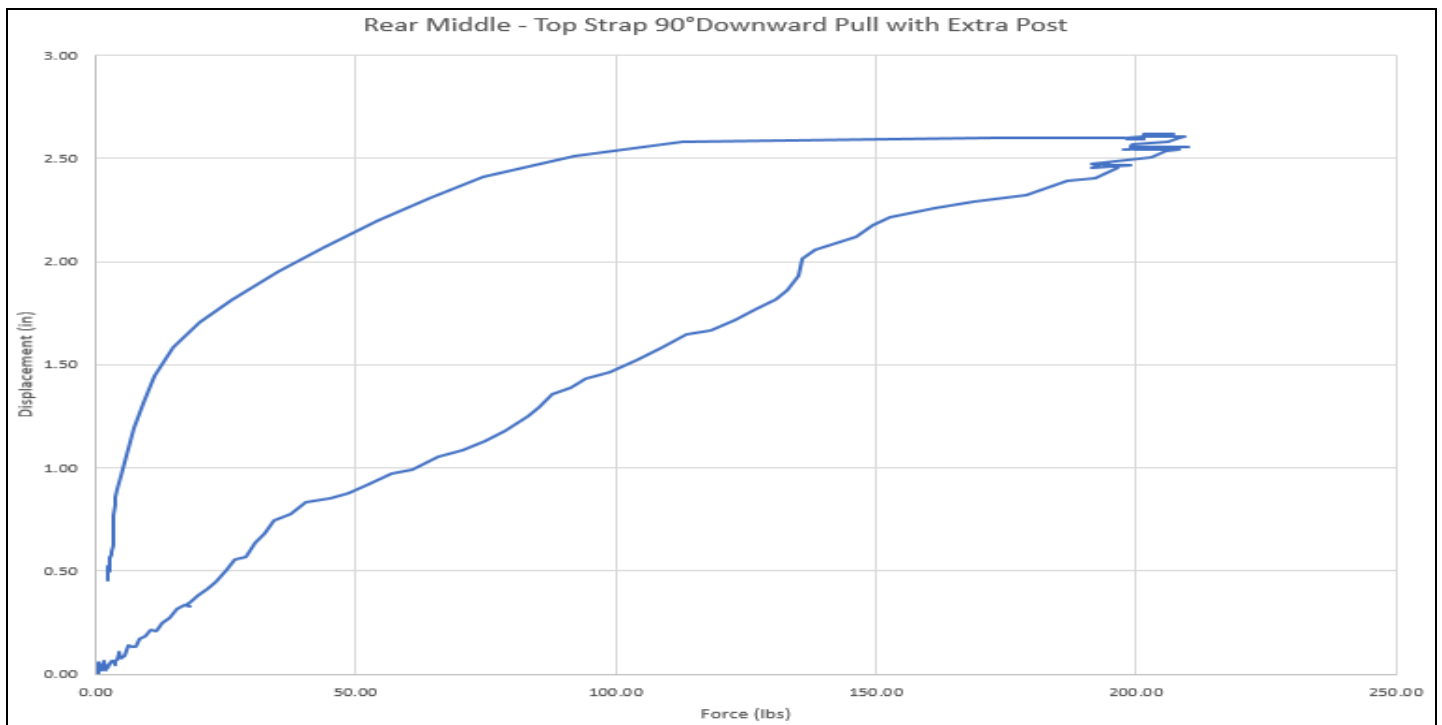


Figure 31: Rear Middle Top Strap Downward Pull with Extra Post

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

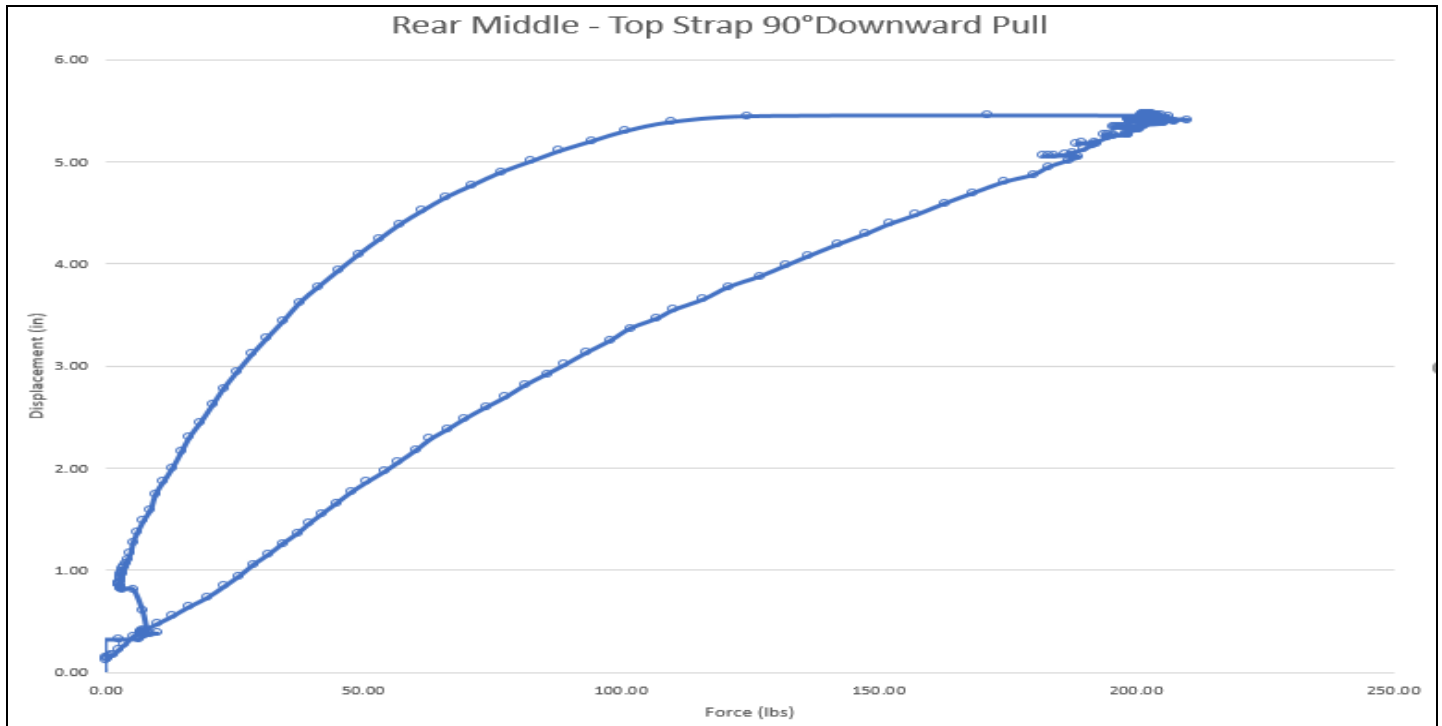


Figure 32: Rear Middle Top Strap Downward Pull

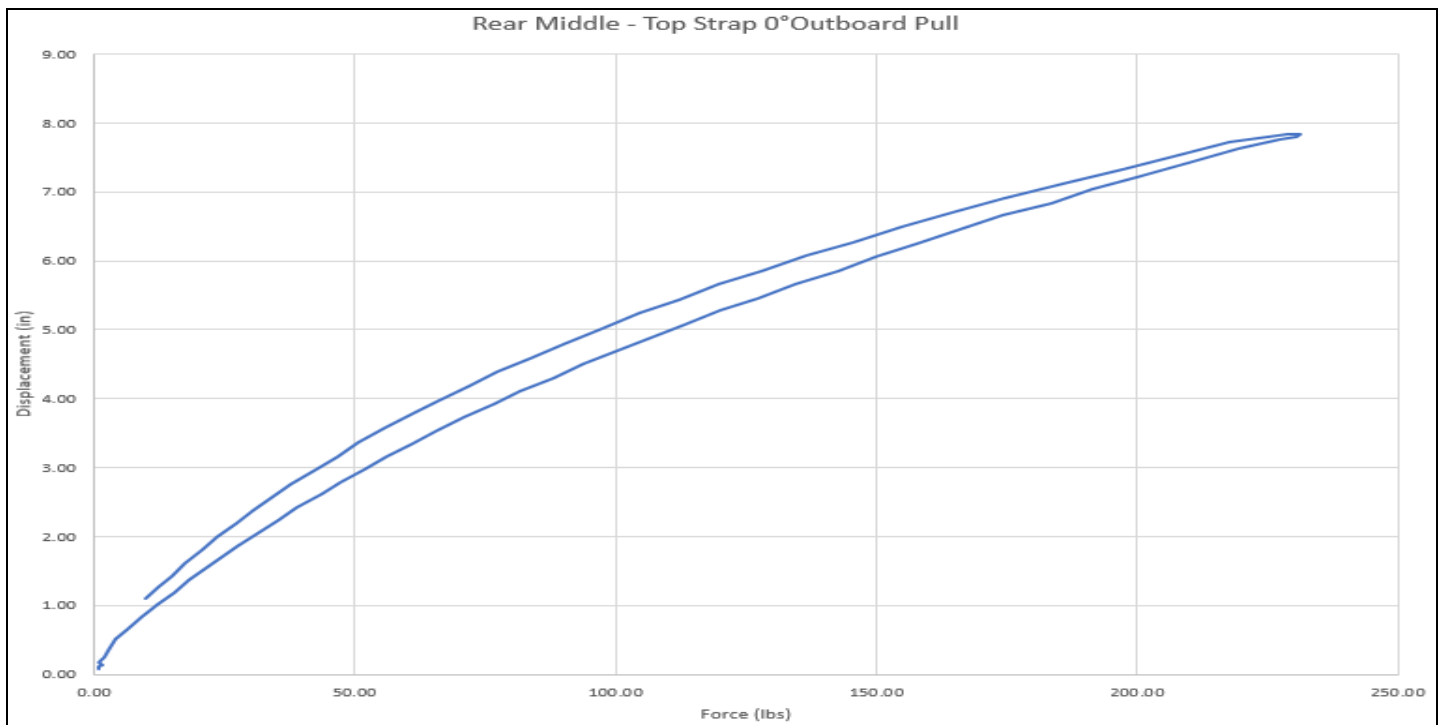


Figure 33: Rear Middle Top Strap Outboard Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

