Validation Report

Tennessee, SPS-6
Task Order 16, CLIN 2
June 12 to 13, 2007

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1 Executive Summary

A visit was made to the Tennessee 0600 on June 12 to 13, 2007 for the purposes of conducting a validation of the WIM system located on I-40, approximately 8 miles east of Jackson, TN. The SPS-6 is located in the righthand, westbound lane of a four-lane divided facility. The posted speed limit at this location is 70 mph. The LTPP lane is one of 4 lanes instrumented with WIM at this site and is identified in the system controller as Lane 4. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This site is a relocation of a site originally installed 148 feet upstream of the current location. The old sensors were removed and the pavement was resurfaced prior to this installation. This is the first validation visit to this location. The site was installed on May 7 to 10, 2007 by IRDynamics.

This site meets all LTPP precision requirements except speed which is not considered sufficient to disqualify the site as having research quality data. The classification data is of research quality for Traffic Monitoring Guide Classes.

The site is instrumented with quartz piezo and iSINC electronics. It is installed in asphalt concrete.

The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 74,870 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a split rear tandem and an air suspension loaded to 67,280 lbs., the "partial" truck.

The validation speeds ranged from 59 to 70 miles per hour. The pavement temperatures ranged from 72 to 115 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was also achieved.

Table 1-1 Post-Validation results – 470600 – 13-Jun-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.5 ± 5.6%	Pass
Single axles	±20 percent	0.5 ± 8.8%	Pass
Tandem axles	±15 percent	1.4 ± 7.4%	Pass
GVW	±10 percent	1.1 ± 4.3%	Pass
Speed	**±1 mph [2 km/hr]**	**-0.4 ± 1.3 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The pavement condition appeared to be satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area. There is no post-installation profile data currently available to compute WIM Index values. An amended report will be submitted when the data becomes available.

If this site had been evaluated using ASTM E-1318-02 it would have met the conditions for a Type I site exclusive of wheel loads. LTPP does not validate WIM performance with respect to wheel loads.

Table 1-2 Results Based on ASTM E-1318-02 Test Procedures

Characteristic	Limits for Allowable Error	Percent within Allowable Error	Pass/Fail
Single Axles	± 20%	100%	Pass
Axle Groups	± 15%	100%	Pass
GVW	± 10%	100%	Pass

This site needs five years of data to meet the goal of five years of research quality data.

2 Corrective Actions Recommended

There are no corrective actions required for this site at this time.

3 Post Calibration Analysis

This final analysis is based on test runs conducted June 13, 2007 during the morning and afternoon hours at test site 470600 on I-40. This SPS-6 site is at milepost 91.6 on the westbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for the validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and air suspension loaded to 74,870 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a a split rear tandem and an air suspension loaded to 67,280 lbs., the "partial" truck.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 59 to 70 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 72 to 115 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was also achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

As shown in Table 3-1, the site passed all of the performance criteria except speed.

Table 3-1 Post-Validation Results – 470600 – 13-Jun-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.5 ± 5.6%	Pass
Single axles	±20 percent	0.5 ± 8.8%	Pass
Tandem axles	±15 percent	1.4 ± 7.4%	Pass
GVW	±10 percent	1.1 ± 4.3%	Pass
Speed	**±1 mph [2 km/hr]**	**-0.4 ± 1.3 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The test runs were conducted primarily during the evening and early morning hours during sunny weather conditions, resulting in a wide range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed groups and three temperature groups. The distribution of runs by speed and temperature is illustrated in Figure 3-1. The figure indicates that the desired distribution of speed and temperature combinations was achieved for this set of validation runs.

The three speed groups were divided as follows: Low speed – 59 to 62 mph, Medium speed – 63 to 67 mph and High speed – 68 + mph. The three temperature groups were created by splitting the runs between those at 72 to 90 degrees Fahrenheit for Low temperature, 91 to 105 degrees Fahrenheit for Medium temperature and 106 to 115 degrees Fahrenheit for High temperature.

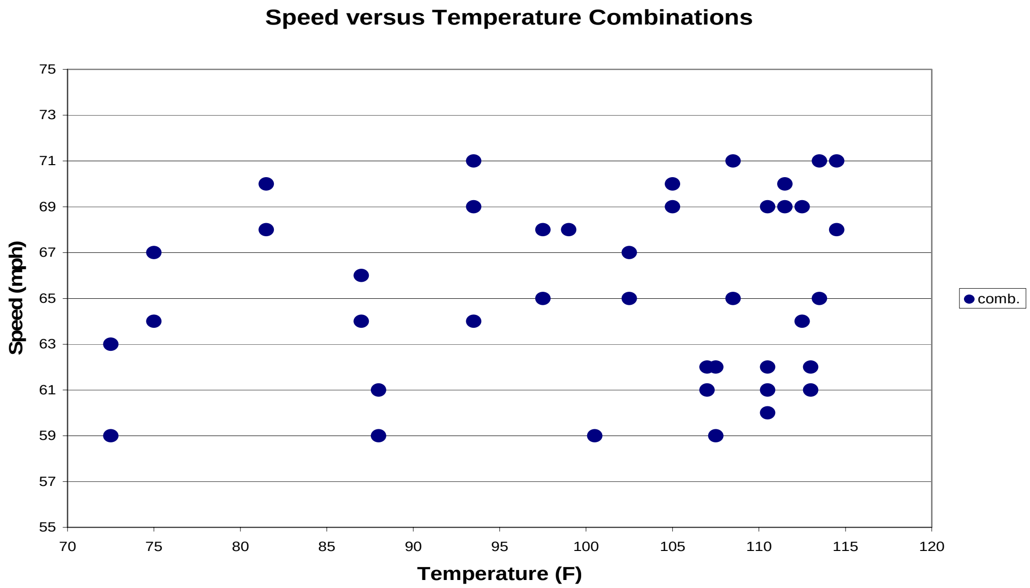


Figure 3-1 Post-Validation Speed-Temperature Distribution – 470600 – 13-Jun-2007

A series of graphs was developed to investigate visually any sign of a relationship between speed or temperature and the scale performance.

Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. From the figure, it appears that the equipment generally overestimates GVW at all speeds. Variability in error is reasonably consistent over the entire speed range.

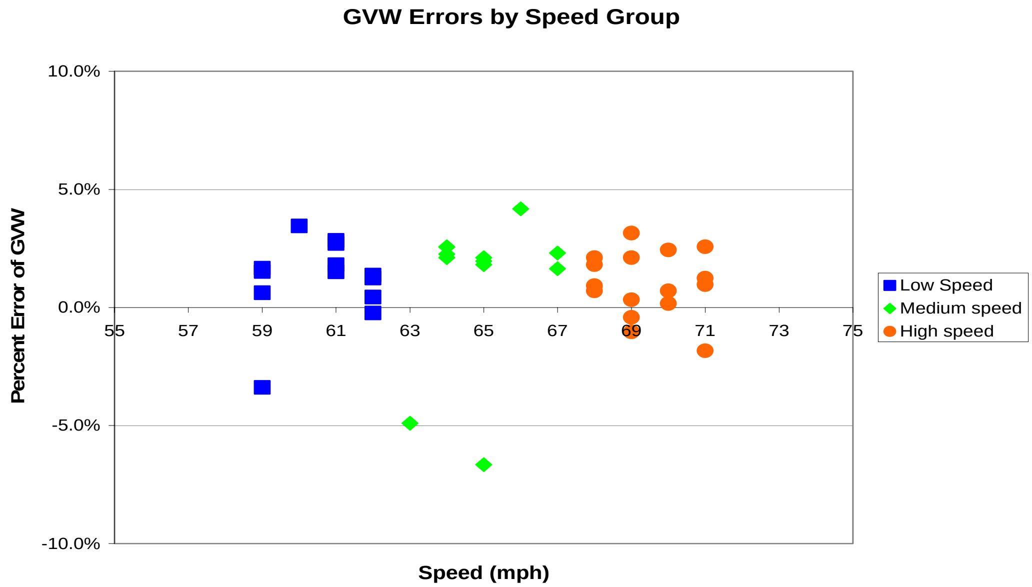


Figure 3-2 Post-validation GVW Percent Error vs. Speed – 470600 – 13-Jun-2007

Figure 3-3 shows the lack of relationship between temperature and GVW percentage error.

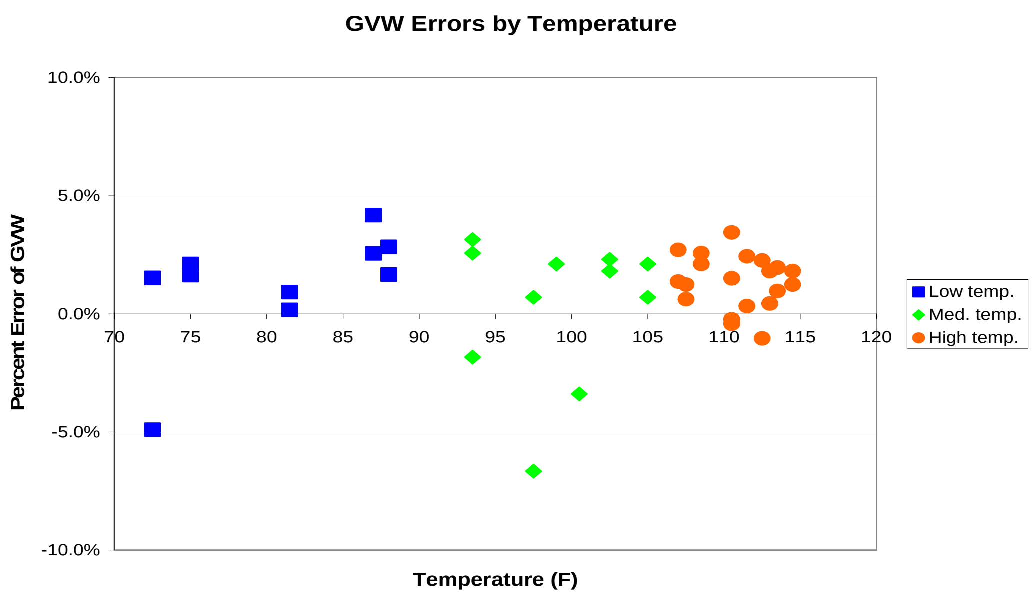


Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 470600 – 13-Jun-2007

Figure 3-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. The graph indicates that the errors in tandem spacings for the test trucks were not affected by speed.

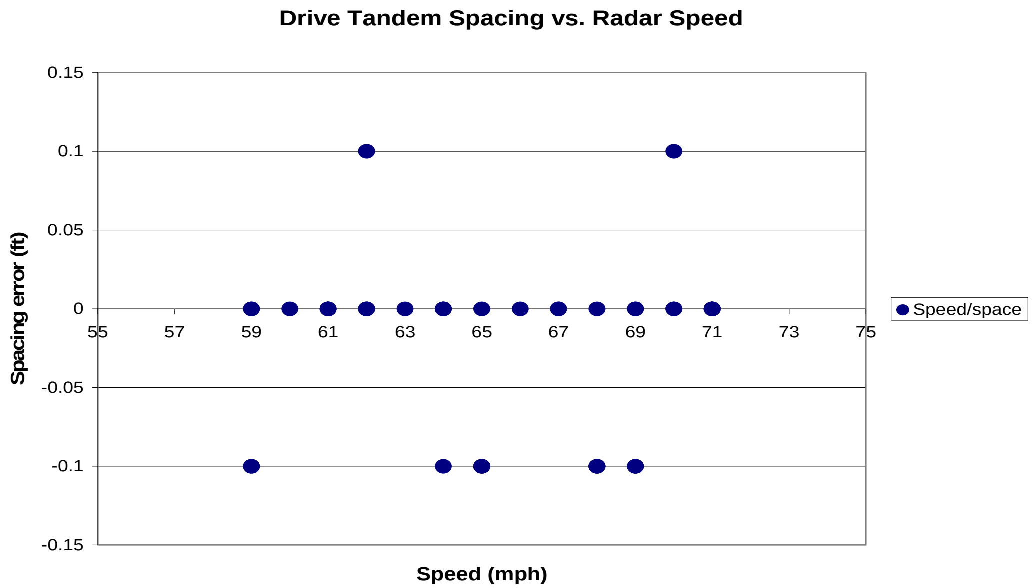


Figure 3-4 Post-Validation Spacing vs. Speed – 470600 – 13-Jun-2007

3.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 72 to 90 degrees Fahrenheit for Low temperature, 91 to 105 degrees Fahrenheit for Medium temperature and 106 to 115 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 470600 – 13-Jun-2007

Element	95% Limit	Low Temperature 72 to 90 °F	Medium Temperature 91 to 105 °F	High Temperature 106 to 115 °F
Steering axles	±20 %	0.2 ± 4.7%	0.0 ± 6.1%	-3.1 ± 4.4%
Single axles	±20 %	2.0 ± 6.3%	-0.7 ± 11.6%	0.4 ± 8.4%
Tandem axles	±15 %	0.9 ± 8.6%	1.2 ± 7.0%	1.9 ± 7.8%
GVW	±10 %	1.3 ± 5.5%	0.3 ± 6.8%	1.4 ± 2.4%
Speed	±1 mph	-0.2 ± 1.0 mph	-0.5 ± 1.8 mph	-0.4 ± 1.3 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

From Table 3-2, it appears that the equipment underestimates steering axle weights at the higher temperatures and overestimates single axles at the lower temperatures. For other weights and temperatures, the equipment appears to estimate loads with reasonable accuracy. For all weights except tandem axles, the variability in error appears to be greatest at the medium temperatures. For tandem weights, variability in error appears to be lowest at medium temperatures.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph.

From the figure, it appears that mean error is not particularly affected by temperature for the population as a whole or for each truck independently. Excluding the outliers, variability in error for each truck appears to be reasonably consistent throughout the entire temperature range, with only a slight increase at medium temperatures.

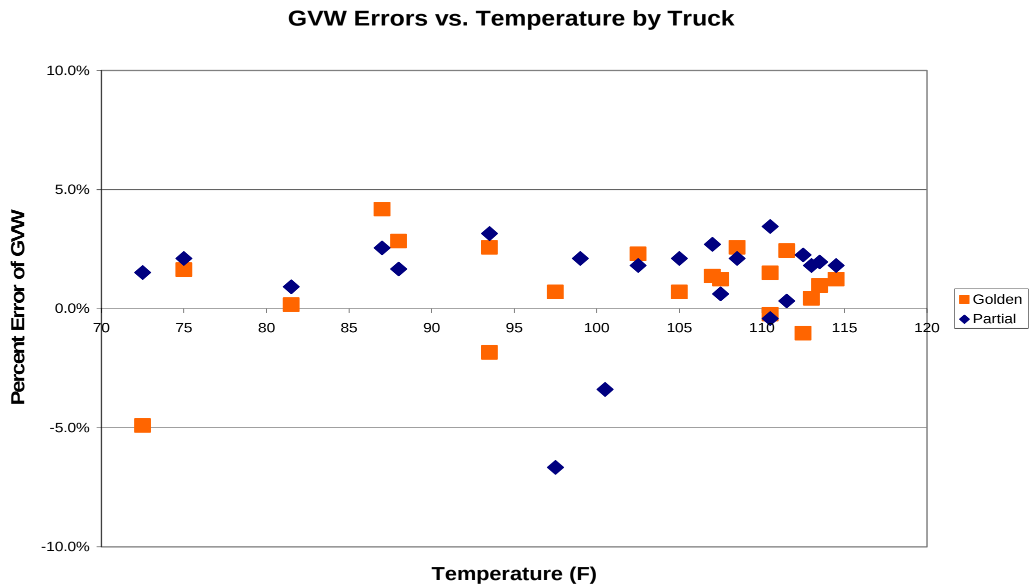


Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 470600 – 13-Jun-2007

Figure 3-6 shows the relationship between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site *does not* use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. From the figure, it can be seen that the equipment underestimates steering axle weights at the higher temperatures. Variability in steering axle error appears to increase slightly at the medium temperatures.

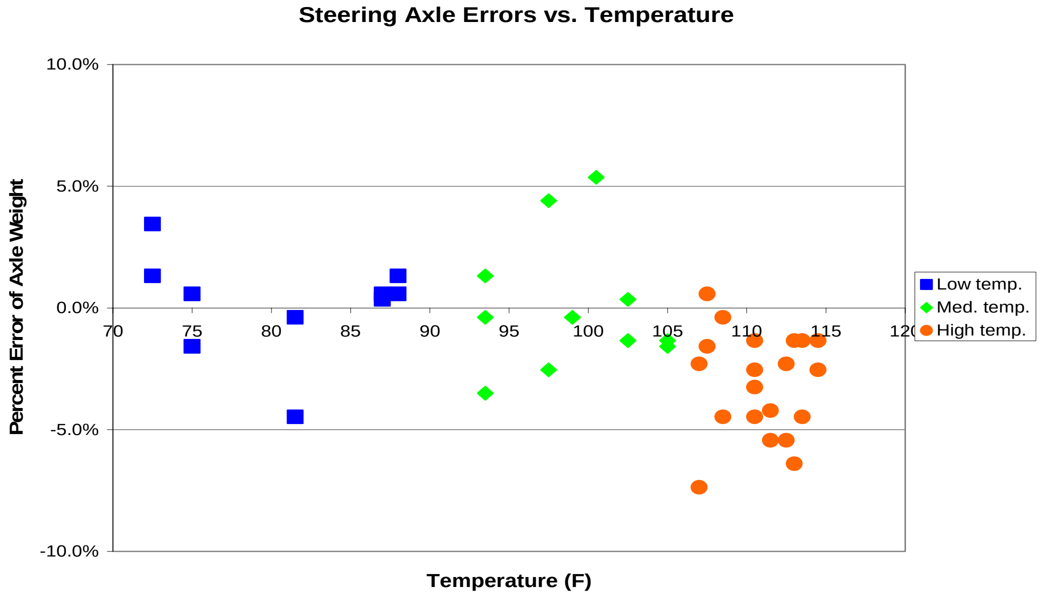


Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 470600 – 13-Jun-2007

Figure 3-7 shows the relationship between single axle errors and temperature. This graph is included due to the split tandem configuration of the partial truck trailer.

