

# **Heavy and Overweight Vehicle Brake Testing: Combination Six-Axle Final Report**



U.S. Department of Transportation  
**Federal Motor Carrier Safety Administration**

**May 2017**

## **FOREWORD**

The Federal Motor Carrier Safety Administration (FMCSA), in coordination with the Federal Highway Administration (FHWA), sponsored the Heavy and Overweight Vehicle Brake Testing (HOVBT) program in order to provide information about the effect of gross combination vehicle weight on braking performance. While the Federal Motor Carrier Safety Regulations (FMCSRs) limit the number of braking system defects that may exist for a vehicle to be allowed to operate on the roadways for given weight limits, the HOVBT program seeks to provide relevant stopping distance data to those considering the effect of increased cargo loads for various levels of brake defects.

This document serves as the final report for the six-axle commercial motor vehicle (CMV) research associated with this program. This phase of testing was conducted on a six-axle combination vehicle, with testing conducted both for brakes meeting the Federal Motor Vehicle Safety Standard (FMVSS) 121 reduced stopping distance requirements required by the National Highway Traffic Safety Administration (NHTSA) in the July 27, 2009 final rule and for brake components used prior to the enactment of this rule. This report provides a summary of the testing activities, the results of various analyses of the data, and recommendations for future research. Stopping tests, constant-brake-application-pressure tests, and performance-based brake tests (PBBTs) were performed on a six-axle CMV following a complete brake rebuild. Tests were performed for various brake conditions, weights, and initial speeds. Analysis of the stopping test data showed the stopping distance increasing with load in most cases (as expected) and showed more braking force being generated by the drive axle brakes than the trailer axle brakes, consistent with previous research. The relationship between initial speed, brake application, stopping distance, and load was found to be highly linear in the low to mid-pressure range, providing the basis for a proposed real-time onboard dynamic brake assessment. This research also provided valuable information regarding areas in which future research might focus.

## **NOTICE**

This document is disseminated under the sponsorship of the U.S. Department of Transportation (USDOT) in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in this document. The contents of this report reflect the views of the contractor, who is responsible for the accuracy of the data presented herein. The contents do not necessarily reflect the official policy of the USDOT. This report does not constitute a standard, specification, or regulation.

The U.S. Government does not endorse products or manufacturers named herein. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of this report.

## **QUALITY ASSURANCE STATEMENT**

FMCSA provides high-quality information to serve government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FMCSA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

## Technical Report Documentation Page

1. Report No. <b>FMCSA-PSV-16-010</b>	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle <b>Heavy and Overweight Vehicle Brake Testing: Combination Six-Axle Final Report</b>		5. Report Date <b>May 2017</b>	
		6. Performing Organization Code	
7. Author(s) <b>Lascurain, Mary Beth; Capps, Gary; Franzese, Oscar</b>		8. Performing Organization Report No. <b>ORNL/TM-2014/198</b>	
9. Performing Organization Name and Address <b>Oak Ridge National Laboratory P.O. Box 2008 Oak Ridge, TN 37831-6472</b>		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. <b>DTMC75-11-X-00040</b>	
12. Sponsoring Agency Name and Address <b>U.S. Department of Transportation Federal Motor Carrier Safety Administration Office of Analysis, Research, and Technology 1200 New Jersey Ave. SE Washington, DC 20590</b>		13. Type of Report and Period Covered <b>Final Report, December 2015</b>	
		14. Sponsoring Agency Code <b>FMCSA</b>	
15. Supplementary Notes <b>Contracting Officer's Manager: Luke W. Loy</b>			
16. Abstract <b>The Heavy and Overweight Vehicle Brake Testing (HOVBT) program exists in order to provide information about the effect of gross vehicle weight (GVW) and on braking performance testing included service brake stopping distance tests, constant-pressure stopping distance tests, and performance-based brake tests. Tests were performed for various combinations of GVW, initial vehicle speed, brake application pressure, and brake condition (with brakes on select wheel-ends disabled). Analysis of the stopping test data showed the stopping distance increasing with load in most cases (as expected) and showed more braking force being generated by the drive axle brakes than the trailer axle brakes, consistent with previous research. The relationship between initial speed, brake application, stopping distance, and load was found to be highly linear in the low to mid-pressure range, providing the basis for a proposed real-time onboard dynamic brake assessment. This research also provided valuable information regarding areas in which future research might focus.</b>			
17. Key Words <b>Commercial motor vehicle, crash avoidance, brake testing, six-axle, HOVBT.</b>		18. Distribution Statement <b>No restrictions</b>	
19. Security Classif. (of this report) <b>Unclassified</b>	20. Security Classif. (of this page) <b>Unclassified</b>	21. No. of Pages <b>111</b>	22. Price

# SI\* (MODERN METRIC) CONVERSION FACTORS

Approximate Conversions to SI Units				
Symbol	When You Know	Multiply By	To Find	Symbol
<b>Length</b>				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
<b>Area</b>				
in <sup>2</sup>	square inches	645.2	square millimeters	mm <sup>2</sup>
ft <sup>2</sup>	square feet	0.093	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.836	square meters	m <sup>2</sup>
ac	Acres	0.405	hectares	ha
mi <sup>2</sup>	square miles	2.59	square kilometers	km <sup>2</sup>
<b>Volume (volumes greater than 1,000L shall be shown in m<sup>3</sup>)</b>				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft <sup>3</sup>	cubic feet	0.028	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.765	cubic meters	m <sup>3</sup>
<b>Mass</b>				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2,000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
<b>Temperature (exact degrees)</b>				
°F	Fahrenheit	5(F-32)/9 or (F-32)/1.8	Celsius	°C
<b>Illumination</b>				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m <sup>2</sup>	cd/m <sup>2</sup>
<b>Force and Pressure or Stress</b>				
lbf	poundforce	4.45	newtons	N
lbf/in <sup>2</sup>	poundforce per square inch	6.89	kilopascals	kPa
Approximate Conversions from SI Units				
Symbol	When You Know	Multiply By	To Find	Symbol
<b>Length</b>				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
<b>Area</b>				
mm <sup>2</sup>	square millimeters	0.0016	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	10.764	square feet	ft <sup>2</sup>
m <sup>2</sup>	square meters	1.195	square yards	yd <sup>2</sup>
Ha	hectares	2.47	acres	ac
km <sup>2</sup>	square kilometers	0.386	square miles	mi <sup>2</sup>
<b>Volume</b>				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m <sup>3</sup>	cubic meters	35.314	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.307	cubic yards	yd <sup>3</sup>
<b>Mass</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2,000 lb)	T
<b>Temperature (exact degrees)</b>				
°C	Celsius	1.8c+32	Fahrenheit	°F
<b>Illumination</b>				
lx	lux	0.0929	foot-candles	fc
cd/m <sup>2</sup>	candela/m <sup>2</sup>	0.2919	foot-Lamberts	fl
<b>Force and Pressure or Stress</b>				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in <sup>2</sup>

\* SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003, Section 508-accessible version September 2009.)

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>XI</b>
<b>1. INTRODUCTION.....</b>	<b>1</b>
1.1 BACKGROUND AND PROGRAM OVERVIEW .....	1
1.2 FIVE-AXLE TESTING .....	1
1.3 SIX-AXLE TESTING .....	2
<b>2. TEST SETUP .....</b>	<b>3</b>
2.1 DESCRIPTION OF TEST VEHICLE.....	3
2.2 BRAKE REBUILD AND INSTRUMENTATION.....	5
2.3 TYPES OF TESTS .....	6
2.3.1 Service Brake Stops .....	6
2.3.2 Constant-Pressure Stops.....	6
2.3.2 Performance-Based Brake Tests.....	7
2.3.3 Other Measurements .....	7
<b>3. OVERVIEW OF COLLECTED DATA.....</b>	<b>9</b>
3.1 DESCRIPTION OF DATA .....	9
3.2 CALCULATION OF KEY PARAMETERS FOR EACH STOP .....	11
3.3 ADDITIONAL DATA COMMENTS.....	12
<b>4. ANALYSIS OF SERVICE BRAKE STOP DATA.....</b>	<b>13</b>
4.1 TRACTOR TESTING WITH A CONTROL TRAILER .....	13
4.2 OVERVIEW OF RESULTS FOR 20 MI/H SERVICE BRAKE STOPS .....	13
4.3 OVERVIEW OF RESULTS FOR 60 MI/H SERVICE BRAKE STOPS .....	15
4.4 ANTI-LOCK BRAKING SYSTEM AND SERVICE BRAKE STOP DATA .....	17
4.5 OBSERVED TRENDS IN SERVICE BRAKE STOP DATA .....	19
4.6 ANALYSIS OF TIRE LOAD CAPACITY .....	19
<b>5. ANALYSIS OF PERFORMANCE-BASED BRAKE TESTER DATA .....</b>	<b>21</b>
5.1 OVERVIEW OF RESULTS.....	21
5.2 DATA OBSERVATIONS .....	21
5.3 COMPARISON OF SCALE AND PBBT-REPORTED WEIGHTS.....	23
<b>6. DEVELOPMENT OF CONSTANT-PRESSURE DECELERATION MODEL.....</b>	<b>25</b>
6.1 BACKGROUND .....	25

6.2	LINEAR PRESSURE REGION .....	25
6.3	EFFECT OF GROSS VEHICLE WEIGHT .....	26
6.4	EFFECT OF INITIAL SPEED .....	27
6.5	LINEAR MODEL FROM MULTIPLE REGRESSION ANALYSIS .....	28
6.6	LINEAR MODEL APPLIED TO OTHER CONSTANT-PRESSURE DATA SETS	29
6.7	APPLICATION OF LINEAR MODEL .....	34
6.8	POSSIBLE RTDBA APPLICATIONS OF MODEL.....	34
6.8.1	Detection of Degradation of Brake Performance.....	34
6.8.2	Determination of “Safe” and “Unsafe” Performance Regions .....	35
<b>7.</b>	<b>LESSONS LEARNED.....</b>	<b>37</b>
7.1	PROCUREMENT AND SCHEDULING PROCESSES.....	37
7.2	REDUCED DATASET FOR RTDBA SUPPORT .....	37
<b>8.</b>	<b>FUTURE DIRECTIONS.....</b>	<b>39</b>
	<b>REFERENCES.....</b>	<b>97</b>

## **LIST OF APPENDICES**

<b>APPENDIX A: SUMMARY OF STOPPING TEST RESULTS.....</b>	<b>41</b>
<b>APPENDIX B: BRAKE STROKE MEASUREMENT LOG .....</b>	<b>79</b>
<b>APPENDIX C: PBBT RESULTS .....</b>	<b>89</b>

## LIST OF FIGURES

Figure 1. Photo. Test vehicle in 80,000-lb GVW configuration.....	5
Figure 2. Chart. Time history plot of data from a constant-pressure stop. ....	10
Figure 3. Chart. Comparison of stopping distances for 20 mi/h service brake stops (RSD brakes). ....	14
Figure 4. Chart. Comparison of stopping distances for 20 mi/h service brake stops (non- RSD brakes). ....	14
Figure 5. Chart. Comparison of stopping distances for 60 mi/h service brake stops (RSD). ....	16
Figure 6. Chart. Comparison of stopping distances for 60 mi/h service brake stops (non- RSD). ....	17
Figure 7. Chart. Effect of disabling ABS on 20 mi/h stopping distance. ....	18
Figure 8. Chart. Effect of disabling ABS on 60 mi/h stopping distance. ....	18
Figure 9. Chart. Brake efficiency of test vehicles. ....	22
Figure 10. Chart. Total braking force for each loading condition as measured by the PBBT. ....	22
Figure 11. Chart. Comparison of PBBT and scale-reported GVW. ....	23
Figure 12. Chart. Pressure-deceleration curves for RSD brakes tested at 80,000-lb load. ....	26
Figure 13. Chart. Deceleration vs. GVW for 40-mi/h RSD testing with fully-functioning brakes. ....	27
Figure 14. Chart. Deceleration versus initial speed for RSD testing with fully-functioning brakes at 88,000 lb. ....	28
Figure 15. Equation. Linear model from multiple regression analysis. ....	28
Figure 16. Chart. Linear deceleration model for 6-axle RSD test vehicle at 90,000-lb GVW. ....	32
Figure 17. Chart. Linear deceleration model for 6-axle non-RSD test vehicle at 88,000-lb GVW (view 1). ....	33
Figure 18. Chart. Linear deceleration model for 6-axle non-RSD test vehicle at 88,000-lb GVW (view 2). ....	34
Figure 19. Graph. Potential “safe region” application of linear deceleration model. ....	35



## LIST OF TABLES

Table 1. General tractor information. ....	3
Table 2. Tractor axle information. ....	3
Table 3. Tractor RSD brakes. ....	3
Table 4. Tractor standard (non-RSD) brakes. ....	4
Table 5. Tractor tire specifications. ....	4
Table 6. General trailer specifications. ....	4
Table 7. Trailer brake specifications. ....	4
Table 8. Trailer tire specifications. ....	4
Table 9. Stopping test streaming data. ....	9
Table 10. Test weights (lb) for RSD brake testing. ....	10
Table 11. Test weights (lb) for non-RSD brake testing. ....	11
Table 12. PBBT service brake streaming data. ....	11
Table 13. Parameters calculated for each stopping test. ....	12
Table 14. FMVSS 121 stopping distance test results. ....	13
Table 15. Average corrected stopping distance for 20 mi/h service brake stops (RSD brakes). ....	15
Table 16. Average corrected stopping distance for 20 mi/h service brake stops (non-RSD brakes). ....	15
Table 17. Average corrected stopping distances for 60 mi/h service brake stops (RSD). ....	16
Table 18. Average corrected stopping distances for 60 mi/h service brake stops (non-RSD brakes). ....	17
Table 19. Tire load capacity for RSD loading conditions. ....	19
Table 20. Tire load capacity for non-RSD loading conditions. ....	20
Table 21. PBBT scores for fully-functioning brake systems. ....	21
Table 22. Comparison of scale and PBBT-reported GVW. ....	23
Table 23. Multiple regression values for six-axle RSD constant-pressure stop data (fully functioning brakes). ....	29
Table 24. Linear model values for five-axle and six-axle RSD brake testing. ....	30
Table 25. Linear model values for six-axle non-RSD brake testing. ....	31
Table 26. RSD PBBT results—fully functioning brakes. ....	90
Table 27. RSD PBBT results—front drive brakes disabled. ....	91
Table 28. RSD PBBT results—middle trailer brakes disabled. ....	92
Table 29. RSD PBBT results—front and right rear drive brakes disabled. ....	93
Table 30. RSD PBBT results—middle and right rear trailer brakes disabled. ....	94
Table 31. RSD PBBT results—steer brakes disabled. ....	95
Table 32. Non-RSD PBBT results—fully functioning brakes. ....	96

## LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

<b>Acronym</b>	<b>Definition</b>
ABS	anti-lock braking system
CFR	Code of Federal Regulations
CMV	commercial motor vehicle
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FMCSR	Federal Motor Carrier Safety Regulation
ft/s <sup>2</sup>	feet per second squared
FMVSS	Federal Motor Vehicle Safety Standard
GPS	global positioning system
GVW	gross vehicle weight
GVWR	gross vehicle weight rating
HOVBT	heavy and overweight vehicle brake testing
Hz	Hertz
mi/h	miles per hour
MTDC	medium truck duty cycle
NHTSA	National Highway Transportation Safety Administration
ORNL	Oak Ridge National Laboratory
PBBT	performance-based brake tester
psi	pounds per square inch
RSD	reduced stopping distance
RTDBA	real-time dynamic brake assessment
sec	seconds

**Acronym****Definition**

VIN

vehicle identification number

[This page intentionally left blank.]

## EXECUTIVE SUMMARY

The Federal Motor Carrier Safety Administration (FMCSA), in coordination with the Federal Highway Administration (FHWA), sponsored the Heavy and Overweight Vehicle Brake Testing (HOVBT) program in order to provide information about the effect of gross vehicle weight (GVW) on braking performance. The examination of the effect of brake defects on brake performance for increased vehicle weight is important because the Federal Motor Carrier Safety Regulations (FMCSRs) limit the number of braking system defects that may exist for a vehicle to be allowed to operate on the roadways. The HOVBT program seeks to provide relevant stopping distance data for increasing cargo loads at various levels of brake defects.

This phase of testing was conducted on a six-axle combination vehicle with two different tractor conditions; one with brake components used by the tractor manufacturer to comply with the Federal Motor Vehicle Safety Standard (FMVSS) 121 reduced stopping distance requirements required by the National Highway Traffic Safety Administration (NHTSA) in the July 27, 2009 final rule, and one with brake components used by the manufacturer prior to the enactment of the FMVSS-121 reduced stopping distance requirements. This report provides a summary of the testing activities, the results of various analyses of the data, and recommendations for future research. Following a complete brake rebuild, instrumentation, and brake burnish, service brake tests were performed on the test vehicle by applying full system brake application pressure from initial speeds of 20 and 60 mi/h until the vehicle came to a stop. These were conducted for various brake conditions at the following GVWs: 80,000, 88,000, 97,000, 112,000, and 132,000 lb. The 97,000-lb GVWs included both balanced and unbalanced loads (where the load on the trailer was biased to increase the load on the drive axle of the tractor). Similar constant-pressure stops were performed on the full tractor-trailer combination vehicle with various brake application pressures (15 pounds per square inch [psi], 25 psi, 35 psi, 45 psi, 55 psi) from 20, 40, and 60 mi/h for three loading conditions (GVWs): 80,000 lb; 88,000 lb; and 97,000 lb (balanced). For both types of stopping tests, the condition of the braking system was varied by introducing a variety of brake defects on axle and wheel end combinations by making those brakes inoperative. In addition to the stopping tests, performance-based brake tests (PBBTs) were conducted for the various loading and brake conditions.

Analysis of the stopping test data showed the stopping distance to increase with load in most cases (as expected) and also showed that more braking force was generated by the drive axle brakes, as measured in relative stopping distance length, than the trailer axle brakes—an observation consistent with earlier five-axle research. The linear relationships between initial speed, brake application, stopping distance, and load was used to develop a model relating these parameters to one another, allowing predictions to be made about any one of these parameters provided that the others were known.

This research also provided valuable information regarding areas in which future research might focus, including the need for further data collection to develop and test an onboard brake assessment algorithm and similar stopping distance tests of vehicles with other body types and trailer configurations.

[This page intentionally left blank.]

# 1. INTRODUCTION

## 1.1 BACKGROUND AND PROGRAM OVERVIEW

Commercial trucks normally travel at or below the maximum weight allowed by the Federal Highway Administration (FHWA) Bridge Formula on the interstate highways. Many states allow commercial trucks to operate on state roads and highways at weights significantly higher than that allowed under the FHWA Bridge Formula. The Federal Motor Carrier Safety Administration (FMCSA) and FHWA are interested in gathering real-world brake performance and stopping distance test data on vehicles representative of current in-use commercial motor vehicles (CMVs) that are operating at Bridge Formula weights, weights that are grandfathered under state commercial truck weight provisions on non-interstate highways, and permitted weights.

The Heavy and Overweight Vehicle Brake Testing (HOVBT) program was designed to provide information about the effect of gross vehicle weight (GVW) on braking performance. Because the Federal Motor Carrier Safety Regulations (FMCSRs) limit the number of braking system defects that may exist for a vehicle to be allowed to operate on the roadways, the effect of brake defects on brake performance for increased loads was also examined. The HOVBT program seeks to provide relevant information to policy makers responsible for establishing load limits, beginning with providing test data for the combination tractor/trailer configuration.

## 1.2 FIVE-AXLE TESTING

The first study in the HOVBT program involved a five-axle combination vehicle fitted with brakes meeting the reduced stopping distance (RSD) requirement rulemaking. This report provides a summary of the testing activities, the results of various analyses of the data, and recommendations for future research. Following a complete brake rebuild, instrumentation, and brake burnish, stopping tests were performed from 20 and 40 miles per hour mi/h with various brake application pressures (15 pounds per square inch [psi], 25 psi, 35 psi, 45 psi, 55 psi, and full system pressure). These tests were conducted for various brake conditions at the following GVWs: 60,000, 80,000, 91,000, 97,000, 106,000, and 116,000 lb. The 80,000-lb GVWs included both balanced and unbalanced loads. The condition of the braking system was also varied. To introduce these defects, brakes (none, forward drive axle, or rear trailer axle) were made inoperative. In addition to the stopping tests, performance-based brake tests were conducted for the various loading and brake conditions.

Analysis of the stopping test data showed the stopping distance to increase with load (as expected) and also showed that more braking force was generated by the drive axle brakes than the trailer axle brakes. The constant-pressure stopping test data revealed a linear relationship between brake application pressure and deceleration and was used to develop an algorithm to normalize stopping data for weight and initial speed.

Additional, future five-axle combination vehicle testing may involve standard (non-RSD) brakes and/or low-rolling-resistance tires.

### **1.3 SIX-AXLE TESTING**

This report outlines the testing and analysis activities conducted to support follow-on six-axle vehicle research. The first part of the six-axle testing was conducted in 2013 and involved a combination vehicle equipped with RSD brakes. Similar to the five-axle research, tests for this phase of the research effort included PBBT tests, service brake stops, and constant-pressure stops. FMVSS-121-protocol tests were performed, and additional brake defect conditions were tested.

Oak Ridge National Laboratory (ORNL) gathered the required stopping distance data via a subcontract to Link Commercial Vehicle Testing (East Liberty, OH) and analyzed the data to provide background information regarding the braking capability of air-braked commercial combination vehicles operating at maximum weight allowed by FHWA Bridge Formula and in heavy weight conditions under various levels of brake performance. This testing was conducted on a vehicle with larger tractor brakes meeting the RSD requirement rulemaking reflected in Federal Motor Vehicle Safety Standard (FMVSS) 121 (49 CFR Part 571). A similar set of tests were repeated on the same vehicle fitted instead with non-RSD tractor brake components. This report provides a summary of the testing activities, the results of various analyses of the data, and recommendations for future research.



## 2. TEST SETUP

This section provides information regarding the test vehicle and various tests performed as part of the HOVBT effort.

### 2.1 DESCRIPTION OF TEST VEHICLE

The test vehicle was a 2013 model year Volvo VNL tractor with a 48-ft Wabash flatbed trailer in a three-axle configuration. The specifications for the tractor are shown in Table 1, Table 2, Table 3, Table 4, and Table 5. The trailer specifications are shown in Table 6, Table 7, and Table 8. The combination tractor/trailer is shown in the 80,000-lb GVW balanced load configuration in Figure 1.

**Table 1. General tractor information.**

Manufacturer	Type	Model Number	Date of Manufacture	Vehicle Identification Number (VIN)	GVWR	Number of Axles
Volvo	6x4 Tractor	2013 VNL64T 670	February 2012	4V4NC9THODN567602	51,200 lb	3

**Table 2. Tractor axle information.**

Specification	Axle 1	Axle 2	Axle 3
Gross axle weight rating (GAWR) (lb)	13,200	19,000	19,000
Suspension Type	Leaf Spring	Airbag	Airbag

**Table 3. Tractor RSD brakes.**

Specification	Axle 1	Axle 2	Axle 3
Manufacturer	Meritor	Meritor	Meritor
Type	S-cam	S-cam	S-cam
Size	16.5 x 5	16.5 x 7	16.5 x 7
Lining Code	MA1201	MA2001	MA2001
Chamber Make/Size (in)	MGM 24L	MGM 3030	MGM T30L3
Slack Make/Size	Meritor / 5.5	Meritor / 5.5	Meritor / 5.5
Rotor or Drum Make/Part #	Gunite 3772x	Gunite 3600Ax	Gunite 3600Ax
Anti-lock Braking System (ABS)	Bendix 6s4m	Bendix 6s4m	Bendix 6s4m

**Table 4. Tractor standard (non-RSD) brakes.**

Specification	Axle 1	Axle 2	Axle 3
Manufacturer	Meritor	Meritor	Meritor
Type	S-cam	S-cam	S-cam
Size	15 x 4	16.5 x 7	16.5 x 7
Lining Code	R301	R301	R301
Chamber Make/Size (in)	MGM T20	MGM T3030	MGM T30L3
Slack Make/Size	Meritor/5.5	Meritor / 5.5	Meritor / 5.5
Rotor or Drum Make/Part #	Gunite 3800x	Gunite 3600Ax	Gunite 3600Ax
ABS	Bendix 6s4m	Bendix 6s4m	Bendix 6s4m

**Table 5. Tractor tire specifications.**

Specification	Axle 1	Axle 2	Axle 3
Manufacturer	Bridgestone	Bridgestone	Bridgestone
Tread Name	R280	M726EL	M726EL
Size	295/75R22.5	295/75R22.5	295/75R22.5
Load Range	"H"	"G"	"G"
Pressure	110 psi	110 psi	110 psi
Max Load per Tire (Config.)	6,780 lb (single)	5,675 lb (dual)	5,675 lb (dual)

**Table 6. General trailer specifications.**

Make/Model	Suspension
Wabash	Airbag

**Table 7. Trailer brake specifications.**

Make/Model	Type/Size	Chambers Make/Size	Slacks Make/Size	Lining Edge Code	(Drum—Rotor) Number/Size	ABS Manufacturer
Meritor/S-Cam	16.5x7	Bendix 30/30	Bendix 5.5"	MA212	Meritor 123207	Bendix

**Table 8. Trailer tire specifications.**

Make / Model	Size	Pressure	Max Load per Tire
Bridgestone R280	295/75R22.5 (Load Range H)	105 psi	5,940 lb (dual)



**Figure 1. Photo. Test vehicle in 80,000-lb GVW configuration.**

Source: Oak Ridge National Laboratory.

The test tractor was first outfitted with the larger front brakes, complying with the RSD requirements for three-axle tractors with a GVWR of 59,600 lb or less manufactured on or after August 1, 2011. Tests were then repeated with the tractor axle brake components replaced with non-RSD brake drums and brake pad components.

## **2.2 BRAKE REBUILD AND INSTRUMENTATION**

In preparation for testing, a complete foundation brake rebuild was performed. Linings, drums, anchor pins, anchor pin bushings, brake shoe rollers, and return springs were replaced. Other foundation brake components were found to be in acceptable condition and were not replaced. The tires on the test vehicle were also replaced as the originals showed excessive wear. Prior to testing each set of brakes (RSD and non-RSD), a 500-stop burnish was performed on the new brake system in accordance with the FMVSS-121 procedure.

The process of rebuilding and burnishing ensured the effects of loading, brake condition, and brake application pressure on brake performance examined in this study were not compounded by performance degradation introduced by any braking system components that were worn, faulty, or not properly broken in.

In preparation of the various tests performed as part of this research, the test vehicle was instrumented with sensors to collect speed, brake application pressure, and related data. A complete list of all the signals collected appears in Section 3.1. In addition, a pressure regulator was installed near the treadle valve to allow the operator to provide a precise brake application pressure to the primary and secondary pressure circuits.

## **2.3 TYPES OF TESTS**

The following tests were performed for various brake conditions at the following approximate GVWs: 80,000 lb, 88,000 lb, 97,000 lb, 112,000 lb, and 132,000 lb. The 97,000-lb GVW loading conditions included both balanced and unbalanced loads. The condition of the braking system was also varied. To introduce these defects, various combinations of brakes were made inoperative rather than changing adjustment—not only is this the easiest to quantify (in terms of brake degradation), but it is the worst-case scenario for a brake defect. The following brake conditions were tested:

- Fully-functioning braking system.
- Disabled tractor drive brakes on one axle (front drive axle).
- Disabled trailer brakes on one axle (middle trailer axle).
- Disabled tractor brakes on three wheel ends (front drive axle and right side of rear drive axle.)
- Disabled trailer brakes on three wheel ends (middle trailer axle and right side of rear trailer axle).
- Disabled steer axle brakes.