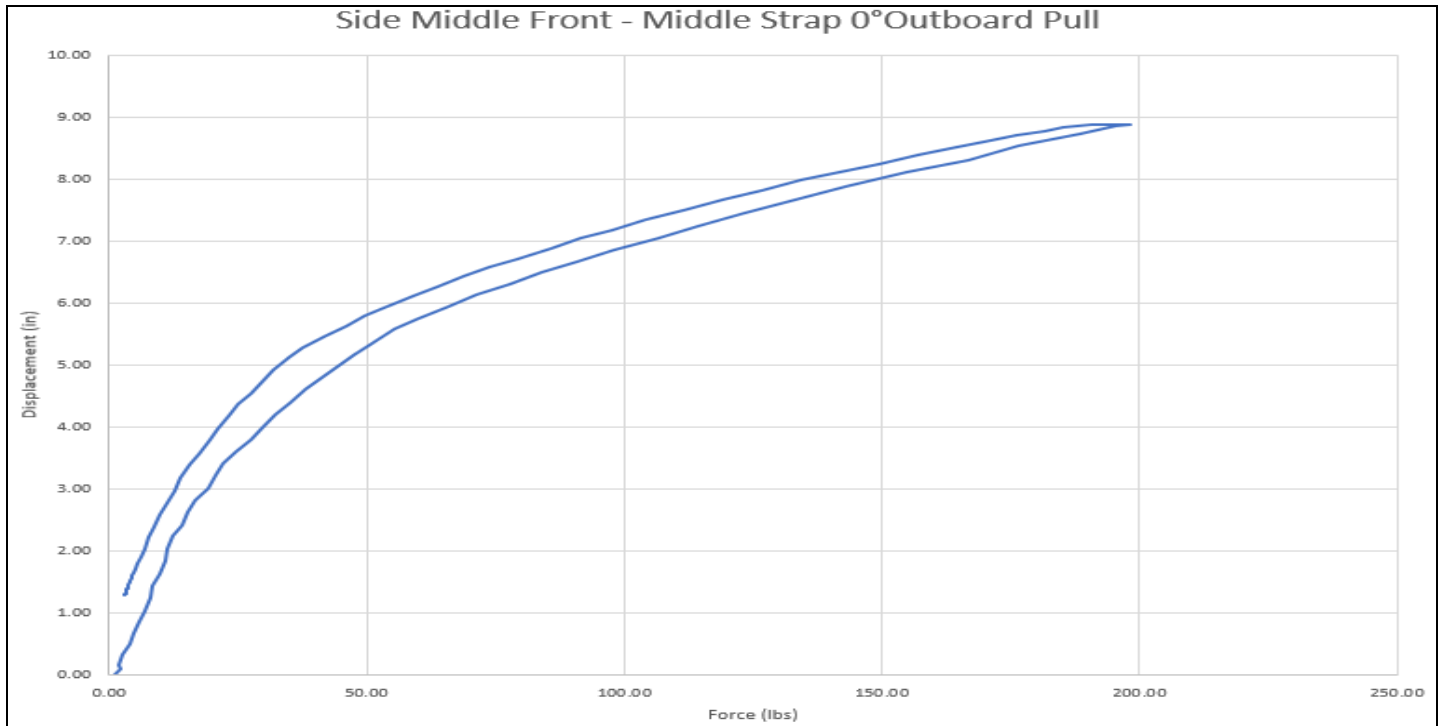


Figure 34: Side Middle Front Middle Strap Outboard Pull

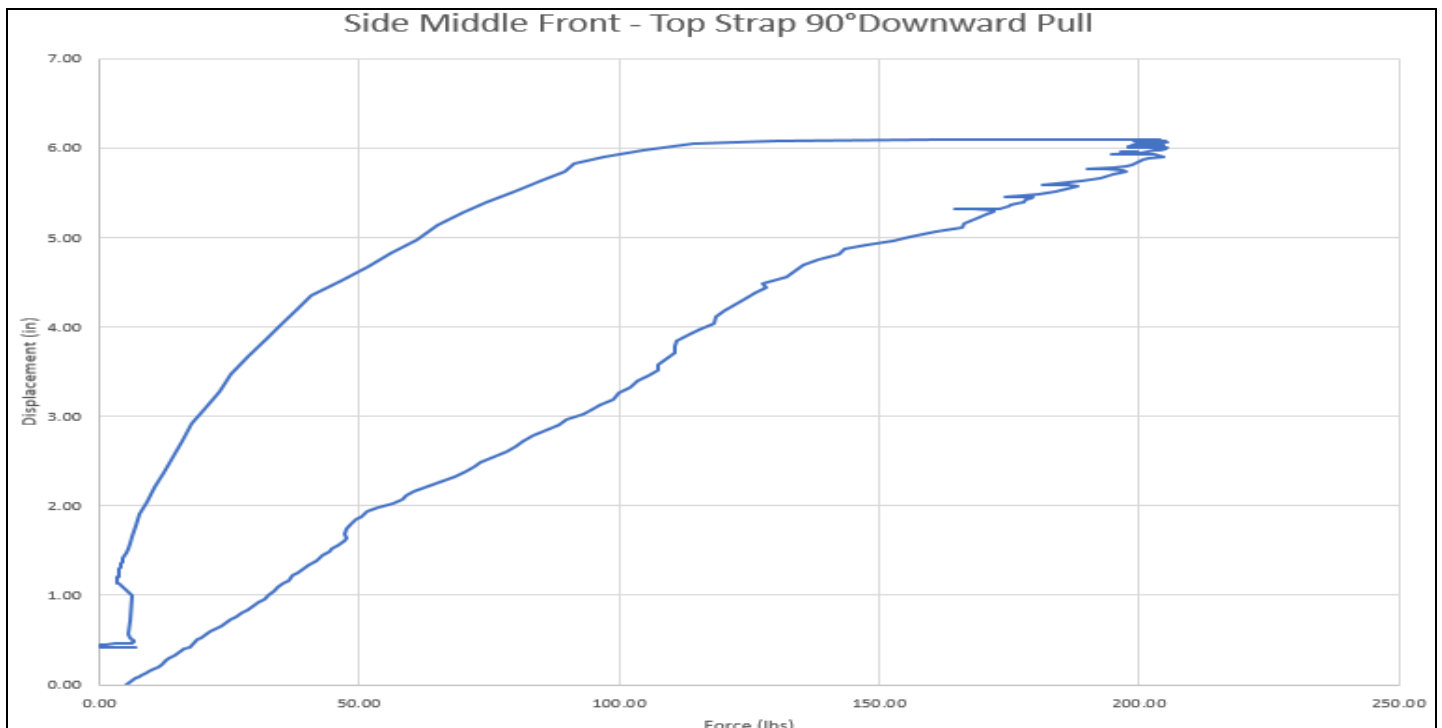


Figure 35: Side Middle Front Top Strap Downward Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