From the figure, it can be seen that the equipment estimates single axles with reasonable accuracy for the population as a whole. Independently, the equipment underestimates steering axles for both trucks (squares) at the higher temperatures while trailer single axles (diamonds) are generally overestimated at all temperatures. Excluding the effects of the outliers at the medium temperatures, variability appears to be greatest at the higher temperatures. The variability is associated with the single axle error (steering or split tandem) more than speed. The singles on the split tandem are about forty percent heavier than the steering axles. It would appear that over the temperature range heavy axles are more likely to be over-estimated than light axles.

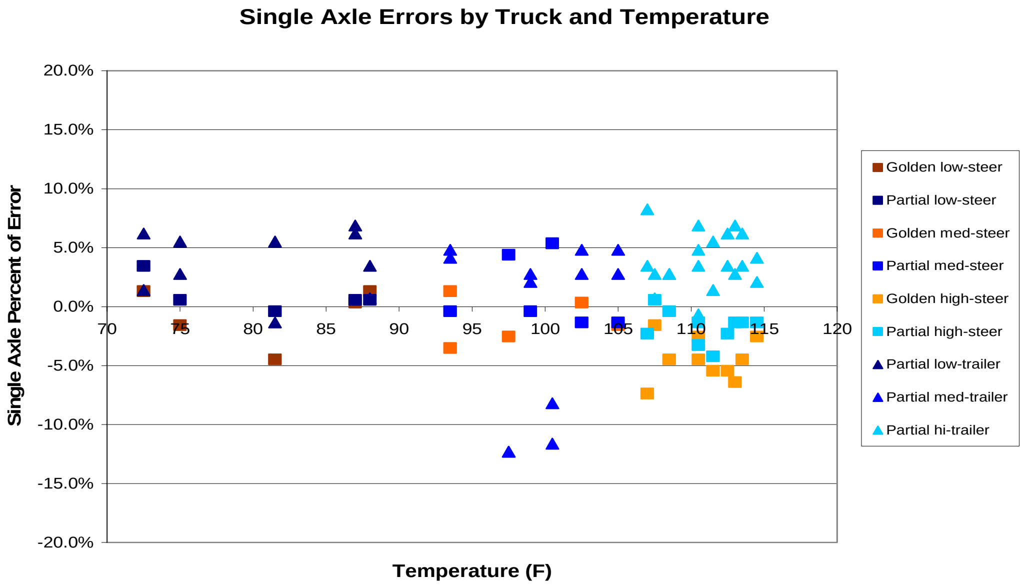


Figure 3-7 Post-Validation Single Axle Error vs. Temperature by Group – 470600 – 13-Jun-2007

3.2 Speed-based Analysis

The three speed groups were divided using 59 to 62 mph for Low speed, 63 to 67 mph for Medium speed and 68+ mph for High speed.

Table 3-3 Post-Validation Results by Speed Bin – 470600 – 13-Jun-2007

Element	**95% Limit**	**Low Speed 59 to 62 mph**	**Medium Speed 63 to 67 mph**	**High Speed 68+ mph**
Steering axles	±20 %	-1.2 ± 7.9%	0.2 ± 3.9%	-2.9 ± 3.8%
Single axles	±20 %	0.5 ± 10.2%	1.2 ± 9.8%	-0.1 ± 7.2%
Tandem axles	±15 %	1.8 ± 8.4%	1.0 ± 8.8%	1.5 ± 6.6%
GVW	±10 %	1.2 ± 3.7%	1.0 ± 7.2%	1.0 ± 2.9%
Speed	±1 mph	-0.3 ± 1.4 mph	-0.3 ± 1 mph	-0.6 ± 1.6 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

From Table 3-3, it can be seen that the equipment underestimates steering axle weights at the higher speeds. All other weights are estimated with reasonable accuracy at all speeds. Variability for GVW and Tandem weights appears to be greater at medium speeds when compared with lower and higher speeds. Variability for other weights tends to decrease as speed increases.

Figure 3-8 illustrates the tendency for the system to estimate GVW accurately for the population as a whole and for each truck independently over the entire speed range. Excluding the effects of a few outliers, variability appears to be consistent throughout the entire speed range.

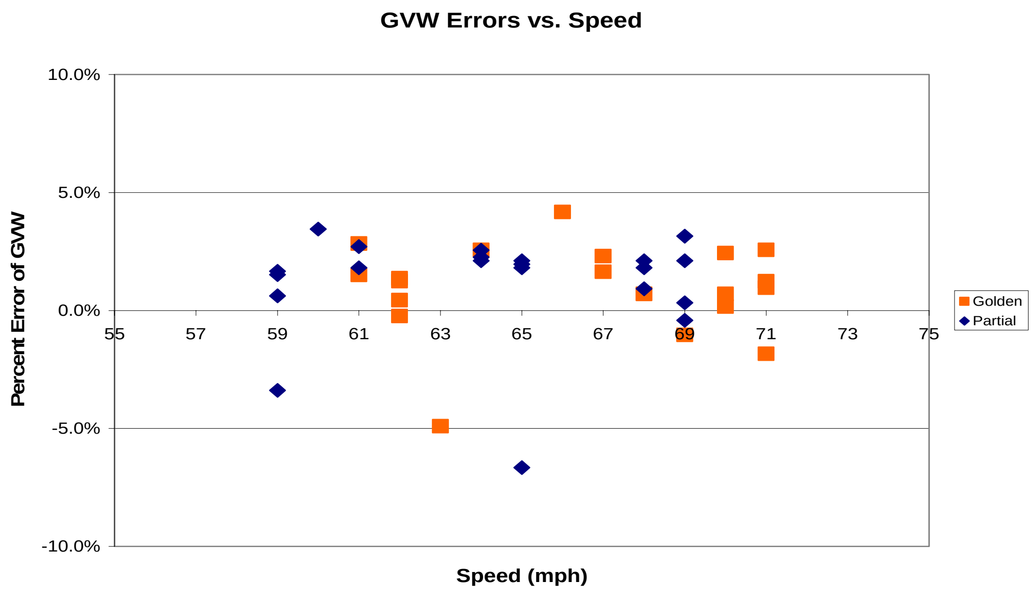


Figure 3-8 Post-Validation GVW Percent Error vs. Speed by Truck – 470600 – 13-Jun-2007

Figure 3-9 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From the figure, steering axle weights appear to be estimated with reasonable accuracy at the low and medium speeds. The equipment tends to underestimate steering axle weights at the higher speeds. Variability is greater at the lower speeds.

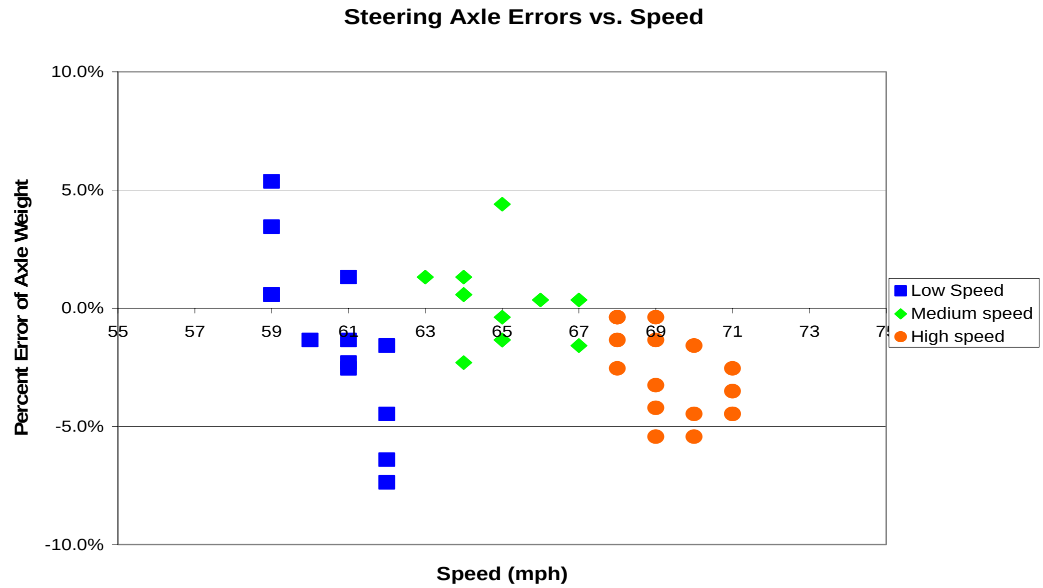


Figure 3-9 Post-Validation Steering Axle Percent Error vs. Speed by Group – 470600 – 13-Jun-2007

Figure 3-10 shows the relationship between single axle errors and speed. This graph is included due to the split tandem configuration of the "partial" truck.

From the figure, it appears that the WIM equipment estimates the single axle weight population as a whole with reasonable accuracy. For steering axle weights (squares), the equipment underestimates the weight at the higher speeds. The trailer axle weights for the partial truck (diamonds) are generally overestimated at all speeds. Variability in error appears to be greater at the lower speeds for all single axles.

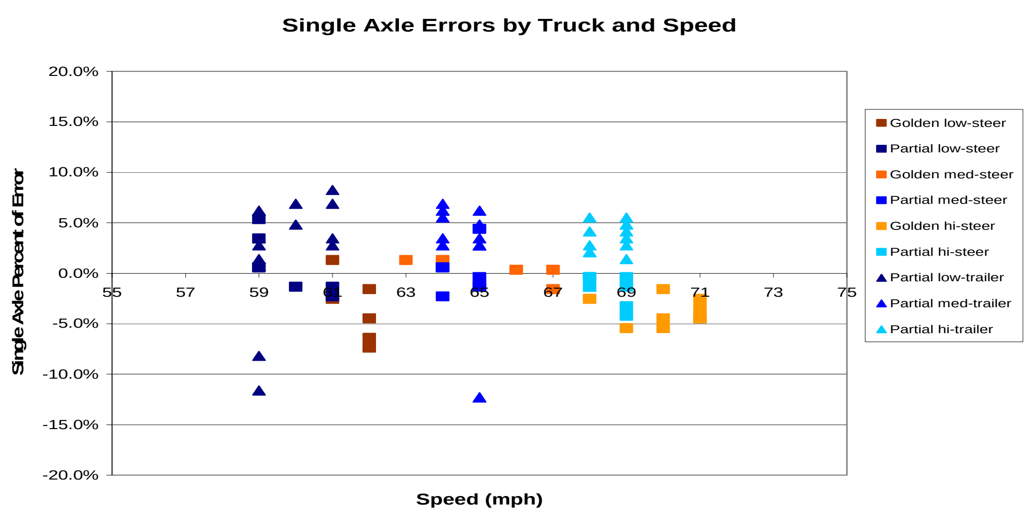


Figure 3-10 Post-Validation Single Axle Percent Error vs. Speed by Group – 470600 – 13-Jun-2007

3.3 Classification Validation

This LTPP installed site uses the FHWA 13-bin classification scheme and the LTPP Mod 3 classification algorithm. Classification 15 has been added to define unclassified vehicles.

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0.0 percent unknown vehicles and 0.0 percent unclassified vehicles.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 3-4 has the classification error rates by class. The overall misclassification rate is   .0 percent.

Table 3-4 Truck Misclassification Percentages for 470600 – 13-Jun-2007

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	N/A	5	N/A	6	0
7	0				
8	0	9	0	10	0
11	0	12	0	13	0

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations with at least one Class 9 and only six of them are matches, the error rate is 25 percent. The percent error and the mean differences reported below do not represent the same statistic. It is possible to have error rates greater than 0 with a mean difference of zero.

Table 3-5 Truck Classification Mean Differences for 470600 – 13-Jun-2007

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	N/A	5	N/A	6	0
7	0				
8	0	9	0	10	0
11	0	12	0	13	0

These error rates are normalized to represent how many vehicles of the class are expected to be over or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred.   Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual “hundred observed”. Classes marked Unknown (UNK) are those identified by the equipment but no vehicles of the type were seen by the observer. There is no way to tell how many vehicles of that type might actually exist. N/A means no vehicles of the class were recorded by either the equipment or the observer.

3.4 Evaluation by ASTM E-1318 Criteria

The ASTM E-1318 criteria for a successful validation of Type I sites is 95% of the observed errors within the limits for allowable errors for each of the relevant statistics. If this site had been evaluated using ASTM E-1318-02 it would have met the conditions for a Type I site exclusive of wheel loads. LTPP does not validate WIM performance with respect to wheel loads.

Table 3-6 Results of Validation Using ASTM E-1318-02 Criteria

Characteristic	Limits for Allowable Error	Percent within Allowable Error	Pass/Fail
Single Axles	± 20%	100%	Pass
Axle Groups	± 15%	100%	Pass
GVW	± 10%	100%	Pass

4 Pavement Discussion

The pavement condition did not appear to influence truck movement across the sensors.

4.1 Profile Analysis

Profile data collected in the year prior to the site visit does not exist. A site visit to collect profile data has not been scheduled yet. An amended report will be submitted when the data is available.

4.2 Distress Survey and Any Applicable Photos

During a visual survey of the pavement no distresses that would influence truck movement across the WIM scales were noted.

4.3 Vehicle-pavement Interaction Discussion

A visual observation of the trucks as they approach, traverse and leave the sensor area did not indicate any visible motion of the trucks that would affect the performance of the WIM scales. Trucks appear to track down the wheel path and daylight cannot be seen between the tires of any of the sensors for the equipment.

5 Equipment Discussion

The traffic monitoring equipment at this location includes quartz piezo and iSINC. These sensors are installed in asphalt concrete pavement.

5.1 Pre-Evaluation Diagnostics

A complete electronic and electrical check of all system components including in-road sensors, electrical power, and telephone service were performed immediately prior to the evaluation. All sensors and system components were found to be within operating parameters.

5.2 Calibration Process

The equipment required no iterations of the calibration process between the initial 40 runs and the final 40 runs.

5.3 Summary of Traffic Sheet 16s

This site has validation information from previous visits as well as the current one in the tables below. Table 5-1 has the information found in TRF_CALIBRATION_AVC for Sheet 16s submitted prior to this validation as well as the information for the current visit.

Table 5-1 Classification Validation History – 470600 – 13-Jun-2007

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
06/13/07	Manual	0	0			0
06/12/07	Manual	0	0			0
09/22/02	Manual					
05/14/02	Manual					

Table 5-2 has the information found in TRF_CALIBRATION_WIM for Sheet 16s submitted prior to this validation as well as the information for the current visit.

Table 5-2 Weight Validation History – 470600 – 13-Jun-2007

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
06/13/07	Test Trucks	1.1 (2.1)	0.5 (4.4)	1.4 (3.7)
06/12/07	Test Trucks	1.3 (1.4)	2.2 (3.0)	1.0 (2.9)
09/22/02	Test Trucks			
05/14/02	Test Trucks			

5.4 Projected Maintenance/Replacement Requirements

As a part of the SPS Pooled Fund contract under which this site was installed semi-annual maintenance activities will be conducted. No additional maintenance requirements have been identified as a result of this visit.

6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted June 12, 2007 during the morning and afternoon hours at 470600 located approximately 8 miles east of Jackson, TN. This SPS-6 site is at milepost 91.6 on I-40 in the westbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for initial validation included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and an air suspension loaded to 74,860 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a split rear tandem and an air suspension loaded to 67,750 lbs., the "partial" truck.

For the initial validation each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 58 to 70 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 95 to 120degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 6-1.

As shown in Table 6-1, the site passed all of the performance criteria except speed.

Table 6-1 Pre-Validation Results – 470600 – 12-Jun-2007

SPS-1, -2, -5, -6 and -8	**95 %Confidence Limit of Error**	**Site Values**	**Pass/Fail**
Steering axles	±20 percent	0.3 ± 5%	Pass
Single axles	±20 percent	2.2 ± 6%	Pass
Tandem axles	±15 percent	1.0 ± 5.9%	Pass
GVW	±10 percent	1.4 ± 2.9%	Pass
Speed	**±1 mph [2 km/hr]**	**0.0 ± 1.6 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The test runs were conducted primarily during the evening and early morning hours, under mostly sunny weather conditions, resulting in a fairly wide range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed groups and three temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs. Three temperature groups could be created despite the small sample of runs at the higher temperatures due to the clearly definable separation between the medium and higher temperatures.