For most test scenarios, the brakes involved in ABS actuation remained enabled where possible. A few extra stopping tests were performed with the ABS disabled as part of the non-RSD brake testing. All stopping tests were performed along a straight-line path.

### **2.3.1 Service Brake Stops**

Service brake stops were performed by bringing the test vehicle up to slightly above the target speed (20 or 60 mi/h) and applying the full braking capacity of the vehicle (full treadle application without the use of a pressure regulator to limit the brake application pressure) until the vehicle came to a complete stop. The procedure followed was that specified for the stopping tests in FMVSS-121, following a straight-line path. This test was performed for all combinations of loading and brake conditions. To provide comparison data, 20- and 60-mi/h stops were also performed using an unbraked control trailer as specified in FMVSS-121 and loaded to bring the tractor up to gross vehicle weight rating (GVWR).

### **2.3.2 Constant-Pressure Stops**

Constant-pressure stops were performed by bringing the test vehicle up to slightly above the target speed (20, 40, or 60 mi/h) and applying the target constant pressure with an in-line pressure regulator (with driver override capability, for safety) until the vehicle came to a complete stop. Tested pressures were primarily in the 15- to 45-psi range at intervals of 10 psi. Because the previous five-axle vehicle tests had confirmed that the pressure-deceleration relationship is highly linear in this low- to mid-pressure region, the constant-pressure testing was focused on the variability introduced by weight and brake conditions.

Constant-pressure stopping tests for the RSD brake tests involved the 80,000-lb, 88,000-lb, and 97,000-lb balanced loads for the fully-functioning brake system, disabled tractor drive axle

brakes on one axle, and disabled trailer axle brakes on one axle. Tested brake application pressures of 15, 25, 35, and 45 psi; one of the load/brake conditions was tested at 5-psi intervals from 15 to 50 psi to show that the limited number of brake application pressures was adequate.

Informed by the results of the RSD testing, the non-RSD constant pressure stops were performed at the same GVWs with the three additional brake conditions: disabled tractor drive axle brakes on three wheel ends, disabled trailer axle brakes on three wheel ends, and disabled steer axle brakes. Brake application pressures tested were reduced to three; 15, 30, and 45 psi.

### **2.3.2 Performance-Based Brake Tests**

Performance-based brake tests (PBBT) were performed with a PBBT machine meeting FMCSA functional requirements. In addition to weight and brake force application data, wheel-end air pressure information was also obtained for each axle using pressure transducers.

### **2.3.3 Other Measurements**

Weigh tickets were also generated for each load configuration. Additionally, brake-stroke measurements were taken periodically throughout the test period. The temperature of the braking components was also monitored throughout testing to ensure the brakes did not overheat (lining temperatures remaining below 200°F).

[This page intentionally left blank.]

### 3. OVERVIEW OF COLLECTED DATA

#### 3.1 DESCRIPTION OF DATA

For the stopping tests, the data signals shown in Table 9 were collected at 100 hertz (Hz). The temperatures listed are for the linings on the indicated wheel-end. For each run, data was collected beginning 1 second (sec) prior to the application of the brakes and ending 0.5 sec after the vehicle speed decreased to 0.4 mi/h.

**Table 9. Stopping test streaming data.**

Parameter	Units	Parameter	Units
Time	sec	Tractor Axle 1 Right Temperature	F
Control Pressure	psi	Tractor Axle 2 Left Temperature	F
Tractor Axle 1 Left Pressure	psi	Tractor Axle 2 Right Temperature	F
Tractor Axle 1 Right Pressure	psi	Tractor Axle 3 Left Temperature	F
Tractor Axle 2 Left Pressure	psi	Tractor Axle 3 Right Temperature	F
Tractor Axle 2 Right Pressure	psi	Trailer Axle 1 Left Temperature	F
Tractor Axle 3 Left Pressure	psi	Trailer Axle 1 Right Temperature	F
Tractor Axle 3 Right Pressure	psi	Trailer Axle 2 Left Temperature	F
Trailer Axle 1 Left Pressure	psi	Trailer Axle 2 Right Temperature	F
Trailer Axle 2 Left Pressure	psi	Trailer Axle 3 Left Temperature	F
Trailer Axle 3 Left Pressure	psi	Trailer Axle 3 Right Temperature	F
Trailer Axle 3 Right Pressure	psi	Tractor Axle 1 Left Wheel Speed	mi/h
Tractor Primary Reservoir Pressure	psi	Tractor Axle 1 Right Wheel Speed	mi/h
Tractor Secondary Reservoir Pressure	psi	Tractor Axle 2 Left Wheel Speed	mi/h
Vehicle GPS Speed	mi/h	Tractor Axle 2 Right Wheel Speed	mi/h
Vehicle Deceleration	ft/s <sup>2</sup>	Tractor Axle 3 Left Wheel Speed	mi/h
Tractor Axle 1 Left Temperature	F	Tractor Axle 3 Right Wheel Speed	mi/h

A sample plot of speed and braking data is shown in Figure 2. This plot shows speed, deceleration, and brake application pressure for one of the constant-pressure stops at the 88,000-lb GVW loading condition with the front drive brakes disabled on the RSD test vehicle. For this stop, the original speed was approximately 40 mi/h before the brakes were applied at 25 psi at time zero seconds.

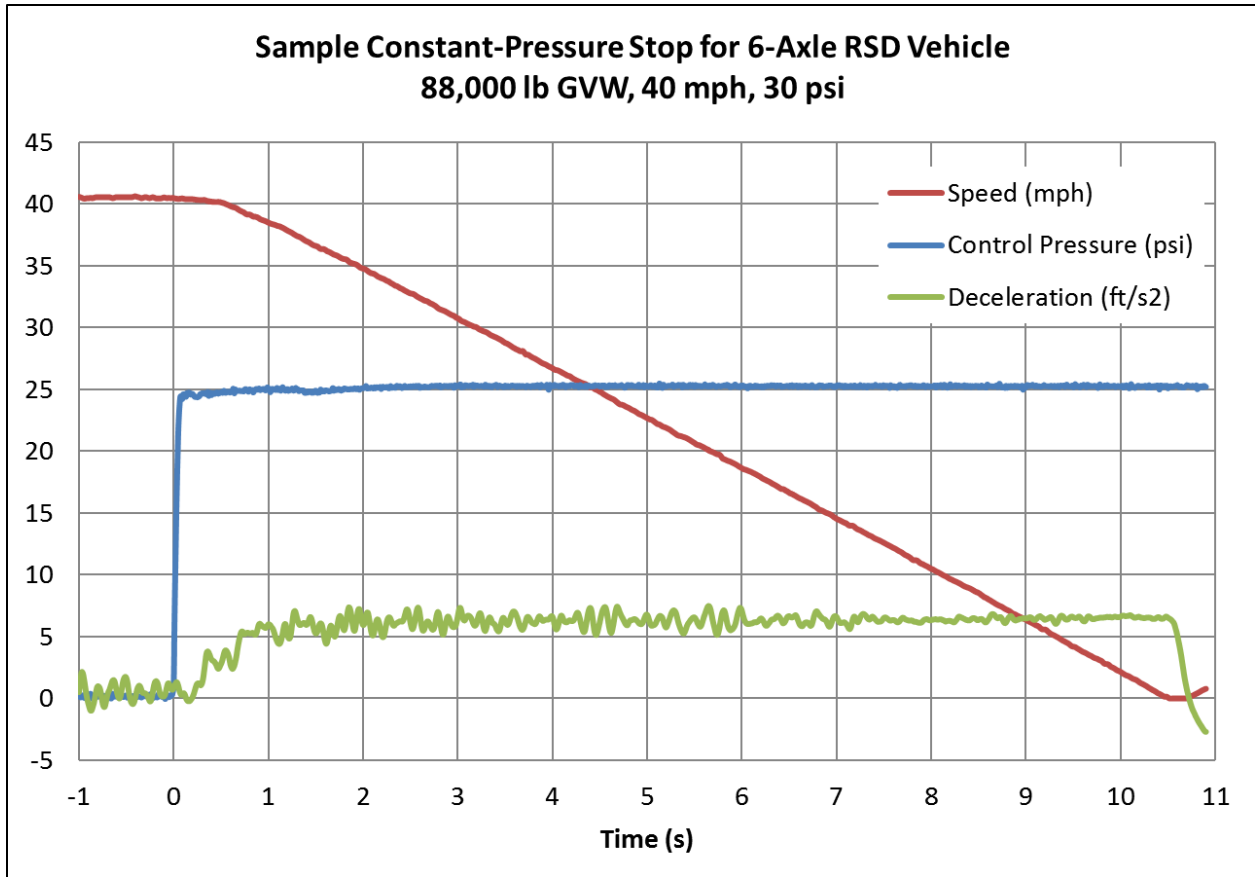


Figure 2. Chart. Time history plot of data from a constant-pressure stop.

Weigh tickets were obtained for each loading condition to determine the distribution of the load across the vehicle by axle group. A complete list of all test weights along with the nominal weight values used throughout this report is shown in Table 10 and Table 11.

Table 10. Test weights (lb) for RSD brake testing.

Nominal	Abbreviation	Steer	Drives	Trailer	GVW
Control Trailer	FMVSS-121	13,500	39,780	4,490	57,770
80,000	80k	13,120	30,110	36,800	80,030
88,000	88k	13,200	31,240	43,660	88,100
97,000 Balanced	97k Bal	13,410	34,270	49,390	97,070
97,000 Unbalanced	97k Unbal	13,260	42,590	41,180	97,030
112,000	112k	13,110	39,360	59,680	112,150
132,000	132k	13,500	47,120	71,420	132,040



**Table 11. Test weights (lb) for non-RSD brake testing.**

Nominal	Abbreviation	Steer	Drives	Trailer	GVW
Control Trailer	FMVSS-121	13,120	40,150	4,500	57,770
80,000	80k	13,100	30,150	36,800	80,050
88,000	88k	13,150	31,250	43,890	88,290
97,000 Balanced	97k Bal	13,340	34,260	49,630	97,230
97,000 Unbalanced	97k Unbal	13,150	42,590	41,370	97,110
112,000	112k	13,020	39,410	59,810	112,240
132,000	132k	13,430	46,980	71,480	131,890

A number of signals were collected during the PBBT tests as well. The information listed in Table 12 was collected at 10 Hz for each axle during testing of the service brakes.

**Table 12. PBBT service brake streaming data.**

Parameter	Units
Time	sec
Brake Force Left	lb
Lock-up Left	lb
Brake Force Right	lb
Lock-up Right	lb
Weight Left	lb
Weight Right	lb
Control Pressure	psi
Chamber Pressure	psi

### 3.2 CALCULATION OF KEY PARAMETERS FOR EACH STOP

Link Engineering, the company that was contracted to perform the tests and collect the data referenced in Section 3.1, provided several key parameters for each stopping test. These parameters are listed in Table 13. The values for each of these parameters for every stopping test performed appear in Appendix A.

Stopping distance was determined from a global positioning system (GPS) with an internal accelerometer that is used to correct the data points between actual measurements from GPS position. The output from this accelerometer was used by the data-acquisition system to record the actual distance from the beginning of the braking event (triggered by using a pedal switch on the brake pedal) and the end of the braking event (triggered when the vehicle speed decreased to 0.4 mi/h). The stop time was determined by the time between these two triggers. Like the stopping-distance measurement, the deceleration was also measured with an accelerometer with the data being filtered to reduce the noise. Average pressures and decelerations were calculated from the data beginning 1.0 seconds after the braking event is initiated until the end of the stop.

**Table 13. Parameters calculated for each stopping test.**

<b>Measure</b>	<b>Units</b>
Stop #	--
Target Speed	mi/h
Target Control Pressure	psi
Actual Speed	mi/h
Actual Stopping Distance	ft
Corrected Stopping Distance	ft
Average Primary Control Pressure	psi
Average Deceleration	ft/s <sup>2</sup>
Stopping Time (seconds)	sec

### **3.3 ADDITIONAL DATA COMMENTS**

As indicated in Section 2.3.4, the brake stroke length was also monitored throughout the testing to ensure the automatic slack adjusters were functioning properly. While this data was not used in the analysis presented in this report, it is included in Appendix B for reference.

## 4. ANALYSIS OF SERVICE BRAKE STOP DATA

Service brake stops provide insight into the maximum brake force that can be developed, typical of an emergency situation where a driver would need to apply full brake force without regard to smooth deceleration. Decelerations determined from this test data represents the maximum possible under the tested scenario (brake condition, initial speed, and road condition), and the stopping distances similarly represent the shortest distances possible. Note that driver response time is not a factor in these tests; the deceleration and stopping distance data is calculated from the time of initial brake application and thus represents an effective a driver response time of zero seconds.

### 4.1 TRACTOR TESTING WITH A CONTROL TRAILER

The first set of stopping tests conducted were FMVSS 121 protocol service brake stops from 20 and 60 mi/h with an unbraked control trailer attached to the tractor with a GVW of approximately 56,000 lb. While these tests did not represent typical in-service loading events, they provided confirmation that the tractor met the required minimum brake performance standard for new equipment. FMVSS 121 specifies that for “loaded tractors with three axles and a GVWR of 70,000 lb or less...tested with an unbraked control trailer,” the 20 mi/h stopping distance for RSD brakes must be no more than 30 ft and the 60 mi/h stopping distance must be no more than 250 ft.<sup>(1)</sup> FMVSS 121 protocol stopping tests were performed at both 20 and 60 mi/h and were repeated for disabled brakes on a drive axle as well. The FMVSS 121 stopping distance requirements are shown along with the average tested stopping distances in Table 14 (values corrected for slight deviations in initial speed as specified by FMVSS 121 protocol). As shown here, the test vehicle exceeded the minimum performance standards equipped with either the RSD or non-RSD brakes.

**Table 14. FMVSS 121 stopping distance test results.**

Stopping Distance Description	Stopping Distance (ft) FMVSS 121 Requirement (Maximum)	Stopping Distance (ft) Average for Test Vehicle (Corrected)
RSD: 20 mi/h	30	27.5
Non-RSD: 20 mi/h	40	30.2
RSD: 60 mi/h	250	228.2
Non-RSD: 60 mi/h	355	257.8

### 4.2 OVERVIEW OF RESULTS FOR 20 MI/H SERVICE BRAKE STOPS

The average stopping distances for the 20 mi/h service brake stops for RSD and non-RSD tests are shown in Figure 3 and Figure 4, respectively. Table 15 and Table 16 present this same information in tabular form. The average values are presented here to show general trends in the data; the actual stopping distances for each run appear in Appendix A. The distances for the regular service brake stops for all loads and brake conditions tested were under the 40-ft limit specified in FMCSR 393.52(3), with the exception of the non-RSD disabled drive axle braking performance for the unbalanced 97,000 and 132,000 testing.

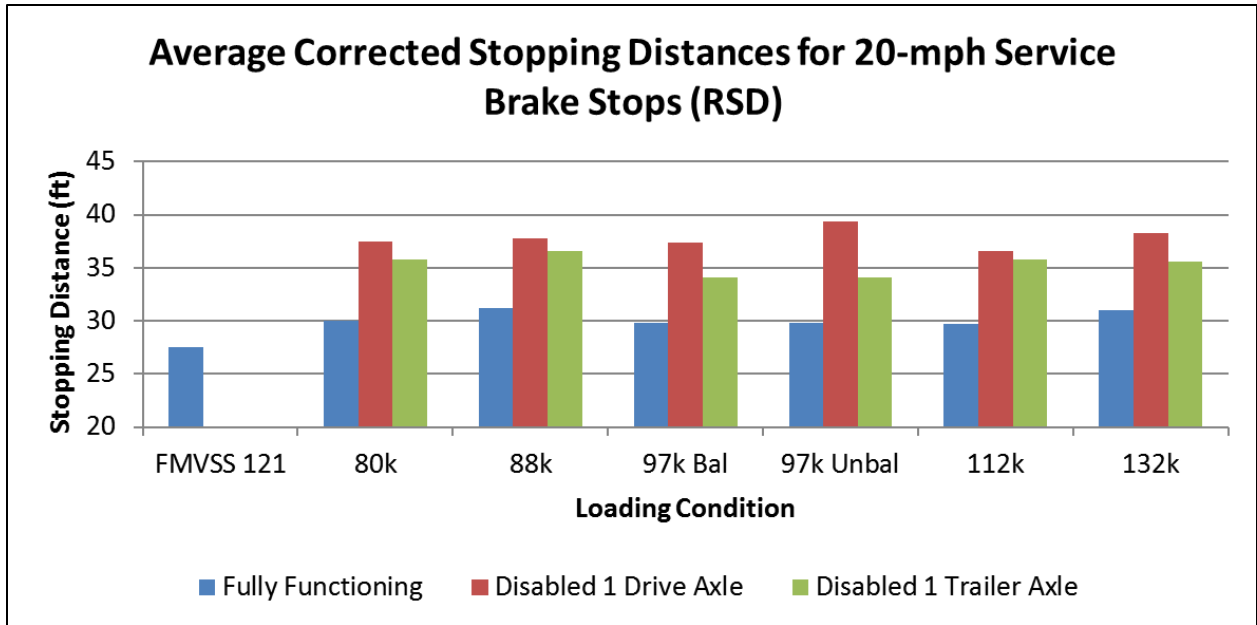


Figure 3. Chart. Comparison of stopping distances for 20 mi/h service brake stops (RSD brakes).

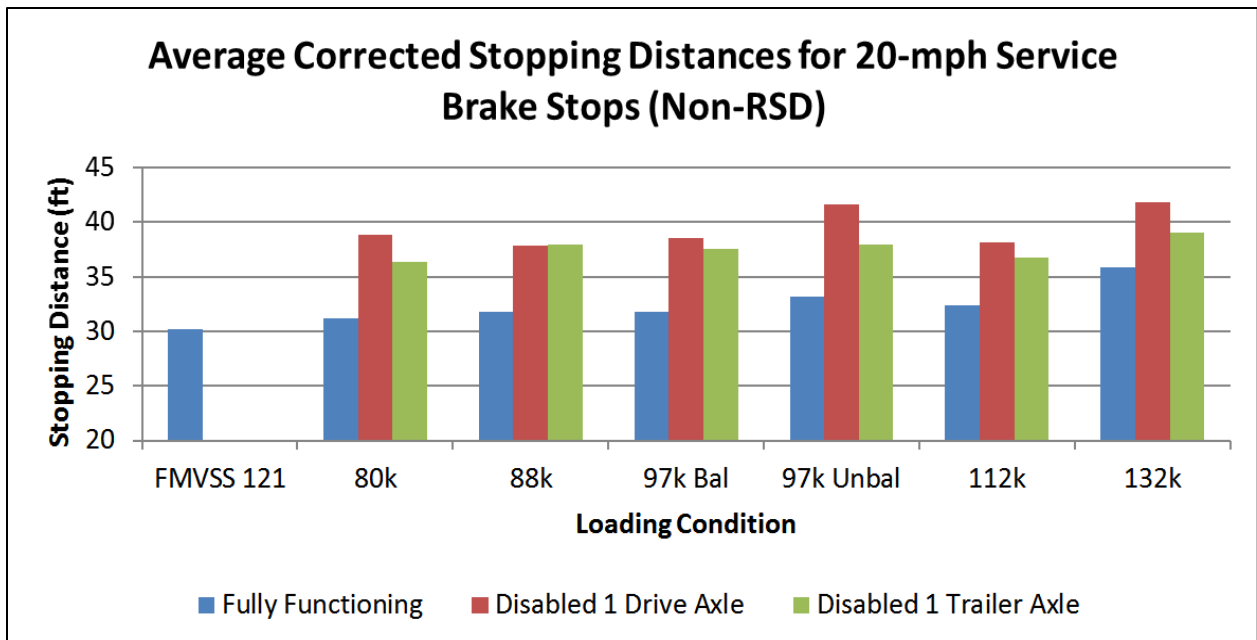


Figure 4. Chart. Comparison of stopping distances for 20 mi/h service brake stops (non-RSD brakes).

**Table 15. Average corrected stopping distance for 20 mi/h service brake stops (RSD brakes).**

<b>Loading Condition</b>	<b>Stopping Distance (ft) Fully Functioning</b>	<b>Stopping Distance (ft) Disabled 1 Drive Axle</b>	<b>Stopping Distance (ft) Disabled 1 Trailer Axle</b>
FMVSS 121 control trailer	27.5	--	--
80,000 lb load	30.0	37.5	35.8
88,000 lb load	31.2	37.7	36.6
97,000 lb balanced load	29.8	37.4	34.1
97,000 lb unbalanced load	29.8	39.3	34.0
112,000 lb load	29.7	36.6	35.8
132,000 lb load	31.0	38.2	35.6

**Table 16. Average corrected stopping distance for 20 mi/h service brake stops (non-RSD brakes).**

<b>Loading Condition</b>	<b>Stopping Distance (ft) Fully Functioning</b>	<b>Stopping Distance (ft) Disabled 1 Drive Axle</b>	<b>Stopping Distance (ft) Disabled 1 Trailer Axle</b>
FMVSS 121 control trailer	30.2	--	--
80,000 lb load	31.2	38.8	36.4
88,000 lb load	31.8	37.9	38.0
97,000 lb balanced load	31.8	38.5	37.5
97,000 lb unbalanced load	33.2	41.6	38.0
112,000 lb load	32.4	38.2	36.7
132,000 lb load	35.9	41.9	39.0

### **4.3 OVERVIEW OF RESULTS FOR 60 MI/H SERVICE BRAKE STOPS**

The average stopping distances for the 60 mi/h service brake stops are shown in Figure 5 (actual values in Table 17) and Figure 6 (values in Table 18). These tests were performed for all six braking conditions.

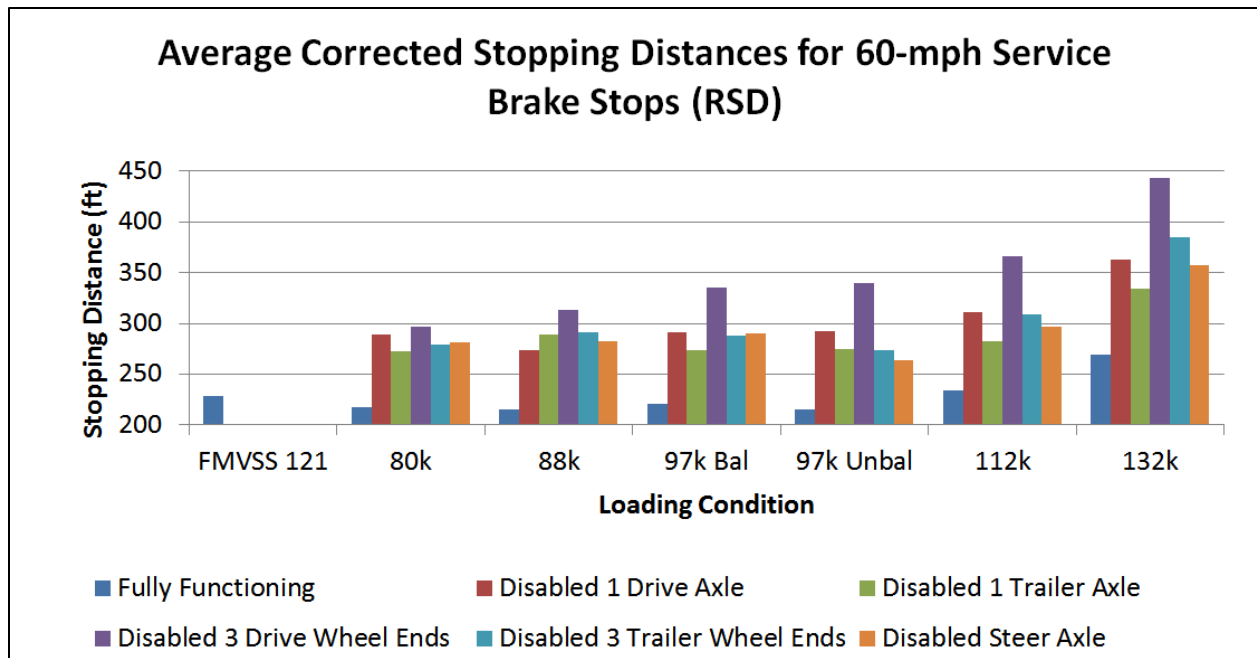


Figure 5. Chart. Comparison of stopping distances for 60 mi/h service brake stops (RSD).

Table 17. Average corrected stopping distances for 60 mi/h service brake stops (RSD).

Loading Condition	Stopping Distance (ft) Fully Functioning	Stopping Distance (ft) Disabled 1 Drive Axle	Stopping Distance (ft) Disabled 1 Trailer Axle	Stopping Distance (ft) Disabled 3 Drive Wheel Ends	Stopping Distance (ft) Disabled 3 Trailer Wheel Ends	Stopping Distance (ft) Disabled Steer Axle
FMVSS-121 control trailer	228.1	--	--	--	--	--
80,000 lb load	217.8	288.6	272.1	297.2	279.6	281.1
88,000 lb load	215.7	273.2	289.6	312.9	291.4	282.4
97,000 lb balanced load	220.7	291.8	273.7	334.9	288.4	290.5
97,000 lb unbalanced load	215.0	292.0	274.4	339.4	273.2	263.2
112,000 lb load	233.9	310.8	283.0	366.0	308.5	296.4
132,000 lb load	268.8	362.9	334.3	443.8	385.3	357.2

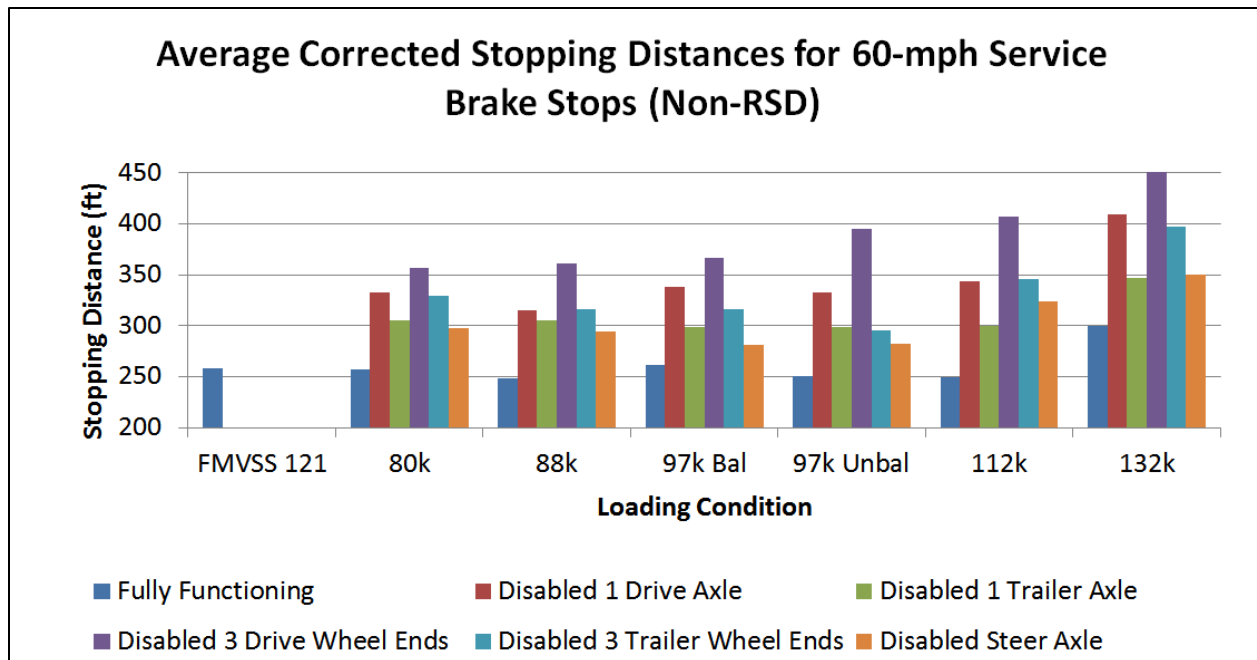


Figure 6. Chart. Comparison of stopping distances for 60 mi/h service brake stops (non-RSD).