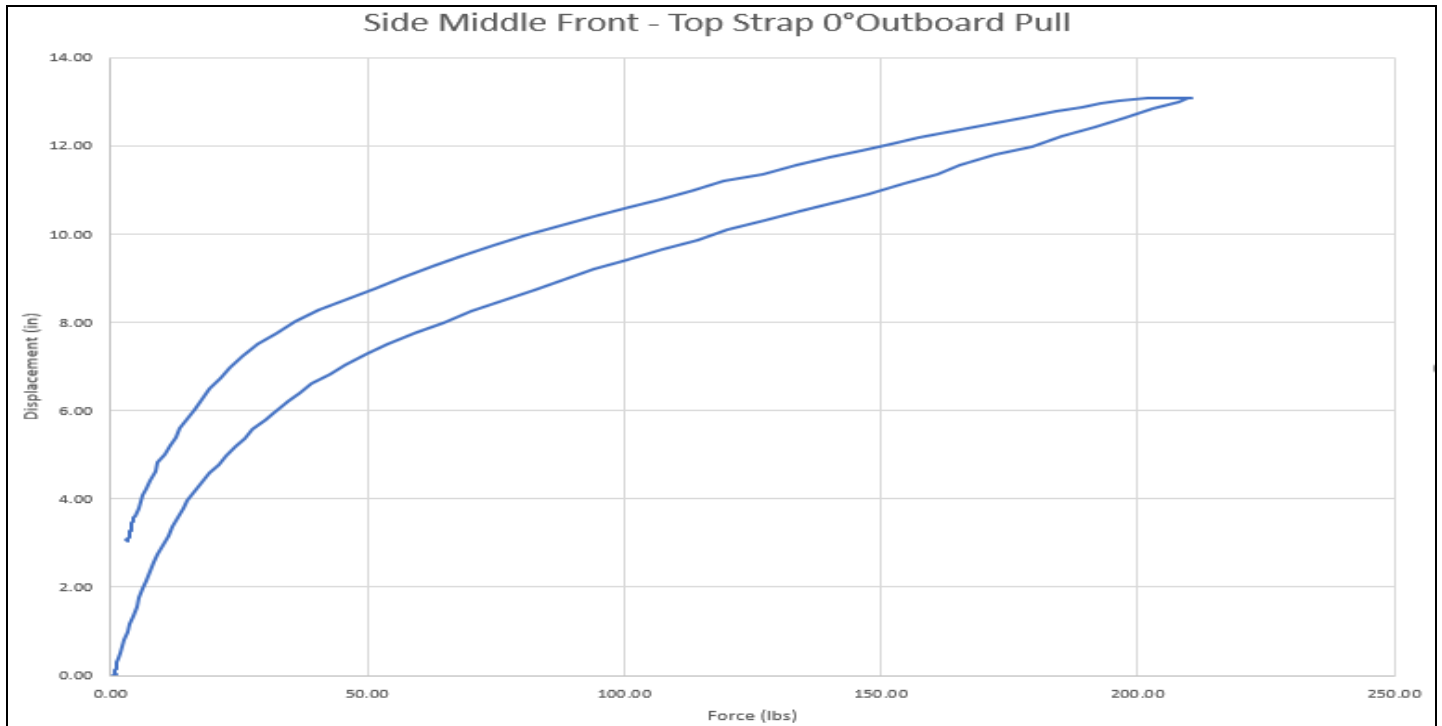


Figure 36: Side Middle Front Top Strap Outboard Pull

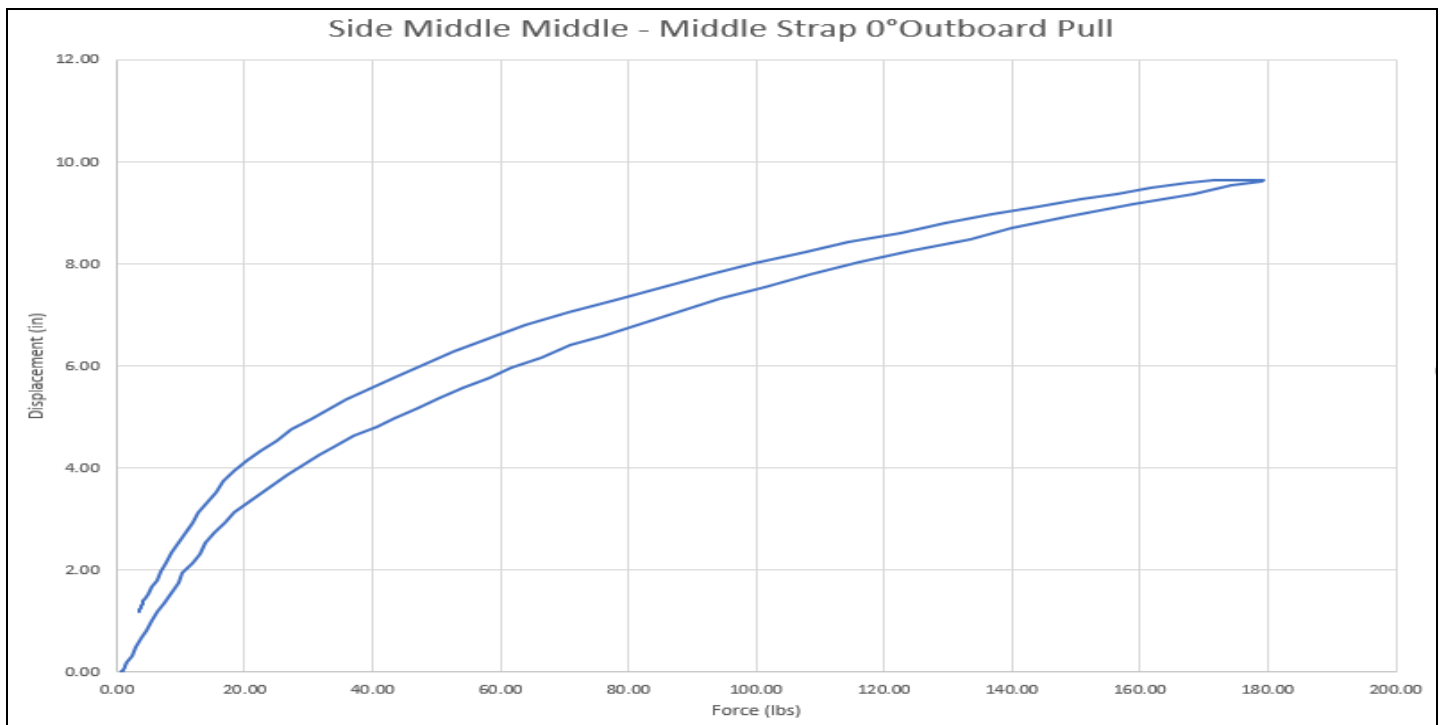


Figure 37: Side Middle Middle - Middle Strap Outboard Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

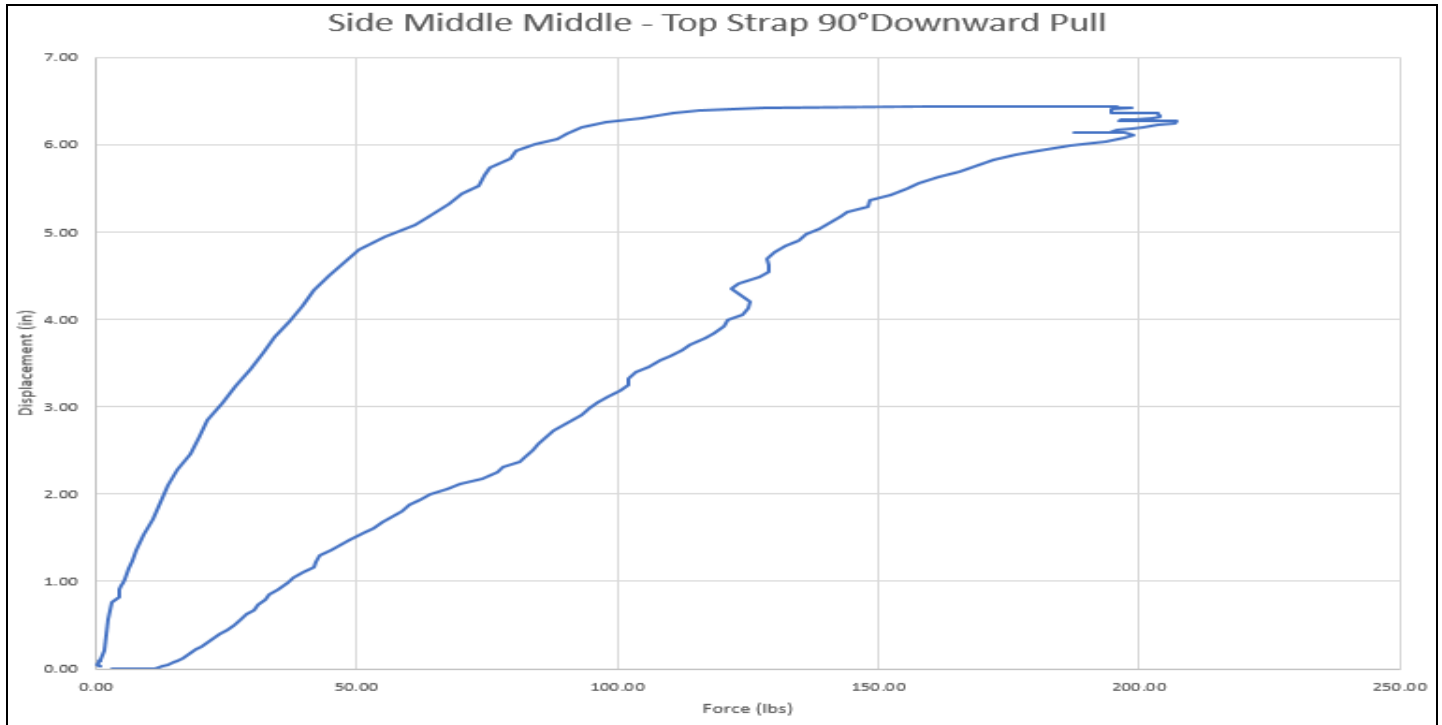


Figure 38: Side Middle Middle Top Strap Downward Pull

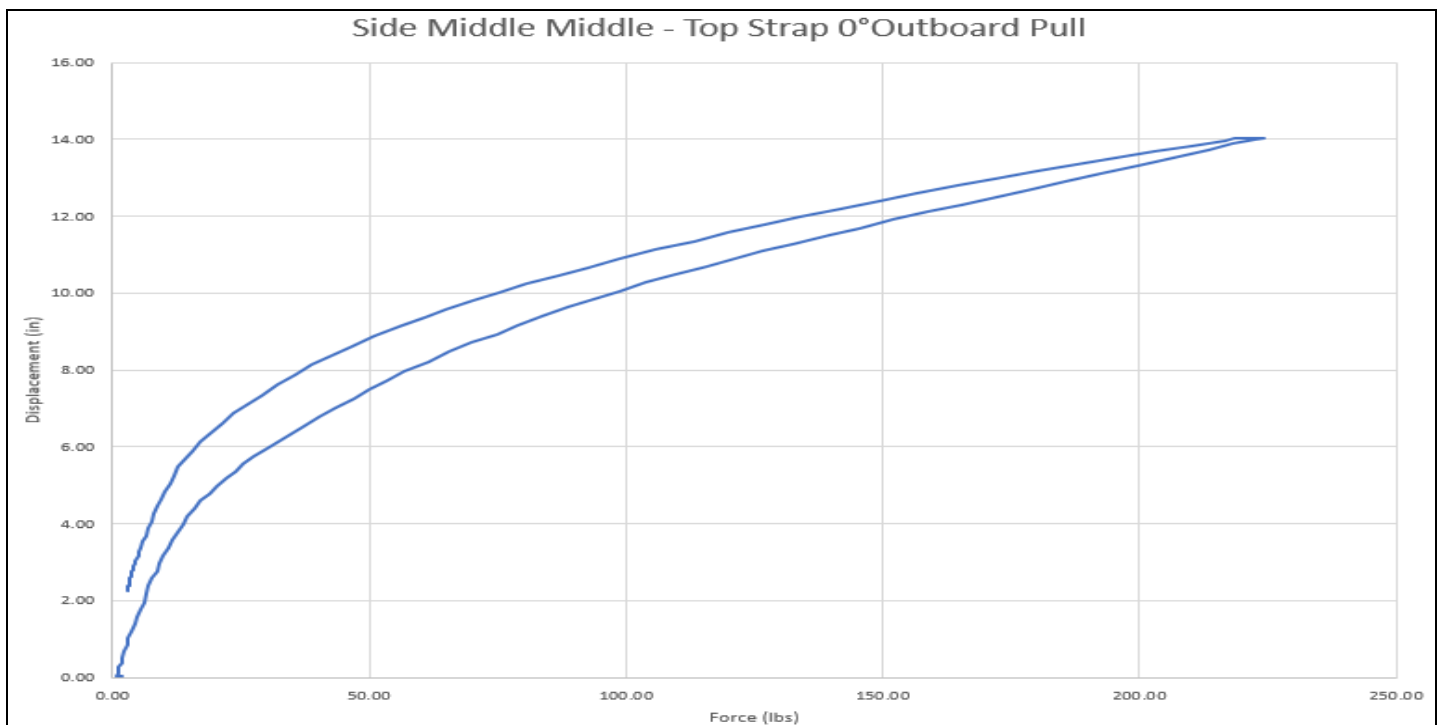


Figure 39: Side Middle Middle Top Strap Outboard Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