The three speed groups were divided into 58 to 62 mph for Low speed, 63 to 67 mph for Medium speed and 68+ mph for High speed. The three temperature groups were created by splitting the runs between those at 95 to 100 degrees Fahrenheit for Low temperature, 101 to 112 degrees Fahrenheit for Medium temperature and 113 to 120 degrees Fahrenheit for High temperature.

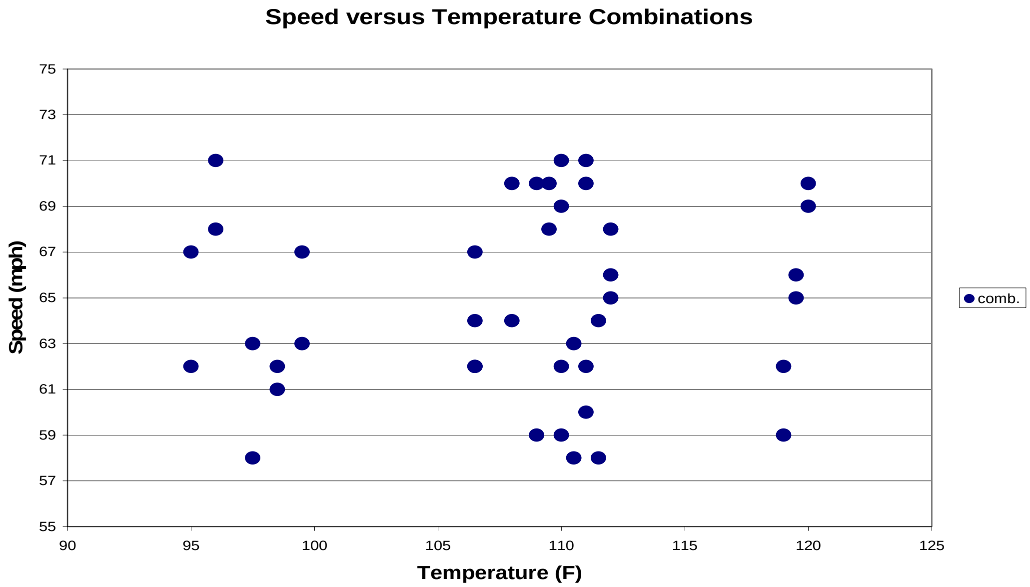


Figure 6-1 Pre-Validation Speed-Temperature Distribution – 470600 – 12-Jun-2007

A series of graphs was developed to investigate visually for any sign of any relationship between speed or temperature and the scale performance.

Figure 6-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. From the figure, it appears that the equipment generally overestimates GVW at all speeds. Variability in error appears to be slightly greater at the medium and high speeds when compared with the lower speeds.

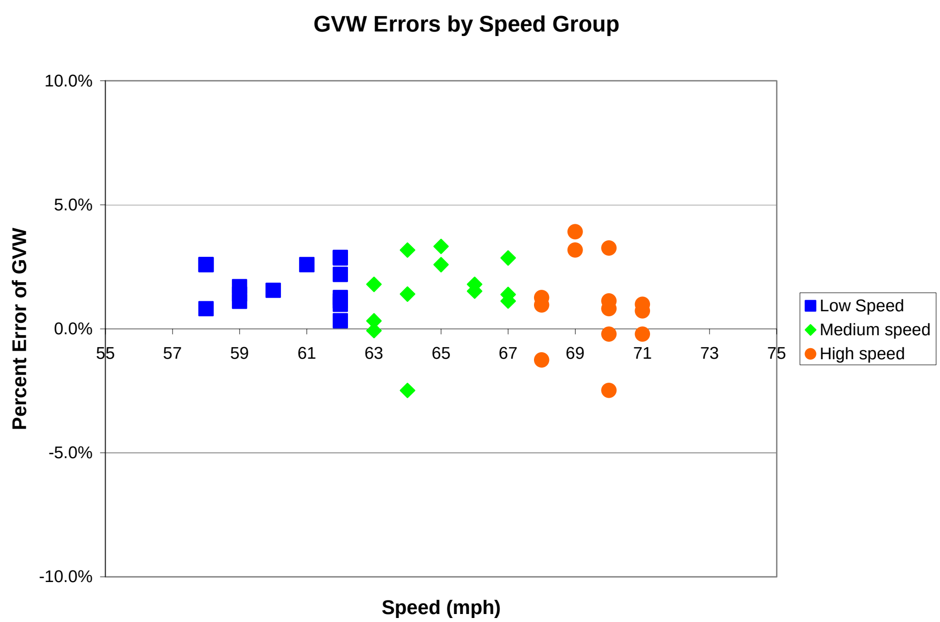


Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 470600 – 12-Jun-2007

Figure 6-3 shows the lack of relationship between temperature and GVW percentage error.

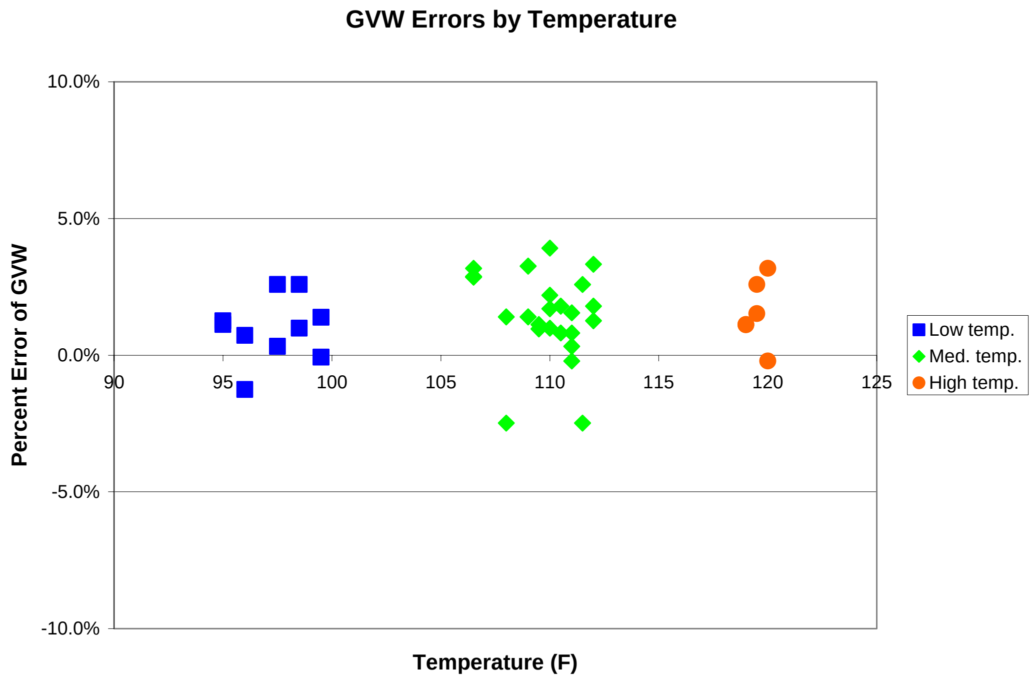


Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 470600 – 12-Jun-2007

Figure 6-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. The graph indicates that the errors in tandem spacings for the test trucks were not influenced by speed.

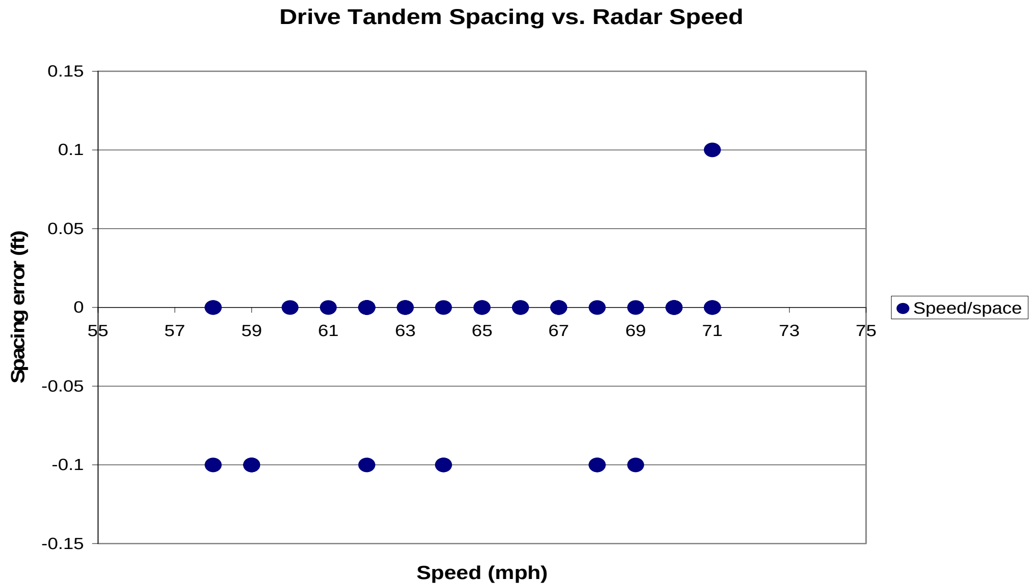


Figure 6-4 Pre-Validation Spacing vs. Speed - 470600 – 12-Jun-2007

6.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 95 to 100 degrees Fahrenheit for Low temperature, 101 to 112 degrees Fahrenheit for Medium temperature and 113 to 120 degrees Fahrenheit for High temperature.

Table 6-2 Pre-Validation Results by Temperature Bin – 470600 – 12-Jun-2007

Element	95% Limit	Low Temperature 95 to 100 °F	Medium Temperature 101 to 112 °F	High Temperature 113 to 120 °F
Steering axles	±20 %	1.9 ± 5.8%	0.0 ± 5%	-1.2 ± 3.6%
Single axles	±20 %	2.4 ± 4.7%	2.2 ± 6.5%	1.7 ± 7.5%
Tandem axles	±15 %	0.2 ± 5.7%	1.2 ± 6.5%	1.2 ± 4.6%
GVW	±10 %	1.0 ± 2.6%	1.5 ± 3.3%	1.5 ± 3.1%
Speed	±1 mph	-0.5 ± 2.4 mph	0.1 ± 1.3 mph	0.3 ± 1.3 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

From Table 6-2, it appears that the equipment underestimates steering axle weights at the higher temperatures and overestimates single axles at the lower temperatures. For other weights and temperatures the equipment appears to estimate with reasonable accuracy. For all weights except tandem axles, the variability in error appears to be greatest at the medium temperatures. For tandem weights, variability in error appears to be lowest at medium temperatures.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. From the figure, it appears that mean error is not particularly affected by temperature for the population as a whole or for each truck independently. Variability in error appears to be greater at the medium temperatures for the golden truck (squares).

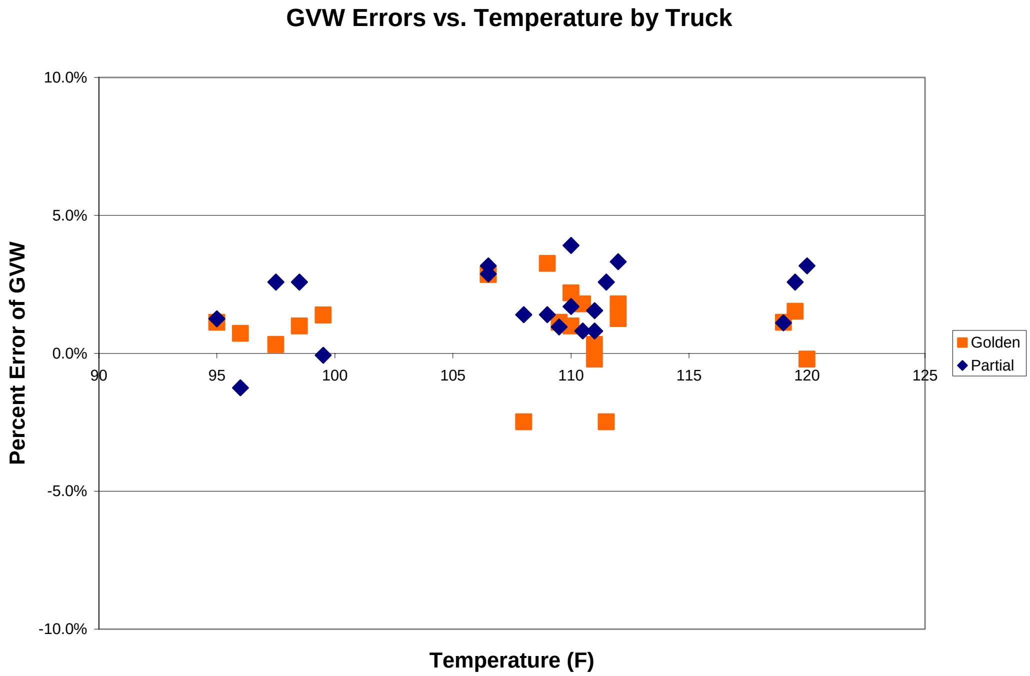


Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 470600 – 12-Jun-2007

Figure 6-6 shows the relation between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From the figure, it can be seen that the equipment progresses linearly from an overestimation at lower temperatures to an underestimation at higher temperatures. Variability in steering axle error appears to be greater at the lower and medium temperatures when compared with higher temperatures, considering the small sample size at the higher temperatures.

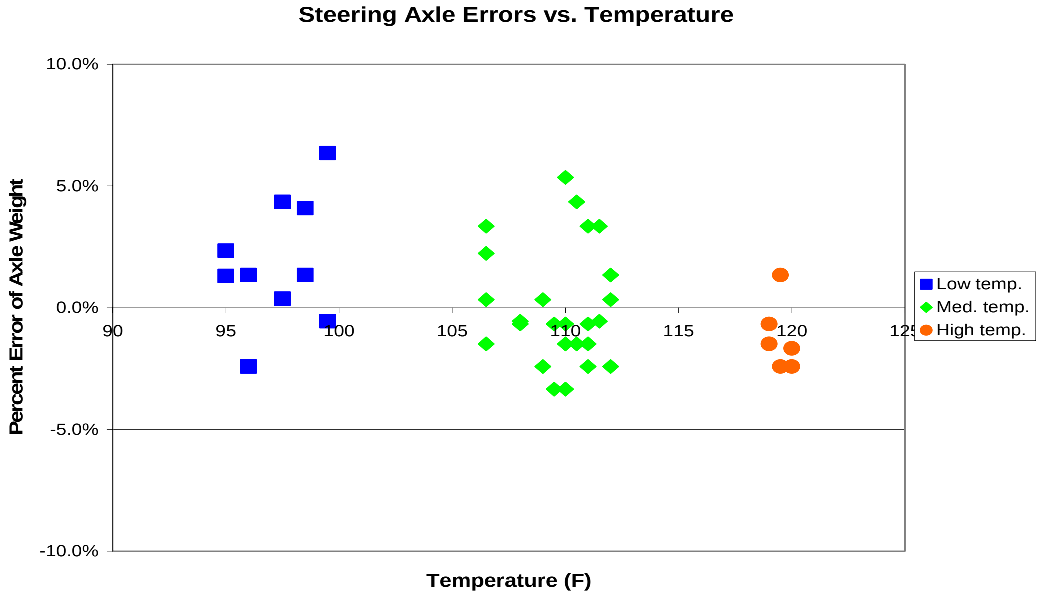


Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group – 470600 – 12-Jun-2007

Figure 6-7 shows the relation between single axle errors and temperature. This graph is included due to the split tandem configuration of the partial truck trailer.

From the figure, it can be seen that the equipment slightly overestimates single axles for the population as a whole at all temperatures. Independently, the equipment generally underestimates steering axles for both trucks (squares) at all temperatures while trailer single axles (diamonds) are overestimated at all temperatures. Variability appears to be greatest at the medium temperatures.

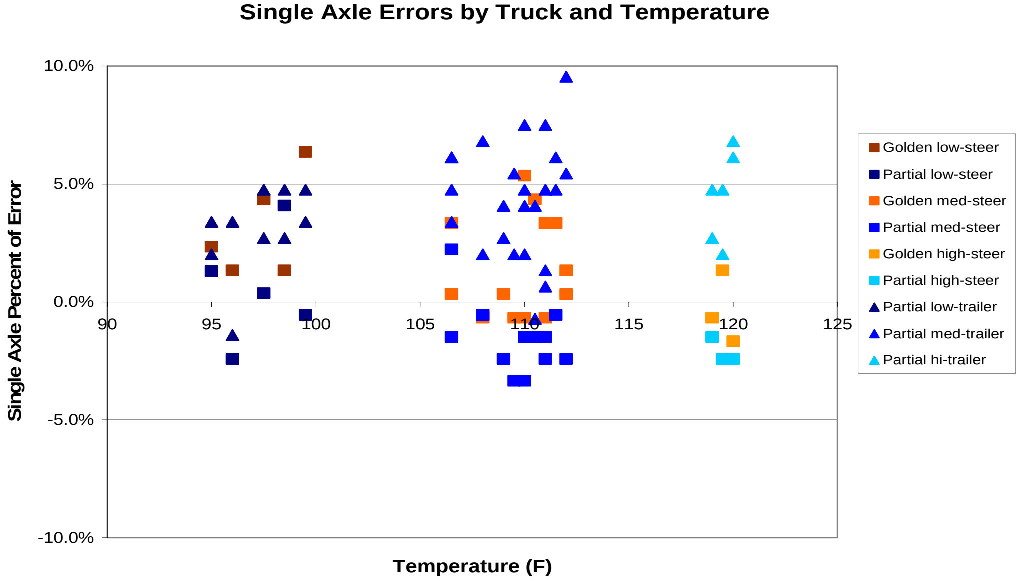


Figure 6-7 Pre-Validation Single Axle Error vs. Temperature by Group – 470600 – 12-Jun-2007

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 58 to 62 mph, Medium speed – 63 to 67 mph and High speed – 68+ mph.