Table 18. Average corrected stopping distances for 60 mi/h service brake stops (non-RSD brakes).

Loading Condition	Stopping Distance (ft) Fully Functioning	Stopping Distance (ft) Disabled 1 Drive Axle	Stopping Distance (ft) Disabled 1 Trailer Axle	Stopping Distance (ft) Disabled 3 Drive Wheel Ends	Stopping Distance (ft) Disabled 3 Trailer Wheel Ends	Stopping Distance (ft) Disabled Steer Axle
FMVSS 121 control trailer	257.8	--	--	--	--	--
80,000 lb load	256.5	332.5	305.7	356.9	329.3	297.1
88,000 lb load	248.7	315.2	305.0	361.6	316.5	294.7
97,000 lb balanced load	261.7	337.8	298.2	366.5	315.9	280.8
97,000 lb unbalanced load	250.8	332.8	299.0	395.3	295.8	282.2
112,000 lb load	249.6	343.5	299.6	407.4	345.5	323.4
132,000 lb load	299.5	409.4	346.9	513.4	397.7	349.6

As described previously, the control trailer testing was performed with an unbraked control trailer; thus, the service brake stops performed with the control trailer represent a stop in which the total braking force is provided by the steer and drive axles only.

#### 4.4 ANTI-LOCK BRAKING SYSTEM AND SERVICE BRAKE STOP DATA

Several additional test runs were performed to examine the effect of the ABS on stopping distance when the test vehicle equipped with non-RSD brakes was loaded to a GVW of 97,000 lb (balanced load). Three runs each were performed for the tractor ABS disabled and the entire ABS disabled for panic stops from 20 and 60 mi/h. The results are compared to those of the regular ABS-enabled stopping tests in Figure 7 and Figure 8.

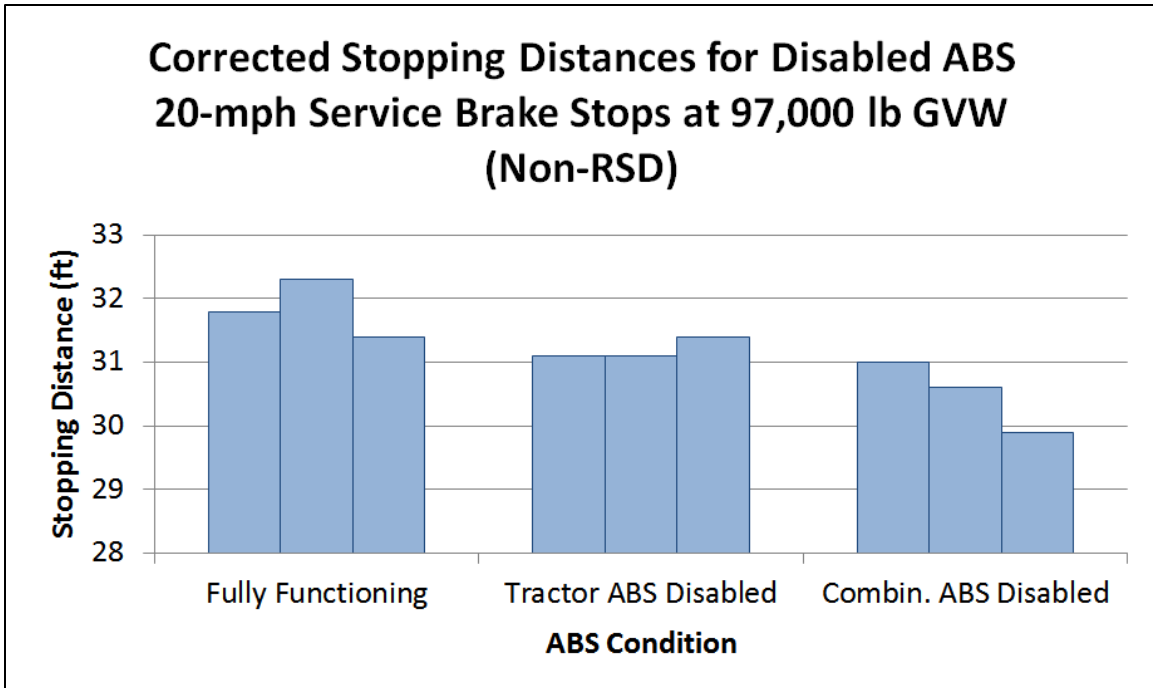


Figure 7. Chart. Effect of disabling ABS on 20 mi/h stopping distance.

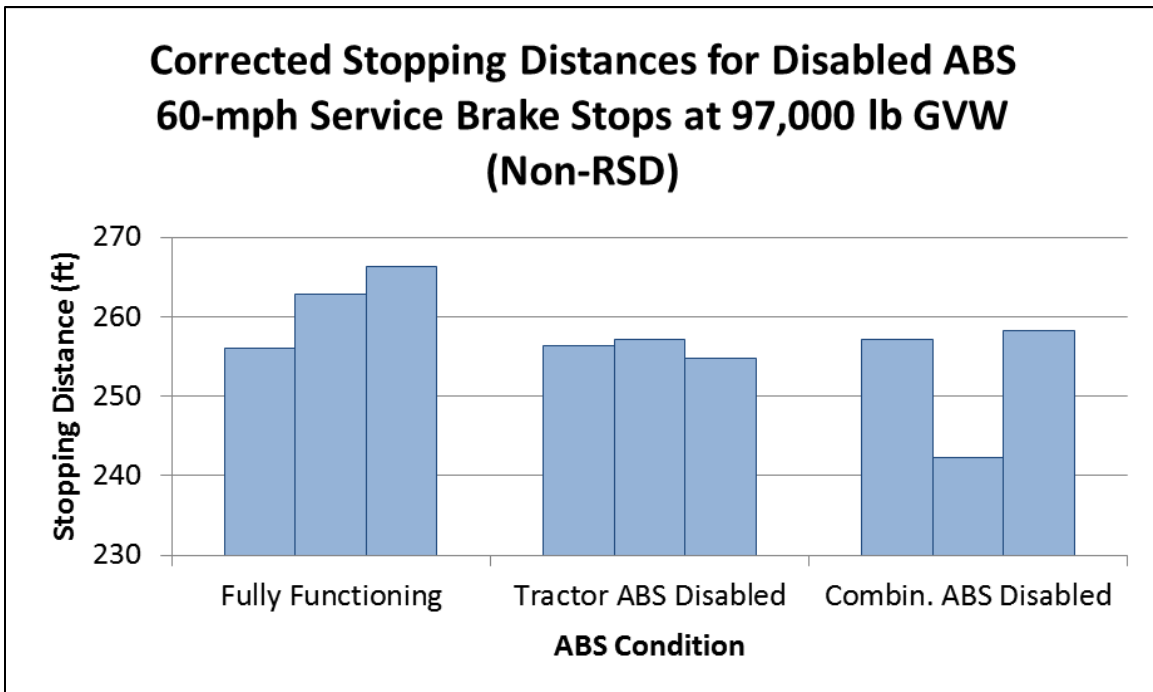


Figure 8. Chart. Effect of disabling ABS on 60 mi/h stopping distance.

While the variation in the data set makes it difficult to draw any clear conclusions, in the tested scenario, disabling the ABS resulted in generally shorter stopping distances. However, it is of note that all testing in this phase was on dry pavement and is not expected to be representative of degraded road conditions.



#### 4.5 OBSERVED TRENDS IN SERVICE BRAKE STOP DATA

The test data for both 20 mi/h and 60 mi/h stopping tests revealed a difference in brake force supplied depending on which brakes were disabled. For the test scenarios where the brakes on a single axle were disabled, disabling a pair of drive axle brakes resulted in a greater stopping distance (decreased braking force) than disabling a pair of trailer brakes. The relationship held true for both initial speeds and all loading conditions. Thus, for the vehicle tested, more brake force was generated by the drive axle brakes than the trailer axle brakes.

As expected, increases in load resulted in corresponding increase in stopping distance, with a few minor exceptions for unknown reasons in the 20 mi/h stopping data.

#### 4.6 ANALYSIS OF TIRE LOAD CAPACITY

Another area of concern to policy-makers considering loading regulations includes tire capacity. Tire capacities for each axle group are summarized and compared to the test loads in Table 19 and Table 20.

**Table 19. Tire load capacity for RSD loading conditions.**

Load Condition (RSD Brake Testing)	GVW (lb)	Steer Axle (lb) Capacity	Drive Axle Group (lb) Capacity	Trailer Axle Group (lb) Capacity
<b>Tire Capacity</b>	--	<b>13,560</b>	<b>45,400</b>	<b>71,280</b>
Control trailer (FMVSS 121, only tractor weight shown)	53,280	13,500 99.6%	39,780 87.6%	--
80,000 lb load	80,030	13,120 96.8%	30,110 66.3%	36,800 51.6%
88,000 lb load	88,100	13,200 97.3%	31,240 68.8%	43,660 61.3%
97,000 lb balanced load	97,070	13,410 98.9%	34,270 75.5%	49,390 69.3%
97,000 lb unbalanced load	97,030	13,260 97.8%	42,590 93.8%	41,180 57.8%
112,000 lb load	112,150	13,110 96.7%	39,360 86.7%	59,680 83.7%
132,000 lb load	132,040	13,500 99.6%	47,120 103.8%*	71,420 100.2%*

\*For the 132,000-lb configuration, an overload condition was created for the rating of the tires used for testing.

**Table 20. Tire load capacity for non-RSD loading conditions.**

<b>Load Condition (Non-RSD Brake Testing)</b>	<b>GVW (lb)</b>	<b>Steer Axle (lb) Capacity</b>	<b>Drive Axle Group (lb) Capacity</b>	<b>Trailer Axle Group (lb) Capacity</b>
Tire capacity	--	13,560	45,400	71,280
Control trailer (FMVSS 121, only tractor weight shown)	53,270	13,120 96.8%	40,150 88.4%	--
80,000 lb load	80,050	13,100 96.6%	30,150 66.4%	36,800 51.6%
88,000 lb load	88,290	13,150 97.0%	31,250 68.8%	43,890 61.6%
97,000 lb balanced load	97,230	13,340 98.4%	34,260 75.5%	49,630 69.6%
97,000 lb unbalanced load	97,110	13,150 97.0%	42,590 93.8%	41,370 58.0%
112,000 lb load	112,240	13,020 96.0%	39,410 86.8%	59,810 83.9%
132,000 lb load	131,890	13,430 99.0%	46,980 103.5%*	71,480 100.3%*

\*For the 132,000-lb configuration, an overload condition was created for the rating of the tires used for testing.

As a product of the desired 132,000-lb test configuration, a slightly overloaded condition was created for the rating of the tires used for testing. Adjustments could have been made to tire pressure and tire selection to avoid this condition. In the trailer tires, this could have been addressed with a change to the tire pressure; a pressure of 110 psi instead of the tested 105 psi would increase the maximum trailer axle group load from 71,280 lb to 74,100 lb. Since the drive axle tires were already at maximum rated pressure for the tire model, a higher load range tire would have been need to test at this GVW unless the load were redistributed between the drive and trailer axle groups. For example, the use of load range “H” tires instead of load range “G” would have increased the rated load from 45,400 to 49,400 lb. Similar research involving testing at high GVWs without exceeding rated tire loads may be possible with similar adjustments to tire configurations.

## 5. ANALYSIS OF PERFORMANCE-BASED BRAKE TESTER DATA

### 5.1 OVERVIEW OF RESULTS

The PBBT tests were performed for each loading and brake condition for the RSD testing, and for each loading condition for the non-RSD testing. Results of individual PBBT tests are included in Appendix C. The PBBT overall vehicle scores for the fully functioning brakes are shown in Table 21.

**Table 21. PBBT scores for fully-functioning brake systems.**

Load Condition	RSD Braking Force (lb)	RSD GVW (lb)	RSD Brake Efficiency	Non-RSD Braking Force (lb)	Non-RSD GVW (lb)	Non-RSD Brake Efficiency
80,000 lb load	40,479	79,190	51.1%	40,525	77,514	52.3%
88,000 lb load	46,428	87,523	53.0%	43,761	85,010	51.5%
97,000 lb balanced load	49,044	95,768	51.2%	50,226	95,329	52.7%
97,000 lb unbalanced load	43,687	97,622	44.8%	47,297	93,388	50.6%
112,000 lb load	55,618	112,083	49.6%	53,969	108,556	49.7%
132,000 lb load	64,348	131,351	49.0%	62,299	129,807	48.0%

### 5.2 DATA OBSERVATIONS

This information is shown in bar chart form in the following figures. Figure 9 shows the overall PBBT scores for the fully functioning brake systems—both RSD and non-RSD. Interestingly, the RSD brakes did not consistently out-perform the non-RSD brakes for these tests. There is a general decrease in score (total braking force divided by total vehicle weight) as the load increases, as expected.

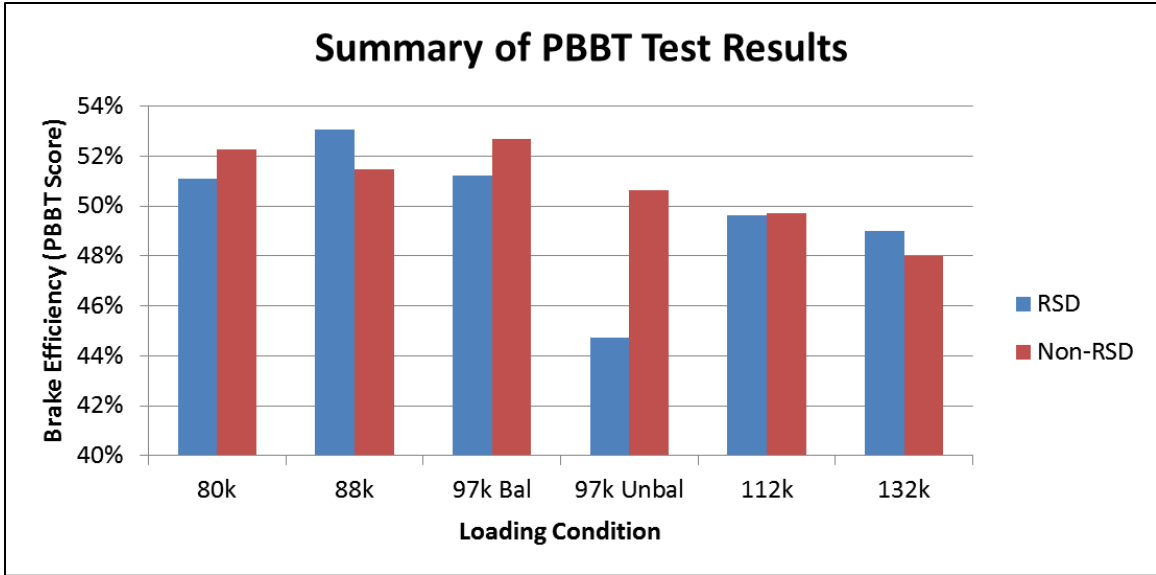


Figure 9. Chart. Brake efficiency of test vehicles.

Figure 10 shows the total measured braking force for each loading condition. The total braking force developed by the test vehicle during the PBBT test increased overall as the load increased, with the exception of the unbalanced loading condition. This suggests that brakes are more efficient at higher loads, and an unbalanced load can have a detrimental effect on braking performance.

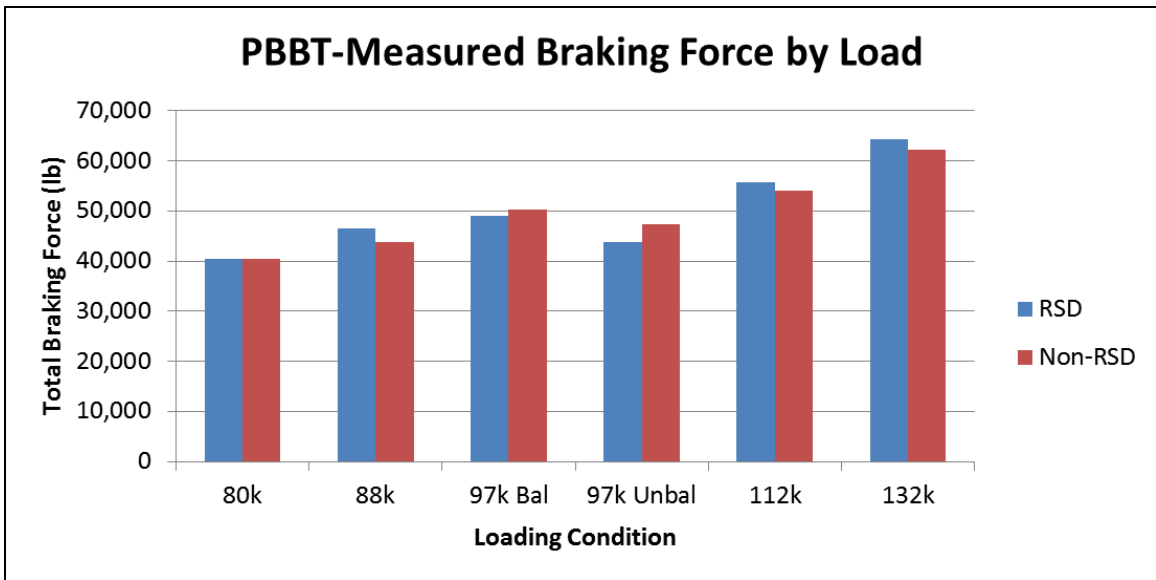


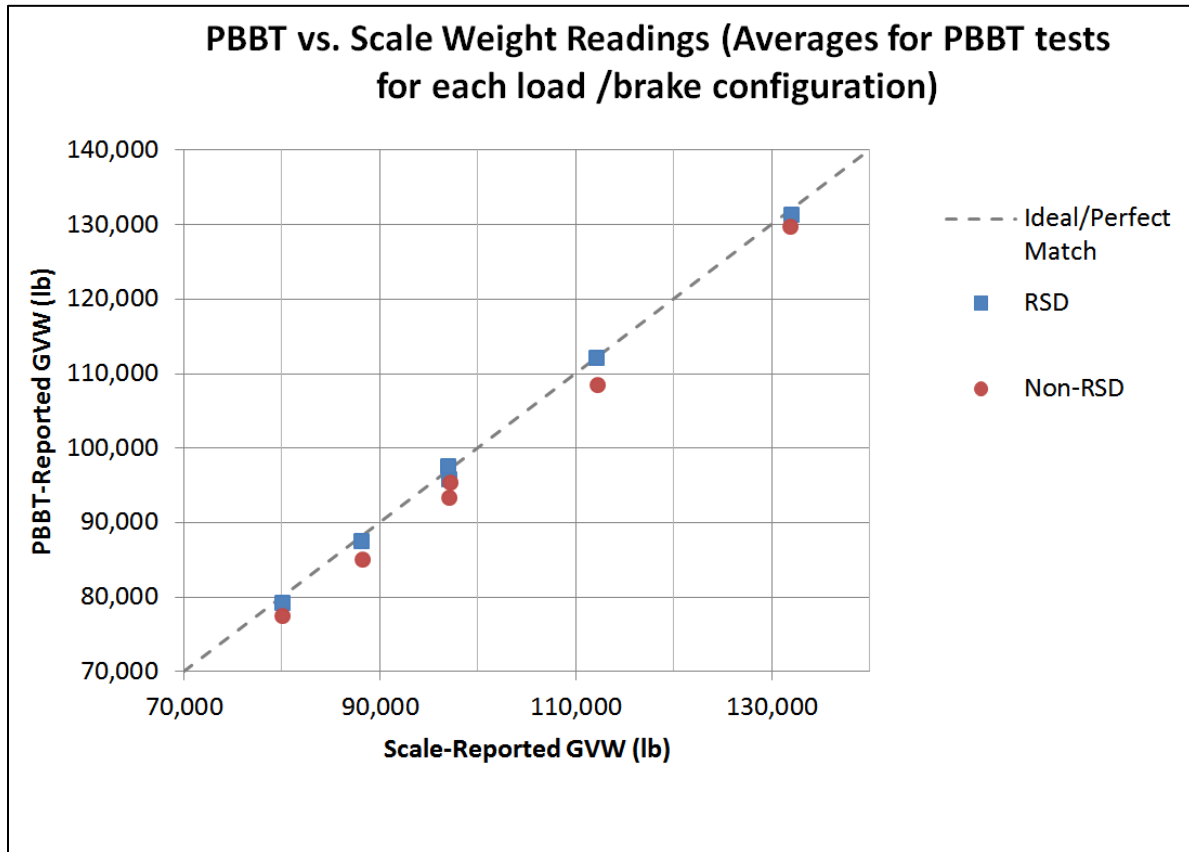
Figure 10. Chart. Total braking force for each loading condition as measured by the PBBT.

### 5.3 COMPARISON OF SCALE AND PBBT-REPORTED WEIGHTS

Brake efficiency is calculated by dividing the sum of the wheel-end brake forces by the sum of the wheel-end weights. The GVW measured and used by the PBBT machine is compared to the GVW reported in the weight ticket from the scale in Table 22 and graphed in Figure 11.

**Table 22. Comparison of scale and PBBT-reported GVW.**

Load Condition (lb)	PBBT GVW (lb)	Scale GVW (lb)	Braking Force (lb)	GVW (lb)
80,000 lb load	79,190	80,030	77,514	80,050
88,000 lb load	87,523	88,100	85,010	88,290
97,000 lb balanced load	95,768	97,070	95,329	97,230
97,000 lb unbalanced load	97,622	97,030	93,388	97,110
112,000 lb load	112,083	112,150	108,556	112,240
132,000 lb load	131,351	132,040	129,807	131,890



**Figure 11. Chart. Comparison of PBBT and scale-reported GVW.**

As shown in this figure, the PBBT occasionally measured a total weight value slightly under GVW measured on the scale. This is likely because unlike the pit scale, the axles are weighed individually and the weighing surface is not level with respect to the length of the vehicle. The

under-reporting of the non-RSD weights may be responsible for lack of a clear trend comparing the RSD to non-RSD brakes.

## **6. DEVELOPMENT OF CONSTANT-PRESSURE DECELERATION MODEL**

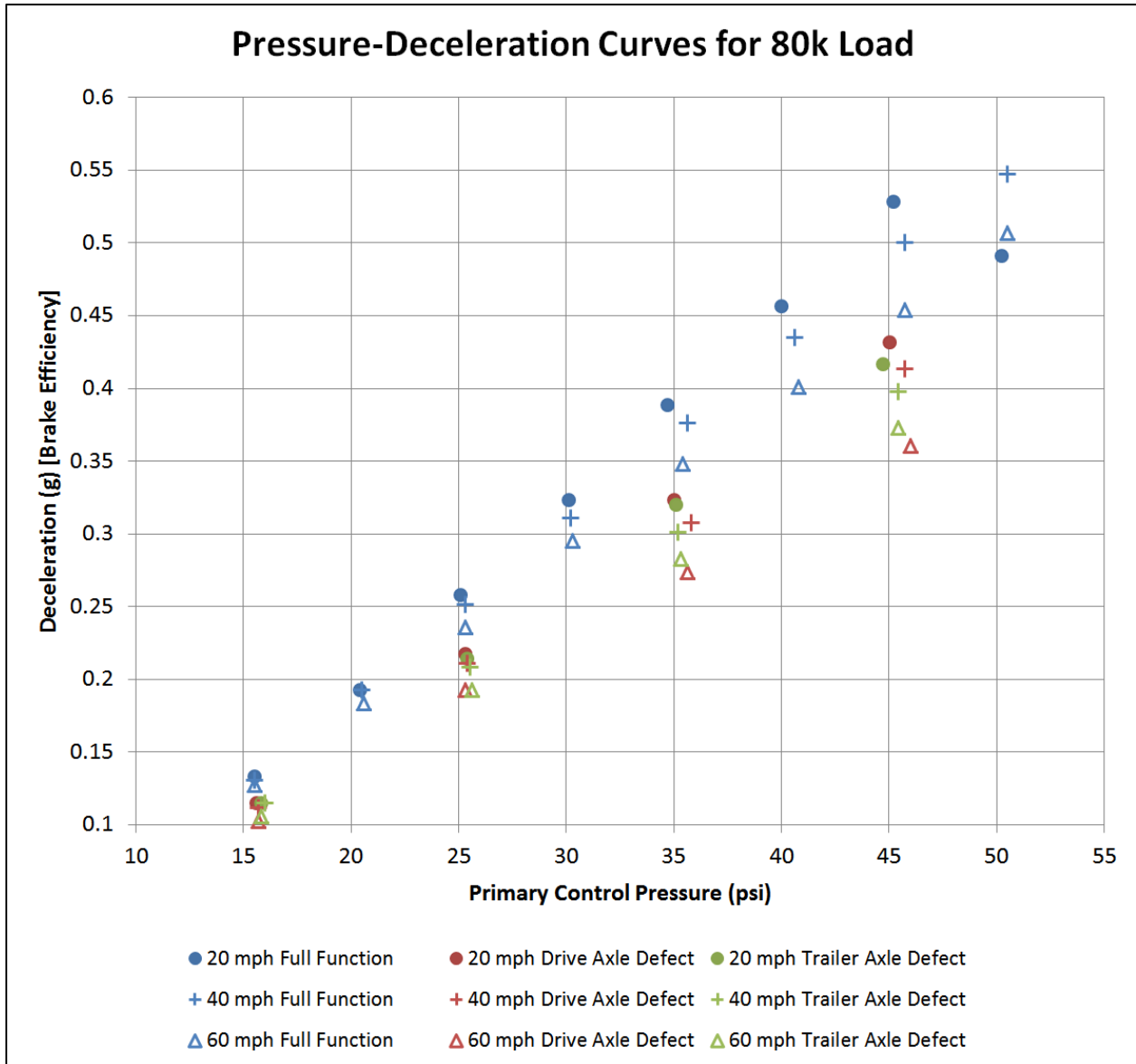
### **6.1 BACKGROUND**

In addition to the service brake stops (full-pressure stops) conducted for stopping distance research, constant-pressure stops were performed to support the development of a real-time dynamic brake assessment (RTDBA) algorithm. Such an algorithm would be incorporated to an on-board system to provide warnings for potentially under real-world brake performance

Where the previous five-axle testing involved three braking conditions (fully functioning, disabled drive axle, disabled trailer axle), there were only two initial speeds tested (20 and 60 mi/h) and only two GVWs (60,000 lb, 80,000 lb). Due to the limited breadth of data collected in the five-axle testing, a clear relationship between deceleration and GVW or deceleration and initial speed could not be determined. In this most recent six-axle testing, in addition to the similar three braking conditions (fully function, disabled forward drive, and disabled intermediate trailer), the constant-pressure tests involved three GVWs (80,000, 88,000, and 97,000 lb) and three initial speeds (20, 40, and 60 mi/h). As such, the data can be used to determine how brake application pressure, initial speed, and GVW influence deceleration for each brake condition.

### **6.2 LINEAR PRESSURE REGION**

In order to confirm that the pressure-deceleration relationship was in fact linear in the 15–45 psi region and to explore whether the linear region extended beyond the 45-psi limit, there was more resolution in the brake application pressure data for the first loading and brake condition (80,000 lb GVW, fully functioning brakes). The data from the first loading condition is shown in Figure 12.