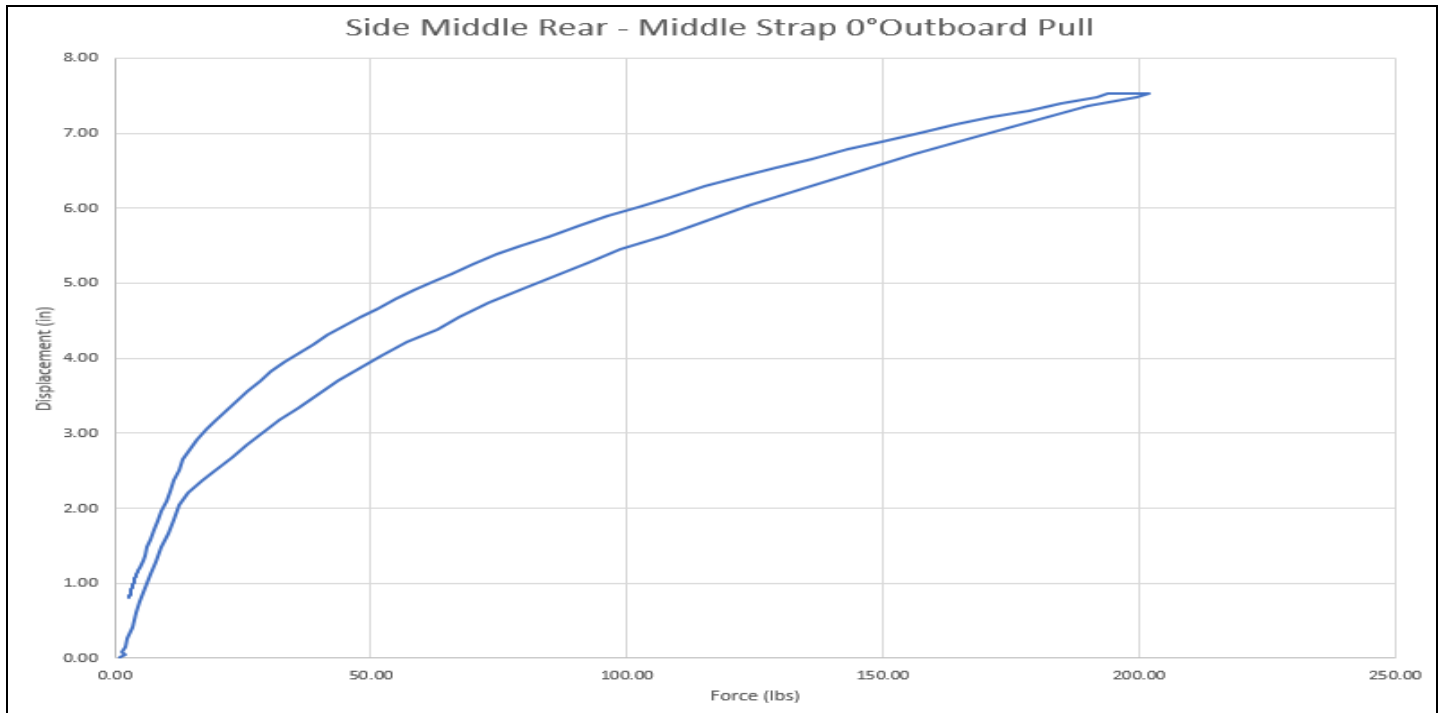


Figure 40: Side Middle Rear Middle Strap Outboard Pull

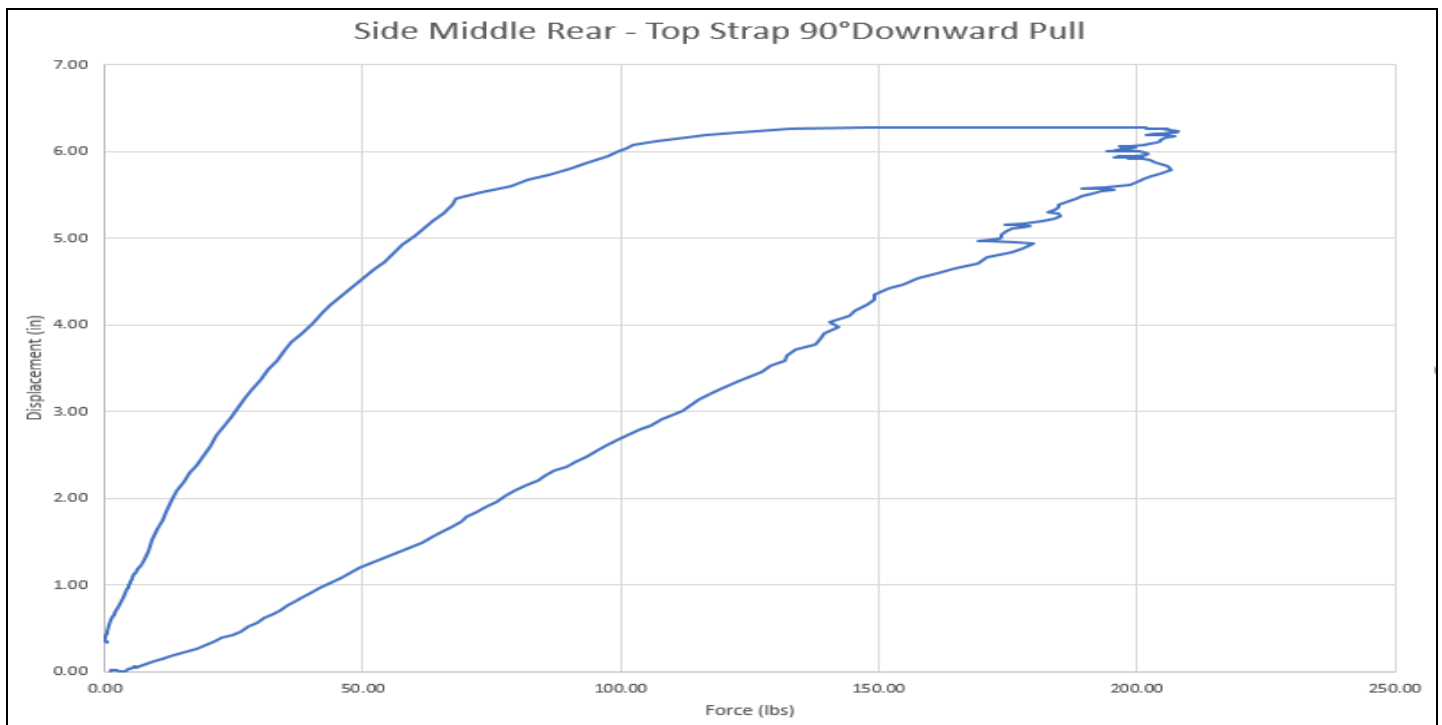


Figure 41: Side Middle Rear Top Strap Downward Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA(cont'd)