Table 6-3 Pre-Validation Results by Speed Bin – 470600 – 12-Jun-2007

Element	95% Limit	Low Speed 58 to 62 mph	Medium Speed 63 to 67 mph	High Speed 68+ mph
Steering axles	±20 %	0.1 ± 4.7%	1.8 ± 5.8%	-0.9 ± 4.3%
Single axles	±20 %	2.1 ± 5.4%	3.0 ± 5.9%	1.3 ± 7.4%
Tandem axles	±15 %	1.4 ± 4.9%	0.9 ± 5.9%	0.7 ± 7.4%
GVW	±10 %	1.7 ± 1.8%	1.4 ± 3.4%	0.9 ± 3.9%
Speed	±1 mph	-0.1 ± 2.1 mph	0.1 ± 1.7 mph	-0.1 ± 1.4 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

From Table 6-3, it can be seen that the equipment generally estimates all weights with reasonable accuracy at all speeds, although single axle weights are slightly overestimated at low and medium speeds. For all weights, variability appears to generally increase as speed increases.

Figure 6-8 illustrates the tendency for the system to overestimate GVW as a whole and for each truck independently over the entire speed range. Variability appears to increase slightly with speed.

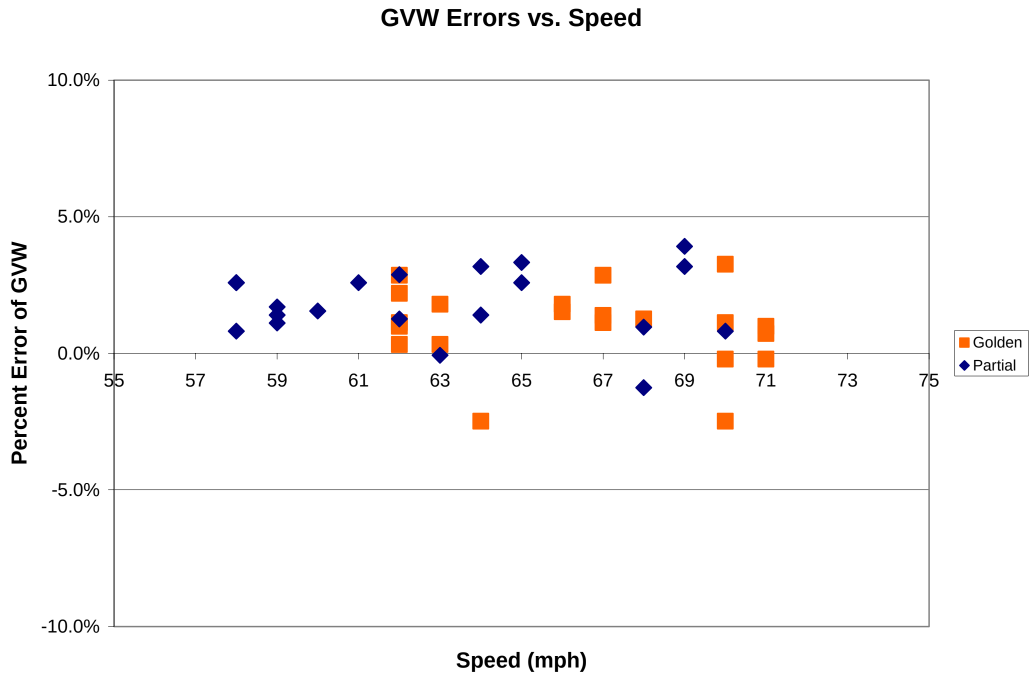


Figure 6-8 Pre-Validation GVW Percent Error vs. Speed Group - 470600 –12-Jun-2007

Figure 6-9 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From the figure, steering axle weights appear to be estimated with reasonable accuracy at the low and medium speeds. The equipment tends to underestimate steering axle weights at the higher speeds. Variability is greater at the lower and medium speeds.

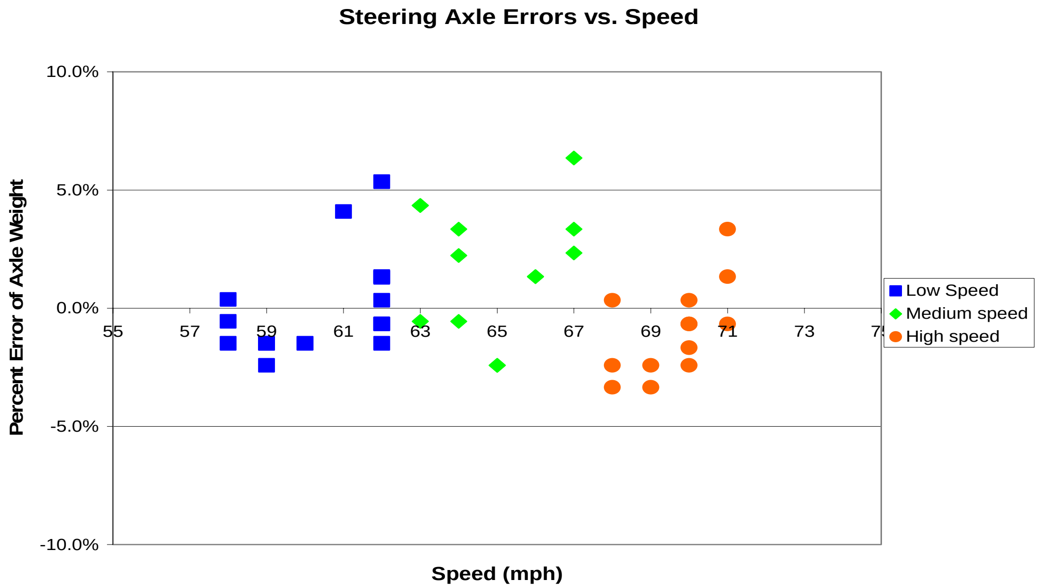


Figure 6-9 Pre-Validation Steering Axle Percent Error vs. Speed Group - 470600 – 12-Jun-2007

Figure 6-10 shows the relationship between single axle errors and speed. This graph is included due to the split tandem configuration of the "partial" truck.

From the figure, it appears that the WIM equipment overestimates the single axle weight population as a whole at all speeds. For steering axle weights (squares), the equipment underestimates the weight at the higher speeds. The trailer axle weights for the partial truck (diamonds) are overestimated at all speeds. Variability in error appears to be greater at the higher speeds.

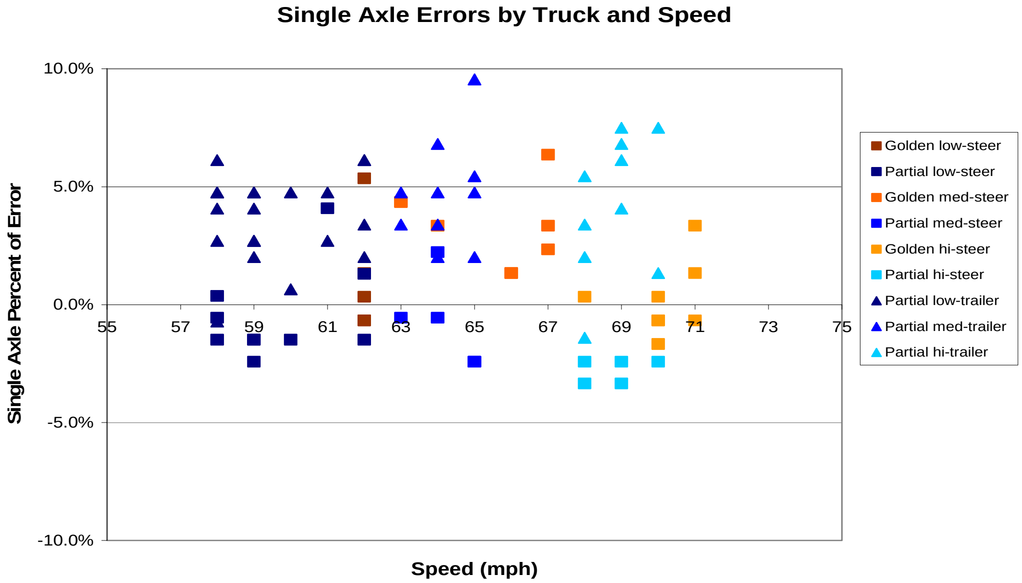


Figure 6-10 Pre-Validation Steering Axle Percent Error vs. Speed Group - 470600 – 12-Jun-2007

6.3 Classification Validation

This LTPP installed site uses the FHWA 13-bin classification scheme and the LTPP Mod 3 classification algorithm. Classification 15 has been added to define unclassified vehicles.

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. The classification identification is to identify gross errors in classification, not validate the classification algorithm. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0.0 percent unknown vehicles and 0.0 percent unclassified vehicles.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 6-4 has the classification error rates by class. The overall misclassification rate is 4.9 percent.

Table 6-4 Truck Misclassification Percentages for 470600 – 12-Jun-2007

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	100	5	75	6	0
7	0				
8	0	9	0	10	0
11	0	12	0	13	N/A

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations with at least one Class 9 and only six of them a re matches, the error rate is 25 percent. The percent error and the mean differences reported below do not represent the same statistic. It is possible to have error rates greater than 0 with a mean difference of zero.

Table 6-5 Truck Classification Mean Differences for 470600 – 12-Jun-2007

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	0	5	-33	6	0
7	0				
8	0	9	0	10	0
11	0	12	0	13	N/A

These error rates are normalized to represent how many vehicles of the class are expected to be over- or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual “hundred observed”. Classes marked Unknown are those identified by the equipment but no vehicles of the type were seen the observer. There is no way to tell how many vehicles of that type might actually exist. N/A means no vehicles of the class were recorded by either the equipment or the observer.

6.4 Evaluation by ASTM E-1318 Criteria

The ASTM E-1318 criteria for a successful validation of Type I sites is 95% of the observed errors within the limits for allowable errors for each of the relevant statistics. If this site had been evaluated using ASTM E-1318-02 it would have met the conditions for a Type I site exclusive of wheel loads. LTPP does not validate WIM performance with respect to wheel loads.

Table 6-6 Results of Validation Using ASTM E-1318-02 Criteria

Characteristic	Limits for Allowable Error	Percent within Allowable Error	Pass/Fail
Single Axles	± 20%	100%	Pass
Axle Groups	± 15%	100%	Pass
GVW	± 10%	100%	Pass

7 Data Availability and Quality

As of June 12, 2007 this site does not have at least 5 years of research quality data. Research quality data is defined to be at least 210 days in a year of data of known calibration meeting LTPP’s precision requirements.

Data that has validation information available has been reviewed in light of the patterns present in the two weeks immediately following a validation/calibration activity. A determination of research quality data is based on the consistency with the validation pattern. Data that follows consistent and rational patterns in the absence of calibration information may be considered nominally of research quality pending validation information with which to compare it. Data that is inconsistent with expected patterns and has no supporting validation information is not considered research quality.

The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. As can be seen from the table, no years have a sufficient quantity to be considered complete years of data. In the absence of sufficient quantity and previously gathered validation information it can be seen that at least five additional years of research quality data are needed to meet the goal of a minimum of 5 years of research weight data.

Table 7-1 Amount of Traffic Data Available 470600 – 12-Jun-2007

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
2001	90	4	Full Week	90	4	Full Week
2002	104	6	Full Week			

GVW graphs and characteristics associated with them are used as data screening tools. As a result classes constituting more that ten percent of the truck population are considered major sub-groups whose evaluation characteristics should be identified for use in screening. The typical values to be used for reviewing incoming data after a validation are determined starting with data from the day after the completion of a validation.

Only Class 9s constitute more than 10 percent of the truck population. Based on the data collected from the end of the last calibration iteration the following are the expected values for these populations. The precise values to be used in data review will need to be determined by the Regional Support Contractor on receipt of the first 14 days of data after the successful validation. For sites that do not meet LTPP precision requirements, this period may still be used as a starting point from which to track scale changes.

Table 7-2 is generated with a column for every vehicle class 4 or higher that represents 10 percent or more of the truck (class 4-20) population. In creating Table 7-2 the following definitions are used:

- Class 9 overweights are defined as the percentage of vehicles greater than 88,000 pounds
- Class 9 underweights are defined as the percentage of vehicles less than 20,000 pounds.
- Class 9 unloaded peak is the bin less than 44,000 pounds with the greatest percentage of trucks.
- Class 9 loaded peak is the bin 60,000 pounds or larger with the greatest percentage of trucks.

There may be more than one bin identified for the unloaded or loaded peak due to the small sample size collected after validation. Where only one peak exists, the peak rather than a loaded or unloaded peak is identified. This may happen with single unit trucks. It is not expected to occur with combination vehicles.

Table 7-2 GVW Characteristics of Major sub-groups of Trucks – 470600 – 13-Jun-2007

Characteristic	Class 9
Percentage Overweights	0.0%
Percentage Underweights	0.2%
Unloaded Peak	36 kips
Loaded Peak	76 kips

The expected percentage of unclassified vehicles is 1.8%. This is based on the percentage of unclassified vehicles in the post-validation data download.

The graphical screening comparison figures are found in Figure 7-1 through Figure 7-3. These are based on data collected immediately after the validation and may not be wholly representative of the population at the site. They should however provide a sense of the statistics expected when SPS comparison data is computed for the post-validation Sheet 16.

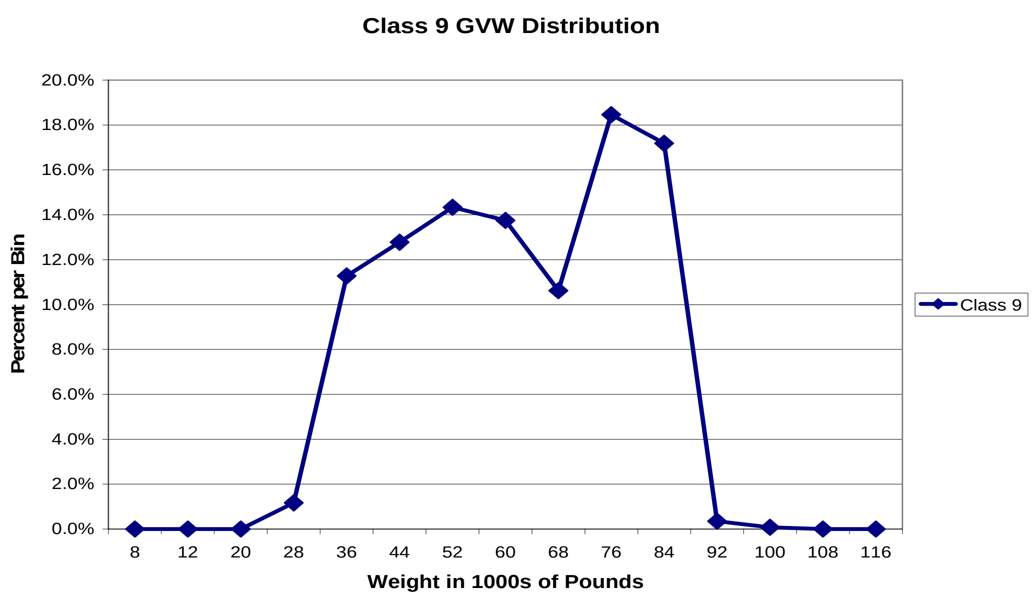


Figure 7-1 Expected GVW Distribution Class 9 – 470600 – 13-Jun-2007

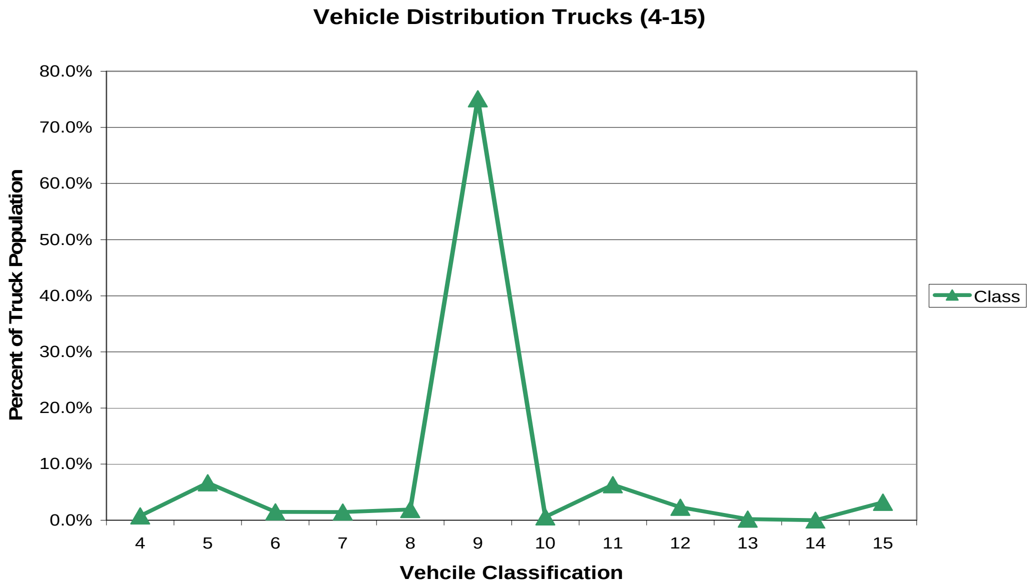


Figure 7-2 Expected Vehicle Distribution – 470600 – 13-Jun-2007

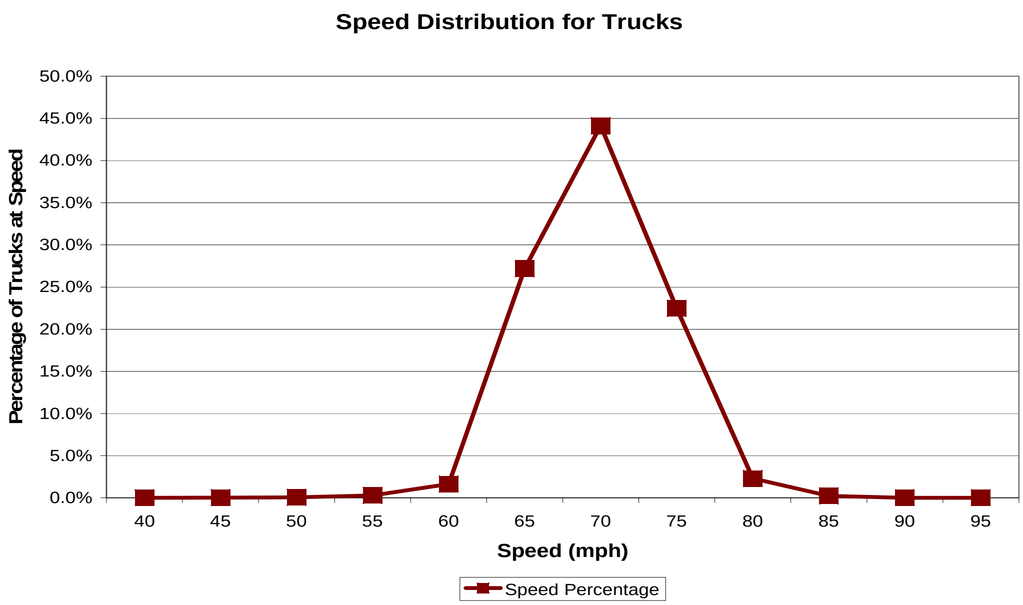


Figure 7-3 Expected Speed Distribution – 470600 – 13-Jun-2007

8 Data Sheets

The following is a listing of data sheets incorporated in Appendix A.