**Figure 12. Chart. Pressure-deceleration curves for RSD brakes tested at 80,000-lb load.**

At the higher 50 psi brake pressure, the relationship between pressure and deceleration is no longer linear. However, this relationship is highly in the 15–45 psi range, as anticipated (and observed in previous research). The RTDBA algorithm should be based on pressures in linear region—here (as in previous research) using 15 psi (comfortably above the crack pressure) to 45 psi (less than the pressure at which nonlinearities appear).

### 6.3 EFFECT OF GROSS VEHICLE WEIGHT

The breadth of six-axle data collected allowed the link between GVW and deceleration to be examined. Previously, only two weights were tested, so the relationship between deceleration and GVW could not be characterized (although it was observed that the braking system was more effective for lower than higher GVWs). Constant-pressure test data for a single initial



speed and brake condition were selected for cursory observation to determine whether it would be reasonable to model the relationship between deceleration and GVW as a linear one as shown in Figure 13.

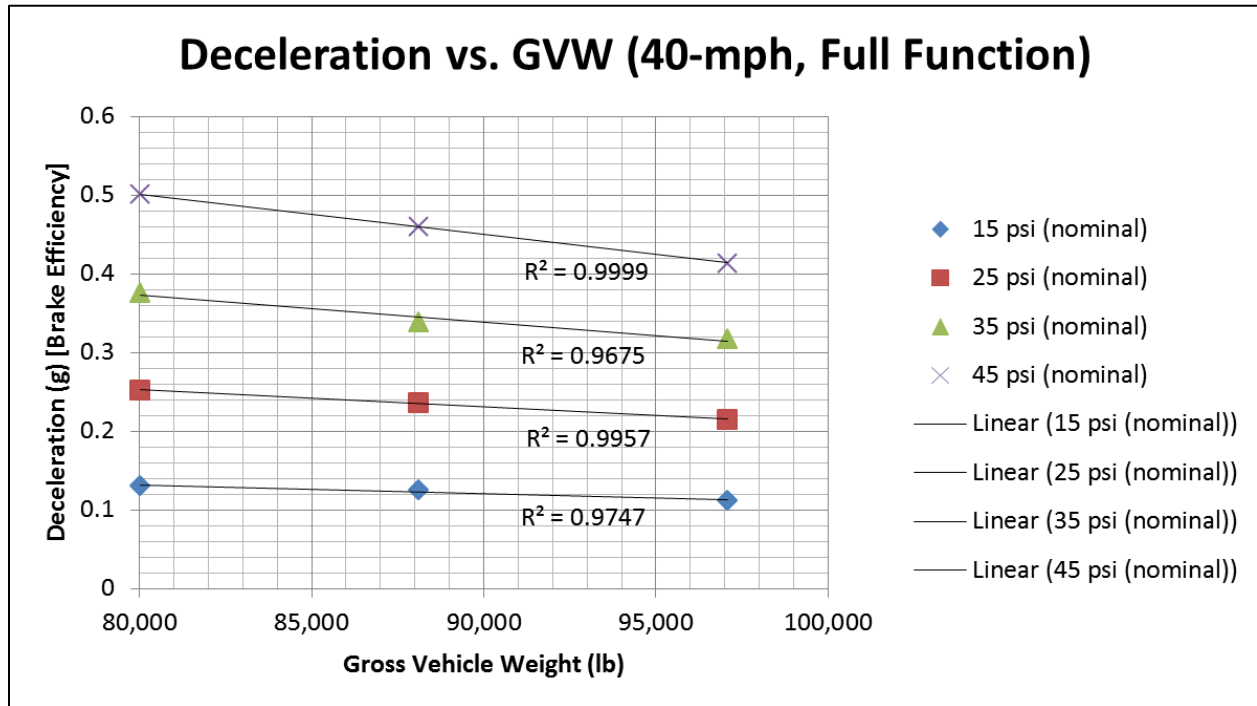


Figure 13. Chart. Deceleration vs. GVW for 40-mi/h RSD testing with fully-functioning brakes.

From this initial look at the data, it appears that deceleration is a linear function of the GVW.

#### 6.4 EFFECT OF INITIAL SPEED

The breadth of six-axle data collected also allowed the link between initial speed and deceleration to be examined. Previously, only two weights were tested, so the relationship between deceleration and initial speed could not be characterized (although it was observed that the braking system was more effective—developing a greater overall deceleration—from an initial speed of 20 mi/h than 60 mi/h). Constant-pressure test data for a single GVW and brake condition were selected for cursory observation to determine whether it would be reasonable to model the relationship between deceleration and GVW as a linear one also shown in Figure 14.

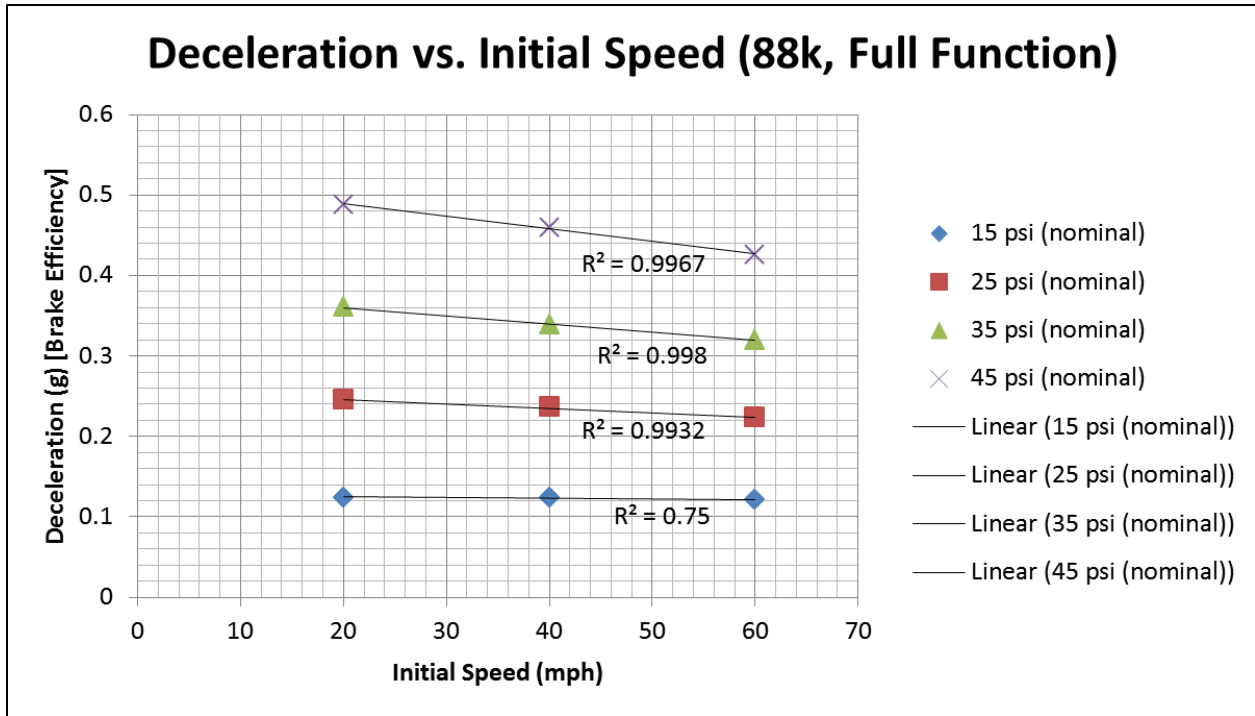


Figure 14. Chart. Deceleration versus initial speed for RSD testing with fully-functioning brakes at 88,000 lb.

From this cursory analysis, it seems reasonable to assume that the deceleration is a linear function of the initial speed at which the brakes are applied.

### 6.5 LINEAR MODEL FROM MULTIPLE REGRESSION ANALYSIS

With the conclusion that deceleration is linear with respect to GVW, initial speed, and brake application pressure (in the 15–45 psi region), multiple regression analysis was performed to determine quantitatively the “level” of this linearity in the direction of each variable and construct a linear model for deceleration using the variables which proved to be significant.

In other words, an analysis was performed in Excel (and later repeated in Matlab) for the following model:

$$y_g = m_{psi} \cdot x_{psi} + m_{mph} \cdot x_{mph} + m_{lb} \cdot x_{lb} + b$$

Figure 15. Equation. Linear model from multiple regression analysis.

Note that any units could be used for deceleration, pressure, speed, and GVW, provided that the constants are calculated accordingly.

All collected constant-pressure data for the fully functioning brake situation was used in the development and the linear model. (Pressures above 50 psi were omitted, as discussed previously, but the data set included the three initial speeds and three GVWs tested.)

The values shown in Table 23 were calculated from this data.

**Table 23. Multiple regression values for six-axle RSD constant-pressure stop data (fully functioning brakes).**

Variable	Value
Coefficients	$m_{psi} = 1.121E-02$ $m_{mi/h} = -9.102E-04$ $m_{lb} = -2.976E-06$ $b = 2.457E-01$
Standard error	$se_{psi} = 2.068E-04$ $se_{mi/h} = 1.349E-04$ $se_{lb} = 3.105E-07$ $se_b = 2.824E-02$
Coefficient of determination	$r^2 = 0.9867807$
Standard error of the y estimate	$se_y = 0.0147244$
F-statistic	$F = 1020.1758$
Degrees of freedom	$df = 41$
Regression sum of squares	$ss_{reg} = 0.6635462$
Residual sum of squares	$ss_{resid} = 0.0088891$
Sample size	$n = 45$
T-observed (abs)	$t_{psi} = 54.214$ $t_{mi/h} = 6.745$ $t_{lb} = 9.582$ $t_b = 8.701$
Min abs. value of T for statistical significance	$\alpha = 0.01$ T-critical = 2.7012
Probably F-value occurred by chance	$v1 = 3$ $p = 1.578E-38$

The coefficient of determination indicates the proportion of the variability—in this case, nearly 99 percent. The alpha (and calculated T-critical) was chosen for a 99 percent statistical significance for the four constants used in this model. In this case, the T-observed values for each variable are well above this value.

## 6.6 LINEAR MODEL APPLIED TO OTHER CONSTANT-PRESSURE DATA SETS

Multiple regression was performed for the other two brake conditions tested in the six-axle RSD constant-pressure stops. In addition, the linear model was also applied to the five-axle RSD test data (all three brake conditions). The results are summarized in Table 24.

**Table 24. Linear model values for five-axle and six-axle RSD brake testing.**

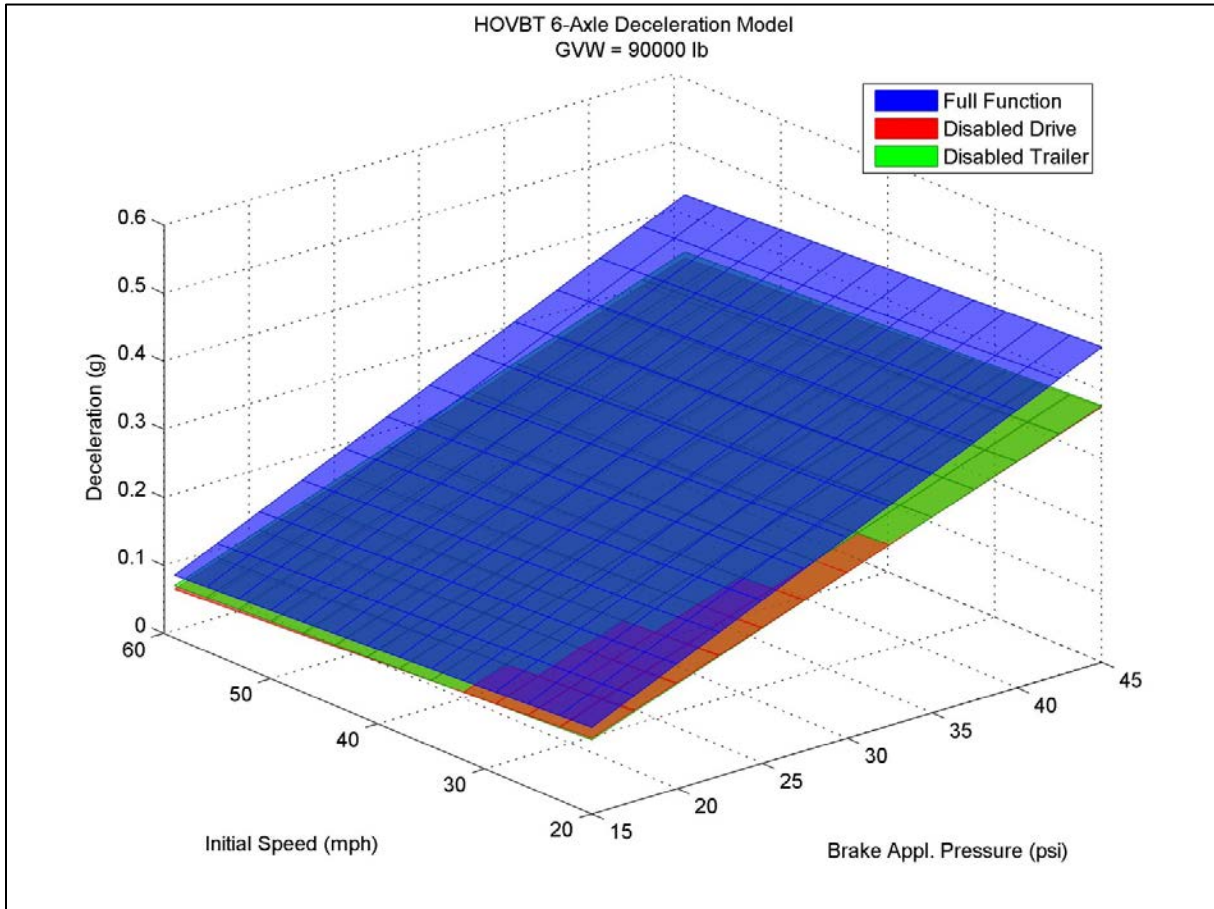
<b>Description</b>	<b>Six-Axle Vehicle RSD Brakes Fully Functioning</b>	<b>Six-Axle Vehicle RSD Brakes Disabled Drive</b>	<b>Six-Axle Vehicle RSD Brakes Disabled Trailer Axle</b>	<b>Five-Axle Vehicle RSD Brakes Fully Functioning</b>	<b>Five-Axle Vehicle RSD Brakes Disabled Drive</b>	<b>Five-Axle Vehicle RSD Brakes Disabled Trailer Axle</b>
Model Constants	$m_{\psi} = 1.121E-02$ $m_{mi/h} = -9.102E-04$ $m_{lb} = -2.976E-06$ $b = 2.457E-01$	$m_{\psi} = 8.797E-03$ $m_{mi/h} = -1.032E-03$ $m_{lb} = -2.920E-06$ $b = 2.638E-01$	$m_{\psi} = 8.930E-03$ $m_{mi/h} = -8.354E-04$ $m_{lb} = -2.461E-06$ $b = 2.139E-01$	$m_{\psi} = 1.073E-02$ $m_{mi/h} = -1.024E-03$ $m_{lb} = -3.812E-06$ $b = 2.937E-01$	$m_{\psi} = 7.663E-03$ $m_{mi/h} = -8.758E-04$ $m_{lb} = -2.969E-06$ $b = 2.502E-01$	$m_{\psi} = 9.424E-03$ $m_{mi/h} = -8.404E-04$ $m_{lb} = -3.849E-06$ $b = 2.754E-01$
Standard Error	$se_{\psi} = 2.068E-04$ $se_{mi/h} = 1.349E-04$ $se_{lb} = 3.105E-07$ $se_b = 2.824E-02$	$se_{\psi} = 2.370E-04$ $se_{mi/h} = 1.623E-04$ $se_{lb} = 3.796E-07$ $se_b = 3.503E-02$	$se_{\psi} = 1.949E-04$ $se_{mi/h} = 1.324E-04$ $se_{lb} = 3.100E-07$ $se_b = 2.863E-02$	$se_{\psi} = 3.161E-04$ $se_{mi/h} = 1.758E-04$ $se_{lb} = 3.512E-07$ $se_b = 2.758E-02$	$se_{\psi} = 2.803E-04$ $se_{mi/h} = 1.570E-04$ $se_{lb} = 3.129E-07$ $se_b = 2.442E-02$	$se_{\psi} = 3.012E-04$ $se_{mi/h} = 1.698E-04$ $se_{lb} = 3.379E-07$ $se_b = 2.647E-02$
Coefficient of determination	$r^2 = 0.9868$	$r^2 = 0.9787$	$r^2 = 0.9856$	$r^2 = 0.9790$	$r^2 = 0.9686$	$r^2 = 0.9759$
Standard error of the y estimate	$se_y = 0.0147$	$se_y = 0.0158$	$se_y = 0.0129$	$se_y = 0.0199$	$se_y = 0.0177$	$se_y = 0.0191$
F-statistic	F = 1020.18	F = 490.16	F = 731.86	F = 435.78	F = 288.25	F = 378.27
Degrees of freedom	df = 41	df = 32	df = 32	df = 28	df = 28	df = 28
Regression sum of squares	SS <sub>reg</sub> = 0.6635	SS <sub>reg</sub> = 0.3694	SS <sub>reg</sub> = 0.3679	SS <sub>reg</sub> = 0.5160	SS <sub>reg</sub> = 0.2709	SS <sub>reg</sub> = 0.4145
Residual sum of squares	SS <sub>resid</sub> = 0.0089	SS <sub>resid</sub> = 0.0080	SS <sub>resid</sub> = 0.0054	SS <sub>resid</sub> = 0.0111	SS <sub>resid</sub> = 0.0088	SS <sub>resid</sub> = 0.0102
Sample size	n = 45	n = 36	n = 36	n = 32	n = 32	n = 32
T-observed (abs)	$t_{\psi} = 54.2143$ $t_{mi/h} = 6.7454$ $t_{lb} = 9.5824$ $t_b = 8.7014$	$t_{\psi} = 37.1122$ $t_{mi/h} = 6.3574$ $t_{lb} = 7.6932$ $t_b = 7.5310$	$t_{\psi} = 45.8203$ $t_{mi/h} = 6.3087$ $t_{lb} = 7.9378$ $t_b = 7.4700$	$t_{\psi} = 33.9342$ $t_{mi/h} = 5.8274$ $t_{lb} = 10.8530$ $t_b = 10.6497$	$t_{\psi} = 27.3423$ $t_{mi/h} = 5.5784$ $t_{lb} = 9.4889$ $t_b = 10.2462$	$t_{\psi} = 31.2882$ $t_{mi/h} = 4.9496$ $t_{lb} = 11.3914$ $t_b = 10.4044$
Min abs value of T for 99% significance	$T_{critical} = 2.7012$	$T_{critical} = 2.7385$	$T_{critical} = 2.7385$	$T_{critical} = 2.7633$	$T_{critical} = 2.7633$	$T_{critical} = 2.7633$
Prob. F-value occurred by chance (df2=3)	p = 1.578E-38	p = 8.1943E-27	p = 1.5087E-29	p = 1.363E-23	p = 3.806E-21	p = 9.440E-23

This analysis was repeated for the non-RSD testing, involving three additional brake conditions. This data appears in Table 25.

**Table 25. Linear model values for six-axle non-RSD brake testing.**

<b>Description</b>	<b>Symbol</b>	<b>Fully Functioning</b>	<b>Disabled Drive</b>	<b>Disabled Trailer Axle</b>	<b>Disabled Forward and Right Rear Drive Wheel Ends</b>	<b>Disabled Middle and Right Rear Trailer Wheel Ends</b>	<b>Disabled Steer Axle</b>
Model Constants	$m_{\psi} =$	1.002E-02	7.727E-03	7.857E-03	6.525E-03	6.959E-03	8.588E-03
Model Constants	$m_{mi/h} =$	-9.122E-04	-9.285E-04	-7.343E-04	-7.668E-04	-6.216E-04	-7.667E-04
Model Constants	$m_b =$	-3.527E-06	-2.982E-06	-2.715E-06	-2.753E-06	-2.297E-06	-3.481E-06
Model Constants	$b =$	2.988E-01	2.657E-01	2.326E-01	2.465E-01	1.947E-01	2.957E-01
Standard Error	$se_{\psi} =$	3.854E-04	3.616E-04	2.952E-04	3.248E-04	2.470E-04	3.777E-04
Standard Error	$se_{mi/h} =$	2.349E-04	2.222E-04	1.804E-04	2.011E-04	1.512E-04	2.310E-04
Standard Error	$se_b =$	6.673E-07	6.317E-07	5.123E-07	5.702E-07	4.294E-07	6.568E-07
Standard Error	$se_b =$	6.108E-02	5.785E-02	4.697E-02	5.225E-02	3.936E-02	6.022E-02
Coefficient of determination	$r^2 =$	0.9808	0.9724	0.9817	0.9692	0.9836	0.9754
Standard error of the y estimate	$se_y =$	0.0199	0.0188	0.0152	0.0170	0.0128	0.0195
F-statistic	$F =$	238.38	164.64	250.53	146.88	279.27	185.21
Degrees of freedom	$df =$	14	14	14	14	14	14
Regression sum of squares	$SS_{reg} =$	0.2822	0.1746	0.1747	0.1269	0.1369	0.2123
Residual sum of squares	$SS_{resid} =$	0.0055	0.0049	0.0033	0.0040	0.0023	0.0053
Sample size	$n =$	18	18	18	18	18	18
T-observed (abs)	$t_{\psi} =$	25.9981	21.3684	26.6160	20.0896	28.1698	22.7407
T-observed (abs)	$t_{mi/h} =$	3.8838	4.1783	4.0690	3.8132	4.1119	3.3185
T-observed (abs)	$t_b =$	5.2848	4.7208	5.3000	4.8281	5.3489	5.3008
T-observed (abs)	$t_b =$	4.8917	4.5923	4.9529	4.7164	4.9463	4.9105
Min abs value of T for 99% significance	$T_{critical} =$	2.9768	2.9768	2.9768	2.9768	2.9768	2.9768
Prob. F-value occurred by chance ( $df_2=3$ )	$p =$	2.997E-12	3.7526E-11	2.1314E-12	8.136E-11	1.0106E-12	1.6835E-11

In reality, these models exist in four-dimensional space (three input variables and one output variable). For illustration purposes, the weight was held constant, leaving only two input variables and allowing each model to be visualized as a plane in three-dimensional space, as shown in Figure 16.



**Figure 16. Chart. Linear deceleration model for 6-axle RSD test vehicle at 90,000-lb GVW.**

Sample plots for the 88,000-lb GVW 6-axle non-RSD testing are shown in Figure 17 and Figure 18 (two different views of the same plot).

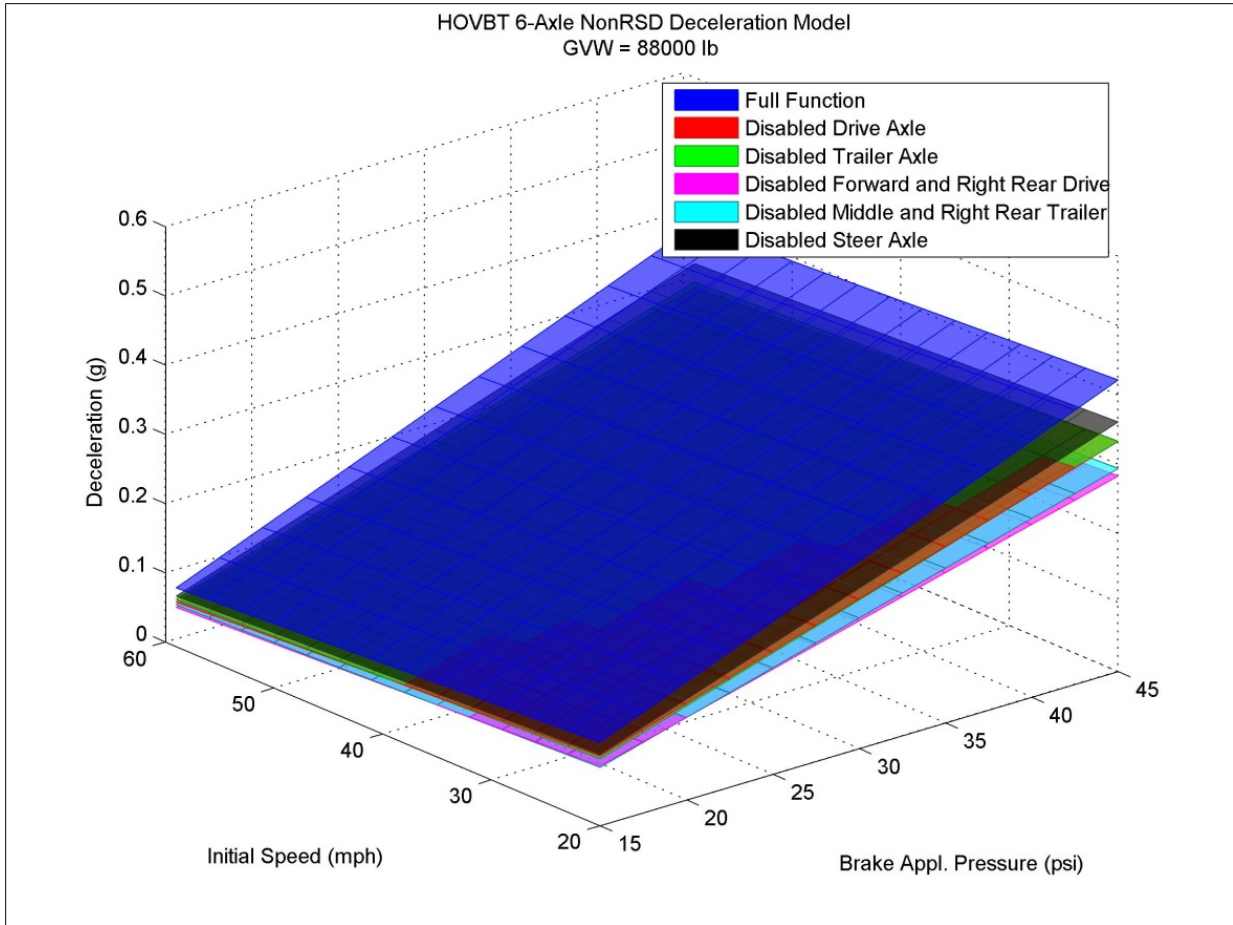


Figure 17. Chart. Linear deceleration model for 6-axle non-RSD test vehicle at 88,000-lb GVW (view 1).