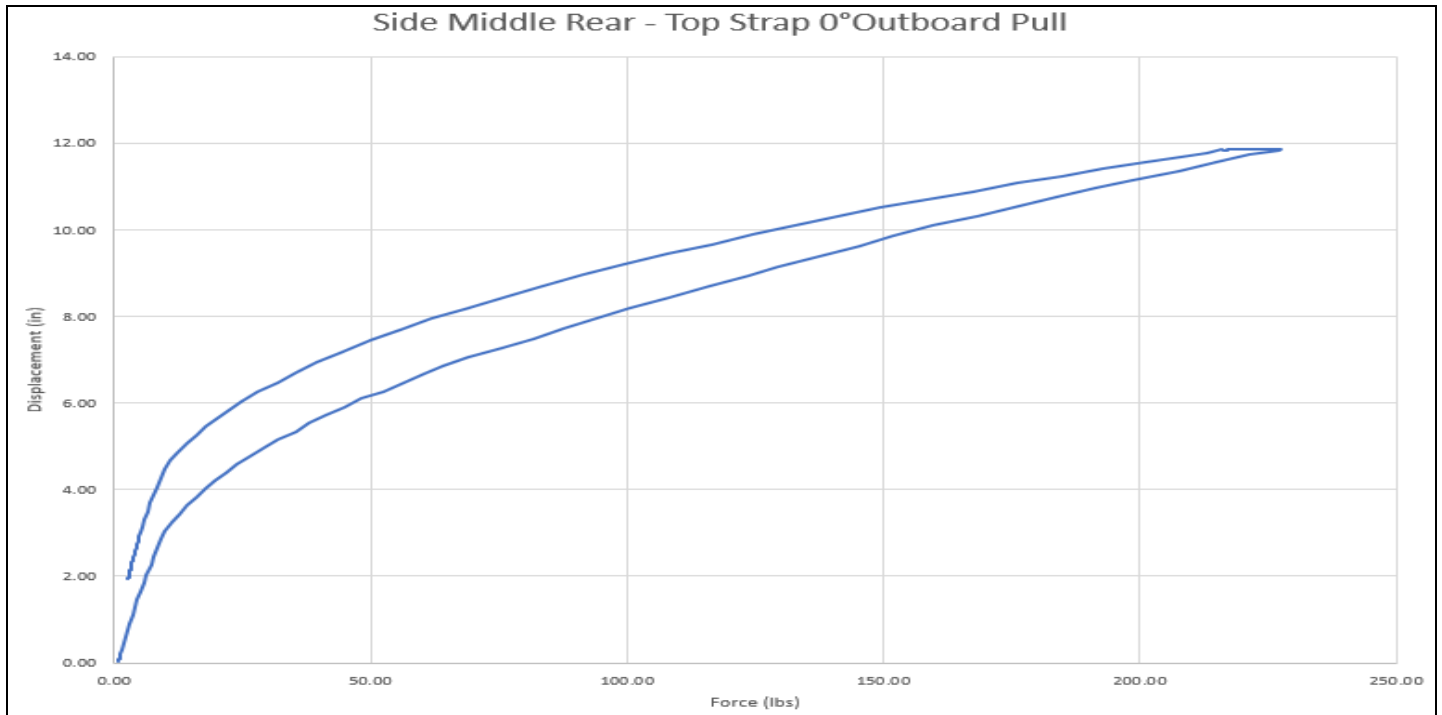


Figure 42: Side Middle Rear Top Strap Outboard Pull

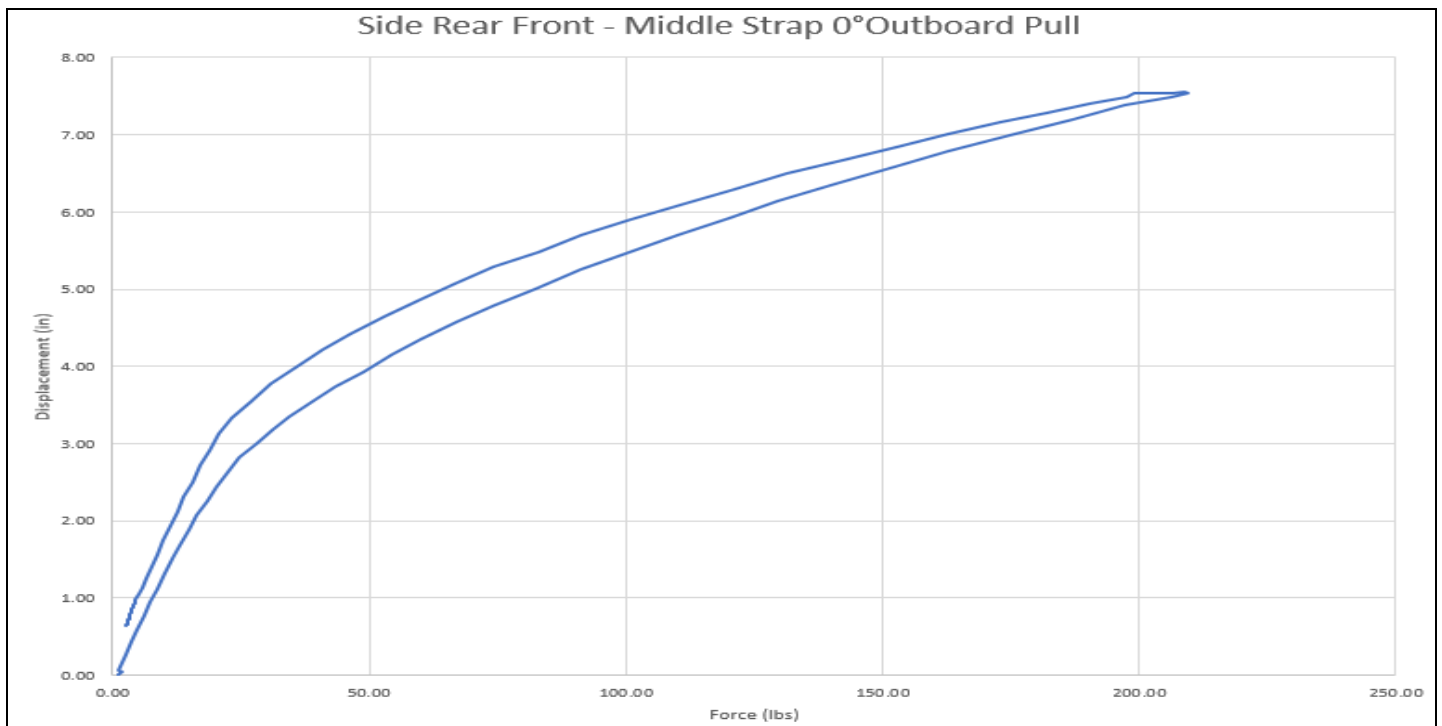


Figure 43: Side Rear Front Middle Strap Outboard Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