Sheet 19 – Truck 1 – 3S2 loaded air suspension (5 pages)
Sheet 19 – Truck 2 – 3S2 partially loaded air suspension split trailer tandem (5 pages)

Sheet 20 – Speed and Classification Verification – Pre-Validation (2 pages)
Sheet 20 – Speed and Classification Verification – Post-Validation (2 pages)

Sheet 21 – Pre-Validation (3 pages)
Sheet 21 – Post-Validation (3 pages)

Test Truck Photographs (7 pages)

LTPP Mod 3 Classification Scheme (1 page)

Final System Parameters (1 page)

9 Updated Handout Guide and Sheet 17

A copy of the handout has been included following this page. It includes a current Sheet 17 with all applicable maps and photographs. Information describing the new installation location is included with the Sheet 17.

10 Updated Sheet 18

A current Sheet 18 indicating the contacts, conditions for assessments and evaluations has been attached following the updated handout guide.

11 Traffic Sheet 16(s)

Sheet 16s for the pre-validation and post-validation conditions are attached following the current Sheet 18 information at the very end of the report.

POST-VISIT HANDOUT GUIDE FOR SPS WIM VALIDATION

STATE: Tennessee

SHRP ID: 0600

Figures

1. General Information

SITE ID: *470600*

LOCATION: *I-40 West (Mile Post: 91.67)*

VISIT DATE: June 12, *2007*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

Validation Team Leader: *Dean J. Wolf, 301-210-5105, djwolf@mactec.com*

Highway Agency: *Jim Maxwell, 615-350-4167, james.maxwell@state.tn.us*

Gary Wright, 512-977-1856, gwright@fugro.com

FHWA COTR: *Debbie Walker, 202-493-3068, deborah.walker@fhwa.dot.gov*

FHWA Division Office Liaison: *John H. Steele, 615-781-5777, john.steele@fhwa.dot.gov*

LTPP SPS WIM WEB PAGE: *http://www.tfhrc.gov/pavement/ltpp/spstraffic/index.htm*

3. Agenda

BRIEFING DATE: *No briefing requested*

ONSITE PERIOD: *June 12 and 13, 2007*

TRUCK ROUTE CHECK: *Completed during Assessment (11/18/03) (See Truck Route)*

4. Site Location/ Directions

NEAREST AIRPORT: *Memphis International Airport, Memphis, TN*

DIRECTIONS TO THE SITE: *1.8 miles W of exit 93, US 152/Low Road.*

MEETING LOCATION: *On Site at 9:00AM*

WIM SITE LOCATION: *Westbound lane of IH-40, near Milepost 91.67, approximately 3 miles East of Jackson, TN (35^0 42' 555" North and 88^0 39' 800" West)*

WIM SITE LOCATION MAP: *See Figure 4.1*

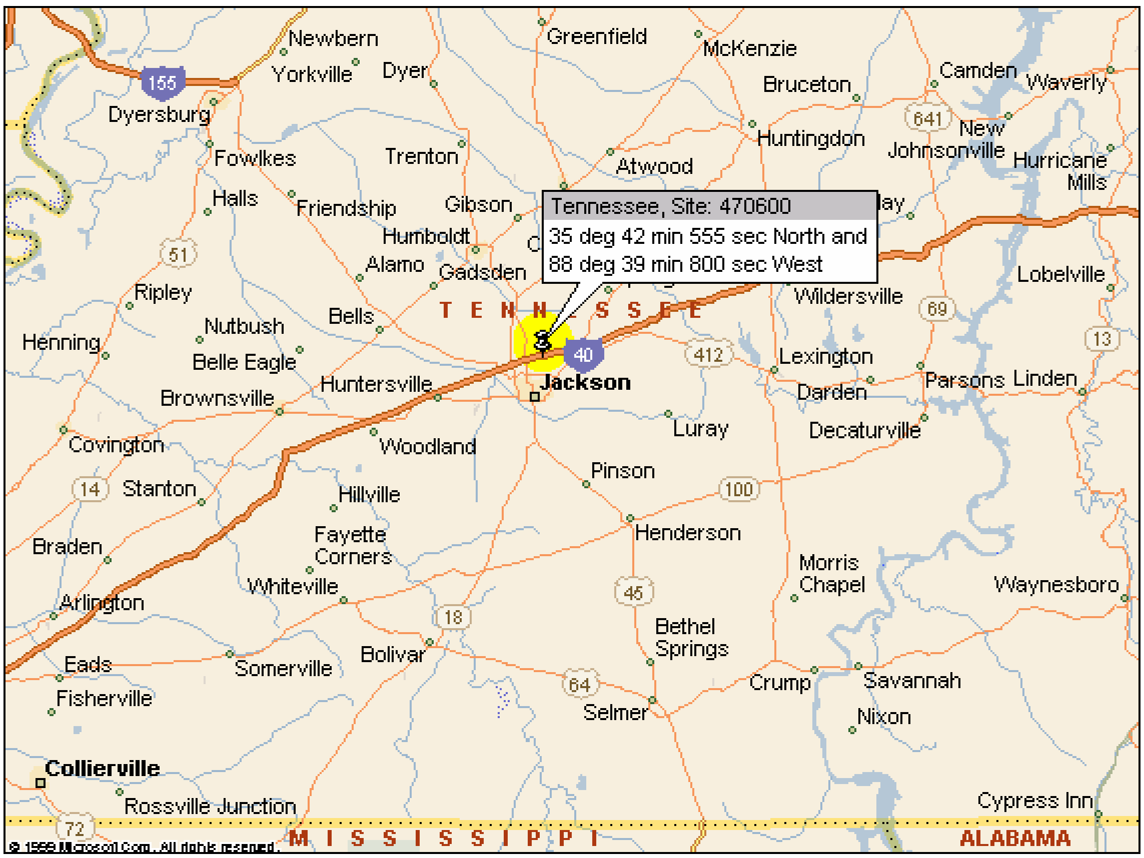


Figure 4-1 Section 470600 near Jackson, Tennessee

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *Lowe's Country Store, I-40 at Exit 87, Jackson, TN. Contact Carol Delane, Ph: 731-422-0901 (35^0 67. 897' North and 88^0 74. 7444' West)*

TRUCK ROUTE:

- *Westbound Turnaround – Route 70 (Exit 87) 4.96 miles from the site (35^0 40' 786" North and 88^0 44' 607").*
- *Eastbound Turnaround – Route 152/Law Road (Exit 93) 1.60 miles from the site (35^0 43' 105" North and 88^0 38' 099").*

6. Sheet 17 – Tennessee (470600)

1.* ROUTE ___I-40WB____ MILEPOST __91.67___LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade ___<_1____ % Sag vertical Y / N
Nearest SPS section upstream of the site _project out of study__
Distance from sensor to nearest upstream SPS Section ___ N/A__ ft

3.* LANE CONFIGURATION
Lanes in LTPP direction __2__ Lane width _1_ _2_ ft

Median - 1 – painted
2 – physical barrier
3 – grass
4 – none

Shoulder - 1 – curb and gutter
2 – paved AC
3 – paved PCC
4 – unpaved
5 – none

Shoulder width _1__ _1__ ft

4.* PAVEMENT TYPE _____Asphalt Concrete ___ ____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date: 6/13/2007 _Photo: 470600_2007_06_13_Upstream.JPG
Date: 6/13/2007__Photo:470600_2007_06_13_Downstream.JPG
Date: ______ Filename: ____

6. * SENSOR SEQUENCE____loop – quartz piezo – quartz piezo – loop __________

7. * REPLACEMENT AND/OR GRINDING __ __ __ / __ __ / __ __ __ __
REPLACEMENT AND/OR GRINDING __ __ __ / __ __ / __ __ __ __
REPLACEMENT AND/OR GRINDING __ __ __ / __ __ / __ __ __ __

8. RAMPS OR INTERSECTIONS
Intersection/driveway within 300 m upstream of sensor location Y / N
distance __________
Intersection/driveway within 300 m downstream of sensor location Y / N
distance __________
Is shoulder routinely used for turns or passing? Y / N

9. DRAINAGE (*Bending plate and load cell systems only)*
1 – Open to ground
2 – Pipe to culvert
3 – None

Clearance under plate ___ ___ . ___ in
Clearance/access to flush fines from under system Y / N

10. * CABINET LOCATION

Same side of road as LTPP lane Y / N Median Y/ N Behind barrier Y / N

Distance from edge of traveled lane _4_ _4_ ft

Distance from system __ _5_ 0__ ft

TYPE ________3R______________________________

CABINET ACCESS controlled by LTPP / STATE / JOINT ?

Contact - name and phone number: ______________________________

Alternate - name and phone number ______________________________

11. * POWER

Distance to cabinet from drop ___ _32 ___ ___ ft Overhead / underground / solar / AC in cabinet?

Service provider ___________________ Phone number ____________________

12. * TELEPHONE

Distance to cabinet from drop __ _32_ __ ft Overhead / under ground / cell?

Service provider _____________________ Phone Number _____________________

13.* SYSTEM (software & version no.)- _______iSINC_______________________

Computer connection – RS232 / Parallel port / USB / Other _______________

14. * TEST TRUCK TURNAROUND time __1_5___minutes DISTANCE _1_6_ mi.

15. PHOTOS	FILENAME
Power source	470600_2007_06_13_Power_Meter.JPG
Phone source	470600_2007_06_13_Telephone_Box.JPG
Cabinet exterior	470600_2007_06_13_Cabinet_Exterior.JPG
Cabinet interior	470600_2007_06_13_Cabinet_Interior_Front.JPG
	470600_2007_06_13_Cabinet_Interior_Back.JPG
Weight sensors	470600_2007_06_13_Leading_WIM_Sensor.JPG
	470600_2007_06_13_Trailing_WIM_Sensor.JPG
Classification sensors	_N/A_________________________________
Other sensors	_____________________________________

Description ___loops_________________________________

470600_2007_06_13_Leading_Loop.JPG

470600_2007_06_13_Trailing_Loop.JPG

Downstream direction at sensors on LTPP lane 470600_2007_06_13_Downstream.JPG

Upstream direction at sensors on LTPP lane 470600_2007_06_13_Upstream.JPG

COMMENTS GPS Coordinates for Site: *35⁰ 42' 555" North and 88⁰ 39' 800"*______________________________

______new site is 164 feet west of old site.

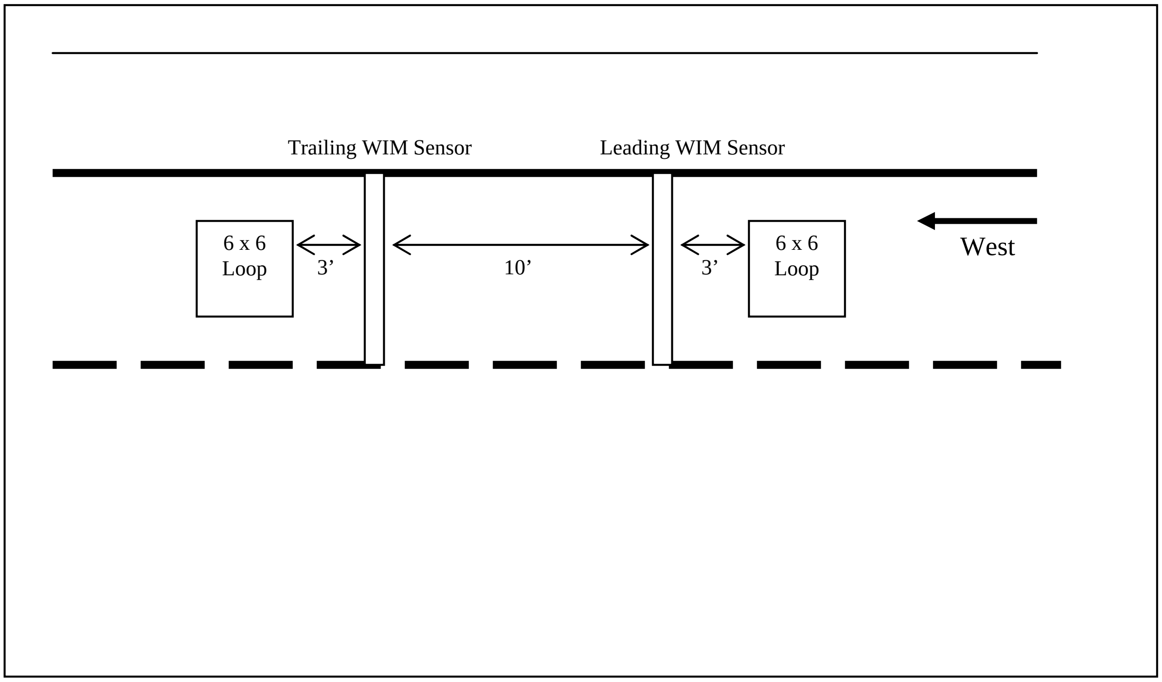
______Amenities: ________Various Hotels, Restaurants, Gas Stations etc. can be found 6 to 11 miles west of the site in Jackson, TN. Exits 80 A & B, 82 A & B and 85.