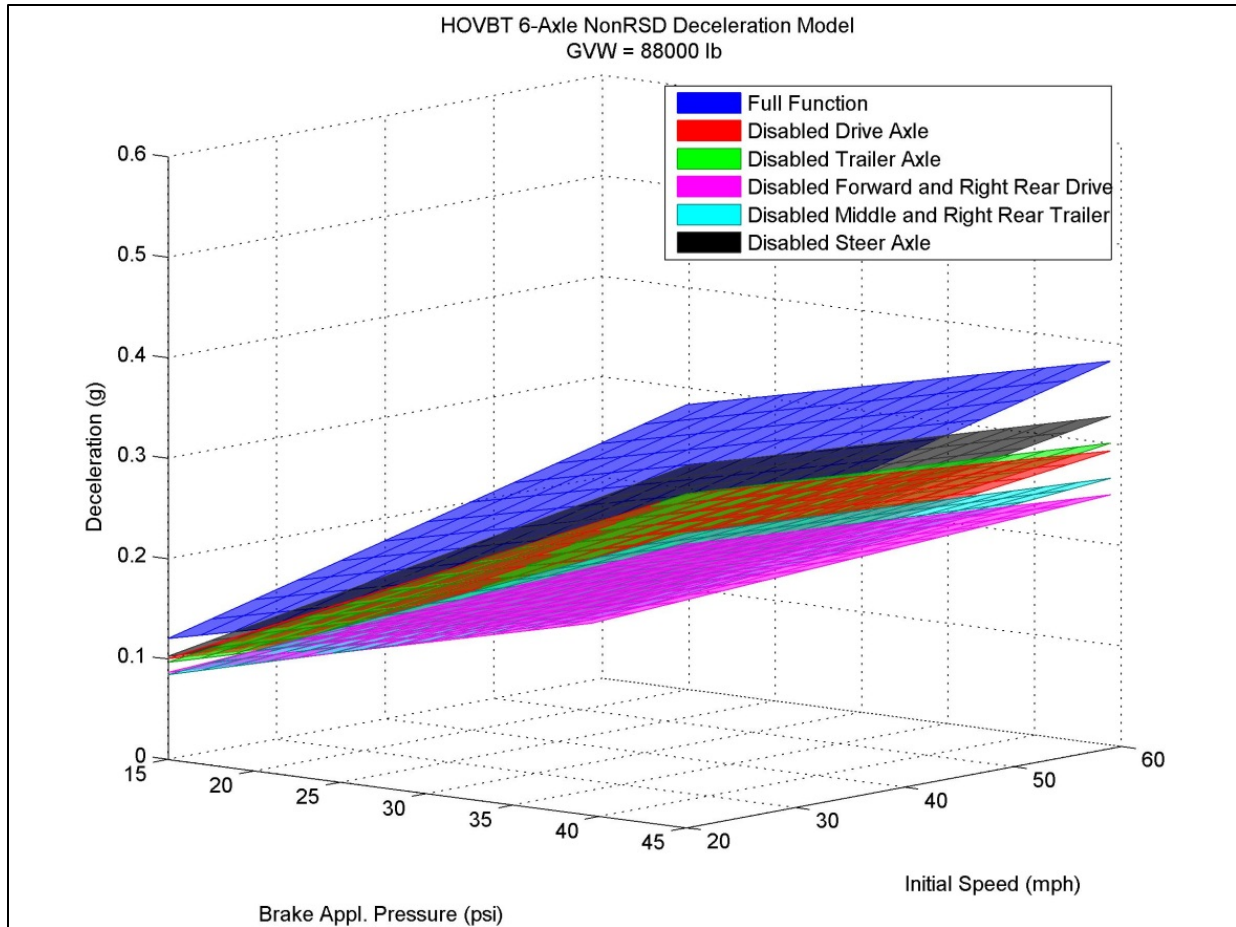


Figure 18. Chart. Linear deceleration model for 6-axle non-RSD test vehicle at 88,000-lb GVW (view 2).

## 6.7 APPLICATION OF LINEAR MODEL

The analysis presented here is based on the assumption that the data comes from constant-pressure application of brakes within this linear pressure region. It is therefore expected to be a suitable model for typical day-to-day brake application events, but unsuited for the prediction of service brake stops performance (~90+ psi), PBBT tests (~60 psi), or brake applications where insufficient pressure is applied to activate all vehicle brakes (i.e., below crack pressure, typically <10 psi).

## 6.8 POSSIBLE RTDBA APPLICATIONS OF MODEL

### 6.8.1 Detection of Degradation of Brake Performance

One way in which the model could be implemented is an algorithm that tracks performance over time and detects change for the worse throughout the life of the brake components. In this application, there would be a constant monitoring or building of the model for a given tractor/trailer combination and the algorithm would detect substantial degradation in performance. (The precise definition of “substantial degradation” is yet to be determined.)



This application would require that data points to feed the linear model be generated frequently since the multiple regression models must be constructed for each tractor/trailer combination. This would be difficult to implement for drop-and-hook operators, where a given system (tractor and trailer) may only be seen once every few months (depending on the number of tractors and trailers in a company’s pool), and data may only be collected for a single loading condition at a time for long-haul operations. Another disadvantage of this application even for mated tractor-trailers is that it is more subjective as it assumes a particular starting point as representative of good brake performance and degradation from that point would present a potential safety issue, whereas safety issues may already be present in the “baseline” condition.

### 6.8.2 Determination of “Safe” and “Unsafe” Performance Regions

A second RTDBA application of the multiple regression model is the determination of a “safe space” for brake performance. This would be similar to splitting the four-dimensional space (in the region where the input variables of initial speed, GVW, and brake application pressure have a linear relationship to the output variable of deceleration) into “safe” and “unsafe” regions (this would be akin to having another plane in Figure 16 between the fully functioning and brake defect models to serve as a “dividing line”). This concept is illustrated in a simplified two-dimensional graph in Figure 19, where the weight and speed are set as constants (88,000 lb and 40 mi/h, respectively).

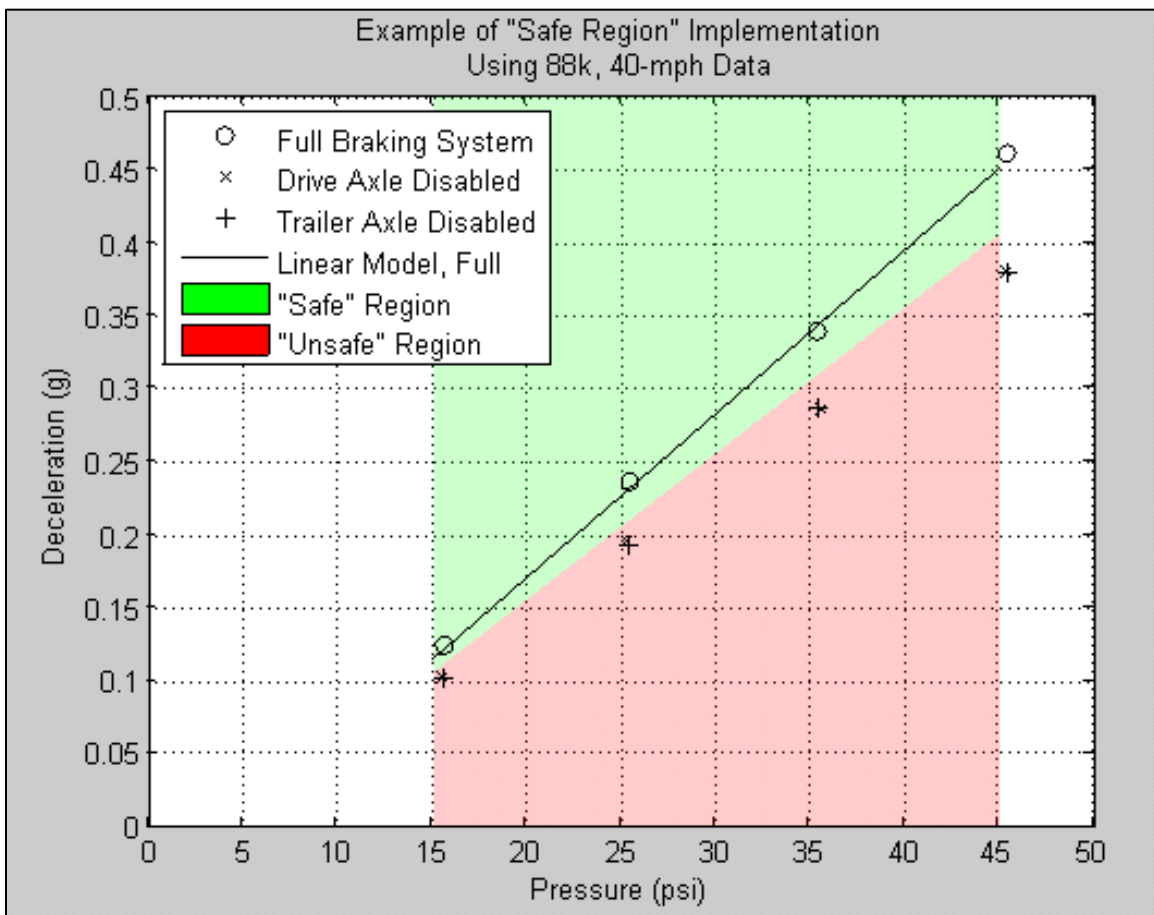


Figure 19. Graph. Potential “safe region” application of linear deceleration model.

Real-world brake performance data above the “dividing line” would be considered acceptable (green region), and data falling below it would be considered unacceptable, indicating a brake defect (red region).

The implementation of this type of algorithm would require knowledge of not just the ideal all-brakes working capacity, but an understanding of how much variation is reasonable within “good” or “acceptable” brakes, to avoid mistakenly identifying brakes as defective or unsafe brakes as acceptable. A standard for this “dividing line” must be explored and developed. Existing standards (minimum PBBT score and maximum service brake stopping distance) are applicable to higher brake application pressures than those experienced on day-to-day basis, and thus not suitable standards for brake performance monitoring using real-world driving cycles (where higher pressures are not typically seen).

## **7. LESSONS LEARNED**

As with any research and testing effort, certain lessons were learned this may provide guidance for future research of a similar nature.

### **7.1 PROCUREMENT AND SCHEDULING PROCESSES**

Testing of this nature requires the test facility roadway to be clear. Further, it is best facilitated in the warmer months of the year to eliminate the chance of snow and or ice delaying testing. Depending on the location of the test facility, seasons and pending long bad weather periods must be calculated in the overall test duration and budgeting. Clear communication and delineation of scheduling expectations should be conveyed to the testing facility and periodic follow-up conversations are recommended to abate possible schedule creep that could delay testing into inclement weather.

To ensure overall test schedule compliance, a day-to-day test schedule is recommended that sets testing milestones that should be accomplished throughout the testing period. This day-to-day schedule should have a reasonable amount of contingency to allow for sporadic weather issues and equipment malfunctions. The day-to-day schedule should be agreed to by the testing sponsor and the testing facility and, once accepted, be used to measure progress and alert the research team to schedule creep that can be detrimental to time-sensitive testing.

### **7.2 REDUCED DATASET FOR RTDBA SUPPORT**

The first set of six-axle tests (with the RSD brakes) showed the deceleration model for low-pressure stops to be highly linear and the stopping data highly repeatable. Based on this observation, the test plan for the non-RSD brakes was designed with only three brake application pressures (rather than four) and a single run for each speed/pressure combination (rather than three). This allowed a much broader set of data to be collected; three additional brake conditions were tested for a similar number of overall test runs.

[This page intentionally left blank.]

## **8. FUTURE DIRECTIONS**

This research built upon previous five-axle tractor-semitrailer brake performance research to determine the effect of loading and brake condition on service brake stopping distances for both RSD and non-RSD brakes in a variety of loaded vehicle conditions. Areas of further research could include testing tractor semitrailer brake performance with additional brake performance degradation introduced by the use of selectively adjusted manual slack adjusters. Additional brake performance testing of straight trucks and buses under various loading conditions would provide additional useful data, and test data for double and triple trailer configurations may also be of value.

Further examination of an on-board brake assessment algorithm also revealed gaps in understanding which would be of benefit in development of such an algorithm. In addition to the testing of additional vehicles to determine differences between vehicle types, a key next step would also involve real-world data collection, where the values used in the linear deceleration model would be collected from an in-service vehicle and compared to test track results. The final goal of such an on-board brake assessment algorithm would be the ability to determine vehicle brake performance through readily available on-board vehicle performance data (from the vehicle data bus) coupled with brake deceleration data obtained thru normal vehicle braking operations.

[This page intentionally left blank.]

## **APPENDIX A: SUMMARY OF STOPPING TEST RESULTS**

Link Engineering performed the stopping tests and collected the data referenced in Section 3.1. They provided several key parameters for each stopping test and those parameters were listed in Table 13. The values for each of these parameters for every stopping test performed follow.

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 CONTROL TRAILER STOPS	RSD	None	Stop 1	20	Full	20.6	28.5	26.9	108	19.3	1.7	13,500	39,780	4,490	57,770
ORNL 01 CONTROL TRAILER STOPS	RSD	None	Stop 2	20	Full	20.4	29	27.9	107.8	18.4	1.75	13,500	39,780	4,490	57,770
ORNL 01 CONTROL TRAILER STOPS	RSD	None	Stop 3	20	Full	20.4	28.8	27.7	108.3	18.1	1.75	13,500	39,780	4,490	57,770
ORNL 01 CONTROL TRAILER STOPS	RSD	None	Stop 4	60	Full	61	238.4	230.6	109	19.6	5.01	13,500	39,780	4,490	57,770
ORNL 01 CONTROL TRAILER STOPS	RSD	None	Stop 5	60	Full	60.5	229.1	225.3	107.6	20.2	4.84	13,500	39,780	4,490	57,770
ORNL 01 CONTROL TRAILER STOPS	RSD	None	Stop 6	60	Full	60.8	234.6	228.5	107.4	19.9	4.92	13,500	39,780	4,490	57,770
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 1	20	Full	20.8	32.6	30.1	106.2	17.3	1.95	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 2	20	Full	20.2	30.5	29.9	106.8	18.6	1.84	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 3	20	Full	21	32.9	29.8	105.5	17.6	1.94	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 4	60	Full	60.6	220.6	216.3	103.1	20.7	4.68	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 5	60	Full	60.6	220.5	216.2	103.5	20.4	4.75	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 6	60	Full	60.2	222.6	221.1	103.3	20.5	4.7	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 7	20	15	20.2	132.9	130.3	15.5	4.3	8.07	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 8	40	15	40.4	492.3	482.6	15.5	4.2	15.65	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 9	60	15	60.2	1,095.8	1,088.5	15.5	4.1	23.97	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 10	20	20	20.8	95.7	88.5	20.4	6.2	5.59	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 11	40	20	40.5	340.5	332.1	20.5	6.2	10.65	13,120	30,110	36,800	80,030



Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 12	60	20	60.5	759.3	746.8	20.6	5.9	16.29	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 13	20	25	20.4	70	67.3	25.1	8.3	4.15	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 14	40	25	40.6	260.1	252.5	25.3	8.1	8.08	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 15	60	25	60.4	584.8	577.1	25.3	7.6	12.56	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 16	20	30	20.7	59.3	55.4	30.1	10.4	3.43	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 17	40	30	40.3	209.5	206.4	30.2	10	6.54	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 18	60	30	60.5	476.1	468.3	30.3	9.5	10.12	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 19	20	35	20.6	50.6	47.7	34.7	12.5	2.9	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 20	40	35	40.5	178.3	173.9	35.6	12.1	5.5	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 21	60	35	60.3	400.9	396.9	35.4	11.2	8.55	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 22	20	40	20.4	43.8	42.1	40	14.7	2.51	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 23	40	40	40.4	155.7	152.6	40.6	14	4.78	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 24	60	40	60.6	352.4	345.5	40.8	12.9	7.46	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 25	20	45	20.5	39.7	37.8	45.2	17	2.23	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 26	40	45	40.4	137.2	134.5	45.7	16.1	4.19	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 27	60	45	60.5	311.5	306.4	45.7	14.6	6.61	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 28	20	50	20.4	38.7	37.2	50.2	15.8	2.25	13,120	30,110	36,800	80,030

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 29	40	50	40	126.1	126.1	50.5	17.6	3.84	13,120	30,110	36,800	80,030
ORNL 01 80K FULL FUNCTION STOPS	RSD	None	Stop 30	60	50	60.5	288.9	284.1	50.5	16.3	5.99	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 1	20	Full	20.5	37.9	36.1	108.3	14.7	2.3	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 2	20	Full	20.4	40.1	38.5	108.4	14.1	2.4	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 3	20	Full	20.5	39.8	37.9	108.8	14.2	2.37	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 4	60	Full	60.7	292.7	286.0	101.2	15.6	6.2	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 5	60	Full	60.6	295.4	289.6	102.1	15.3	6.26	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 6	60	Full	61	300.1	290.3	101.7	14.7	6.47	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 7	20	15	20.6	156.4	147.4	15.6	3.7	9.4	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 8	40	15	40.7	586.7	566.7	15.7	3.6	18.52	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 9	60	15	60.5	1,378.6	1,355.9	15.7	3.3	30.08	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 10	20	25	20.6	83.3	78.5	25.3	7	4.93	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 11	40	25	40.3	303.6	299.1	25.4	6.8	9.55	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 12	60	25	60.6	726.5	712.2	25.3	6.2	15.57	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 13	20	35	20.5	58.7	55.9	35	10.4	3.43	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 14	40	35	40.4	210.7	206.5	35.8	9.9	6.61	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 15	60	35	60.2	501.3	498.0	35.6	8.8	10.88	13,120	30,110	36,800	80,030

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 16	20	45	20.4	46.2	44.4	45	13.9	2.65	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 17	40	45	40.2	162.9	161.3	45.7	13.3	5.04	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 1 STOPS	RSD	Front Drive	Stop 18	60	45	60.6	387.5	379.9	46	11.6	8.28	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 1	20	Full	20.6	37.7	35.5	106.5	15.3	2.2	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 2	20	Full	20.6	38.1	35.9	106.4	15.1	2.3	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 3	20	Full	20.5	37.7	35.9	106.7	15.1	2.3	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 4	60	Full	60.3	274.5	271.8	103.5	16	6	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 5	60	Full	60.6	275.6	270.2	104.7	16.1	5.9	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 6	60	Full	60.6	279.9	274.4	103.6	16.1	6	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 7	20	15	20.5	153	145.6	15.8	3.7	9.3	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 8	40	15	40.4	569	557.8	16	3.7	18.2	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 9	60	15	60.6	1,335.4	1,309.1	15.8	3.4	29.1	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 10	20	25	20.5	81.3	77.4	25.4	6.9	4.9	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 11	40	25	40.4	305.8	299.8	25.5	6.7	9.7	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 12	60	25	60.4	712.3	702.9	25.6	6.2	15.4	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 13	20	35	20.6	58.2	54.9	35.1	10.3	3.4	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 14	40	35	40.2	210.6	208.5	35.2	9.7	6.7	13,120	30,110	36,800	80,030

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 15	60	35	60.6	487.1	477.5	35.3	9.1	10.5	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 16	20	45	20.8	47.2	43.6	44.7	13.4	2.7	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 17	40	45	40.3	163.4	161.0	45.4	12.8	5.1	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 2 STOPS	RSD	Middle Trailer	Stop 18	60	45	60.6	376.4	369.0	45.4	12	8	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 1	60	Full	60.2	288.1	286.2	103.3	15.7	6.1	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 2	60	Full	60.7	305.5	298.5	107.7	15	6.5	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 3	60	Full	60.2	309	307.0	105.4	14.1	6.7	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 1	60	Full	60.5	281.2	276.6	103.6	15.8	6	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 2	60	Full	60.4	288.2	284.4	104.3	15.4	6.1	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 3	60	Full	60.1	278.8	277.9	105	15.9	6	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 1	60	Full	60.6	281.6	276.1	103.3	15.9	6	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 2	60	Full	60.7	288.9	282.3	103.3	15.4	6.2	13,120	30,110	36,800	80,030
ORNL 01 80K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 3	60	Full	60.6	290.6	284.9	105	15.7	6.1	13,120	30,110	36,800	80,030
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 1	20	Full	20.7	31.2	29.1	107.4	18.7	1.84	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 2	20	Full	20.4	33.3	32.0	106.2	17.7	1.97	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 3	20	Full	20.4	33.8	32.5	106.4	17.4	2.01	13,200	31,240	43,660	88,100

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 4	60	Full	60.2	211.4	210.0	104.3	22.1	4.42	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 5	60	Full	60.4	213.5	210.7	102.1	21.9	4.44	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 6	60	Full	60.5	230.1	226.3	103.3	20.2	4.79	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 7	20	15	20.5	143.9	137.0	15.5	4	8.65	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 8	40	15	40.3	516.6	508.9	15.6	4	16.5	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 9	60	15	60.2	1,152.9	1,145.3	15.6	3.9	25.17	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 10	20	25	20.3	72.6	70.5	25.3	7.9	4.35	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 11	40	25	40.1	270.8	269.5	25.4	7.6	8.58	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 12	60	25	60.3	621.4	615.2	25.3	7.2	13.39	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 13	20	35	20.4	53.5	51.4	35.1	11.6	3.09	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 14	40	35	40.5	193.4	188.7	35.3	10.9	6.04	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 15	60	35	60.2	429	426.2	35.3	10.3	9.23	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 16	20	45	20.8	43.1	39.8	45	15.7	2.41	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 17	40	45	40.4	147.6	144.7	45.3	14.8	4.54	13,200	31,240	43,660	88,100
ORNL 01 88K FULL FUNCTION STOPS	RSD	None	Stop 18	60	45	60.5	332.6	327.1	45.4	13.7	7.07	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 1	20	Full	20.6	39.7	37.4	107	14.2	2.36	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 2	20	Full	20.7	40.2	37.5	107.1	15	2.34	13,200	31,240	43,660	88,100

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 3	20	Full	20.5	40.2	38.3	106.8	13.5	2.47	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 4	60	Full	60.2	275.3	273.5	101.6	16.8	5.75	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 5	60	Full	60.3	277	274.3	103	16.8	5.76	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 6	60	Full	60.1	272.9	272.0	102.6	16.7	5.74	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 7	20	15	20.4	175.3	168.5	15.5	3.3	10.66	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 8	40	15	40.2	630.2	623.9	15.5	3.3	20.25	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 9	60	15	60.4	1,453.1	1,433.9	15.4	3.2	31.97	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 10	20	25	20.4	89.2	85.7	25.1	6.4	5.34	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 11	40	25	40.5	329.2	321.1	25.2	6.3	10.4	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 12	60	25	60	768.2	768.2	25.4	5.7	16.8	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 13	20	35	20.8	63.9	59.1	35.5	9.6	3.7	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 14	40	35	40.6	226.7	220.0	35.5	9.2	7.11	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 15	60	35	60.4	559.6	552.2	35.8	8.3	11.9	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 16	20	45	20.6	50.1	47.2	45.1	12.8	2.86	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 17	40	45	40.2	174.4	172.7	45.3	12.2	5.44	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 1 STOPS	RSD	Front Drive	Stop 18	60	45	60.6	422.4	414.1	45.6	10.6	9.07	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 1	20	Full	20.3	36.8	35.7	106.5	15	2.22	13,200	31,240	43,660	88,100

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 2	20	Full	20.4	37.7	36.2	107.7	15	2.27	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 3	20	Full	20.5	39.7	37.8	105.7	14.3	2.38	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 4	60	Full	60.5	290.4	285.6	100.9	15.4	6.18	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 5	60	Full	60.2	287.3	285.4	102.5	15.4	6.16	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 6	60	Full	60.5	302.8	297.8	103.7	14.9	6.39	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 7	20	15	20.6	170.7	160.9	15.6	3.4	10.4	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 8	40	15	40.2	629.9	623.6	15.6	3.3	20.31	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 9	60	15	60.5	1,464.9	1,440.8	15.6	3.1	32.21	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 10	20	25	20.5	87.4	83.2	25.3	6.4	5.26	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 11	40	25	40.4	327.4	320.9	25.4	6.2	10.42	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 12	60	25	60.4	752.7	742.8	25.4	5.9	16.29	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 13	20	35	20.5	60.3	57.4	35.4	9.8	3.57	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 14	40	35	40.2	221.5	219.3	35.4	9.2	7.03	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 15	60	35	60.4	521.8	514.9	35.4	8.4	11.34	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 16	20	45	20.9	48.9	44.8	45.3	13	2.8	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 17	40	45	40.6	174.7	169.6	45.4	12.2	5.42	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 2 STOPS	RSD	Middle Trailer	Stop 18	60	45	60.4	406.2	400.8	45.6	10.9	8.71	13,200	31,240	43,660	88,100

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 1	60	Full	61	317	306.7	105.7	14.9	6.53	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 2	60	Full	60.6	328.3	321.8	106	14	6.83	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 3	60	Full	60.6	316.5	310.3	105.4	14	6.79	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 1	60	Full	60.6	298.5	292.6	104.7	15.2	6.24	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 2	60	Full	60.7	295.1	288.3	105.5	15.4	6.18	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 3	60	Full	60.2	295.3	293.3	105.9	15	6.3	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 1	60	Full	60.7	296.6	289.8	104.2	16	6.01	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 2	60	Full	60.5	284.2	279.5	105.1	16.2	5.89	13,200	31,240	43,660	88,100
ORNL 01 88K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 3	60	Full	60.4	281.7	278.0	106.3	16.8	5.76	13,200	31,240	43,660	88,100
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 1	20	Full	20.4	30.1	28.9	106.2	19.2	1.79	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 2	20	Full	20.4	32.4	31.1	105.2	17.3	1.92	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 3	20	Full	20.3	30.1	29.2	107.1	19.6	1.78	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 4	60	Full	60	214.5	214.5	103.2	21.4	4.47	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 5	60	Full	60.5	223.6	219.9	103.7	20.8	4.62	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 6	60	Full	60.6	232.4	227.8	101.7	19.6	4.87	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 7	20	15	20.5	146.9	139.8	15.5	3.6	8.87	13,410	34,270	49,390	97,070



Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 8	40	15	40.2	527.4	522.2	15.6	3.6	16.86	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 9	60	15	60.2	1,236.2	1,228.0	15.6	3.5	26.95	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 10	20	25	20.7	78.6	73.4	25.2	7.1	4.65	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 11	40	25	40.4	286.8	281.1	25.5	6.9	9.04	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 12	60	25	60.2	664.3	659.9	25.6	6.5	14.38	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 13	20	35	20.2	53	52.0	35.6	10.8	3.13	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 14	40	35	40.3	198.1	195.2	35.7	10.2	6.22	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 15	60	35	60.1	460.5	459.0	35.8	9.3	9.95	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 16	20	45	20.4	43.9	42.2	45.3	14.1	2.53	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 17	40	45	40.4	159.7	156.6	45.5	13.3	4.93	13,410	34,270	49,390	97,070
ORNL 01 97K BAL FULL FUNCTION STOPS	RSD	None	Stop 18	60	45	60.4	361	356.2	45.7	12.1	7.72	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 1	20	Full	20.5	38.2	36.4	106.2	15.1	2.29	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 2	20	Full	20.4	39.5	38.0	106	14.2	2.37	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 3	20	Full	20.5	39.8	37.9	104.6	13.9	2.39	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 4	60	Full	60.4	290.4	286.6	101.8	15.4	6.15	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 5	60	Full	60.2	295.6	293.6	102.5	14.9	6.28	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 6	60	Full	60.1	296.1	295.1	102.2	14.8	6.3	13,410	34,270	49,390	97,070

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 7	20	15	20.2	175.9	172.4	15.6	2.9	10.79	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 8	40	15	40.3	652.4	642.7	15.5	2.9	21.03	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 9	60	15	60.3	1,634.7	1,618.5	15.5	2.6	35.84	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 10	20	25	20.2	89.1	87.3	25.8	6	5.39	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 11	40	25	40.3	341.8	336.7	25.9	5.7	10.81	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 12	60	25	60.2	821.5	816.1	25.8	5	17.95	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 13	20	35	20.8	68.3	63.1	35.5	8.7	4	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 14	40	35	40.4	251.4	246.4	35.5	8	7.95	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 15	60	35	60.2	604.3	600.3	35.6	7	13.18	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 16	20	45	20.5	52.1	49.6	45.2	11.5	3.04	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 17	40	45	40.4	196.9	193.0	45.4	10.4	6.17	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 1 STOPS	RSD	Front Drive	Stop 18	60	45	60.3	481.9	477.1	45.5	8.9	10.42	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 1	20	Full	20.5	35.5	33.8	106.8	16	2.13	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 2	20	Full	20.6	36.1	34.0	106.5	16.2	2.13	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 3	20	Full	20.8	37.2	34.4	105.1	15.7	2.19	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 4	60	Full	60.5	282.1	277.5	101.3	16.2	5.94	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 5	60	Full	60.1	276	275.1	103.5	16.3	5.86	13,410	34,270	49,390	97,070