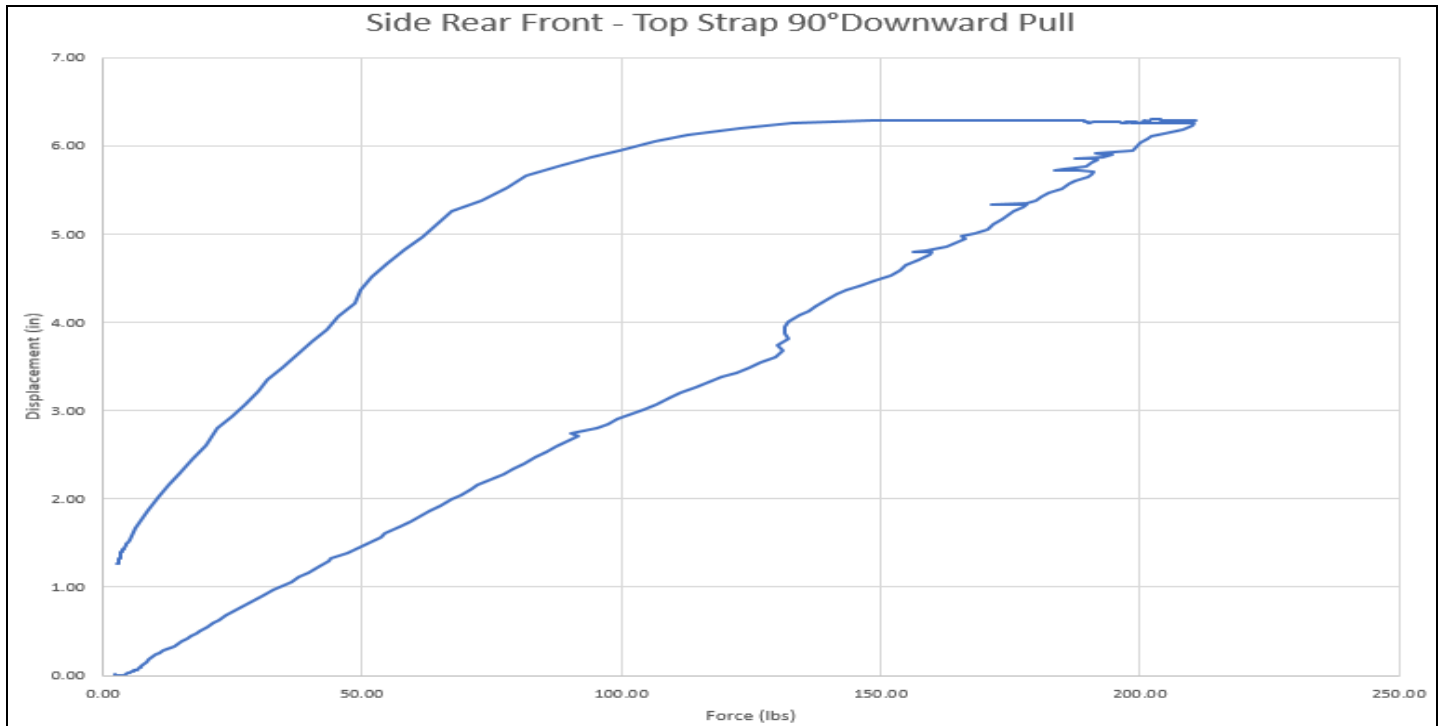


Figure 44: Side Rear Front Top Strap Downward Pull

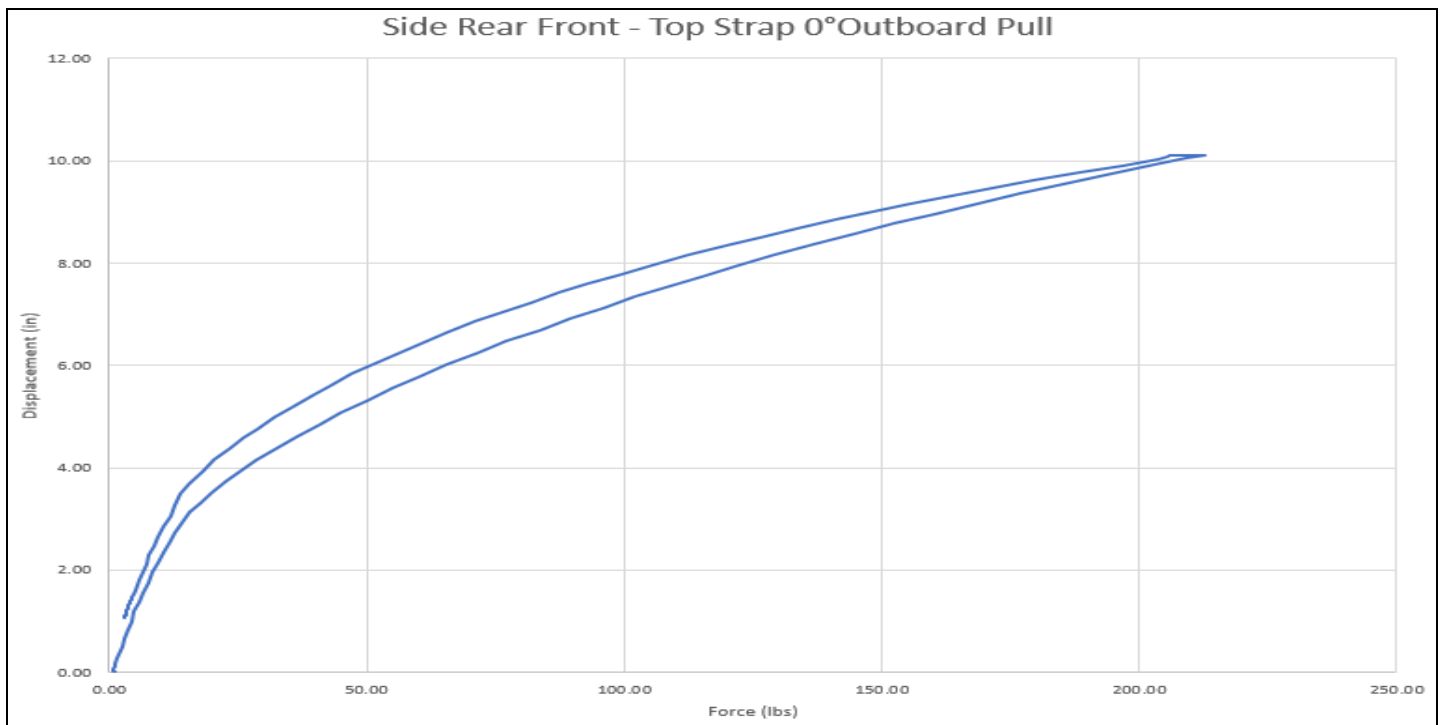


Figure 45: Side Rear Front Top Strap Outboard Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

