

# PBBT Valuation Study

## Introduction

The Federal Motor Carriers Safety Administration has requested the Oak Ridge National Laboratory's Transportation Technology Group and Tennessee Highway Patrol to conduct a study on the benefits of using a Commercial Motor Vehicle (CMV) Inspection Pit and Performance Based Brake Tester (PBBT) in CMV inspections.

## Purpose

The purpose of this study was to analyze the following:

- Determine time savings afforded by using CMV Inspection Pit to conduct NAS Level-1 inspections
- Determine change in out-of-service rate (OOS) with a PBBT
- Determine number of NAS Level-1, 2, and 3 inspections possible within an 8-hour shift when used in conjunction with a PBBT
- Quantify time savings with using a PBBT

## PBBT

The Performance Based Brake Tester is a roller dynamometer that measures the efficiency of each brake on a vehicle. Brake efficiency is calculated by dividing brake force by the weight of each wheel end. The PBBT displays a pass, fail, or invalid result. In order to pass the PBBT, the overall vehicle has to score a 43.5 % efficiency or higher. Anything below 43.5 is failing.

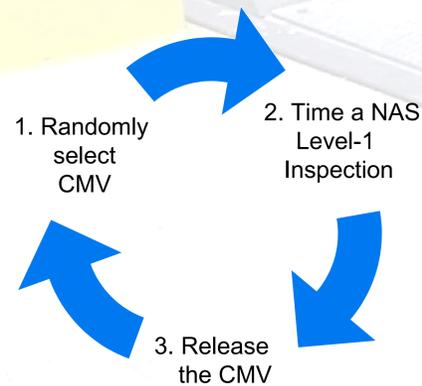
By law, a failed PBBT test is a direct OOS violation, but the PBBT test cannot be used in lieu of a brake stroke measurement in a Level-1 inspection. Some potential causes for a vehicle to fail a PBBT test are worn brake linings, worn brake drums, air line leaks, air bag leaks, broken push rods, or other defects in the vehicle's foundation brake system.

## Methods

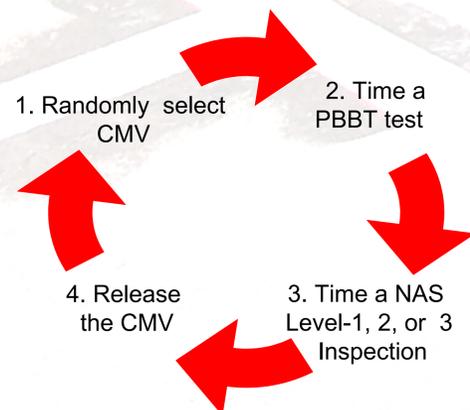
### NAS Level-1 Inspection Pit Time Savings



VS.



### NAS Level-1, 2, and 3 Inspection Augmentation

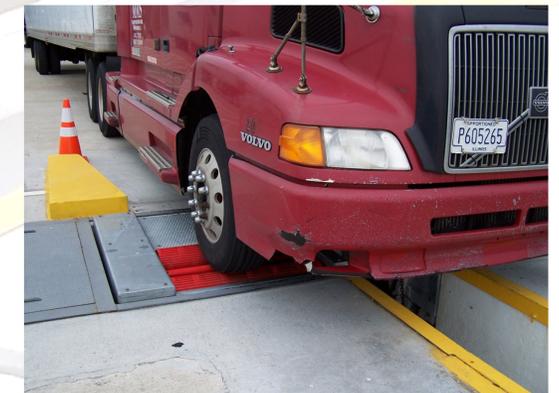


### Pit VS No Pit Average Vehicle Inspection Times and OOS Rate

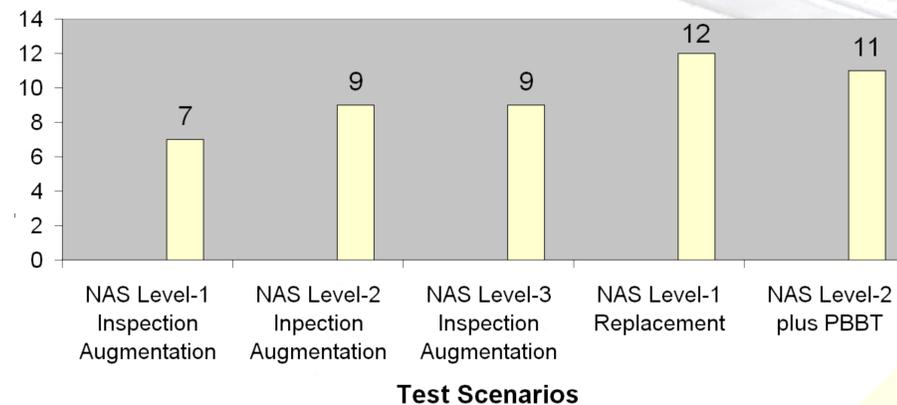
Scenario	Average time for one inspection	Average OOS rate per day
Without Inspection Pit (Knox Co.)	21:18	2
With Inspection Pit (Greene Co.)	19:51	5

### Overall Out-of-Service Rate Compared to PBBT Results

Date (s)	Inspection type	Number of CMVs				
		Total Contacted	Passed PBBT	Failed PBBT	Invalid PBBT	Placed OOS
Jun 15,16,26	Level-1	19	12	5	2	10
Jun 17,18	Level-2	14	10	3	1	4
Jun 19,22	Level-3	15	9	3	3	4
Jun 23, 24	Level-1 Replacement	22	17	4	1	5
Jun 29	Level-2 with PBBT	10	8	1	1	1
<b>TOTAL</b>		<b>80</b>	<b>56</b>	<b>16</b>	<b>8</b>	<b>24</b>



### Probable Number of CMV Contacts Within an 8-Hour Shift



### Average Times

Scenario	Time
PBBT	9:22
Total Level-1	25:25
Brake Stroke	6:20
Vehicle Portion	14:10
Level-2	9:34
Level-3	6:38

## Conclusion

- Inspection pit doubled the OOS rate, but it did not increase the number of vehicles being contacted.
- The Level-1 inspection may have had the best OOS rate, but it was not the most efficient with time.
- The results of this valuation study indicate that combing a Level-2 inspection with a PBBT test is an effective way to identify violations while increasing the number of vehicles contacted.

### Time Comparison

Component	Time
Level-1 without PBBT	25:25
Level-2 with PBBT	19:21
Level-3 with PBBT	15:59