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 6	60	Full	60.4	272.1	268.5	102.3	16.2	5.85	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 7	20	15	20.3	164.8	160.0	15.5	3	10.23	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 8	40	15	40.3	626.3	617.0	15.5	3	20.18	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 9	60	15	60.4	1518.4	1498.4	15.4	2.8	33.51	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 10	20	25	20.4	87.9	84.5	25.5	5.9	5.37	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 11	40	25	40.4	339.3	332.6	25.5	5.7	10.82	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 12	60	25	60.1	805.8	803.1	25.6	5.2	17.69	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 13	20	35	20.3	61.5	59.7	35.4	8.8	3.73	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 14	40	35	40.3	236.6	233.1	35.5	8.2	7.56	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 15	60	35	60.1	558.4	556.5	35.6	7.5	12.2	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 16	20	45	20.2	49.2	48.2	45.1	11.6	2.93	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 17	40	45	40.2	186.2	184.4	45.4	10.8	5.87	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 2 STOPS	RSD	Middle Trailer	Stop 18	60	45	60.5	450.2	442.8	45.8	9.5	9.75	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 1	60	Full	60.3	343.2	339.8	103.2	12.7	7.23	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 2	60	Full	60.3	333.9	330.6	107	13.4	7.01	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 3	60	Full	60.4	338.7	334.2	104.4	13.1	7.13	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 1	60	Full	60.2	290.6	288.7	104.4	15.2	6.15	13,410	34,270	49,390	97,070

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 2	60	Full	60.2	291.1	289.2	105	15.2	6.17	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 3	60	Full	60.3	290.1	287.2	105.6	15	6.2	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 1	60	Full	60.1	287.1	286.1	105.8	16.1	5.88	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 2	60	Full	60.5	297.4	292.5	105	15.6	6.04	13,410	34,270	49,390	97,070
ORNL 01 97K BAL DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 3	60	Full	60.2	294.9	292.9	106.7	15.8	5.94	13,410	34,270	49,390	97,070
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 1	20	Full	20.4	30.7	29.5	107	17.5	1.85	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 2	20	Full	20.8	31.8	29.4	107.6	16.9	1.89	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 3	20	Full	20.4	31.8	30.6	106.8	16.1	1.92	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 4	60	Full	60	213.8	213.8	105.2	20.5	4.58	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 5	60	Full	60.5	220.2	216.6	104.4	20.9	4.58	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 6	60	Full	60.4	217.4	214.5	106.1	21	4.59	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 1	20	Full	20.5	42.1	40.1	104.6	12.6	2.56	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 2	20	Full	20.5	40.3	38.4	106.4	13.7	2.43	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 3	20	Full	20.6	41.9	39.5	105.2	13.6	2.5	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 4	60	Full	60.2	297.4	295.4	101.9	14.5	6.42	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 5	60	Full	60.3	300	297.0	100	14.4	6.47	13,260	42,590	41,180	97,030

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 6	60	Full	60.3	286.4	283.6	101.6	15.2	6.17	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 1	20	Full	20.3	35.8	34.7	107.4	15	2.14	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 2	20	Full	20.5	35.4	33.7	109.3	16.3	2.08	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 3	20	Full	20.3	34.7	33.7	110.6	16.4	2.05	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 4	60	Full	60.4	281.7	278.0	106.7	15.6	6.02	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 5	60	Full	60.2	273.8	272.0	106.8	15.9	5.89	13,260	42,590	41,180	97,030
ORNL 01 97K UNBAL FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 6	60	Full	60.1	274	273.1	106.6	15.9	5.88	13,260	42,590	41,180	97,030
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 1	60	Full	60.4	337.1	332.6	105	13.2	7.17	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 2	60	Full	60.3	341.9	338.5	105.6	12.7	7.36	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 3	60	Full	60.3	350.5	347.0	104	12.3	7.6	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 1	60	Full	60.6	281.9	276.3	105.6	15.8	6.01	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 2	60	Full	60.6	274.8	269.4	107.5	16.2	5.88	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 3	60	Full	60.2	275.8	274.0	104.2	15.7	5.93	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 1	60	Full	60.3	266.4	263.8	106.5	16.7	5.67	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 2	60	Full	60.1	262.9	262.0	105.4	16.7	5.59	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 3	60	Full	60.1	264.8	263.9	109.2	16.8	5.62	13,110	39,360	59,680	112,150

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 1	20	Full	20.6	31.1	29.3	105.4	18.2	1.8	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 2	20	Full	20.4	31.1	29.9	106.9	17.4	1.84	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 3	20	Full	20.2	30.5	29.9	107.6	17.2	1.83	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 4	60	Full	60.3	232.7	230.4	104.9	19.2	4.92	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 5	60	Full	60.6	238.3	233.6	104.3	18.9	5	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 6	60	Full	60.3	240.2	237.8	104.6	18.8	5.03	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 1	20	Full	20.2	37.3	36.6	103.5	15.1	2.24	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 2	20	Full	20.4	38.3	36.8	106	15.8	2.23	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 3	20	Full	20.6	38.5	36.3	104.8	14.8	2.3	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 4	60	Full	60.2	315.2	313.1	103.2	13.4	6.87	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 5	60	Full	60.6	319.3	313.0	102.8	13.5	6.89	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 6	60	Full	60.4	310.5	306.4	104.2	13.7	6.75	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 1	20	Full	20.7	38.8	36.2	104.5	13.7	2.32	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 2	20	Full	20.4	36.9	35.5	108	15.5	2.19	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 3	20	Full	20.5	37.5	35.7	107	14.5	2.27	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 4	60	Full	60.3	282.6	279.8	106.9	15.6	6.04	13,110	39,360	59,680	112,150
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 5	60	Full	60.5	298.2	293.3	102.8	14.6	6.38	13,110	39,360	59,680	112,150

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 112K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 6	60	Full	60.1	276.9	276.0	105	15.6	5.95	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 1	60	Full	60.6	377.5	370.1	105.9	11.6	8.2	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 2	60	Full	60.2	370.9	368.4	105.7	11.5	8.15	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 3	60	Full	60.2	361.8	359.4	106.5	11.9	7.91	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 1	60	Full	60.3	308.6	305.5	108.2	13.8	6.72	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 2	60	Full	60.3	315.3	312.2	107.7	13.6	6.8	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 3	60	Full	60.2	309.8	307.7	109.7	13.7	6.71	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 1	60	Full	60.4	306.2	302.2	106	14.4	6.49	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 2	60	Full	60.2	290	288.1	109.8	15.1	6.18	13,110	39,360	59,680	112,150
ORNL 01 112K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 3	60	Full	60.1	299.9	298.9	109.3	14.8	6.34	13,110	39,360	59,680	112,150
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 1	20	Full	20.5	32	30.5	108.3	20.2	1.82	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 2	20	Full	20.6	33.7	31.8	106.2	18.8	1.92	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 3	20	Full	20.6	32.6	30.7	109.5	18.2	1.91	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 4	60	Full	60.1	269.8	268.9	107.1	15.8	5.87	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 5	60	Full	60.3	271.8	269.1	107	15.8	5.87	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	None	FF Stop 6	60	Full	60.5	273	268.5	106.6	15.9	5.87	13,500	47,120	71,420	132,040

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 1	20	Full	20.3	40.2	39.0	106.2	15.4	2.34	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 2	20	Full	20.4	37.8	36.3	108.5	16.2	2.21	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 3	20	Full	20.5	41.3	39.3	105.4	14.4	2.42	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 4	60	Full	60.3	362	358.4	105.6	11.9	7.9	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 5	60	Full	60.3	370	366.3	105	11.7	8.01	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Front Drive	DBC 1 Stop 6	60	Full	60.2	366.5	364.1	105.5	11.6	8.01	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 1	20	Full	20.5	37.7	35.9	110.3	16.1	2.2	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 2	20	Full	20.3	36.5	35.4	110.7	16.4	2.15	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 3	20	Full	20.5	37.2	35.4	110.5	16.8	2.15	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 4	60	Full	60.6	348.3	341.4	106	12.3	7.57	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 5	60	Full	60.2	335.1	332.9	109.3	12.6	7.34	13,500	47,120	71,420	132,040
ORNL 01 132K FF and DBC 1 and 2 STOPS	RSD	Middle Trailer	DBC 2 Stop 6	60	Full	60.1	329.8	328.7	108.6	12.8	7.25	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 1	60	Full	60.3	454	449.5	106.9	9.5	9.85	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 2	60	Full	59.9	439.7	441.2	108.7	9.8	9.65	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Front and RR Drive	DBC 3 Stop 3	60	Full	60.4	446.6	440.7	106.2	9.7	9.73	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 1	60	Full	60.4	396.8	391.6	108.4	10.7	8.7	13,500	47,120	71,420	132,040



Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 2	60	Full	60.6	386.1	378.5	111	10.9	8.5	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Middle and RR Trailer	DBC 4 Stop 3	60	Full	60.7	395	385.9	106.4	10.7	8.69	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 1	60	Full	60.3	357.4	353.9	109.2	12	7.77	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 2	60	Full	60.5	363.3	357.3	107.3	12	7.8	13,500	47,120	71,420	132,040
ORNL 01 132K DBC 3 4 5 STOPS	RSD	Steer	DBC 5 Stop 3	60	Full	60.1	361.7	360.5	107	12	7.79	13,500	47,120	71,420	132,040
ORNL 01 CONTROL TRAILER STOPS	Non-RSD	None	Stop 1	20	Full	20.6	28.5	26.9	108	19.3	1.7	13,500	39,780	4,490	57,770
ORNL 02 CONTROL TRAILER STOPS	Non-RSD	None	Stop 1	20	Full	20.2	31.3	30.7	77	18.8	1.83	13,120	40,150	4,500	57,770
ORNL 02 CONTROL TRAILER STOPS	Non-RSD	None	Stop 2	20	Full	20.3	31.3	30.4	66.8	18.6	1.83	13,120	40,150	4,500	57,770
ORNL 02 CONTROL TRAILER STOPS	Non-RSD	None	Stop 3	20	Full	20.4	30.8	29.6	78.8	19.8	1.78	13,120	40,150	4,500	57,770
ORNL 02 CONTROL TRAILER STOPS	Non-RSD	None	Stop 4	60	Full	60.2	258.3	256.6	92.9	17.1	5.51	13,120	40,150	4,500	57,770
ORNL 02 CONTROL TRAILER STOPS	Non-RSD	None	Stop 5	60	Full	60.4	263.5	260.0	81.9	17.1	5.52	13,120	40,150	4,500	57,770
ORNL 02 CONTROL TRAILER STOPS	Non-RSD	None	Stop 6	60	Full	60.1	257.7	256.8	81.6	17.1	5.51	13,120	40,150	4,500	57,770
ORNL-02 80K Full Function	Non-RSD	None	Stop 1	20	Full	20.4	32.3	31.0	108.6	17.5	1.92	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 2	20	Full	20.6	33.7	31.8	108.5	17.5	1.97	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 3	20	Full	20.7	33	30.8	108.3	18.8	1.92	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 4	60	Full	60.3	249.7	247.2	103.5	17.9	5.25	13,100	30,150	36,800	80,050

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 80K Full Function	Non-RSD	None	Stop 5	60	Full	60.3	272.7	270.0	101	16.7	5.61	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 6	60	Full	60.4	255.7	252.3	100.9	17.4	5.43	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 7	20	15	20.6	146	137.6	15.5	3.7	8.85	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 8	60	15	60.2	1,223.5	1,215.4	15.5	3.6	26.69	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 9	20	30	20.3	61.2	59.4	30.2	9.6	3.59	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 10	60	30	60.1	507.6	505.9	30.5	8.5	10.95	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 11	20	45	20.2	41.9	41.1	44.7	15.4	2.38	13,100	30,150	36,800	80,050
ORNL-02 80K Full Function	Non-RSD	None	Stop 12	60	45	60.4	331.9	327.5	45.9	13.6	7.01	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 1	20	Full	20.6	40.5	38.2	108.5	13.1	2.47	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 2	20	Full	20.4	41.4	39.8	108.2	13.3	2.5	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 3	20	Full	20.6	40.8	38.5	109.7	13.9	2.42	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 4	60	Full	60.3	323.6	320.4	97.9	13.5	6.86	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 5	60	Full	60.4	346.7	342.1	98.3	12.6	7.37	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 6	60	Full	60.2	337.3	335.1	98.2	12.2	7.4	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 7	20	15	20.3	171.9	166.9	15.4	3.1	10.51	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 8	60	15	60.2	1,556.3	1,546.0	15.4	2.8	34.83	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 9	20	30	20.7	74.8	69.8	30.7	8	4.37	13,100	30,150	36,800	80,050

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 10	60	30	60.3	645.9	639.5	30.8	6.7	13.93	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 11	20	45	20.5	50.2	47.8	45.1	12.7	2.86	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-1	Non-RSD	Front Drive	Stop 12	60	45	60.3	433.4	429.1	45.8	10.2	9.22	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 1	20	Full	20.6	38.9	36.7	108.3	15	2.3	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 2	20	Full	20.7	38.7	36.1	108.3	15.1	2.28	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 3	20	Full	20.6	38.6	36.4	108.1	15	2.29	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 4	60	Full	60.4	311.6	307.5	103.5	14.2	6.57	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 5	60	Full	60.8	312.1	303.9	103.2	14.7	6.46	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 6	60	Full	60.2	307.6	305.6	103.8	14.3	6.54	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 7	20	15	20.4	161.3	155.0	16	3.3	9.89	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 8	60	15	60.4	1,527.1	1,506.9	15.8	2.9	33.85	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 9	20	30	20.6	73.4	69.2	30.6	7.9	4.34	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 10	60	30	60	624	624.0	30.7	6.8	13.61	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 14	20	45	20.7	50.7	47.3	45	12.2	2.9	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-2	Non-RSD	Middle Trailer	Stop 15	60	45	60.3	404.2	400.2	45.9	10.4	8.8	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 1	60	Full	60.3	359.8	356.2	102.4	11.7	7.8	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 2	60	Full	60.5	362.3	356.3	102.7	11.8	7.7	13,100	30,150	36,800	80,050

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 3	60	Full	60.4	363.1	358.3	102	11.5	7.8	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 4	20	15	20.5	193.1	183.8	15.6	2.7	11.6	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 5	60	15	60.2	1,548.1	1,537.8	15.6	2.6	34.9	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 6	20	30	20.5	83	79.0	30.5	6.9	4.9	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 7	60	30	60.2	728.6	723.8	30.6	5.7	15.9	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 8	20	45	20.6	57	53.7	45	10.9	3.3	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-3	Non-RSD	Front and RR Drive	Stop 9	60	45	60.2	478.2	475.0	45.9	9	10.3	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 1	60	Full	60.5	305.4	300.4	104.4	14.2	6.5	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 2	60	Full	60	345.2	345.2	102.5	12.1	7.5	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 3	60	Full	60	342.4	342.4	102.5	12.2	7.4	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 4	20	15	20.4	179.3	172.3	15.8	2.8	11.1	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 5	60	15	60.2	1,510.6	1,500.6	15.6	2.5	34.1	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 6	20	30	20.6	81.5	76.8	30.6	6.6	4.9	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 7	60	30	60.3	691.3	684.4	30.6	5.9	15.3	13,100	30,150	36,800	80,050

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 9	20	45	20.2	53.9	52.8	44.7	10.6	3.2	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-4	Non-RSD	Middle and RR Trailer	Stop 10	60	45	60.2	440.2	437.3	45.6	9.5	9.5	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 7	60	Full	60.2	305	303.0	100.1	14.3	6.5	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 8	60	Full	60.3	295.1	292.2	100.7	14.8	6.3	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 9	60	Full	60.2	298	296.0	101.5	14.9	6.3	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 1	20	15	20.4	154.4	148.4	15.8	3.4	9.3	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 2	60	15	60	1,255.6	1,255.6	15.8	3.2	28.1	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 3	20	30	20.5	67.4	64.2	30.7	8.6	3.9	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 4	60	30	60.2	551.7	548.0	30.9	7.5	12	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 5	20	45	20.5	47.2	44.9	45.4	13.8	2.7	13,100	30,150	36,800	80,050
ORNL-02 80K DBC-5	Non-RSD	Steer	Stop 6	60	45	60.3	363.7	360.1	45.9	11.9	7.8	13,100	30,150	36,800	80,050
ORNL-02 88K Full Function	Non-RSD	None	Stop 1	20	Full	20.6	33.5	31.6	107	17.1	1.97	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 2	20	Full	20.5	34.5	32.8	110.1	16.5	2.03	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 3	20	Full	20.4	32.3	31.0	107.2	17.5	1.92	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 4	60	Full	60.4	254.4	251.0	101.4	17.6	5.33	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 5	60	Full	60.5	250	245.9	102.5	17.6	5.33	13,150	31,250	43,890	88,290

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 88K Full Function	Non-RSD	None	Stop 6	60	Full	60.6	254.2	249.2	101.6	17.2	5.47	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 8	20	15	20.5	146.3	139.3	15.6	3.8	8.65	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 9	60	15	60.1	1,219.7	1,215.6	15.6	3.3	26.99	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 10	20	30	20.5	64.5	61.4	30.6	9.2	3.76	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 11	60	30	60.3	533.3	528.0	30.7	7.8	11.67	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 12	20	45	20.4	45.7	43.9	45.1	14.1	2.59	13,150	31,250	43,890	88,290
ORNL-02 88K Full Function	Non-RSD	None	Stop 13	60	45	60.3	356	352.5	45.6	12.2	7.66	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 1	20	Full	20.5	39	37.1	106.8	15	2.26	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 2	20	Full	20.5	40.4	38.5	108.7	14.4	2.34	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 3	20	Full	20.5	39.9	38.0	107.8	14.3	2.36	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 4	60	Full	60.4	313.4	309.3	100.3	13.9	6.62	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 5	60	Full	60.4	320.3	316.1	99.5	13.4	6.82	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 6	60	Full	60.5	325.7	320.3	99.8	13.4	6.84	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 7	20	15	20.3	172.3	167.2	15.6	2.9	10.5	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 8	60	15	60.3	1,555.7	1,540.3	15.6	2.6	34.96	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 9	20	30	20.3	76.4	74.2	30.7	7.1	4.58	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 10	60	30	60.3	696.8	689.9	30.7	6	15.25	13,150	31,250	43,890	88,290

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 11	20	45	20.3	52.7	51.2	45.4	11.2	3.07	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-1	Non-RSD	Front Drive	Stop 12	60	45	60.4	465.9	459.7	46	9.2	10.03	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 1	20	Full	20.4	39.9	38.4	108.5	14.4	2.36	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 2	20	Full	20.4	39.6	38.1	108	14.2	2.36	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 3	20	Full	20.5	39.4	37.5	109.6	14.5	2.34	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 4	60	Full	60.4	311.7	307.6	102	13.9	6.66	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 5	60	Full	60.3	305.2	302.2	100.6	14.2	6.51	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 6	60	Full	60.5	310.2	305.1	102.8	14.4	6.52	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 7	20	15	20.4	175.2	168.4	15.6	2.8	10.79	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 8	60	15	60.2	1,545.2	1,534.9	15.6	2.6	34.92	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 9	20	30	20.3	74.5	72.3	30.5	7.1	4.52	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 10	60	30	60.1	657.1	654.9	30.7	6.3	14.55	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 11	20	45	20.3	51.1	49.6	45.3	11.3	3	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-2	Non-RSD	Middle Trailer	Stop 12	60	45	60.3	435.5	431.2	45.9	9.7	9.4	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 1	60	Full	60.6	364.4	357.2	105.2	12.2	7.6	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 2	60	Full	60.3	374.2	370.5	105	11.4	8	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 3	60	Full	60.4	362	357.2	105	12.3	7.5	13,150	31,250	43,890	88,290

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 4	20	15	20.3	196.8	191.0	15.5	2.4	12.1	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 5	60	15	60.2	1,848.4	1,836.1	15.5	2.2	41.9	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 6	20	30	20.2	86.5	84.8	30.5	6	5.3	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 7	60	30	60.3	827.4	819.2	30.5	5	18.1	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 8	20	45	20.7	63.7	59.5	45.5	9.4	3.7	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-3	Non-RSD	Front and RR Drive	Stop 9	60	45	60.2	554.2	550.5	46.2	7.7	11.9	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 1	60	Full	60.5	319.6	314.3	102.5	13.9	6.7	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 2	60	Full	60.1	318.1	317.0	102.3	13.8	6.7	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 3	60	Full	60.3	321.3	318.1	101.9	13.6	6.8	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 4	20	15	20.3	175.4	170.3	15.6	2.7	10.9	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 5	60	15	60.2	1,654.5	1,643.5	15.5	2.4	37.4	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 6	20	30	20.3	81.3	78.9	30.4	6.3	4.9	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 7	60	30	60	731.1	731.1	30.6	5.5	16.4	13,150	31,250	43,890	88,290



Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 8	20	45	20.4	56.3	54.1	45.3	10	3.3	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-4	Non-RSD	Middle and RR Trailer	Stop 9	60	45	60	501.4	501.4	45.8	8.3	11	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 1	60	Full	60.5	292.1	287.3	102.4	15.8	6	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 2	60	Full	60.3	300.1	297.1	101.4	15.3	6.2	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 3	60	Full	60.8	307.6	299.6	99.2	14.6	6.4	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 4	20	15	20.3	166.5	161.6	15.7	3	10	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 5	60	15	60.4	1,408.7	1,390.1	15.8	3	31.1	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 6	20	30	20.3	73.4	71.2	30.6	7.6	4.3	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 7	60	30	60.4	636.1	627.7	30.8	6.6	13.9	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 8	20	45	20.4	51.8	49.8	45.1	12	3	13,150	31,250	43,890	88,290
ORNL-02 88K DBC-5	Non-RSD	Steer	Stop 9	60	45	60.3	422.9	418.7	45.9	10.2	9.1	13,150	31,250	43,890	88,290
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 1	20	Full	20.6	33.7	31.8	108.1	17.3	1.96	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 2	20	Full	20.4	33.6	32.3	108.7	16.5	1.99	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 3	20	Full	20.6	33.3	31.4	108.2	17.4	1.94	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 4	60	Full	60	256.1	256.1	101.1	17.8	5.3	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 5	60	Full	60.4	266.3	262.8	100.1	17	5.5	13,340	34,260	49,630	97,230

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 6	60	Full	60.8	273.4	266.3	100.2	17	5.53	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 7	20	15	20.3	161.1	156.4	15.7	3.1	9.74	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 8	60	15	60.3	1,414.2	1,400.2	15.7	2.9	31.41	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 9	20	30	20.2	72.4	71.0	30.4	7.6	4.3	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 10	60	30	60.1	624.5	622.4	30.5	6.7	13.71	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 11	20	45	20.4	50.3	48.3	45.1	12.2	2.88	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced Full Function	Non-RSD	None	Stop 12	60	45	60.4	412	406.6	45.7	10.5	8.89	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 1	20	Full	20.3	39.9	38.7	108.7	13.9	2.4	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 2	20	Full	20.6	40.8	38.5	105.1	13.7	2.45	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 3	20	Full	20.6	40.7	38.4	106.6	14.2	2.4	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 4	60	Full	60.2	338.3	336.1	94.4	12.8	7.19	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 5	60	Full	60.3	340.2	336.8	100.3	12.8	7.18	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 6	60	Full	60.2	342.8	340.5	99.4	12.6	7.32	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 7	20	15	20.3	200.9	195.0	15.4	2.4	12.2	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 8	60	15	60.1	1,746.8	1,741.0	15.6	2.3	39.66	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 9	20	30	20.5	87.4	83.2	30.9	6.2	5.23	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 10	60	30	60.2	797.6	792.3	30.8	5.2	17.53	13,340	34,260	49,630	97,230

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 11	20	45	20.3	59.7	57.9	45.1	9.6	3.52	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-1	Non-RSD	Front Drive	Stop 12	60	45	60.4	531.1	524.1	45.7	8	11.45	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 1	20	Full	20.4	39.6	38.1	106	14.1	2.35	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 2	20	Full	20.6	39.7	37.4	108.8	14.4	2.33	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 3	20	Full	20.5	39	37.1	107.8	14.5	2.32	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 4	60	Full	60.5	293.6	288.8	102.9	14.9	6.28	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 5	60	Full	60.5	297.3	292.4	103.1	15	6.25	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 6	60	Full	60.6	319.7	313.4	101.3	14	6.66	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 7	20	15	20.4	195.4	187.8	15.6	2.5	12.02	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 8	60	15	60.4	1,777.4	1,753.9	15.7	2.3	40	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 9	20	30	20.3	85.5	83.0	30.5	6	5.19	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 10	60	30	60.2	745.9	741.0	30.6	5.5	16.48	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 11	20	45	20.3	59.1	57.4	45.3	9.7	3.5	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-2	Non-RSD	Middle Trailer	Stop 12	60	45	60.3	493.6	488.7	45.8	8.4	10.8	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 1	60	Full	60.7	388.4	379.5	103.5	11.2	8.2	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 2	60	Full	60.3	359.6	356.0	105.7	11.9	7.7	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 3	60	Full	60.4	368.9	364.0	106	11.7	7.9	13,340	34,260	49,630	97,230

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 4	20	15	20.4	229.1	220.2	15.3	2.1	14.1	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 5	60	15	60.4	2,159.2	2,130.7	15.1	1.9	49	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 6	20	30	20.5	102.9	97.9	30.5	5.1	6.2	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 7	60	30	60.4	939.6	927.2	30.6	4.4	20.6	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 8	20	45	20.4	67.7	65.1	45.2	8.2	4	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-3	Non-RSD	Front and RR Drive	Stop 9	60	45	60.1	618.8	616.7	45.8	6.8	13.5	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 1	60	Full	60.4	320.5	316.3	103.6	13.5	6.8	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 2	60	Full	60.2	315.3	313.2	105.2	13.7	6.7	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 3	60	Full	60.1	319.3	318.2	104.1	13.4	6.8	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 4	20	15	20.1	233.2	230.9	15.3	2.1	14.7	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 5	60	15	60.3	2,010.8	1,990.8	15.4	1.9	46	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 6	20	30	20.4	95.6	91.9	30.3	5.3	5.9	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 7	60	30	60.2	849.2	843.6	30.4	4.7	19	13,340	34,260	49,630	97,230

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 8	20	45	20.3	62.4	60.6	45.2	8.6	3.8	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-4	Non-RSD	Middle and RR Trailer	Stop 9	60	45	60.3	546.9	541.5	45.8	7.6	11.9	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 1	60	Full	60.4	285.6	281.8	104.7	15.8	5.9	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 2	60	Full	60.4	283.9	280.2	105.1	15.8	5.9	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 3	60	Full	60.3	283.2	280.4	103.4	15.9	5.8	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 4	20	15	20.4	195	187.4	15.5	2.6	11.9	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 5	60	15	60.2	1,616.4	1,605.7	15.5	2.5	36	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 6	20	30	20.3	83.8	81.3	30.7	6.4	5	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 7	60	30	60.2	709.4	704.7	30.8	5.7	15.7	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 8	20	45	20.3	56.6	54.9	45.3	10.4	3.3	13,340	34,260	49,630	97,230
ORNL-02 97K Balanced DBC-5	Non-RSD	Steer	Stop 9	60	45	60.4	467.1	460.9	45.8	9	10.1	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Tractor	Stop 1	20	Full	20.9	34	31.1	106.8	20.7	1.86	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Tractor	Stop 2	20	Full	20.8	33.6	31.1	106.4	20.9	1.85	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Tractor	Stop 3	20	Full	20.7	33.6	31.4	107.3	20.4	1.87	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Combination	Stop 4	20	Full	20.8	33.5	31.0	104.7	22.3	1.81	13,340	34,260	49,630	97,230