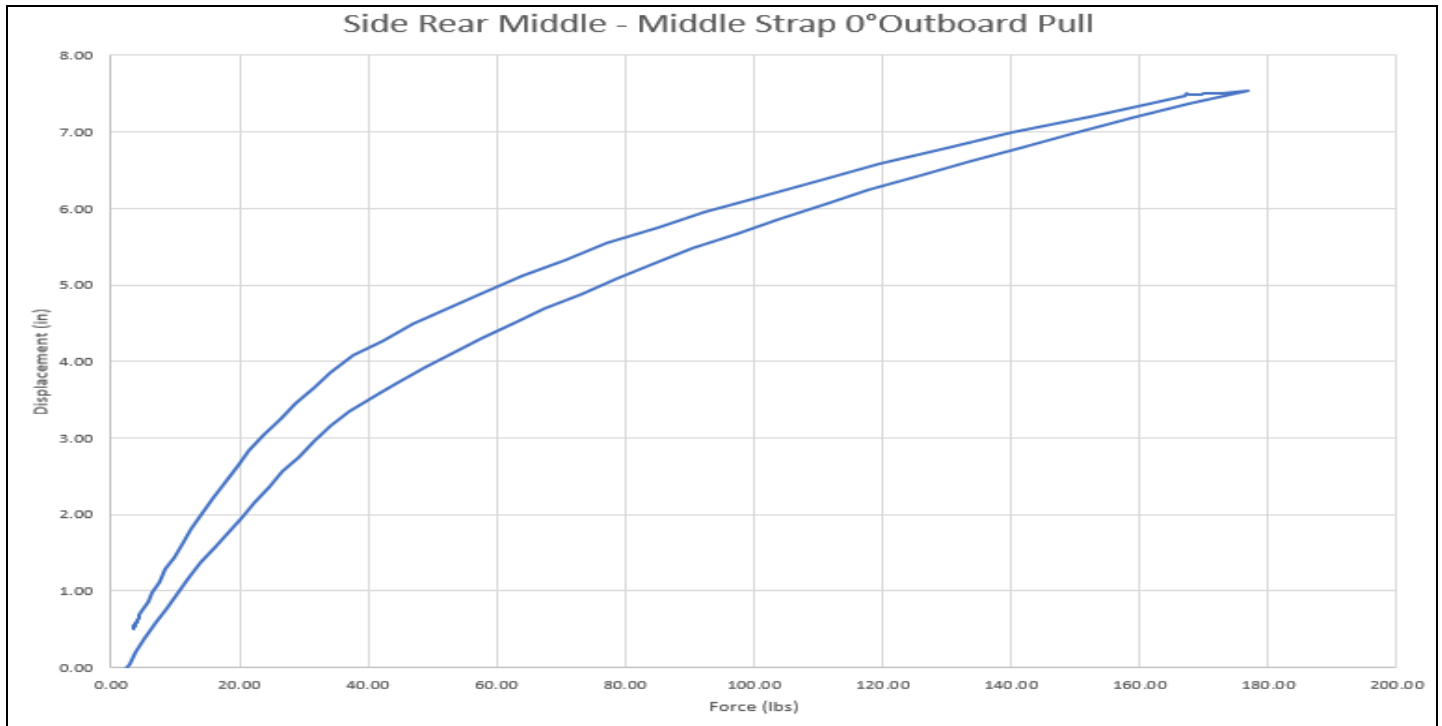


Figure 46: Side Rear Middle Middle Strap Outboard Pull

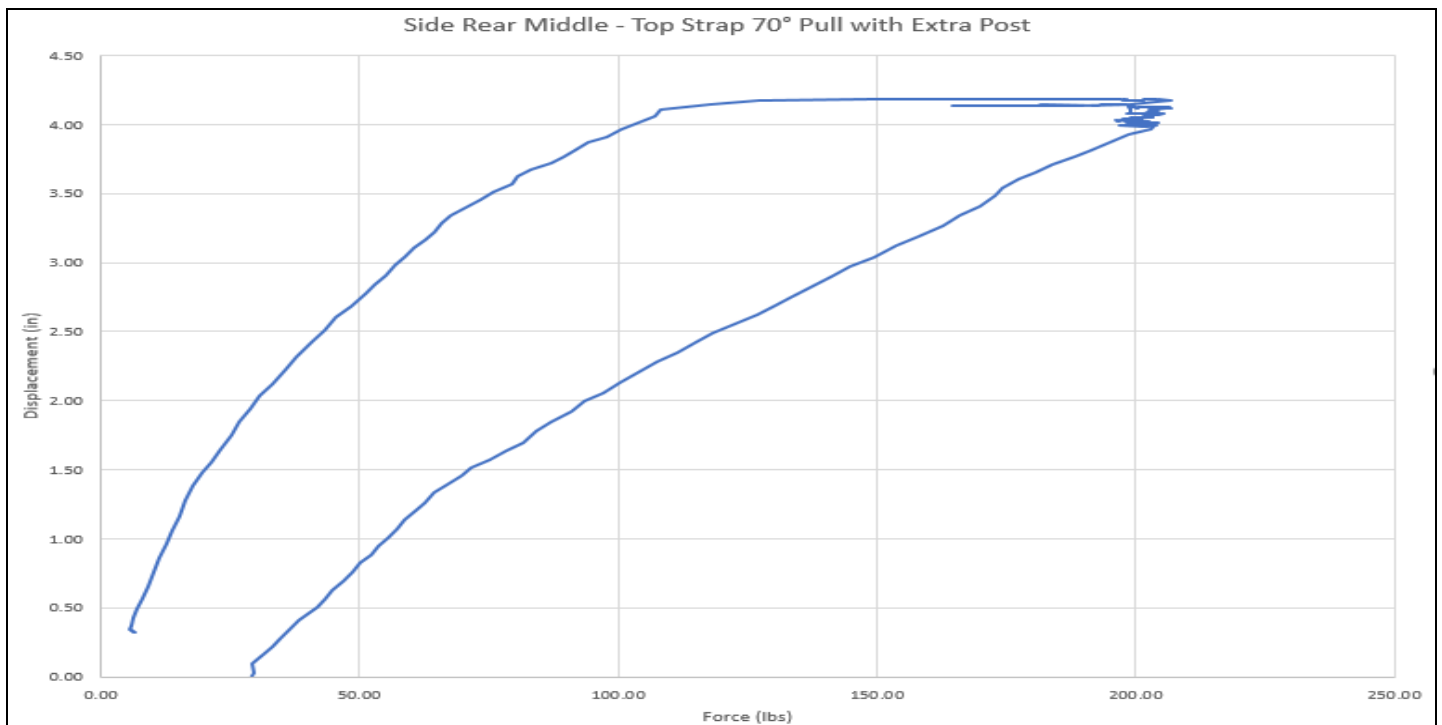


Figure 47: Side Rear Middle Top Strap 70 Degree Pull with Extra Post

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

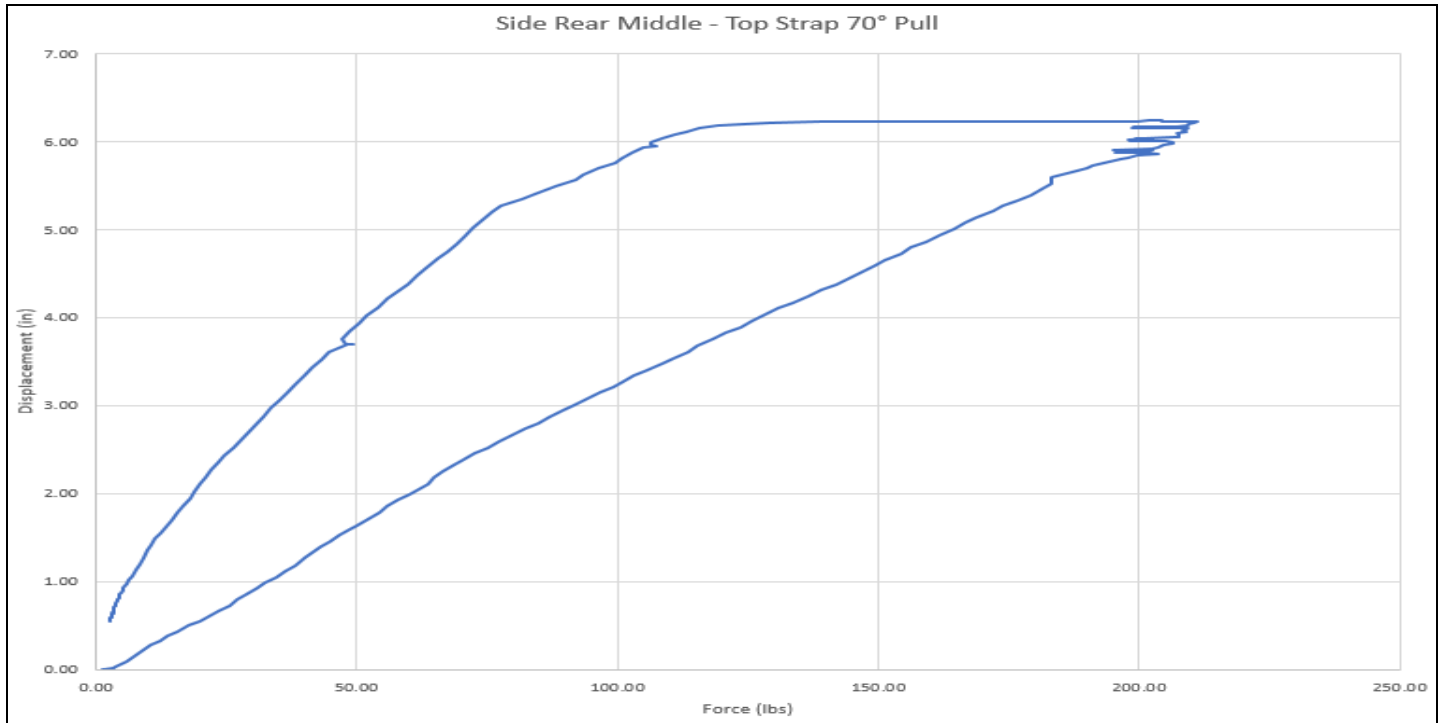


Figure 48: Side Rear Middle Top Strap 70 Degree Pull

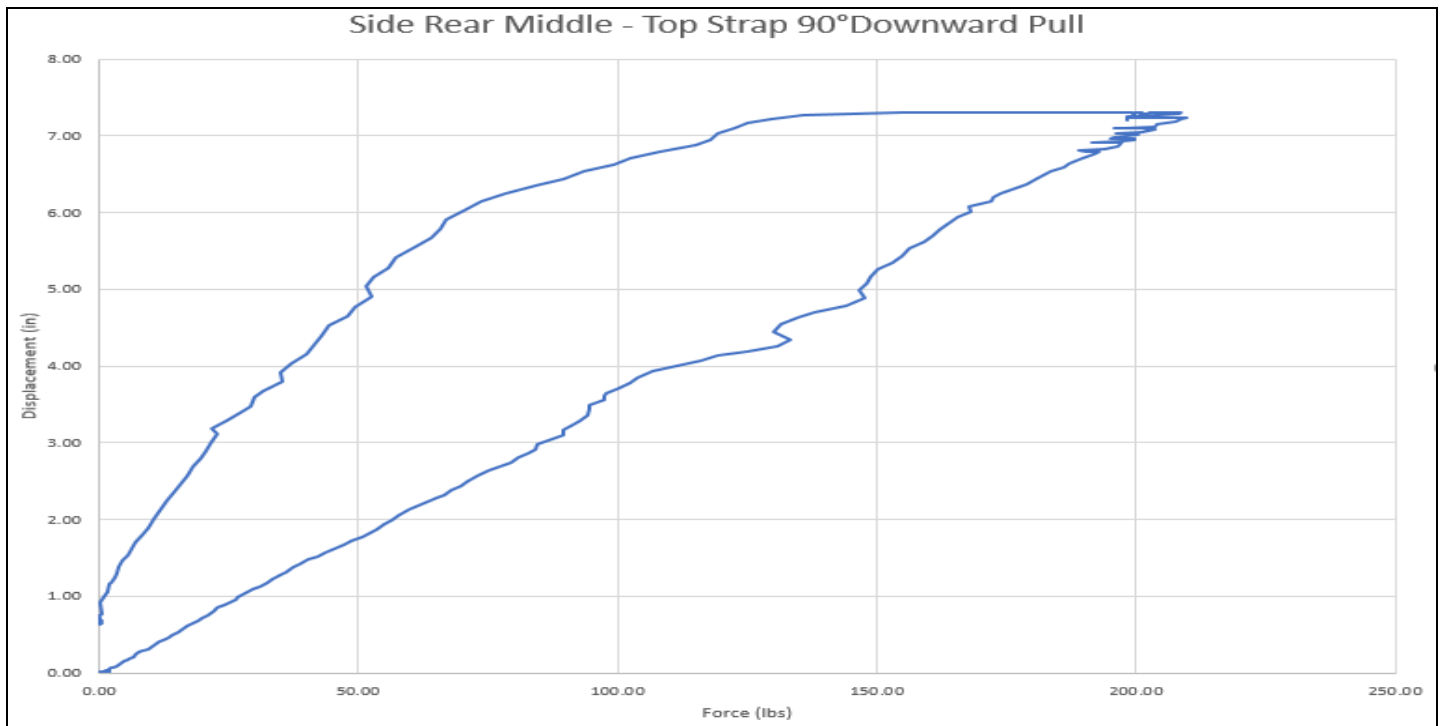


Figure 49: Side Rear Middle Top Strap Downward Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