_Posted Speed limit – 70 mph ______________________________

COMPLETED BY _____Dean J. Wolf____________________________

PHONE _301-210-5105____ DATE COMPLETED _0_6_ /_1_2_ / _2_0_0_7_

Sketch of equipment layout



Site Map

Photo 6-1 470600_2007_06_13_Upstream.JPG

Photo 6-2 470600_2007_06_13_Upstream.JPG

Photo 6-3 470600_2007_06_13_Power_Meter.JPG

Photo 6-4 470600_2007_06_13_Telephone_Box.JPG

Photo 6-5 470600_2007_06_13_Cabinet_Exterior.JPG

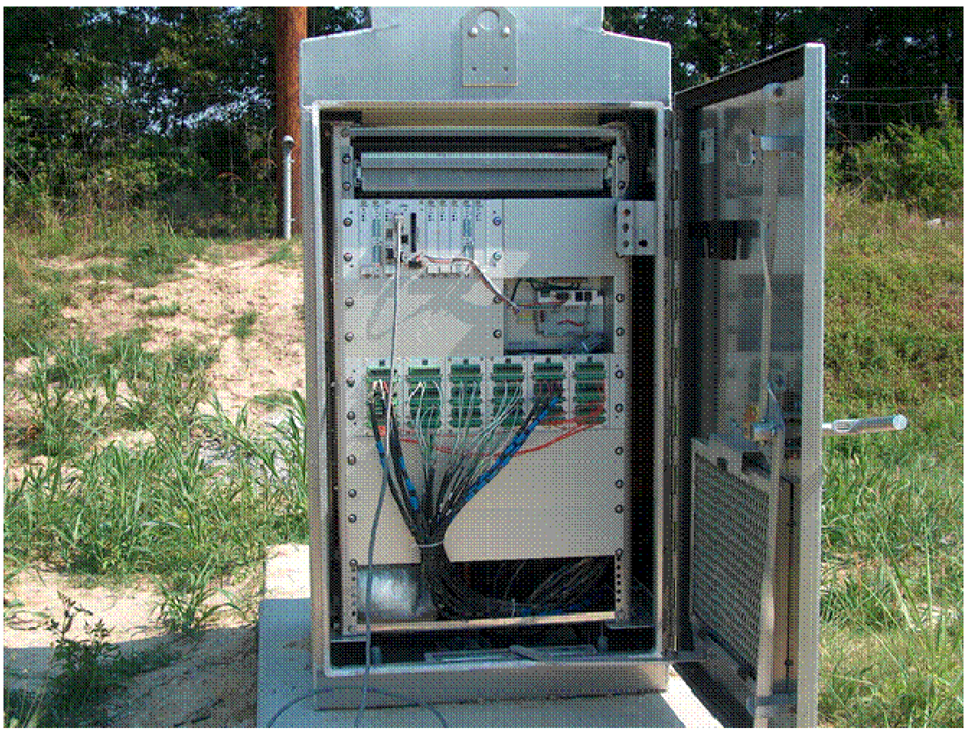


Photo 6-6 470600_06_13_Cabinet_Interior_Front.JPG

Photo 6-7 470600_2007_06_13_Cabinet_Interior_Back.JPG

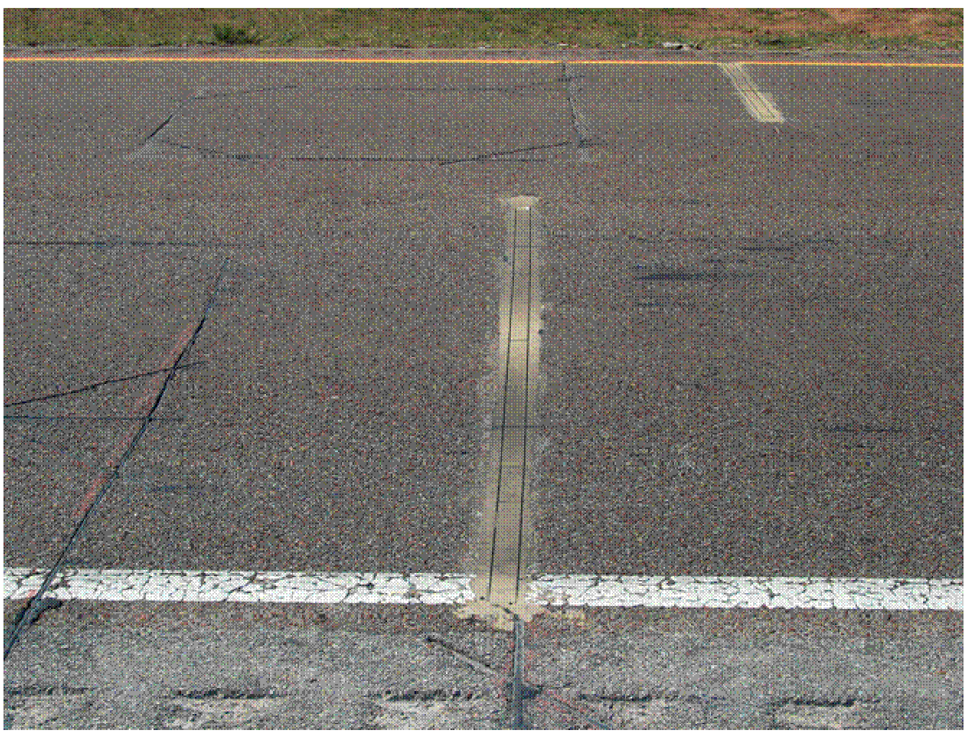


Photo 6-8 470600_2007_06_13_Leading_WIM_Sensor.JPG

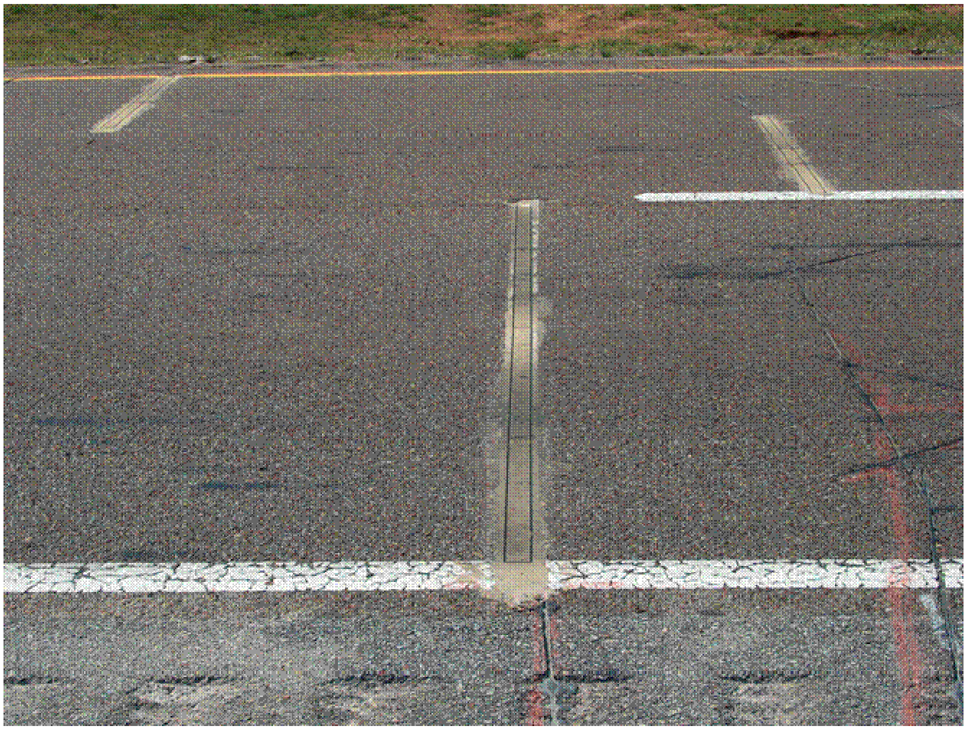


Photo 6-9 470600_2007_06_13_Trailing_WIM_Sensor.JPG

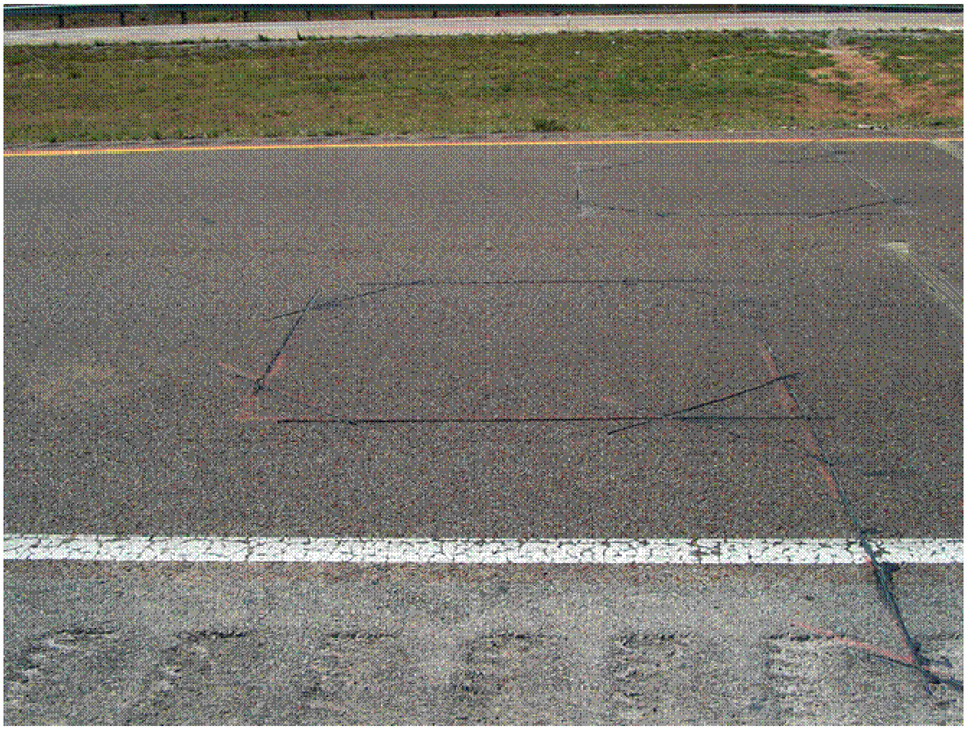


Photo 6-10 470600_2007_06_13_Leading_Loop.JPG

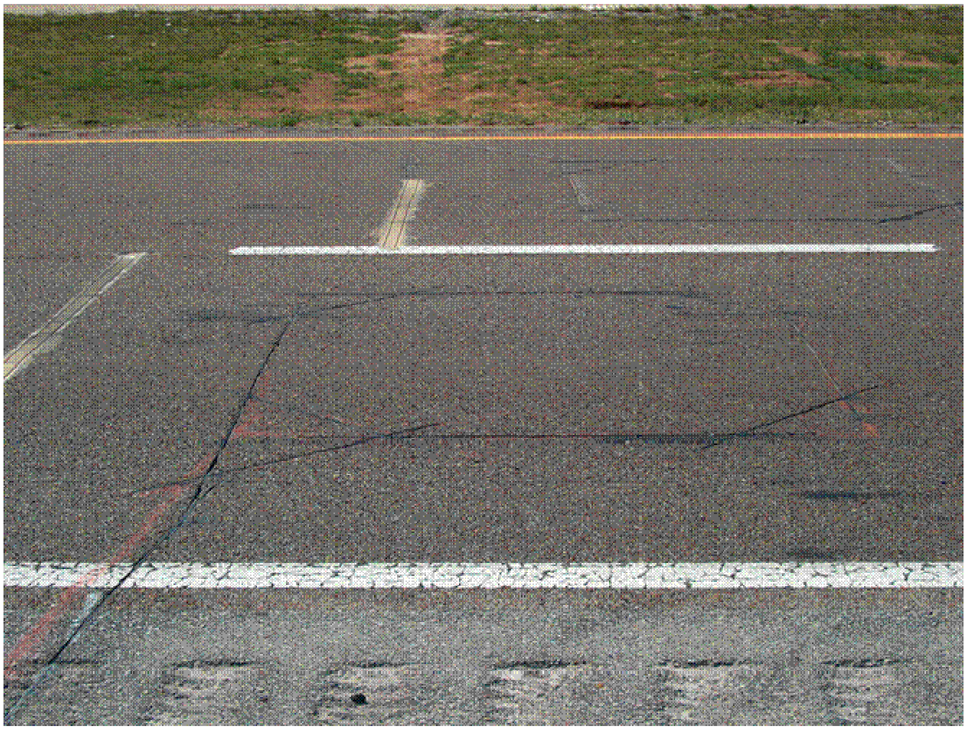


Photo 6-11 470600_2007_06_13_Trailing_Loop.JPG

SHEET 18	STATE CODE [47]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0600]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 6/13/2007

Rev. 05/15/07

1. DATA PROCESSING –
   a. Down load –
      - ☐ State only
      - ☐ LTPP read only
      - ☒ LTPP download
      - ☐ LTPP download and copy to state

   b. Data Review –
      - ☐ State per LTPP guidelines
      - ☐ State – ☐ Weekly ☐ Twice a Month ☐ Monthly ☐ Quarterly
      - ☒ LTPP

   c. Data submission –
      - ☐ State – ☐ Weekly ☐ Twice a month ☐ Monthly ☐ Quarterly
      - ☒ LTPP

2. EQUIPMENT –
   a. Purchase –
      - ☐ State
      - ☒ LTPP

   b. Installation –
      - ☐ Included with purchase
      - ☐ Separate contract by State
      - ☐ State personnel
      - ☒ LTPP contract

   c. Maintenance –
      - ☒ Contract with purchase – Expiration Date _5 years from installation_
      - ☐ Separate contract LTPP – Expiration Date _______
      - ☐ Separate contract State – Expiration Date _______
      - ☐ State personnel

   d. Calibration –
      - ☒ Vendor
      - ☐ State
      - ☐ LTPP

   e. Manuals and software control –
      - ☐ State
      - ☒ LTPP

   f. Power –
      i. Type –
         - ☐ Overhead
         - ☒ Underground
         - ☐ Solar

      ii. Payment –
         - ☒ State
         - ☐ LTPP
         - ☐ N/A

SHEET 18	STATE CODE [47]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0600]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 6/13/2007

Rev. 05/15/07

g. Communication –
   i. Type –
      ☒ Landline
      ☐ Cellular
      ☐ Other
   ii. Payment –
      ☒ State
      ☐ LTPP
      ☐ N/A

3. PAVEMENT –
   a. Type –
      ☐ Portland Concrete Cement
      ☒ Asphalt Concrete
   b. Allowable rehabilitation activities –
      ☐ Always new
      ☐ Replacement as needed
      ☐ Grinding and maintenance as needed
      ☐ Maintenance only
      ☐ No remediation
   c. Profiling Site Markings –
      ☐ Permanent
      ☐ Temporary

4. ON SITE ACTIVITIES –
   a. WIM Validation Check - advance notice required _2__ ☐ days ☒ weeks
   b. Notice for straightedge and grinding check - ________ ☐ days ☐ weeks
      i. On site lead –
         ☐ State
         ☐ LTPP
      ii. Accept grinding –
         ☐ State
         ☐ LTPP
   c. Authorization to calibrate site –
         ☐ State only
         ☐ LTPP
   d. Calibration Routine –
         ☒ LTPP – ☐ Semi-annually ☒ Annually
         ☐ State per LTPP protocol – ☐ Semi-annually ☐ Annually
         ☐ State other – _______________________

e. Test Vehicles
   i. Trucks –
      1st – Air suspension 3S2 ☐ State ☒ LTPP
      2nd – _3S2 different weight/suspension__ ☐ State ☒ LTPP
      3rd – ________________ ☐ State ☐ LTPP
      4th – ________________ ☐ State ☐ LTPP
   ii. Loads – ☐ State ☒ LTPP
   iii. Drivers – ☐ State ☒ LTPP

f. Contractor(s) with prior successful experience in WIM calibration in state:

   Fugro- BRE, IRD

g. Access to cabinet
   i. Personnel Access –
      ☐ State only
      ☒ Joint
      ☐ LTPP
   ii. Physical Access –
      ☒ Key
      ☐ Combination

h. State personnel required on site – ☐Yes ☒No

i. Traffic Control Required – ☐Yes ☒No

j. Enforcement Coordination Required – ☐Yes ☒No

5. SITE SPECIFIC CONDITIONS –
   a. Funds and accountability – ______
   b. Reports – _______
   c. Other – ________
   d. Special Conditions – ________

6. CONTACTS –
   a. Equipment (operational status, access, etc.) –

      Name: Roy Czinku Phone:(306) 653-6627

      Agency: IRD

b. Maintenance (equipment) –

Name: Roy Czinku Phone:(306) 653-6627

Agency: IRD

c. Data Processing and Pre-Visit Data –

Name: Roy Czinku Phone:(306) 653-6627

Agency: IRD

d. Construction schedule and verification –

Name: Jim Maxwell Phone:615-350-4167

Agency: TN DOT

e. Test Vehicles (trucks, loads, drivers) –

Name: _____ Phone:_____

Agency: _____

f. Traffic Control –

Name: _____ Phone:_____

Agency: _____

g. Enforcement Coordination –

Name: _____ Phone:_____

Agency: _____

h. Nearest Static Scale

Name: Lowe's Country Store, Carol Delane Location:I-40 at Exit 87, Jackson, TN.