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 97K Failed ABS	Non-RSD	ABS Combination	Stop 5	20	Full	20.8	33.1	30.6	106.2	22.6	1.79	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Combination	Stop 6	20	Full	20.9	32.7	29.9	107.1	22.8	1.77	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Tractor	Stop 7	60	Full	60.3	259	256.4	106.8	16.8	5.53	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Tractor	Stop 8	60	Full	60.7	263.1	257.1	106.2	14.9	5.6	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Combination	Stop 9	60	Full	60.3	259.8	257.2	109.5	13.7	5.5	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Combination	Stop 10	60	Full	60.7	248	242.3	106.3	14.3	5.4	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Combination	Stop 11	60	Full	60.6	263.4	258.2	107.4	12.4	5.17	13,340	34,260	49,630	97,230
ORNL-02 97K Failed ABS	Non-RSD	ABS Tractor	Stop 13	60	Full	60.7	260.8	254.8	108.4	11.1	5.35	13,340	34,260	49,630	97,230
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	None	Stop 1	20	Full	20.4	34.5	33.2	107.7	17.5	2	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	None	Stop 2	20	Full	20.4	34.7	33.4	108.9	17.3	2	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	None	Stop 3	20	Full	20.4	34.2	32.9	110	17.5	2	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	None	Stop 4	60	Full	60.3	257.5	254.9	103.7	17.2	5.5	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	None	Stop 5	60	Full	60.2	251.7	250.0	102.1	17.2	5.4	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	None	Stop 6	60	Full	60.2	249.3	247.6	101.5	17.6	5.3	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Front Drive	Stop 7	20	Full	20.3	44.2	42.9	108	12.5	2.6	13,150	42,590	41,370	97,110

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Front Drive	Stop 8	20	Full	20.3	44.1	42.8	107.7	12.5	2.6	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Front Drive	Stop 9	20	Full	20.6	41.5	39.1	109.3	13.7	2.5	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Front Drive	Stop 10	60	Full	60.3	318.2	315.0	101.9	13.5	6.7	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Front Drive	Stop 11	60	Full	60.3	357.4	353.9	101	11.9	7.6	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Front Drive	Stop 12	60	Full	60.3	332.8	329.5	100.4	13.2	7	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 13	20	Full	20.2	38.2	37.4	107.2	15.2	2.3	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 14	20	Full	20.5	39.6	37.7	109.3	14.5	2.3	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 15	20	Full	20.5	40.8	38.8	107.5	13.9	2.4	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 16	60	Full	60.3	309.9	306.8	102.2	13.7	6.8	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 17	60	Full	60.4	307.3	303.2	103.3	14.1	6.6	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 18	60	Full	60.4	290.8	287.0	103.9	15.3	6.1	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 1	60	Full	60.3	392.1	388.2	104.4	11	8.3	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 2	60	Full	60.3	397.8	393.9	102.8	10.8	8.4	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 3	60	Full	59.9	402.5	403.8	104.3	10.6	8.5	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 4	60	Full	60.3	297.6	294.6	105.6	14.5	6.4	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 5	60	Full	60.2	300.1	298.1	106.1	14.8	6.4	13,150	42,590	41,370	97,110

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 6	60	Full	60.5	299.7	294.8	105.6	14.6	6.4	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Steer	Stop 7	60	Full	60.4	277.2	273.5	105.4	15.8	5.8	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Steer	Stop 8	60	Full	60.3	293.5	290.6	103.5	15.4	6	13,150	42,590	41,370	97,110
ORNL-02 97K UnBalanced DBC-3_4_5	Non-RSD	Steer	Stop 9	60	Full	60.1	283.4	282.5	105.2	15.8	5.9	13,150	42,590	41,370	97,110
ORNL-02 112K FF_DBC-1_2	Non-RSD	None	Stop 1	20	Full	20.4	33.9	32.6	105.5	19.4	1.9	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	None	Stop 2	20	Full	20.2	33.2	32.5	109.1	18.7	1.9	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	None	Stop 3	20	Full	20.5	33.8	32.2	108.9	19.3	1.9	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	None	Stop 4	60	Full	60.5	254.1	249.9	105.8	17.7	5.4	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	None	Stop 5	60	Full	59.9	243.6	244.4	107	18.3	5.2	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	None	Stop 6	60	Full	60.2	256.2	254.5	104.8	17.5	5.4	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Front Drive	Stop 7	20	Full	20.4	39.7	38.2	108.4	15.2	2.3	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Front Drive	Stop 8	20	Full	20.4	39.9	38.4	108.4	15.1	2.3	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Front Drive	Stop 9	20	Full	20.6	40.3	38.0	107	15.2	2.3	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Front Drive	Stop 10	60	Full	60.6	356.1	349.1	103	11.9	7.7	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Front Drive	Stop 11	60	Full	60.3	342.6	339.2	105.3	12.3	7.4	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Front Drive	Stop 12	60	Full	60.1	343.2	342.1	105.6	12.3	7.4	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 13	20	Full	20.4	38.1	36.6	109.2	14.9	2.2	13,020	39,410	59,810	112,240



Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 112K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 14	20	Full	20.5	38.5	36.6	109.9	15.2	2.2	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 15	20	Full	20.4	38.5	37.0	109.9	16	2.2	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 16	60	Full	60.3	304	301.0	107.7	14.4	6.5	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 17	60	Full	60.2	295.1	293.1	105.8	14.5	6.3	13,020	39,410	59,810	112,240
ORNL-02 112K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 18	60	Full	60.3	307.8	304.7	105.2	14	6.6	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 1	60	Full	60	407.3	407.3	105.5	10.2	8.8	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 2	60	Full	60.1	397.5	396.2	107	10.4	8.6	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 3	60	Full	60.4	424.4	418.8	105.7	10	9.1	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 4	60	Full	60.3	343.5	340.1	108.2	12.2	7.4	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 5	60	Full	60.2	332.8	330.6	107.2	12.5	7.2	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 6	60	Full	60.5	371.9	365.8	107	11.5	7.9	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Steer	Stop 7	60	Full	60.2	314.6	312.5	106.2	14	6.6	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Steer	Stop 8	60	Full	60.3	337.3	334.0	106.5	13	7.1	13,020	39,410	59,810	112,240
ORNL-02 112K DBC-3_4_5	Non-RSD	Steer	Stop 9	60	Full	60.4	328.1	323.8	106.4	13.6	6.8	13,020	39,410	59,810	112,240
ORNL-02 132K FF_DBC-1_2	Non-RSD	None	Stop 1	20	Full	20	37.2	36.1	107.6	17.5	2.1	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	None	Stop 2	20	Full	20	36.8	35.7	108.3	17.5	2.1	13,430	46,980	71,480	131,890

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 132K FF_DBC-1_2	Non-RSD	None	Stop 3	20	Full	20	36.9	35.8	106.4	17.7	2.1	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	None	Stop 4	60	Full	60	307.1	304.1	106.2	13.7	6.7	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	None	Stop 5	60	Full	60	301.7	299.7	105.2	14.2	6.5	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	None	Stop 6	60	Full	60	297.6	294.6	105.3	14.5	6.4	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Front Drive	Stop 7	20	Full	20.4	43.3	41.6	109.8	14.1	2.5	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Front Drive	Stop 8	20	Full	20.3	43.2	41.9	110.4	13.7	2.5	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Front Drive	Stop 9	20	Full	20.4	43.8	42.1	109.2	13.7	2.5	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Front Drive	Stop 10	60	Full	60	401.6	401.6	106.2	10.1	8.8	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Front Drive	Stop 11	60	Full	60.3	422.2	418.0	107.1	9.8	9.3	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Front Drive	Stop 12	60	Full	60.5	415.4	408.6	106.5	10	9	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 13	20	Full	20.5	41.1	39.1	110.5	15.5	2.3	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 14	20	Full	20.4	40.7	39.1	109.3	15.2	2.4	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 15	20	Full	20.4	40.5	38.9	110.7	15.5	2.3	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 16	60	Full	60.3	356.1	352.6	108.3	11.6	7.8	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 17	60	Full	60.6	356.4	349.4	109.1	11.8	7.7	13,430	46,980	71,480	131,890
ORNL-02 132K FF_DBC-1_2	Non-RSD	Middle Trailer	Stop 18	60	Full	60.3	342	338.6	108.7	12	7.4	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 1	60	Full	60.1	512.7	511.0	107.3	7.9	11.3	13,430	46,980	71,480	131,890

Filename	Brake Type	Brakes Disabled	Stop # (in File)	Target Speed (mi/h)	Target Control Pressure (psi)	Actual Speed (mi/h)	Actual Stop Distance (ft)	Corrected Stop Distance (ft)	Avg. Primary Control Pressure (psi)	Avg. Decel (ft/s/s)	Stop Time (sec)	Steer Axle Weight (lb)	Drive Tandem Axles Weight (lb)	Trailer Tridem Axles Weight (lb)	Gross Vehicle Weight (lb)
ORNL-02 132K DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 2	60	Full	60.2	510.7	507.3	105.9	7.9	11.3	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Front and RR Drive	Stop 3	60	Full	60.3	527.2	522.0	107.1	7.8	11.5	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 4	60	Full	60.2	409.6	406.9	108.8	9.9	9.1	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 5	60	Full	60.4	397.4	392.2	107.7	10.3	8.7	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Middle and RR Trailer	Stop 6	60	Full	60.4	399.2	393.9	109.8	10.2	8.7	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Steer	Stop 7	60	Full	60.2	352.2	349.9	109.5	11.8	7.6	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Steer	Stop 8	60	Full	60.2	351	348.7	108.9	12	7.6	13,430	46,980	71,480	131,890
ORNL-02 132K DBC-3_4_5	Non-RSD	Steer	Stop 9	60	Full	60.2	352.5	350.2	109	11.9	7.6	13,430	46,980	71,480	131,890

[This page intentionally left blank.]

## **APPENDIX B: BRAKE STROKE MEASUREMENT LOG**

As indicated in Section 2.3.4, the brake stroke length was also monitored throughout the testing to ensure the automatic slack adjusters were functioning properly. While this data was not used in the analysis presented in this report, it is included here in Appendix B.

Brake Pushrod Stroke Lengths - RSD Pre-Burnish (8/30/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4
FREE STROKE	2 3/4	1/2	2 7/8	5/8	2 7/8	5/8	2 7/8	5/8	2 7/8	5/8	2 7/8	5/8
90 PSI	3 7/8	1 5/8	3 7/8	1 5/8	4 1/8	1 7/8	4 1/8	1 7/8	4 1/4	2	4 1/4	2
SPRING BRAKES					3 3/4	1 1/2	3 3/4	1 1/2				

Brake Pushrod Stroke Lengths - RSD Post-Burnish/Pre-121 Stops (9/9/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4
FREE STROKE	2 3/4	1/2	2 3/4	1/2	2 3/4	1/2	2 5/8	3/8	2 5/8	3/8	2 5/8	3/8
90 PSI	3 5/8	1 3/8	3 5/8	1 3/8	3 3/4	1 1/2	3 3/4	1 1/2	3 3/4	1 1/2	13/16	9/16
SPRING BRAKES					3 1/2	1 1/4	3 1/2	1 1/4				

Brake Pushrod Stroke Lengths - RSD Pre-80k Stops (9/11/2013)

AXLE POSITION	1L		1R		2L		2R		3L		3R		4L		4R		5L		5R		6L				
BSAP	2 1/4		2 1/4		2 1/4		2 1/4		2 1/4		2 1/4		6 3/4		6 3/4		6 3/4		6 3/4		6 3/4		6 3/4		
FREE STROKE	2 5/8	3/8	2 1/2	1/4	2 1/2	1/4	2 1/2	1/4	2 1/2	3/8	1/8	2 3/8	1/8	7 1/4	1/2	7 1/2	3/4	7 1/4	1/2	7 3/8	5/8	7 1/4	1/2	7 1/8	3/8
90 PSI	3 3/8	1 1/8	3 1/2	1 1/4	3 5/8	1 3/8	3 1/2	1 1/4	3 1/2	1 1/4	3 1/2	1 1/4	7 1/4	11 16	8 3/4	2	8 5/8	1 7/8	8 1/2	1 3/4	8 3/8	1 5/8	8 1/2	1 3/4	8 1/2
SPRING BRAKES					3 1/4	1	3 1/6	15 16					8	1 1/4	8 1/4	1 1/2	8 1/8	1 3/8	8 1/8	1 3/8	8 3/8	1 8	1 1/4	8 6	1 5/1

Brake Pushrod Stroke Lengths - RSD Pre-88k Stops (9/14/2013)

AXLE POSITION	1L		1R		2L		2R		3L		3R		4L		4R		5L		5R		6L		6R		
BSAP	2 1/4		2 1/4		2 1/4		2 1/4		2 1/4		2 1/4		6 3/4		6 3/4		6 3/4		6 3/4		6 3/4		6 3/4		6 3/4
FREE STROKE	2 1/2	1/4	2 1/2	1/4	2 5/8	3/8	2 5/8	3/8	2 5/8	3/8	2 5/8	3/8	2 3/8	5/8	7 1/2	3/4	7 1/2	3/4	7 3/8	5/8	7 3/8	5/8	7 3/8	5/8	7 3/8
90 PSI	3 1/4	1	3 1/4	1	3 1/2	1 1/4	3 1/2	1 1/4	3 1/2	1 1/4	3 1/2	1 1/4	8 1/2	1 3/4	8 16	11 16	15 16	9 16	13 16	8 1/2	1 3/4	8 1/4	1 1/2	8 3/8	1 5/8
SPRING BRAKES					3 1/6	15 16	3 1/6	15 16					8	1 1/4	8 1/4	1 1/2	8 6	1 6	7 1/6	8 1/8	1 3/8	7 16	1 6	8 8	1 1/4

Brake Pushrod Stroke Lengths - RSD Pre-97k Balanced Stops (9/16/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	
FREE STROKE	2 1/2	1/4 3/8	2 1/2	1/8 1/4	2 1/2	1/4 3/8	2 3/8	1/8 5/8	2 3/8	1/4 5/8	2 1/4	1/2 1/4
90 PSI	3 3/8	1 1/8	3 1/4	1	3 1/2	1 1/4	3 1/2	1 1/4	3 1/2	1 1/4	3 1/2	1 1/4
SPRING BRAKES					3 1/8	7/8	3 1/4	1				

Brake Pushrod Stroke Lengths - RSD Pre-97k Unbalanced Stops (9/19/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4
FREE STROKE	2 1/2	1/4 1/2	2 1/2	1/4 1/4	2 1/2	1/4 1/2	2 3/8	7/1 5/8	3/1 3/8	2 5/8	1/2 3/8	1/4 5/8
90 PSI	3 1/4	1 1/8	3 3/8	1 1/8	3 1/2	1 1/4	3 1/2	1 1/4	3 1/2	1 1/4	3 1/2	1 1/4
SPRING BRAKES					3 3/16	15/16	3 3/16	15/16				



Brake Pushrod Stroke Lengths - RSD Pre-112k Stops (9/24/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R															
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4															
FREE STROKE	2 1/2	1/4	2 1/2	1/4	2 3/8	1/8	2 3/8	1/8	2 5/8	2 5/8	2 5/8	3/8	7 3/8	5/8	1/2	3/4	7 7/16	11/16	7 16	1/4	1/2	5/16	9/16	7 6	1/4	1/2	
90 PSI	3 1/4	1	3 1/4	1	3 3/8	1 1/8	3 1/4	1	3 1/4	1 1/8	3 3/8	1 1/8	8 3/8	1 5/8	8 5/8	1 7/8	8 1/2	1 3/4	8 1/2	1 3/4	8 1/4	1 1/2	8 1/4	1 1/2	8 1/4	1 1/2	
SPRING BRAKES					3 1/8	7/8	3	3/4					7 7/8	1 1/8	8 1/4	1 1/2	7 7/8	1 1/8		1		1		1 1/4		1	1 1/4

Brake Pushrod Stroke Lengths - RSD Pre-132k Stops (9/19/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L														
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4														
FREE STROKE	2 3/8	1/8	2 3/8	1/8	2 3/8	1/8	2 3/8	1/8	2 3/8	1/8	2 1/2	1/4	7 1/4	1/2	7 1/2	3/4	7 3/8	5/8	7 3/8	5/8	7 1/4	1/2	7 3/8	5/8	
90 PSI	3 1/4	1	3 1/4	1	3 3/8	1 1/8	3 1/4	1	3 1/4	1 1/8	3 3/8	1 1/8	8 3/8	1 5/8	8 5/8	1 7/8	8 1/2	1 3/4	8 1/2	1 3/4	8 1/4	1 1/2	8 1/4	1 1/2	
SPRING BRAKES					3 1/8	7/8	3	3/4					7 7/8	1 1/8	8 1/4	1 1/2	7 7/8	1 1/8		1		1		1 1/4	1

Brake Pushrod Stroke Lengths - RSD Post- Stops (9/29/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L															
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4	6 3/4		
FREE STROKE	2 3/8	1/8 3/8	2 3/8	1/8 3/8	2 3/8	1/8 3/8	2 3/8	1/8 3/8	2 3/8	1/8 3/8	2 3/8	1/8 3/8	7 1/4	1/2 3/8	7 5/8	7 1/4	1/2 3/8	7 1/4	1/2 3/8	7 1/8	3/8 1/8	7 1/8	3/8 1/8	7 1/8	3/8 1/8	
90 PSI	3 1/4	1 3/8	3 1/8	1 1/8	3 1/2	1 1/4	3 3/8	1 1/8	3 3/8	1 1/8	3 1/2	1 1/4	8 3/8	1 5/8	8 5/8	1 7/8	8 1/2	1 3/4	8 3/8	1 5/8	8 1/4	1 1/2	8 3/8	1 5/8	8 1/8	1 5/8
SPRING BRAKES					3 1/8	7/8	3 1/8	7/8					8 1/8	1 3/8	8 1/4	1 1/2	8	1 1/4	8	1 1/4	8	1 1/4	8	1 1/4	8	1 1/4

Brake Pushrod Stroke Lengths – Non-RSD Pre-Burnish (12/2/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R														
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	6 7/8	
FREE STROKE	2 7/8	5/8 7/8	2 7/8	5/8 7/8	2 7/8	5/8 7/8	2 7/8	5/8 7/8	2 7/8	5/8 7/8	2 7/8	5/8 7/8	7 3/8	5/8 7/8	7 5/8	7 5/8	7 1/2	5/8 7/8	7 1/2	5/8 7/8	7 1/2	5/8 7/8	7 1/2	5/8 7/8	7 1/2	5/8 7/8
90 PSI	4 1/1	1 13/16	4 1/4	1 3/4	4 1/8	1 7/8	4 1/8	1 7/8	4 1/8	1 7/8	4 1/8	1 7/8	8 1/2	1 3/4	8 13/16	1 13/16	8 3/4	1 7/8	8 7/8	2 7/8	8 7/8	2 7/8	8 7/8	2 7/8	8 7/8	2 7/8
SPRING BRAKES					3 5/8	1 3/8	3 5/8	1 3/8					8 1/8	1 3/8	7/1 6	7/1 6	8 3/8	1 1/2	8 1/2	1 5/8	8 1/2	1 5/8	8 1/2	1 5/8	8 1/2	1 5/8

Brake Pushrod Stroke Lengths – Non-RSD Post-Burnish/Pre-121 Stops (12/4/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R												
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8												
FREE STROKE	2 1/2	2 1/4	2 3/4	2 1/2	2 9/16	2 5/16	2 9/16	2 5/16	2 9/16	2 5/16	2 11/16	2 7/16	7 3/8	7 5/8	7 3/8	7 3/8	7 1/2	7 5/8	7 1/2	7 5/8	7 1/4	7 3/8	7 3/8	7 1/2
90 PSI	3 3/8	1 1/8	3 1/2	1 1/4	3 1/2	1 1/4	3 3/8	1 1/8	3 3/8	1 1/8	3 5/8	1 3/8	8 1/2	1 3/4	8 3/4	1 3/4	8 1/2	1 5/8	8 1/2	1 5/8	8 3/8	1 1/2	8 1/2	1 5/8
SPRING BRAKES					3 1/4	1	3 1/8	7/8					8 1/8	1 3/8	8 1/4	1 1/4	8 1/8	1 1/4	8 1/4	1 3/8	8	1 1/8	8 1/8	1 1/4

Brake Pushrod Stroke Lengths – Non-RSD Pre-80k Stops (12/5/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R												
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8												
FREE STROKE	2 3/4	2 1/2	2 3/4	2 1/2	2 3/4	2 1/2	2 3/4	2 1/2	2 3/4	2 1/2	2 3/4	2 1/2	7 3/8	7 5/8	7 1/2	7 1/2	7 1/2	7 5/8	7 3/8	7 1/2	7 3/8	7 1/2	7 3/8	7 1/2
90 PSI	3 3/4	1 1/2	3 7/16	1 3/16	3 3/4	1 1/2	3 5/8	1 3/8	3 5/8	1 3/8	3 5/8	1 3/8	8 1/2	1 3/4	8 5/8	1 5/8	8 5/8	1 3/4	8 5/8	1 3/4	8 3/8	1 1/2	8 1/2	1 5/8
SPRING BRAKES					3 3/8	1 1/8	3 1/4	1					8 1/8	1 3/8	8 1/4	1 1/4	8 1/2	1 5/8	8 1/8	1 1/4	8	1 1/8	8 1/8	1 1/4

Brake Pushrod Stroke Lengths - Non-RSD Pre-88k Stops (12/10/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R															
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8															
FREE STROKE	2 1/2	1/4	2 1/2	1/4	2 9/16	2 5/16	2 9/16	2 5/16	2 1/2	1/4	2 1/2	1/4	7 3/8	5/8	7 3/8	7 3/8	7 3/8	1/2	7 3/8	1/2	7 1/4	3/8	7 1/4	3/8			
90 PSI	3 3/8	1 1/8	3 1/4	1	3 1/2	1 1/4	3 1/2	1 1/4	2 5/16	1 1/6	2 7/16	3 1/6	8 5/8	1 7/8	8 5/8	1 5/8	8 5/8	1 3/4	8 5/8	1 3/4	8 3/8	1 1/2	8 1/2	1 6	8 6	1 9/16	1 6
SPRING BRAKES					3 1/4	1	3 1/4	1					8	1 1/4	8 3/16	1 3/16	8 1/16	1 3/16	8 1/8	1 1/4		1 8	1 1/8		1 8	1 1/8	

Brake Pushrod Stroke Lengths - Non-RSD Pre-97k Balanced Stops (12/12/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R															
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8															
FREE STROKE	2 9/16	5/16	2 1/2	1/4	2 9/16	2 5/16	2 1/2	1/4	2 1/2	1/4	2 1/2	1/4	7 5/16	9/16	7 1/2	7 1/2	7 5/16	7 1/16	7 1/16	9/16	5/16	7 1/16	7/16	7 1/16	9/16	9/16	
90 PSI	3 5/16	1 1/16	3 5/16	1 1/16	3 1/2	1 1/4	3 1/2	1 1/4	3 7/16	1 3/16	3 7/16	1 3/16	8 1/2	1 3/4	8 5/8	1 5/8	8 1/2	1 5/8	8 1/2	1 5/8	8 3/8	1 1/2	8 1/2	1 6	8 6	1 9/16	1 6
SPRING BRAKES					3 3/16	15/16	3 3/16	15/16					8 1/8	1 3/8	8 1/4	1 1/4	8 1/8	1 1/4	8 1/8	1 1/4	8 1/6	1 3/16		1 8	1 1/8		

Brake Pushrod Stroke Lengths - Non-RSD Pre-97k Unbalanced Stops (12/16/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R														
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8														
FREE STROKE	2 9/16	5/16	2 1/2	1/4	2 1/2	1/4	2 3/8	1/8	2 3/8	1/8	2 1/2	1/4	7 3/8	5/8	7 1/2	1/2	7 3/8	1/2	7 5/8	3/8	1/2	7 3/8	1/2	7 3/8	1/2	
90 PSI	3 3/8	1 1/8	3 1/4	1	3 1/2	1 1/4	3 3/8	1 1/8	3 3/8	1 1/8	3 7/16	1 3/16	8 1/2	1 3/4	8 5/8	1 5/8	8 1/2	1 5/8	8 1/2	1 5/8	8 3/8	1 1/2	8 1/2	1 3/8	8 1/2	1 1/2
SPRING BRAKES					3 6	15/16	3 6	15/16					8 1/8	1 3/8	8 1/4	1 1/4	8 6	1 6	8 1/4	1 3/8	8 6	1 6	8 6	1 6	8 1/8	1 1/8

Brake Pushrod Stroke Lengths - Non-RSD Pre-112k Stops (12/19/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L	6R														
BSAP	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8														
FREE STROKE	2 3/8	1/8	2 7/16	3/16	2 1/2	1/4	2 1/2	1/4	2 1/2	1/4	2 1/2	1/4	5/16	9/16	7/16	7/16	7 1/2	5/8	7 1/2	5/8	7 3/8	1/2	7 3/8	1/2	7 3/8	1/2
90 PSI	3 3/8	1 1/8	3 1/4	1	3 3/8	1 1/8	3 3/8	1 1/8	9/16	5/16	9/16	5/16	8 6	1 16	8 1/2	1 1/2	8 1/2	1 5/8	8 1/2	1 5/8	8 3/8	1 1/2	8 1/2	1 1/2	8 1/2	1 5/8
SPRING BRAKES					3 6	13/16	3 6	15/16					8 6	1 6	8 1/8	1 1/8	8 8	1 1/8	8 6	1 6	8 6	1 6	8 6	1 6	8 1/8	1 1/8

Brake Pushrod Stroke Lengths - RSD Pre-132k Stops (12/27/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L																
<b>BSAP</b>	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8															
<b>FREE STROKE</b>	2 3/8	7/1 1/8	3/1 6	2 1/2	2 1/4	2 1/4	7 3/8	7 5/8	7 1/2	7 1/2	7 5/8	7 3/8	7 1/2	7 3/8	7 1/2												
<b>90 PSI</b>	3 1/4	3 1	3 1/4	3 6	1 3/1	3 9/1	1 5/1	3 11/16	1 7/1	3 7/1	1 3/1	8 5/8	1 7/8	8 16	1 11/16	8 16	1 5/8	8 3/4	1 5/8	8 3/4	1 6	8 9/16	1 6	8 1/2	1 5/8		
<b>SPRING BRAKES</b>				3 1/8		3 7/8		1 1/4					8 1/8	1 3/8	8 1/4	1 1/4		1 8	1/1 1/8	3/1 6	1/1 6	3/1 6	1/1 6	3/1 6		1 8	1 1/8

Brake Pushrod Stroke Lengths - RSD Post- Stops (12/30/2013)

AXLE POSITION	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R	6L															
<b>BSAP</b>	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	6 3/4	7	6 7/8	6 7/8	6 7/8	6 7/8														
<b>FREE STROKE</b>	2 3/8	2 1/8	2 3/8	2 1/8	2 5/8	2 3/8	2 1/2	2 1/4	2 1/2	2 1/4	2 5/8	2 3/8	2 3/8	2 5/8	2 1/2	2 1/2	2 1/2	2 5/8	2 1/2	2 5/8	2 1/2	2 5/8	2 3/8	2 1/2		
<b>90 PSI</b>	3 3/8	1 1/8	3 1/8	7/8	3 5/8	1 3/8	3 1/2	1 1/4	3 5/8	1 3/8	3 1/4	1	8 5/8	1 7/8	8 3/4	1 3/4	8 3/4	1 7/8	8 5/8	1 3/4	8 5/8	1 3/4	8 5/8	1 3/4	8 5/8	1 3/4
<b>SPRING BRAKES</b>					3 1/4	1	3 1/4	1					8 1/4	1 1/2	8 1/4	1 1/4	8 1/4	1 3/8	8 1/4	1 3/8	8 1/4	1 3/8	8 1/4	1 3/8	8 1/4	1 3/8

## **APPENDIX C: PBBT RESULTS**

The PBBT tests were performed for each loading and brake condition for the RSD testing, and for each loading condition for the non-RSD testing. Results of individual PBBT tests are included here in Appendix C.