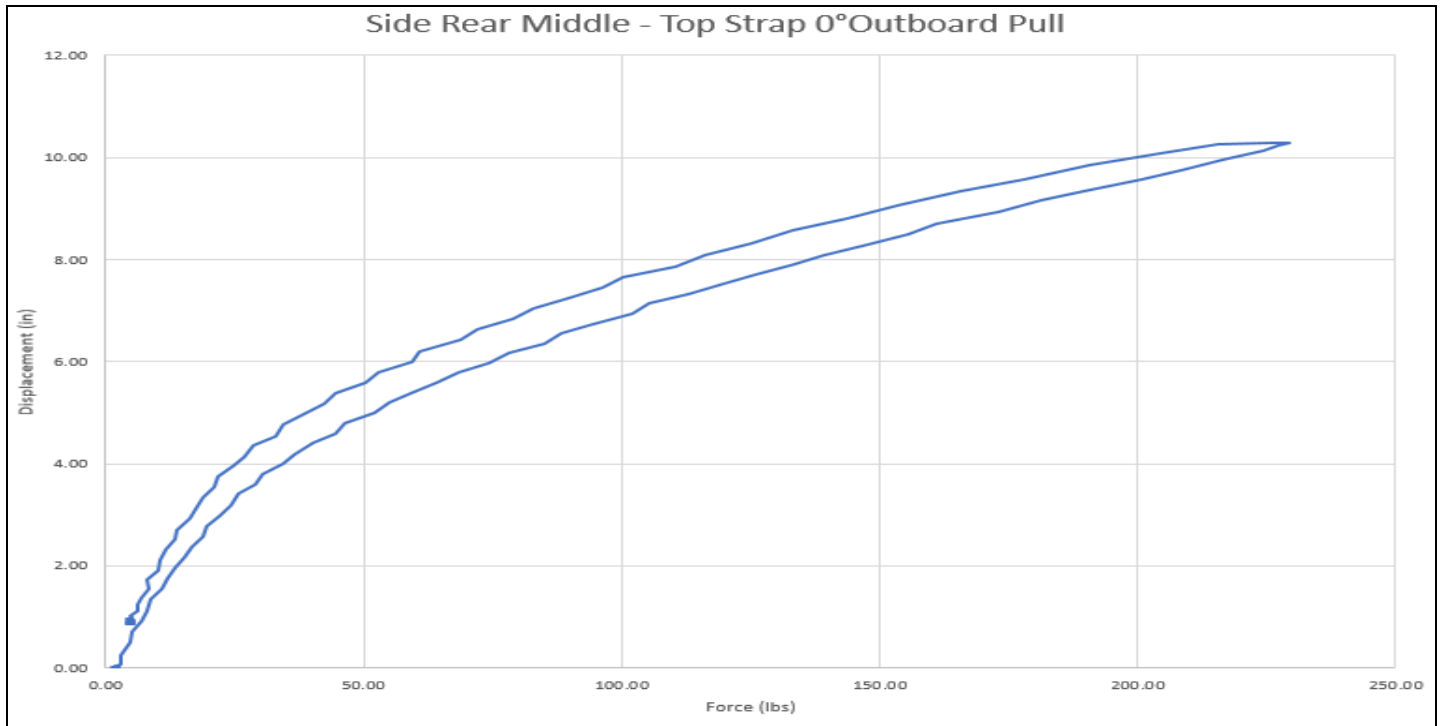


Figure 50: Side Rear Middle Top Strap Outboard Pull

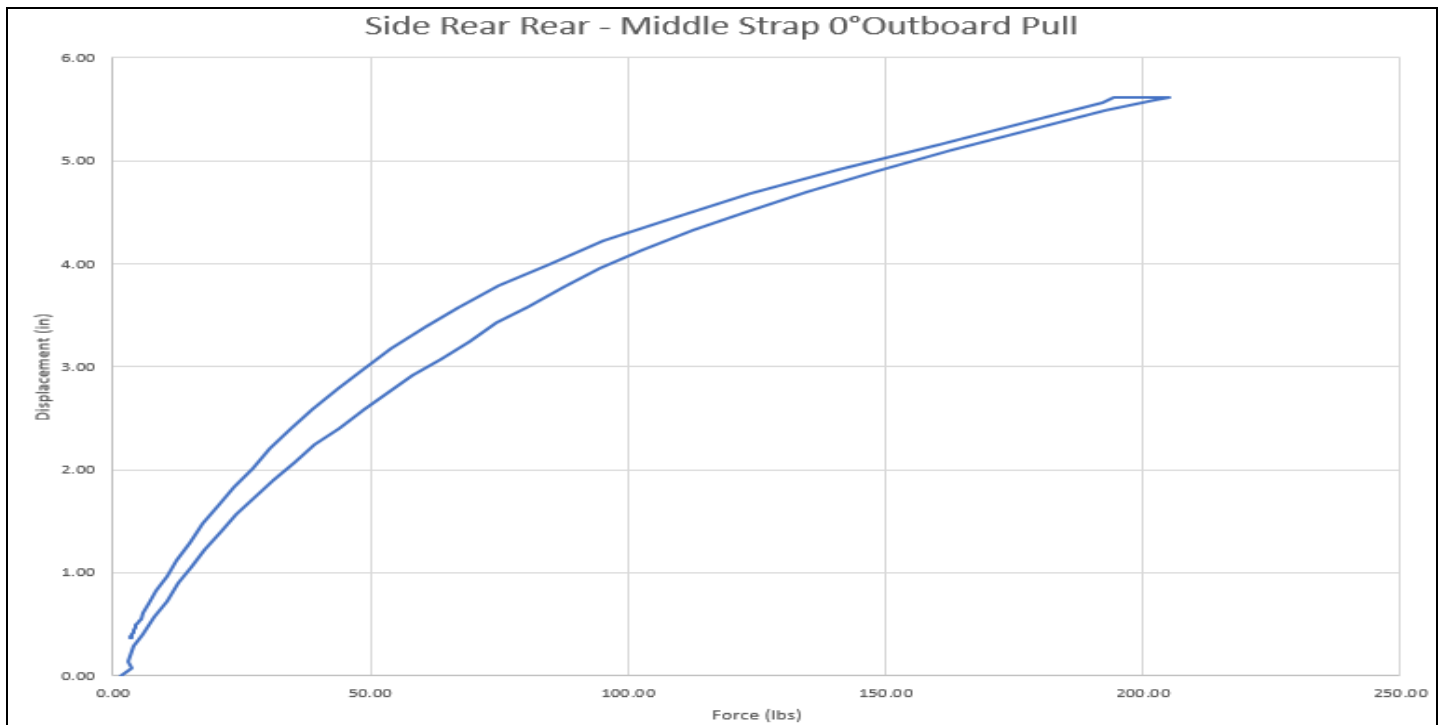


Figure 51: Side Rear Rear Middle Strap Outboard Pull

APPENDIX C – FORCE VS. DISPLACEMENT DATA (cont'd)

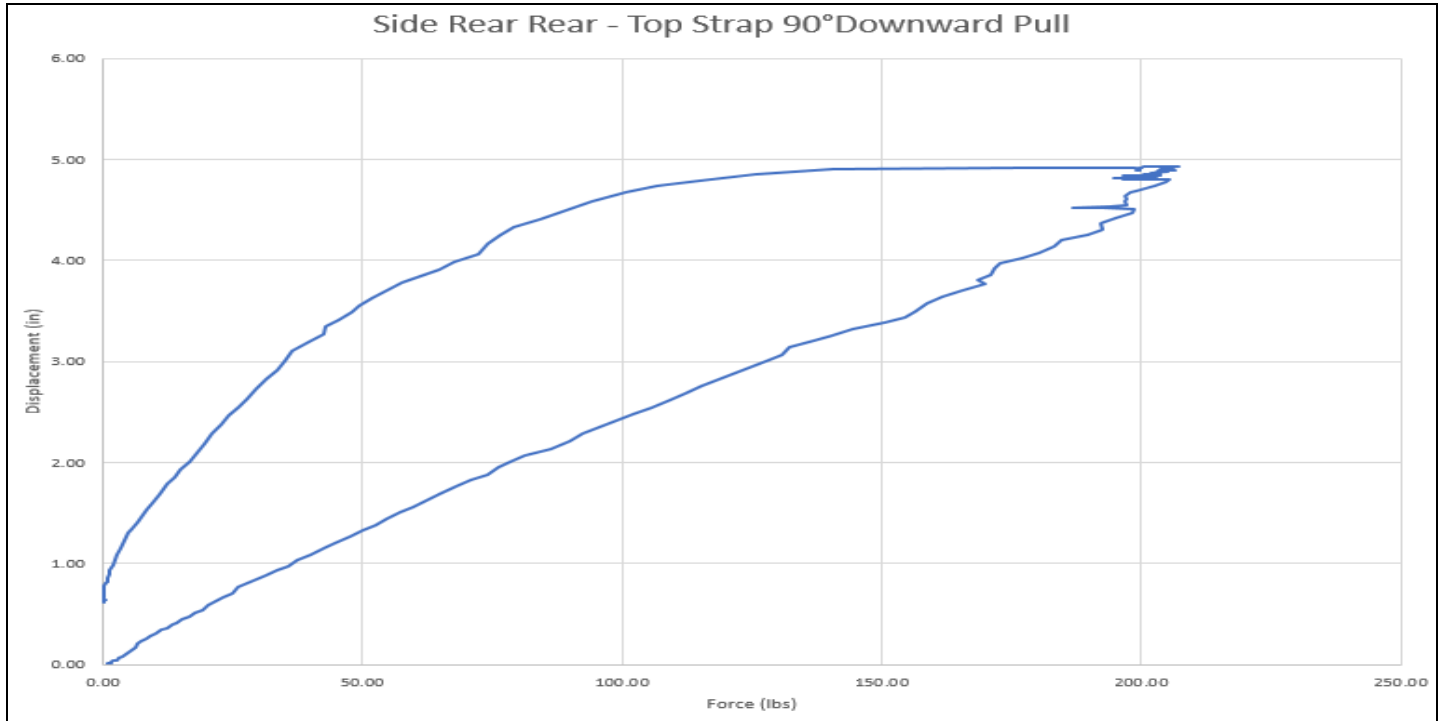


Figure 52: Side Rear Rear Top Strap Downward Pull

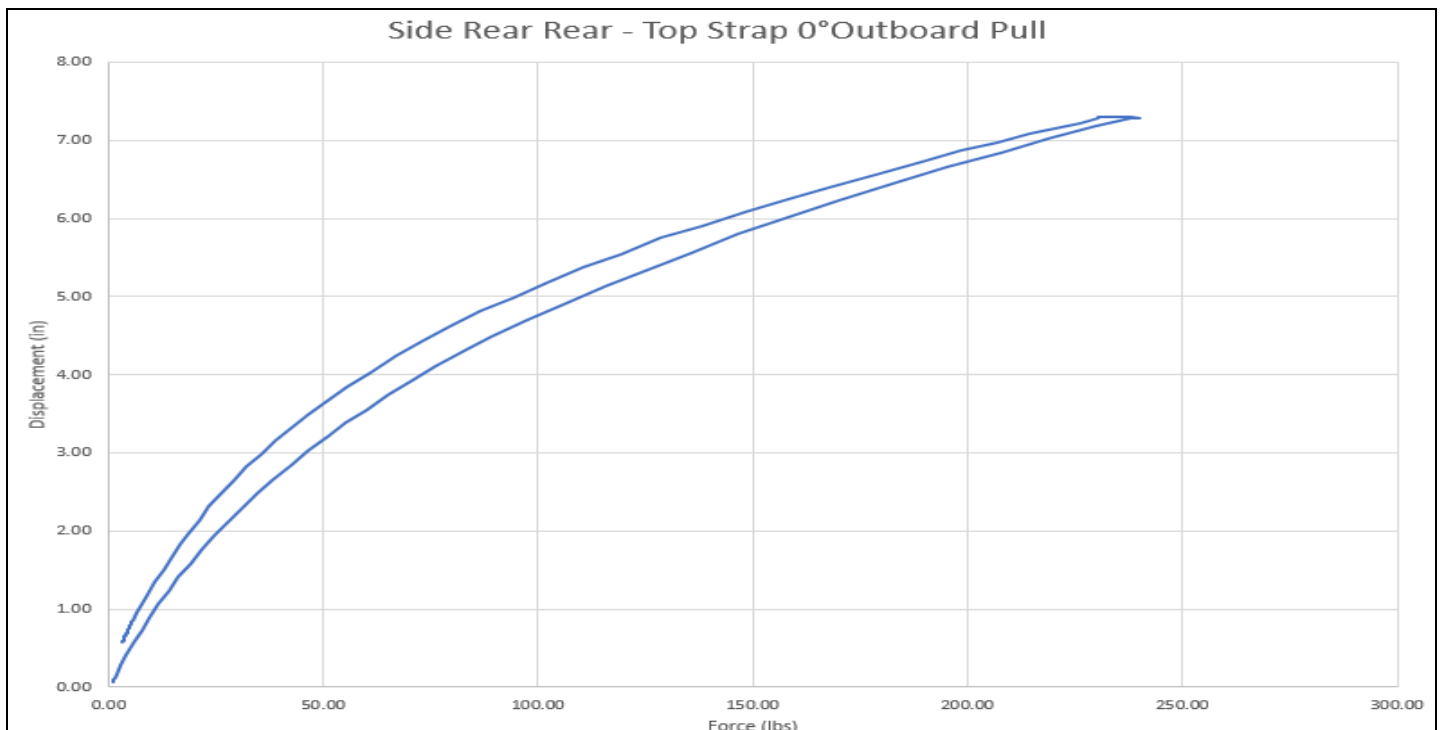


Figure 53: Side Rear Rear Top Strap Outboard Pull