Phone: 731-422-0901

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [47] *SHRP SECTION ID [0600]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [6/12/2007]

2. * TYPE OF EQUIPMENT CALIBRATED ____ WIM ____ CLASSIFIER _X_ BOTH

3. * REASON FOR CALIBRATION
____ REGULARLY SCHEDULED SITE VISIT ____ RESEARCH
____ EQUIPMENT REPLACEMENT ____ TRAINING
____ DATA TRIGGERED SYSTEM REVISION ____ NEW EQUIPMENT INSTALLATION
_X__ OTHER (SPECIFY) ___LTPP Validation______________________________

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
____ BARE ROUND PIEZO CERAMIC ____ BARE FLAT PIEZO _X__ BENDING PLATES
____ CHANNELIZED ROUND PIEZO ____ LOAD CELLS ____ QUARTZ PIEZO
____ CHANNELIZED FLAT PIEZO _X__ INDUCTANCE LOOPS ____ CAPACITANCE PADS
____ OTHER (SPECIFY) _______________

5. EQUIPMENT MANUFACTURER ___IRD/ PAT Traffic___________________________

WIM SYSTEM CALIBRATION SPECIFICS**

6.**CALIBRATION TECHNIQUE USED:
____ TRAFFIC STREAM -- ____STATIC SCALE (Y/N) _X__ TEST TRUCKS

___ NUMBER OF TRUCKS COMPARED __ 2__ NUMBER OF TEST TRUCKS USED

__ 20__ PASSES PER TRUCK

TYPE PER FHWA 13 BIN SYSTEM
SUSPENSION: 1 - AIR; 2 - LEAF SPRING
3 - OTHER (DESCRIBE)

TRUCK	TYPE	SUSPENSION
1	9	1
2	9	1
3		

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
MEAN DIFFERENCE BETWEEN ---
DYNAMIC AND STATIC GVW ___1.4 STANDARD DEVIATION ___1.4
DYNAMIC AND STATIC SINGLE AXLES ___2.2 STANDARD DEVIATION ___3.0
DYNAMIC AND STATIC DOUBLE AXLES ___1.0 STANDARD DEVIATION ___2.9

8. 3 ____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) ______ _60_ __65__ __70_ ______ __ __ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___2764 and 2934___

11.** IS AUTO-CALIBRATION USED AT THIS SITE? (Y/N) _N_
IF YES, LIST AND DEFINE AUTO-CALIBRATION VALUE: ___________

CLASSIFIER TEST SPECIFICS***

12.*** METHOD FOR COLLECTING INDEPENDENT VOLUME MEASUREMENT BY VEHICLE CLASS:
____ VIDEO _X_ MANUAL ____ PARALLEL CLASSIFIERS

13. METHOD TO DETERMINE LENGTH OF COUNT ____ TIME _X_ NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
*** FHWA CLASS 9 ____ 0.0 FHWA CLASS ___ ____ ____ _____
*** FHWA CLASS 8 ____ 0.0 FHWA CLASS ___ ____ ____ _____
FHWA CLASS ___ ____ ____ _____
FHWA CLASS ___ ____ ____ _____
*** PERCENT "UNCLASSIFIED" VEHICLES: ____ 0.0

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, MACTEC____________________
CONTACT INFORMATION: ______301-210-5105_________________________ rev. November 9, 1999

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [47] *SHRP SECTION ID [0600]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [6/13/2007]

2. * TYPE OF EQUIPMENT CALIBRATED ____ WIM ____ CLASSIFIER _X_ BOTH

3. * REASON FOR CALIBRATION
____ REGULARLY SCHEDULED SITE VISIT ____ RESEARCH
____ EQUIPMENT REPLACEMENT ____ TRAINING
____ DATA TRIGGERED SYSTEM REVISION ____ NEW EQUIPMENT INSTALLATION
_X__ OTHER (SPECIFY) ___LTPP Validation___

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
____ BARE ROUND PIEZO CERAMIC ____ BARE FLAT PIEZO _X__ BENDING PLATES
____ CHANNELIZED ROUND PIEZO ____ LOAD CELLS ____ QUARTZ PIEZO
____ CHANNELIZED FLAT PIEZO _X__ INDUCTANCE LOOPS ____ CAPACITANCE PADS
____ OTHER (SPECIFY) ______________

5. EQUIPMENT MANUFACTURER ___IRD/ PAT Traffic___

WIM SYSTEM CALIBRATION SPECIFICS**

6.**CALIBRATION TECHNIQUE USED:
____ TRAFFIC STREAM -- ____STATIC SCALE (Y/N) _X__ TEST TRUCKS

___ NUMBER OF TRUCKS COMPARED __ 2__ NUMBER OF TEST TRUCKS USED

__ 20__ PASSES PER TRUCK

	TRUCK	TYPE	SUSPENSION
TYPE PER FHWA 13 BIN SYSTEM	1	9	1
SUSPENSION: 1 - AIR; 2 - LEAF SPRING	2	9	1
3 - OTHER (DESCRIBE)	3	____	____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
MEAN DIFFERENCE BETWEEN ---
DYNAMIC AND STATIC GVW ___1.1 STANDARD DEVIATION ___2.1
DYNAMIC AND STATIC SINGLE AXLES ___0.5 STANDARD DEVIATION ___4.4
DYNAMIC AND STATIC DOUBLE AXLES ___1.4 STANDARD DEVIATION ___3.7

8. 3 ____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) ______ _60_ __65__ __70_ ______ __ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___2764 and 2934___

11.** IS AUTO-CALIBRATION USED AT THIS SITE? (Y/N) _N_
IF YES, LIST AND DEFINE AUTO-CALIBRATION VALUE: ___________

CLASSIFIER TEST SPECIFICS***

12.*** METHOD FOR COLLECTING INDEPENDENT VOLUME MEASUREMENT BY VEHICLE CLASS:
____ VIDEO _X_ MANUAL ____ PARALLEL CLASSIFIERS

13. METHOD TO DETERMINE LENGTH OF COUNT ____ TIME _X_ NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
*** FHWA CLASS 9 ____ 0.0 FHWA CLASS ____ ____ ____ _____
*** FHWA CLASS 8 ____ 0.0 FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
*** PERCENT "UNCLASSIFIED" VEHICLES: ____ 0.0

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, MACTEC___
CONTACT INFORMATION: ______301-210-5105______ rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE	47
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 1	* DATE	6-12-07

Rev. 08/31/01

PART I.

TRUCK # 05
TRAILER # 05
HEATH - 731-501-0213

1.* FHWA Class 9　　　2.* Number of Axles 5

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight	5.* Post-Test Average Loaded Axle Weight	6.* Measured D)irectly or C)alculated?
A		Table 5-day 1	Table 7 day 1	D / C
B		Table 5.2 day 2	Table 7.2 day 2	D / C
C				D / C
D				D / C
E				D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW ______________

day 1

*b) Average Pre-Test Loaded weight 75100
*c) Post Test Loaded Weight 74620
*d) Difference Post Test – Pre-test 480

GEOMETRY

8 a) * Tractor Cab Style - Cab Over Engine / Conventional　　　b) * Sleeper Cab? Y / N

9. a) * Make: INTERNATIONAL　　b) * Model: 94

10.* Trailer Load Distribution Description:

BULLDOZER LOADED ON LOW BOY TRAILER

11. a) Tractor Tare Weight (units): ______________

b). Trailer Tare Weight (units): ______________

Sheet 19	* STATE_CODE	47
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 1	* DATE	6-12-07

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12.* Axle Spacing – units m / feet and inches / feet and tenths TR

A to B 15.5 B to C 4.4 C to D 21.6

D to E 4.1 E to F ______

Wheelbased (measured A to last) ______ Computed ______

13. *Kingpin Offset From Axle B (units) ______ (+2.2) __
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R22.5	3 LEAF STEEL
B	80R22.5	AIR
C	80R 22.5	AIR
D	8.25 R15	AIR
E	8.25 R15	AIR
F		

16. Cold Tire Pressures (psi) – from right to left

Steering Axle	Axle B	Axle C	Axle D	Axle E

PART II

Table 1. Axle and GVW computations - pre-test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II -I		III -II		IV -III		V -IV		V	
V -VI		VI- VII		VII- VIII		VIII- IX		IX`		X	
										XI	
Avg.											

Table 2. Raw Axle and GVW measurements

Axles	Meas.	Pre-test Weight			Post-test Weight
A	I				
A + B	II				
A + B + C	III				
A + B + C + D	IV				
A + B + C + D + E (1)	V				
B + C + D + E	VI				
C + D + E	VII				
D + E	VIII				
E	IX				
A + B + C + D + E (2)	X				
A + B + C + D + E (3)	XI				

Table 3. Axle and GVW computations - post -test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II -I		III -II		IV -III		V -IV		V	
V -VI		VI- VII		VII- VIII		VIII- IX		IX`		X	
										XI	
Avg.											

Sheet 19	* STATE_CODE	47
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 1	* DATE	6-12-07

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Table 4 . Axle and GVW computations - day 1

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II -I		III -II		IV -III		V -IV		V	
V -VI		VI-VII		VII-VIII		VIII-IX		IX`		X	
										XI	
Avg.											

75100
74620
- 480

Table 5. Raw data – Axle scales – pre-test day 1

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9960	14170	14170	18410	18410		75120
2	10140	14060	14060	18420	18420		75100
3	10120	14070	14070	18410	18410		75080
Average	10073	14100	14100	18413	18413		75100

Table 6. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1							
2							
3							
Average							

Table 7. Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9860	13980	13980	18400	18400		74620
2							
3							
Average	9860	13980	13980	18400	18400		74620

Measured By DJW Verified By BWO

6420060018_SPSWIM_TO_16_47_2.82_0600_Truck_1_Sheet_19.doc

Sheet 19	* STATE_CODE 47
LTPP Traffic Data	* SPS PROJECT ID 0600
*CALIBRATION TEST TRUCK # 1	* DATE 06-13-07

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Day 2

7.2 *b) Average Pre-Test Loaded weight 75110

*c) Post Test Loaded Weight 74640

*d) Difference Post Test – Pre-test - 470

Table 5.2. Raw data – Axle scales – pre-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	~~10560~~ 10280	13980	13980	18430	18430		75100
2	10260	13960	13960	18460	18460		75100
3	10320	13960	13960	18440	18440		75120
Average	10290	13970	13970	18440	18440		75110
	87	67	67	3	3		107

Table 6.2. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1							
2							
3							
Average							

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10440	13650	13650	18450	18450		74640
2							
3							
Average	10440	13650	13650	18450	18450		74640

Measured By DJW Verified By JXO Weight date 6/13/07

Sheet 19	* STATE_CODE	47
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 2	* DATE	6-12-07

Rev. 08/31/01

PART I.

1.* FHWA Class 9 2.* Number of Axles 5

TRUCK # 02
TRAILER # 107
JAMES - 731 - 217 - 4212

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight	5.* Post-Test Average Loaded Axle Weight	6.* Measured D)irectly or C)alculated?
A		See day 1	See day 1	D / C
B		Tables	Table 7	D / C
C		See day 2	See day 2	D / C
D		tables.2	table 7.2	D / C
E				D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW ______________

Day 1

*b) Average Pre-Test Loaded weight 67980
*c) Post Test Loaded Weight 67520
*d) Difference Post Test – Pre-test 460

GEOMETRY

8 a) * Tractor Cab Style - Cab Over Engine / Conventional b) * Sleeper Cab? Y / N

9. a) * Make: KENWORTH b) * Model: '92 160

10.* Trailer Load Distribution Description:

STEEL PLATES LOADED CENTERLINE & MID TRAILER

11. a) Tractor Tare Weight (units): ______________

b). Trailer Tare Weight (units): ______________

Sheet 19	* STATE_CODE 47
LTPP Traffic Data	* SPS PROJECT ID 0600
*CALIBRATION TEST TRUCK # 2	* DATE 6-12-07

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12.* Axle Spacing – units m / feet and inches / feet and tenths

A to B 16.1 B to C 4.4 C to D 26.7

D to E 10.3 E to F ~~57.5~~

Wheelbased (measured A to last) ______ Computed 57.5

13. *Kingpin Offset From Axle B (units) ______(+1.7)__
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	75R24.5	2 LEAF STEEL
B	75R22.5	AIR
C	75R22.5	AIR
D	11R24.5	AIR
E	11R24.5	AIR
F		

16. Cold Tire Pressures (psi) – from right to left

Steering Axle	Axle B	Axle C	Axle D	Axle E

Sheet 19	* STATE_CODE	47
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 2	* DATE	6-12-07

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PART II

Table 1. Axle and GVW computations - pre-test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II -I		III -II		IV -III		V -IV		V	
V -VI		VI- VII		VII- VIII		VIII- IX		IX`		X	
										XI	
Avg.											

Table 2. Raw Axle and GVW measurements

Axles	Meas.	Pre-test Weight			Post-test Weight
A	I				
A + B	II				
A + B + C	III				
A + B + C + D	IV				
A + B + C + D + E (1)	V				
B + C + D + E	VI				
C + D + E	VII				
D + E	VIII				
E	IX				
A + B + C + D + E (2)	X				
A + B + C + D + E (3)	XI				

Table 3. Axle and GVW computations - post -test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II -I		III -II		IV -III		V -IV		V	
V -VI		VI- VII		VII- VIII		VIII- IX		IX`		X	
										XI	
Avg.											

Sheet 19	* STATE_CODE	47
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 2	* DATE	6-12-07

Rev. 08/31/01

day 1

Table 4 . Axle and GVW computations -

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II -I		III -II		IV -III		V -IV		V	
V -VI		VI-VII		VII-VIII		VIII-IX		IX`		X	
										XI	
Avg.											

67980
67520
- 460

Table 5. Raw data – Axle scales – pre-test - day 1

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10920	13890	13890	14640	14640		67980
2	10900	13940	13940	14600	14600		67980
3	10880	13960	13960	14590	14590		67980
Average	10900	13930	13930	~~14100~~ 14610	~~14180~~ 14610		67980

Table 6. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1							
2							
3							
Average							

Table 7. Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10620	13850	13850	14600	14600		67520 ✓
2							
3							
Average	10620	13850	13850	14600	14600		67520 ✓

Measured By DJW Verified By DWO

Sheet 19	* STATE_CODE 47
LTPP Traffic Data	* SPS PROJECT ID 0600
*CALIBRATION TEST TRUCK # 2	* DATE 06-13-07

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 67500
*c) Post Test Loaded Weight 67060
*d) Difference Post Test – Pre-test - 440

Table 5.2. Raw data – Axle scales – pre-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10560	13900	13900	14570	14570		67500
2	10540	13910	13910	14560	14560		67480
3	10580	13890	13890	14580	14580		67520
Average	10560	13900	13900	14570	14570		67500

Table 6.2. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1							
2							
3							
Average							

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10320	13750	13750	14620	14620		67060
2							
3							
Average	10320	13750	13750	14620	14620		67060

Measured By DJW Verified By [signature] Weight date 6/13/07

Sheet 20	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
Speed and Classification Checks * 1 of* 2	* DATE 06/12/2007

Rev. 08/31/2001….

	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
	68	9	4579	70	9	64	9	5738	65	9
	72	9	4607	70	9	69	9	5762	69	9
	70	9	4616	70	9	64	5	5774	64	5
	68	9	4624	69	9	69	6	5792	71	6
	57	11	4643	58	11	69	9	5808	69	9
	65	9	5089	65	9	70	11	5814	70	11
	60	9	5102	61	9	67	9	5823	68	9
	70	9	5106	69	9	73	7	5828	73 ~~64~~	7
	65	9	5152	64	59	66	9	5850	67	9
	62	9	5159	62	9	64	9	5881	64 ~~68~~	9
	66	9	5171	65	9	69	9	5890	70	9
	69	9	5190	69	9	74	9	5895	74	9
	62	9	5201	61	9	61	9	5904	62	9
	63	9	5208	63	9	64	9	5927	65 ~~67~~	9
*	67	4	5273	68	5	70	11	5948	70	11
23.2	64	9	5309	64	9	71	9	5976	71	9
	64	7	5613	64	7	61	11	5985	62	11
	68	9	5620	69	9	74	9	5993	74	9
	69	9	5632	69	9	68	9	6004	70	9
	69	9	5640	69	9	62	11	6014	63	11
	68	9	5645	68	9	69	9	6029	70	9
	71	9	5661	71	9	70	9	6247	70	9
	65	9	5668	65	9	69	9	6258	70	9
	64	9	5680	65	9	66	9	6267	69	9
*	66	3	5688	66	5	67	9	6276	68	9

7.4 GVW

Recorded by MT Direction W Lane 4 Time from 11:30 to 12:17

Sheet 20	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
Speed and Classification Checks * 2 of* 2	* DATE 06/12/2007

Rev. 08/31/2001….

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
71	9	6287	72	9	68	9	7006	68	9
70	9	6321	70	9	62	9	7017	64	9
68	9	6330	69	9	68	8	7027	70	8
69	9	6341	69	9	70	9	7032	69	9
64	9	6357	66	9	63	7	7043	65	7
72	9	6366	72	9	65	9	7055	65	9
67	9	6374	68	9	72	9	7064	72	9
68	9	6378	69	9	63	9	7097	63	9
69	9	6396	69	9	74	9	7119	73	9
77	7	6407	76	7	66	9	7147	68	9
70	8	6428	70	~~9~~ 8	70	9	7155	69	9
67	9	6446	67	9	73	12	7173	73	12
72	9	6453	72	9	71	7	7183	71	7
65	10	6543	66 ~~10~~	10	64	9	7205	64	9
67	9	6562	67	9	70	9	7214	70	9
72	9	6571	72	9	71	9	7220	71	9
67	9	6579	66	9	72	9	7228	72	9
67	12	6584	68	12	68	9	7431	70	9
61	5	6606	61	4	62	9	7439	64	9
69	9	6626	72	9	71	8	7445	71	8
64	11	6877	65 ~~67~~	11	68	9	7454	~~70~~ 69	9
64	9	6983	64	9	69	9	7466	69	9
66	9	6991	67	9	73	7	7468	~~0~~ 75	7
69	8	6996	69	8	65	9	7494	64	9
61	9	7001	60	9	71	9	7514	69	9

21.2
~~1.2~~

Recorded by MT Direction W Lane 4 Time from 12:17 to 12:50

Sheet 20	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
Speed and Classification Checks * 1 of* 2	* DATE 06/13/2007

Rev. 08/31/2001….