**Table 26. RSD PBBT results—fully functioning brakes.**

<b>Load Condition</b>	<b>Measure</b>	<b>Axle 1 Left</b>	<b>Axle 1 Right</b>	<b>Axle 2 Left</b>	<b>Axle 2 Right</b>	<b>Axle 3 Left</b>	<b>Axle 3 Right</b>	<b>Axle 4 Left</b>	<b>Axle 4 Right</b>	<b>Axle 5 Left</b>	<b>Axle 5 Right</b>	<b>Axle 6 Left</b>	<b>Axle 6 Right</b>	<b>Total</b>
80k Load	Brake Force (lb)	5,144	4,087	3,296	3,327	3,682	3,970	2,549	2,590	3,449	2,410	3,381	2,594	<b>40,479</b>
80k Load	Weight (lb)	6,702	6,261	7,848	7,628	7,143	6,746	6,305	6,129	6,085	6,085	6,437	5,820	<b>79,189</b>
80k Load	Efficiency	76.8%	65.3%	42.0%	43.6%	51.5%	58.8%	40.4%	42.3%	56.7%	39.6%	52.5%	44.6%	<b>51.1%</b>
88k Load	Brake Force (lb)	4,716	4,914	3,287	5,494	3,467	4,613	2,927	2,774	4,199	2,923	3,948	3,165	<b>46,427</b>
88k Load	Weight (lb)	6,658	6,526	7,981	8,289	7,408	7,099	7,540	7,363	7,275	6,658	7,672	7,055	<b>87,524</b>
88k Load	Efficiency	70.8%	75.3%	41.2%	66.3%	46.8%	65.0%	38.8%	37.7%	57.7%	43.9%	51.5%	44.9%	<b>53.0%</b>
97k Balanced Load	Brake Force (lb)	5,146	4,431	5,260	3,695	4,982	3,496	3,250	3,161	4,550	3,197	4,431	3,444	<b>49,043</b>
97k Balanced Load	Weight (lb)	6,878	6,393	9,127	8,025	8,466	7,452	8,686	8,113	8,289	7,937	8,686	7,716	<b>95,768</b>
97k Balanced Load	Efficiency	74.8%	69.3%	57.6%	46.0%	58.8%	46.9%	37.4%	39.0%	54.9%	40.3%	51.0%	44.6%	<b>51.2%</b>
97k Unbalanced Load	Brake Force (lb)	4,383	3,620	5,516	3,651	5,163	3,563	3,611	2,399	3,624	2,337	3,399	2,421	<b>43,687</b>
97k Unbalanced Load	Weight (lb)	6,967	6,658	11,420	10,538	10,538	9,877	7,319	6,923	6,878	6,834	7,011	6,658	<b>97,621</b>
97k Unbalanced Load	Efficiency	62.9%	54.4%	48.3%	34.6%	49.0%	36.1%	49.3%	34.7%	52.7%	34.2%	48.5%	36.4%	<b>44.8%</b>
112k Load	Brake Force (lb)	5,256	4,546	4,339	5,776	5,035	4,537	4,863	3,801	3,867	4,740	4,894	3,964	<b>55,618</b>
112k Load	Weight (lb)	6,967	6,482	10,274	9,921	9,480	8,907	10,494	10,097	10,141	9,656	10,318	9,348	<b>112,085</b>
112k Load	Efficiency	75.4%	70.1%	42.2%	58.2%	53.1%	50.9%	46.3%	37.6%	38.1%	49.1%	47.4%	42.4%	<b>49.6%</b>
132k Load	Brake Force (lb)	5,146	4,667	6,574	5,414	6,133	5,454	4,877	5,401	6,027	4,665	5,168	4,828	<b>64,354</b>
132k Load	Weight (lb)	6,967	6,526	12,125	12,170	11,288	10,803	12,522	11,905	12,081	11,332	12,566	11,067	<b>131,352</b>
132k Load	Efficiency	73.9%	71.5%	54.2%	44.5%	54.3%	50.5%	38.9%	45.4%	49.9%	41.2%	41.1%	43.6%	<b>49.0%</b>



**Table 27. RSD PBBT results—front drive brakes disabled.**

Load Condition	Measure	Axle 1 Left	Axle 1 Right	Axle 2 Left	Axle 2 Right	Axle 3 Left	Axle 3 Right	Axle 4 Left	Axle 4 Right	Axle 5 Left	Axle 5 Right	Axle 6 Left	Axle 6 Right	Total
80k Load	Brake Force (lb)	4,815	4,105	27	13	3,341	4,514	3,494	2,626	2,405	3,682	3,386	2,689	35,097
80k Load	Weight (lb)	6,834	6,261	7,716	7,893	7,099	7,055	6,393	6,305	6,085	6,482	6,482	5,864	80,469
80k Load	Efficiency	70.5%	65.6%	0.3%	0.2%	47.1%	64.0%	54.7%	41.6%	39.5%	56.8%	52.2%	45.9%	43.6%
88k Load	Brake Force (lb)	5,067	4,101	9	40	4,654	3,471	3,116	2,891	4,168	2,967	4,056	2,967	37,507
88k Load	Weight (lb)	7,099	6,173	8,554	7,584	7,540	6,614	7,672	7,143	7,363	6,570	7,672	6,878	86,862
88k Load	Efficiency	71.4%	66.4%	0.1%	0.5%	61.7%	52.5%	40.6%	40.5%	56.6%	45.2%	52.9%	43.1%	43.2%
97k Balanced Load	Brake Force (lb)	5,075	4,643	22	13	4,788	3,585	4,356	3,175	4,184	3,139	4,264	3,386	40,630
97k Balanced Load	Weight (lb)	6,967	6,614	9,083	8,686	8,554	7,672	8,686	8,289	8,510	8,069	8,730	7,584	97,444
97k Balanced Load	Efficiency	72.8%	70.2%	0.2%	0.1%	56.0%	46.7%	50.1%	38.3%	49.2%	38.9%	48.8%	44.6%	41.7%
97k Unbalanced Load	Brake Force (lb)	4,484	3,598	0	18	4,952	4,105	3,673	2,469	3,571	2,491	2,976	2,522	34,859
97k Unbalanced Load	Weight (lb)	6,878	6,570	11,067	10,714	10,450	9,744	7,408	7,055	6,923	6,790	6,967	6,746	97,312
97k Unbalanced Load	Efficiency	65.2%	54.8%	0.0%	0.2%	47.4%	42.1%	49.6%	35.0%	51.6%	36.7%	42.7%	37.4%	35.8%
112k Load	Brake Force (lb)	4,921	4,048	18	9	6,032	4,140	5,459	3,840	5,057	3,845	5,600	3,880	46,849
112k Load	Weight (lb)	6,967	6,570	10,450	9,833	9,612	8,686	10,362	9,877	9,965	9,480	10,229	9,436	111,467
112k Load	Efficiency	70.6%	61.6%	0.2%	0.1%	62.8%	47.7%	52.7%	38.9%	50.7%	40.6%	54.7%	41.1%	42.0%
132k Load	Brake Force (lb)	5,176	4,603	18	49	6,451	5,392	6,186	4,832	5,935	4,691	5,983	4,969	54,285
132k Load	Weight (lb)	7,011	6,702	12,081	12,081	11,552	10,450	12,522	11,905	12,170	11,155	12,566	11,244	131,439
132k Load	Efficiency	73.8%	68.7%	0.1%	0.4%	55.8%	51.6%	49.4%	40.6%	48.8%	42.1%	47.6%	44.2%	41.3%

**Table 28. RSD PBBT results—middle trailer brakes disabled.**

Load Condition	Measure	Axle 1 Left	Axle 1 Right	Axle 2 Left	Axle 2 Right	Axle 3 Left	Axle 3 Right	Axle 4 Left	Axle 4 Right	Axle 5 Left	Axle 5 Right	Axle 6 Left	Axle 6 Right	Total
80k Load	Brake Force (lb)	4,690	4,379	3,111	4,820	3,323	4,442	2,441	2,536	9	9	3,318	2,626	35,704
80k Load	Weight (lb)	6,967	6,570	7,937	7,540	7,452	7,011	6,305	6,129	6,261	6,129	6,482	5,908	80,691
80k Load	Efficiency	67.3%	66.7%	39.2%	63.9%	44.6%	63.4%	38.7%	41.4%	0.1%	0.1%	51.2%	44.4%	44.2%
88k Load	Brake Force (lb)	5,040	4,456	4,914	3,512	4,519	3,201	4,181	2,887	13	13	4,042	3,003	39,781
88k Load	Weight (lb)	6,878	6,526	8,113	7,540	7,540	7,055	7,716	7,231	7,452	7,099	7,716	6,923	87,789
88k Load	Efficiency	73.3%	68.3%	60.6%	46.6%	59.9%	45.4%	54.2%	39.9%	0.2%	0.2%	52.4%	43.4%	45.3%
97k Balanced Load	Brake Force (lb)	5,512	4,881	3,699	5,706	4,497	4,030	3,470	4,762	13	18	4,273	3,620	44,481
97k Balanced Load	Weight (lb)	7,011	6,614	8,818	8,422	8,201	7,716	8,598	7,893	8,289	7,672	8,554	7,584	95,372
97k Balanced Load	Efficiency	78.6%	73.8%	41.9%	67.8%	54.8%	52.2%	40.4%	60.3%	0.2%	0.2%	50.0%	47.7%	46.6%
97k Unbalanced Load	Brake Force (lb)	4,489	3,721	5,419	3,964	5,190	3,990	2,566	2,487	13	18	2,575	2,584	37,016
97k Unbalanced Load	Weight (lb)	6,834	6,746	11,288	10,891	10,318	10,229	7,143	6,967	6,967	6,614	7,099	6,129	97,225
97k Unbalanced Load	Efficiency	65.7%	55.2%	48.0%	36.4%	50.3%	39.0%	35.9%	35.7%	0.2%	0.3%	36.3%	42.2%	38.1%
112k Load	Brake Force (lb)	5,066	3,999	6,032	4,145	5,745	4,198	5,348	3,783	4	49	5,141	4,140	47,650
112k Load	Weight (lb)	6,923	6,482	10,318	9,480	9,524	8,686	10,318	9,965	10,053	9,700	10,362	9,392	111,203
112k Load	Efficiency	73.2%	61.7%	58.5%	43.7%	60.3%	48.3%	51.8%	38.0%	0.0%	0.5%	49.6%	44.1%	42.8%
132k Load	Brake Force (lb)	5,401	4,176	6,565	5,066	5,238	5,110	5,040	5,794	9	22	6,111	4,921	53,453
132k Load	Weight (lb)	6,967	6,746	12,478	11,508	11,376	10,759	12,610	12,390	12,302	11,376	12,346	11,023	131,881
132k Load	Efficiency	77.5%	61.9%	52.6%	44.0%	46.0%	47.5%	40.0%	46.8%	0.1%	0.2%	49.5%	44.6%	40.5%

**Table 29. RSD PBBT results—front and right rear drive brakes disabled.**

Load Condition	Measure	Axle 1 Left	Axle 1 Right	Axle 2 Left	Axle 2 Right	Axle 3 Left	Axle 3 Right	Axle 4 Left	Axle 4 Right	Axle 5 Left	Axle 5 Right	Axle 6 Left	Axle 6 Right	Total
80k Load	Brake Force (lb)	4,842	3,885	18	9	3,921	13	2,432	3,727	3,345	2,374	3,449	2,527	30,542
80k Load	Weight (lb)	6,834	6,305	7,937	7,540	7,452	7,011	6,437	6,305	6,173	6,129	6,482	5,776	80,381
80k Load	Efficiency	70.9%	61.6%	0.2%	0.1%	52.6%	0.2%	37.8%	59.1%	54.2%	38.7%	53.2%	43.8%	38.0%
88k Load	Brake Force (lb)	5,440	4,352	9	13	4,172	13	3,993	2,954	4,361	2,999	4,006	3,125	35,437
88k Load	Weight (lb)	7,011	6,570	8,157	7,760	7,452	7,143	7,628	7,275	7,408	7,055	7,672	6,834	87,965
88k Load	Efficiency	77.6%	66.2%	0.1%	0.2%	56.0%	0.2%	52.3%	40.6%	58.9%	42.5%	52.2%	45.7%	40.3%
97k Balanced Load	Brake Force (lb)	4,771	4,458	9	13	4,788	13	3,408	4,907	3,285	3,272	4,286	3,430	36,640
97k Balanced Load	Weight (lb)	6,923	6,393	9,127	8,422	8,466	7,672	8,510	7,848	8,378	7,893	8,466	7,672	95,770
97k Balanced Load	Efficiency	68.9%	69.7%	0.1%	0.2%	56.6%	0.2%	40.0%	62.5%	39.2%	41.5%	50.6%	44.7%	38.3%
97k Unbalanced Load	Brake Force (lb)	4,083	3,704	13	18	5,123	13	3,470	2,526	3,461	2,452	3,338	2,518	30,719
97k Unbalanced Load	Weight (lb)	7,011	6,614	11,199	11,023	10,362	10,009	7,319	7,231	7,055	6,790	7,187	6,614	98,414
97k Unbalanced Load	Efficiency	58.2%	56.0%	0.1%	0.2%	49.4%	0.1%	47.4%	34.9%	49.1%	36.1%	46.4%	38.1%	31.2%
112k Load	Brake Force (lb)	5,044	4,669	13	18	5,476	9	4,096	5,004	5,062	3,858	5,181	4,273	42,703
112k Load	Weight (lb)	6,790	6,349	10,274	9,568	9,524	8,951	10,274	9,965	10,053	9,392	10,318	9,215	110,673
112k Load	Efficiency	74.3%	73.5%	0.1%	0.2%	57.5%	0.1%	39.9%	50.2%	50.4%	41.1%	50.2%	46.4%	38.6%
132k Load	Brake Force (lb)	5,057	4,206	9	18	6,680	9	6,385	4,541	6,138	4,577	6,415	4,638	48,673
132k Load	Weight (lb)	7,055	6,614	12,346	12,037	11,552	11,508	12,655	11,949	12,214	11,552	12,655	11,199	133,336
132k Load	Efficiency	71.7%	63.6%	0.1%	0.1%	57.8%	0.1%	50.5%	38.0%	50.3%	39.6%	50.7%	41.4%	36.5%

**Table 30. RSD PBBT results—middle and right rear trailer brakes disabled.**

Load Condition	Measure	Axle 1 Left	Axle 1 Right	Axle 2 Left	Axle 2 Right	Axle 3 Left	Axle 3 Right	Axle 4 Left	Axle 4 Right	Axle 5 Left	Axle 5 Right	Axle 6 Left	Axle 6 Right	Total
80k Load	Brake Force (lb)	4,699	3,952	4,779	3,093	3,597	3,957	3,417	2,617	4	9	3,080	18	33,222
80k Load	Weight (lb)	6,967	6,305	8,201	7,628	7,187	6,658	6,570	6,305	6,173	5,820	6,482	6,349	80,645
80k Load	Efficiency	67.4%	62.7%	58.3%	40.5%	50.0%	59.4%	52.0%	41.5%	0.1%	0.2%	47.5%	0.3%	41.2%
88k Load	Brake Force (lb)	4,681	4,456	4,878	3,458	3,583	4,447	3,107	2,905	13	18	3,700	18	35,264
88k Load	Weight (lb)	7,011	6,217	8,333	7,628	7,584	7,275	7,672	7,275	7,540	7,099	7,716	6,923	88,273
88k Load	Efficiency	66.8%	71.7%	58.5%	45.3%	47.2%	61.1%	40.5%	39.9%	0.2%	0.3%	48.0%	0.3%	39.9%
97k Balanced Load	Brake Force (lb)	5,873	4,109	5,410	3,673	5,150	3,576	3,580	4,431	0	18	4,087	22	39,929
97k Balanced Load	Weight (lb)	6,923	6,217	8,951	8,422	8,157	7,628	8,774	8,157	8,378	8,157	8,333	7,893	95,990
97k Balanced Load	Efficiency	84.8%	66.1%	60.4%	43.6%	63.1%	46.9%	40.8%	54.3%	0.0%	0.2%	49.0%	0.3%	41.6%
97k Unbalanced Load	Brake Force (lb)	4,444	3,532	5,331	4,052	5,243	4,065	3,788	2,553	9	13	3,541	18	36,589
97k Unbalanced Load	Weight (lb)	7,055	6,746	11,244	10,714	10,362	10,141	7,275	7,187	7,011	7,011	7,055	6,834	98,635
97k Unbalanced Load	Efficiency	63.0%	52.4%	47.4%	37.8%	50.6%	40.1%	52.1%	35.5%	0.1%	0.2%	50.2%	0.3%	37.1%
112k Load	Brake Force (lb)	4,709	4,405	5,798	4,268	5,692	4,233	4,277	3,973	4	22	5,269	40	42,690
112k Load	Weight (lb)	6,614	6,393	10,229	9,612	9,524	8,995	10,229	9,877	10,097	9,348	10,362	9,215	110,495
112k Load	Efficiency	71.2%	68.9%	56.7%	44.4%	59.8%	47.1%	41.8%	40.2%	0.0%	0.2%	50.8%	0.4%	38.6%
132k Load	Brake Force (lb)	5,494	4,087	7,478	5,031	6,548	4,899	5,229	4,581	4	101	6,411	26	49,889
132k Load	Weight (lb)	7,055	6,570	12,522	11,729	11,288	10,891	12,434	11,905	12,081	11,640	12,522	11,376	132,013
132k Load	Efficiency	77.9%	62.2%	59.7%	42.9%	58.0%	45.0%	42.1%	38.5%	0.0%	0.9%	51.2%	0.2%	37.8%

**Table 31. RSD PBBT results—steer brakes disabled.**

<b>Load Condition</b>	<b>Measure</b>	<b>Axle 1 Left</b>	<b>Axle 1 Right</b>	<b>Axle 2 Left</b>	<b>Axle 2 Right</b>	<b>Axle 3 Left</b>	<b>Axle 3 Right</b>	<b>Axle 4 Left</b>	<b>Axle 4 Right</b>	<b>Axle 5 Left</b>	<b>Axle 5 Right</b>	<b>Axle 6 Left</b>	<b>Axle 6 Right</b>	<b>Total</b>
80k Load	Brake Force (lb)	13	13	3,164	5,121	3,197	4,559	2,329	2,504	2,365	2,504	3,368	2,558	31,695
80k Load	Weight (lb)	6,790	7,143	7,760	7,893	7,319	7,099	6,437	6,746	6,085	6,173	6,482	6,129	82,056
80k Load	Efficiency	0.2%	0.2%	40.8%	64.9%	43.7%	64.2%	36.2%	37.1%	38.9%	40.6%	52.0%	41.7%	38.6%
88k Load	Brake Force (lb)	144	22	4,694	3,538	3,633	3,260	3,026	4,303	3,021	2,828	4,047	3,075	35,591
88k Load	Weight (lb)	7,011	6,437	8,201	7,893	7,540	7,231	7,804	7,275	7,408	6,570	7,628	6,967	87,965
88k Load	Efficiency	2.1%	0.3%	57.2%	44.8%	48.2%	45.1%	38.8%	59.1%	40.8%	43.0%	53.1%	44.1%	40.5%
97k Balanced Load	Brake Force (lb)	44	18	5,564	3,743	5,026	3,598	3,457	4,370	4,515	3,241	4,462	3,439	41,477
97k Balanced Load	Weight (lb)	6,923	6,349	8,951	8,422	8,289	7,496	8,598	8,113	8,378	7,716	8,686	7,628	95,549
97k Balanced Load	Efficiency	0.6%	0.3%	62.2%	44.4%	60.6%	48.0%	40.2%	53.9%	53.9%	42.0%	51.4%	45.1%	43.4%
97k Unbalanced Load	Brake Force (lb)	4	13	5,348	4,127	4,903	4,048	3,739	2,434	3,651	2,522	3,527	2,526	36,842
97k Unbalanced Load	Weight (lb)	7,011	6,834	11,111	10,935	10,229	9,568	7,319	7,099	6,878	6,923	7,011	6,834	97,752
97k Unbalanced Load	Efficiency	0.1%	0.2%	48.1%	37.7%	47.9%	42.3%	51.1%	34.3%	53.1%	36.4%	50.3%	37.0%	37.7%
112k Load	Brake Force (lb)	9	22	5,758	4,233	5,472	4,250	4,096	5,141	5,282	3,955	5,295	4,158	47,671
112k Load	Weight (lb)	6,878	6,217	10,185	9,568	9,304	8,730	10,362	9,833	10,097	9,392	10,406	9,259	110,231
112k Load	Efficiency	0.1%	0.4%	56.5%	44.2%	58.8%	48.7%	39.5%	52.3%	52.3%	42.1%	50.9%	44.9%	43.2%
132k Load	Brake Force (lb)	9	13	6,548	5,053	4,810	5,485	6,226	4,603	5,833	4,537	5,966	4,766	53,849
132k Load	Weight (lb)	7,055	6,482	12,346	11,729	11,420	10,759	12,566	12,081	12,346	11,552	12,566	11,332	132,234
132k Load	Efficiency	0.1%	0.2%	53.0%	43.1%	42.1%	51.0%	49.5%	38.1%	47.2%	39.3%	47.5%	42.1%	40.7%

**Table 32. Non-RSD PBBT results—fully functioning brakes.**

<b>Load Condition</b>	<b>Measure</b>	<b>Axle 1 Left</b>	<b>Axle 1 Right</b>	<b>Axle 2 Left</b>	<b>Axle 2 Right</b>	<b>Axle 3 Left</b>	<b>Axle 3 Right</b>	<b>Axle 4 Left</b>	<b>Axle 4 Right</b>	<b>Axle 5 Left</b>	<b>Axle 5 Right</b>	<b>Axle 6 Left</b>	<b>Axle 6 Right</b>	<b>Total</b>
Pre-Burnish	Brake Force (lb)	4,475	4,378	4,131	4,004	4,731	3,765	5,119	3,633	5,234	3,691	5,467	3,616	<b>52,244</b>
Pre-Burnish	Weight (lb)	6,878	6,658	9,965	10,229	9,480	8,951	10,450	9,436	9,833	9,656	10,229	9,480	<b>111,245</b>
Pre-Burnish	Efficiency	65.1%	65.8%	41.5%	39.1%	49.9%	42.1%	49.0%	38.5%	53.2%	38.2%	53.4%	38.1%	<b>47.0%</b>
Post-Burnish	Brake Force (lb)	5,498	4,171	5,736	4,317	5,026	3,898	5,741	4,131	4,361	3,858	5,392	4,136	<b>56,265</b>
Post-Burnish	Weight (lb)	6,526	6,526	10,229	9,965	9,392	8,818	10,538	10,009	9,833	9,700	10,274	9,127	<b>110,937</b>
Post-Burnish	Efficiency	84.2%	63.9%	56.1%	43.3%	53.5%	44.2%	54.5%	41.3%	44.4%	39.8%	52.5%	45.3%	<b>50.7%</b>
Control Trailer	Brake Force (lb)	4,550	4,233	5,767	4,489	4,436	4,387							<b>27,862</b>
Control Trailer	Weight (lb)	6,746	6,129	10,274	9,656	9,171	8,025							<b>50,001</b>
Control Trailer	Efficiency	67.4%	69.1%	56.1%	46.5%	48.4%	54.7%							<b>55.7%</b>
80k Load	Brake Force (lb)	4,780	4,281	4,127	3,192	3,369	3,086	3,541	2,297	3,788	2,253	3,461	2,350	<b>40,525</b>
80k Load	Weight (lb)	6,790	5,732	7,716	7,628	7,143	6,923	6,393	5,732	6,041	5,688	6,261	5,467	<b>77,514</b>
80k Load	Efficiency	70.4%	74.7%	53.5%	41.8%	47.2%	44.6%	55.4%	40.1%	62.7%	39.6%	55.3%	43.0%	<b>52.3%</b>
88k Load	Brake Force (lb)	4,273	4,436	3,347	3,422	3,501	3,730	4,215	2,840	4,171	2,712	4,286	2,831	<b>43,764</b>
88k Load	Weight (lb)	6,702	6,437	7,848	7,672	7,408	6,173	7,540	6,967	7,099	7,143	7,363	6,658	<b>85,010</b>
88k Load	Efficiency	63.8%	68.9%	42.6%	44.6%	47.3%	60.4%	55.9%	40.8%	58.8%	38.0%	58.2%	42.5%	<b>51.5%</b>
97k Balanced Load	Brake Force (lb)	4,242	4,286	5,362	3,827	4,987	3,382	4,762	3,153	3,739	4,167	4,832	3,488	<b>50,227</b>
97k Balanced Load	Weight (lb)	6,790	6,658	9,039	8,422	8,069	7,496	8,598	8,069	8,025	8,069	8,333	7,760	<b>95,328</b>
97k Balanced Load	Efficiency	62.5%	64.4%	59.3%	45.4%	61.8%	45.1%	55.4%	39.1%	46.6%	51.6%	58.0%	44.9%	<b>52.7%</b>
97k Unbalanced Load	Brake Force (lb)	4,418	4,608	4,722	4,806	5,445	4,392	2,932	2,787	3,788	2,553	4,211	2,637	<b>47,299</b>
97k Unbalanced Load	Weight (lb)	6,746	6,437	10,670	10,582	10,097	9,524	6,878	5,732	6,570	6,967	7,011	6,173	<b>93,387</b>
97k Unbalanced Load	Efficiency	65.5%	71.6%	44.3%	45.4%	53.9%	46.1%	42.6%	48.6%	57.7%	36.6%	60.1%	42.7%	<b>50.6%</b>
112k Load	Brake Force (lb)	3,832	3,893	6,063	3,849	5,516	3,704	5,388	3,598	5,322	3,730	5,243	3,832	<b>53,970</b>
112k Load	Weight (lb)	6,437	6,349	9,965	9,127	9,480	8,466	10,450	9,568	9,744	9,789	10,009	9,171	<b>108,555</b>
112k Load	Efficiency	59.5%	61.3%	60.8%	42.2%	58.2%	43.8%	51.6%	37.6%	54.6%	38.1%	52.4%	41.8%	<b>49.7%</b>
132k Load	Brake Force (lb)	3,743	3,686	6,636	5,525	5,825	5,891	6,305	4,766	5,401	4,643	4,974	4,903	<b>62,298</b>
132k Load	Weight (lb)	6,658	6,526	12,081	11,464	11,596	10,450	12,963	11,464	11,993	11,552	12,302	10,759	<b>129,808</b>
132k Load	Efficiency	56.2%	56.5%	54.9%	48.2%	50.2%	56.4%	48.6%	41.6%	45.0%	40.2%	40.4%	45.6%	<b>48.0%</b>

## REFERENCES

---

<sup>1</sup> [http://www.nhtsa.gov/DO T/NHTSA/Rulemaking/Rules/Associated%20Files/121\\_Stopping\\_Distance\\_FR.pdf](http://www.nhtsa.gov/DO T/NHTSA/Rulemaking/Rules/Associated%20Files/121_Stopping_Distance_FR.pdf)  
(Table II p. 143 and Table IIa p. 144)