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
67	9	47170	67	9	72	8	48820	70	8
65	9	47184	65	9	67	9	48829	67	9
63	9	47197	64	9	73	9	48866	72	9
65	9	47295	65	9	75	9	48875	75	9
65	9	47310	65	9	66	9	48888	66	9
65	9	47329	65	9	67	9	48902	67	9
66	9	47345	66	9	66	9	48912	67	9
62	9	47359	63	9	66	11	48950	67	11
67	9	47366	68	9	60	13	48954	61	13
67	9	47393	67	9	67	9	49005	68	9
68	9	47398	67	9	68	9	49018	67	9
66	9	47406	67	9	62	8	49032	62	8
62	9	47418	62	9	68	12	49043	70	12
65	9	47446	65	9	70	9	49049	69	9
64	9	47468	64	9	64	9	49059	64	9
67	9	47476	67	9	72	9	49071	72	9
74	9	47491	74	9	67	11	49082	66	11
65	9	47502	65	9	70	9	49094	70	9
70	9	47517	70	9	65	9	49104	65	9
66	10	47523	66	10	70	9	49122	70	9
61	9	47553	61	9	68	9	49139	68	9
64	9	47562	65	9	63	9	49154	63	9
68	9	47590	68	9	72	9	49166	73	9
61	9	47606	62	9	66	9	49179	66	9
72	9	47615	72	9	70	9	49198	70	9

Recorded by DJW Direction W Lane 4 Time from 1:03 to 1:52

Sheet 20	* STATE_CODE 42
LTPP Traffic Data	*SPS PROJECT_ID 0600
Speed and Classification Checks * 2 of* 2	* DATE 06/13/2007

Rev. 08/31/2001….

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
69	9	49659	69	9	64	9	50229	64	9
65	9	49683	65	9	70	9	50270	71	9
72	9	49694	72	9	64	9	50273	64	9
68	9	49712	67	9	70	9	50295	70	9
64	9	49721	64	9	73	9	50296	73	9
70	9	49735	70	9	72	9	50321	72	9
70	9	49749	71	9	65	9	50344	64	9
72	9	49760	72	9	70	9	50367	70	9
69	6	49774	70	6	70	9	50378	70	9
69	9	49784	69	9	72	9	50387	72	9
68	9	49787	68	9	73	9	50398	70	9
68	9	49809	67	9	66	12	50406	66	12
71	9	49819	70	9	61	9	50421	62	9
68	9	49864	69	9	67	9	50426	67	9
70	9	49870	70	9	69	9	50428	68	9
65	9	50089	66	9	62	9	50451	64	9
66	9	50114	66	9	60	9	50459	61	9
68	9	50116	68	9	63	9	50461	62	9
71	9	50147	71	9	68	9	50717	70	9
69	9	50164	69	9	65	9	50724	65	9
64	7	50174	64	7	70	9	50734	71	9
65	9	50175	65	9	68	9	50743	68	9
64	7	50176	64	7	65	9	50754	64	9
67	9	50199	68	9	71	9	50767	71	9
65	9	50219	65	9	68	12	50773	68	12

Recorded by DJW Direction W Lane 4 Time from 1:53 to 2:30

1-75.1 / 21.6 2-68.0 / 26.7

Sheet 21	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
WIM System Test Truck Records 1 of	* DATE 06/12/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
97.5	58	2	1	10:50	2813	58	5.4/5.4	6.9/7.1	7.3/7.0	7.5/7.5	7.5/7.8		69.5	16.0	4.4	26.8	10.1	
97.5	63 ~~1~~	1 ~~63~~	1	10:51	2837	62	5.0/5.4	7.0/7.4	7.2/7.6	8.4/9.7	8.5/8.9		75.1	15.4	4.3	21.8	4.1	
95.0	62	2	2	11:06	3465	62	5.8/5.1	6.9/6.7	7.6/6.4	7.7/7.2	7.5/7.6		68.6	16.0	4.3	26.7	10.1	
95.0	67	1	2	11:06	3468	68	5.0/5.2	6.9/7.6	7.1/7.6	8.8/9.0	8.8/9.7		75.7	15.3	4.3	21.7	4.1	
96.0	68	2	3	11:22	4093	67	5.4/5.1	7.0/6.9	6.0/6.9	7.6/6.8	7.8/7.3		66.9	16.0	4.3	26.9	10.1	
96.0	71	1	3	11:22	~~40~~ 4102	71	4.8/5.3	7.0/7.3	6.9/7.3	8.6/9.4	8.6/10.1		75.4	15.4	4.3	21.8	4.1	
98.5	61	2	4	11:37	4739	58	5.7/5.5	7.4/7.3	6.7/6.8	7.6/7.4	7.7/7.6		69.5	16.0	4.4	26.9	10.1	
	~~62~~	~~1~~	~~4~~	~~11:37~~	~~4742~~	~~64~~	~~6.2/6.0~~	~~8.6/8.6~~	~~8.8/7.4~~	~~8.6/9.0~~	~~8.8/8.7~~		~~80.8~~	~~16.1~~				
98.5	62	2	4	11:37	4744	62	4.9/5.2	7.3/7.4	6.9/7.4	8.9/9.3	8.1/10.2		75.6	15.4	4.3	21.8	4.1	
99.5	63	2	5	11:54	5325	62	5.5/5.2	6.5/6.5	6.2/7.5	8.0/7.1	7.9/7.4		67.7	15.9	4.4	26.8	10.1	
99.5	67	1	5	11:54	5327	67	5.1/5.5	7.4/7.0	7.0/7.4	8.6/9.5	8.6/9.8		75.9	15.4	4.3	21.7	4.1	
~~105.5~~	~~70~~	~~1~~	~~6~~	~~12:12~~	~~6063~~	~~70~~	~~5.0/5.2~~	~~6.7/7.6~~	~~6.1/7.1~~	~~6.9/9.4~~	~~6.6/9.7~~		~~70.3~~	~~15.4~~	~~4.3~~	~~21.8~~	~~4.1~~	
110.5	58	2	6 ~~7~~	12:28	6632	57	5.5/5.1	6.9/7.0	7.5/6.4	7.8/6.7	8.0/7.2		68.3	16.0	4.3	26.9	10.1	
110.5	63	1	6	12:28	6639	62	4.9/5.5	7.6/7.1	7.3/7.2	8.6/9.3	8.9/9.8		76.2	15.4	4.3	21.7	4.0	
106.5	64	2	7	12:43	7240	64	5.2/5.8	7.1/7.2	7.5/6.6	7.6/7.7	7.5/7.6		69.9	16.0	4.3	26.9	10.1	
106.5	67	1	7	12:43	7248	67	4.9/5.4	7.3/7.0	7.5/7.6	8.8/9.7	9.5/9.4		76.0	15.4	4.3	21.8	4.1	

Recorded by mT

Checked by [signature]

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Sheet 21	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
WIM System Test Truck Records 2 of 3	* DATE 06/12/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
108.0	64	2	8	12:58	7764	65	5.6/5.1	6.9/6.4	6.9/7.4	7.6/7.3	7.8/7.8		68.7	16.0	4.3	26.8	10.1	
108.0	70	1	8	12:58	7772	70	4.9/5.0	6.6/6.4	6.9/7.3	8.5/9.1	8.5/9.7		73.0	15.5	4.3	21.7	3.6	
111.5	58	2	9	13:14	8396	59	5.3/5.4	7.1/6.9	6.7/7.3	8.2/7.3	7.6/7.7		69.5	15.9	4.4	26.9	10.1	
111.5	64	1	9	13:14	8398	64	5.1/5.2	7.0/7.3	6.7/7.2	7.5/9.5	8.1/10.1		73.0	15.5	4.3	21.8	4.1	
~~112.0~~	~~68~~	~~1~~	~~11~~	~~13:30~~	~~8964~~	~~68~~	~~6.0/5.7~~	~~7.5/8.2~~	~~8.8/7.5~~	~~9.7/8.4~~	~~9.0/9.2~~		~~79.7~~					
112.0	68	1	10	13:30	8966	68	4.8/5.2	6.9/7.7	7.0/7.5	8.5/9.5	8.6/9.9		75.8	15.4	4.3	21.8	4.0	
111.0	70	2	10	13:49	9706	69	5.1/5.4	6.9/7.1	6.8/6.6	7.5/7.3	7.8/7.9		68.3	15.9	4.4	26.8	10.1	
111.0	71	1	11	13:54	9912	72	5.0/5.3	7.0/7.7	7.1/7.3	8.3/9.1	8.7/9.3		74.7	15.5	4.3	21.8	4.0	
119.0	59	2	11	14:05	10301	59	5.3/5.3	7.1/6.8	6.3/7.3	7.8/7.2	7.7/7.6		68.5	15.9	4.3	26.8	10.1	
119.0	62	1	12	14:09	10508	62	5.0/4.9	7.4/7.0	7.6/7.4	8.5/9.9	8.9/9.1		75.7	15.4	4.3	21.7	4.1	
119.5	65	2	12	14:20	10915	65	5.4/5.1	7.0/7.0	7.3/7.4	7.7/7.2	7.5/7.8		69.5	16.0	4.4	26.8	10.1	
119.5	66	1	13	14:23	11046	67	4.9/5.2	6.7/7.5	7.0/7.3	8.7/9.4	9.3/10.0		76.0	15.4	4.3	21.7	4.1	
120.0	69	2	13	14:37	11653	69	5.2/5.3	7.1/6.9	6.7/7.6	7.9/7.7	7.7/7.8		69.9	16.0	4.4	27.0	10.1	
120.0	70	1	14	14:40	11739	71	4.7/5.1	6.8/7.2	6.9/7.0	8.7/9.5	8.6/10.2		74.7	15.4	4.3	21.7	4.1	
111.0	60	2	14	14:58	12522	60	5.3/5.3	7.0/7.0	6.5/7.5	7.4/7.3	7.5/7.8		68.8	15.9	4.4	26.8	10.1	
111.0	62	1	15	14:58	12529	62	4.7/5.2	7.0/7.2	7.3/7.5	8.7/9.5	8.3/9.8		75.1	15.4	4.3	21.8	4.1	

Recorded by MT

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Sheet 21	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
WIM System Test Truck Records 3 of 3	* DATE 06/12/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
112.0	65	2	15	15:13	13164	65	5.4/5.1	7.6/ ~~7.0/16.7~~ 6.8	7.0/6.7	8.0/7.4	8.1/7.9		70.0	15.9	4.4	26.8	10.1	
112.0	66	1	16	15:14	13171	67	~~7.6/~~ 4.8 ~~5.3/6.8~~	6.9/7.5	7.5/7.5	8.9/10.0	8.7/9.1		76.2	15.4	4.3	21.8	4.1	
110.0	69	2	16	15:30	13854	68	5.4/5.0	7.2/7.5	7.3/7.0	7.8/7.4	7.8/7.9		70.4	16.0	4.3	26.8	10.1	
110.0	71	1	17	15:30	13860	71	4.9/5.0	7.1/7.8	7.3/7.5	8.3/9.9	7.4/10.4		75.6	15.4	4.4	21.8	4.1	
110.0	59	2	17	15:47	14580	59	5.2/5.4	7.1/7.3	6.9/6.9	7.6/7.3	7.5/7.8		68.9	16.0	4.3	26.9	10.1	
110.0	62	1	18	15:47	14625	62	5.0/5.5	6.9/7.6	7.0/7.8	8.4/9.7	8.6/10.0		76.5	15.5	4.3	21.8	4.1	
* 110.0	64	2	~~18~~	16:03	15286	64	4.7/5.3	5.6/6.2	5.9/5.9	5.9/5.4	6.1/5.6		56.6	16.0	4.3	26.8	10.1	
* 110.0	65	1	~~19~~	16:03	15291	66	5.1/4.9	4.0/6.7	6.8/6.9	6.8/8.8	7.0/9.2		68.1	15.4	4.3	21.7	4.1	
109.5	68	2	18	16:20	16035	68	5.4/5.0	7.4/6.8	6.7/6.6	7.8/7.1	7.9/7.5		68.4	15.9	4.3	26.8	10.1	
109.5	70	1	19	16:20	16046	70	~~7.4/6~~	5.2/4.7	7.3/7.9	7.4/7.3	8.9/9.0	8.8/9.2	75.7	15.4	4.3	21.7	4.1	
109	59	2	19	16:38	16829	60	5.4/5.1	6.8/7.3	7.4/6.7	7.8/7.2	7.5/7.7		68.7	16.0	4.3	26.8	10.1	
109	70	1	20	16:38	16834	70	4.7/5.3	7.6/7.8	7.4/7.7	8.5/9.8	8.7/9.9		77.3	15.4	4.3	21.9	4.1	
106.5	62	2	20	16:55	17557	62	5.3/5.3	6.9/7.0	7.0/7.2	8.0/7.5	7.8/7.7		69.7	16.0	4.4	26.8	10.1	
106.5	62	1	21	16:55	17566	63	4.9/5.1	7.2/7.6	7.8/7.7	8.4/9.8	8.5/10.1		77.0	15.4	4.3	21.7	4.1	

Recorded by MMT

Checked by [signature]

1 - 75.1 / 21.6   2 - 68.0 / 26.7

Sheet 21	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
WIM System Test Truck Records 1 of 3	* DATE 06/13/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
72.5	59	2	1	8:41	37005	59	5.3/5.5	6.9/7.3	6.4/6.6	7.6/7.2	7.6/7.9		68.3	15.9	4.3	26.8	10.1	
72.5	63	1	1	8:41	37012	62	5.1/5.4	6.2/7.7	5.9/7.1	7.0/9.5	7.4/10.0		71.2	15.4	4.3	21.8	4.1	
75.0	64	2	2	8:57	37541	64	5.5/5.0	7.2/6.9	6.9/6.8	7.7/7.3	7.7/7.7		68.7	16.0	4.3	26.8	10.1	
75.0	67	1	2	8:58	37560	67	5.2/5.0	7.1/7.0	7.0/7.5	8.6/9.5	9.0/10.2		76.1	15.4	4.3	21.7	4.1	
81.5	68	2	3	9:12	38087	68	5.6/4.8	6.9/7.3	6.7/6.7	7.6/6.8	7.8/7.6		67.9	16.0	4.3	26.9	10.1	
81.5	70	1	3	9:13	38092	70	5.0/4.9	7.1/7.1	7.4/7.2	8.6/9.3	8.6/9.9		75.0	15.4	4.3	21.7	4.1	
88.0	59	2	4	9:28	38655	59	5.6/4.9	7.2/7.2	6.7/7.1	7.7/7.0	7.6/7.5		68.4	16.0	4.4	26.8	10.1	
88.0	61	1	4	9:28	38658	61	5.0/5.5	7.1/7.4	7.4/7.7	8.5/9.8	8.3/10.1		77.0	15.4	4.3	21.8	4.1	
87.0	64	2	5	9:44	39234	64	5.3/5.2	6.9/7.0	6.7/6.8	7.9/7.6	7.4/8.0		69.0	16.0	4.4	26.8	10.1	
87.0	66	1	5	9:44	39242	65	5.1/5.3	7.3/7.8	7.0/7.7	8.4/9.8	9.0/10.7		78.0	15.4	4.3	21.8	4.1	
93.5	69	2	6	10:00	39803	67	5.3/5.1	7.0/7.1	6.9/7.6	7.8/7.5	7.4/7.8		69.4	16.0	4.3	26.9	10.1	
93.5	71	1	6	10:00	39805	70	4.7/5.3	6.5/6.3	6.7/7.1	8.7/10.1	8.0/10.1		73.5	15.5	4.3	21.8	4.1	
~~93.5~~	~~61~~	~~2~~	~~7~~	~~10:15~~	~~40403~~	~~60~~	~~4.4/5.5~~	~~6.1/6.6~~	~~5.6/6.0~~	~~6.1/5.9~~	~~5.8/6.0~~		~~58.4~~	~~16.0~~	~~4.4~~	~~26.8~~	~~10.1~~	*missed sensor
93.5	64	1	7	10:15	40410	64	5.0/5.5	7.2/7.4	7.3/7.7	8.7/9.5	8.7/9.7		76.8	15.5	4.3	21.8	4.1	
97.5	65	2	7	10:35	41183	65	5.6/5.3	6.5/7.0	6.0/6.8	6.6/6.2	6.3/6.5		62.8	15.9	4.4	26.9	10.1	
97.5	68	1	8	10:35	41188	67	5.2/4.9	7.2/6.9	7.1/7.1	8.6/9.4	8.7/10.3		75.4	15.4	4.3	21.7	4.0	

Recorded by DJW   Checked by MVT

1 - 75.1   2 - 67.5
21.6   26.7

Sheet 21	* STATE_CODE 47
LTPP Traffic Data	*SPS PROJECT_ID 0600
WIM System Test Truck Records 2 of 3	* DATE 06/13/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space	
99	68	2	8	10:52	41840	68	5.1/5.3	7.2/7.3	6.9/7.0	7.6/7.3	7.4/7.6		68.7	15.9	4.3	24.8	10.1		
~~99~~	~~63~~	~~1~~	~~9~~	~~10:52~~	~~41849~~	~~63~~	~~6.2/5.6~~	~~7.8/8.3~~	~~7.9/7.9~~	~~8.5/8.2~~	~~8.4/8.1~~		~~76.9~~	~~15.6~~	~~4.3~~	~~35~~	~~4.0~~		wrong record
~~99~~	~~64~~	~~1~~	~~9~~	~~10:52~~	~~41853~~	~~64~~	~~4.4/5.3~~	~~5.7/6.5~~	~~5.7/6.7~~	~~6.3/8.9~~	~~6.7/8.4~~		~~64.5~~	~~15.5~~	~~4.3~~	~~21.7~~	~~4.1~~		missed sensors
100.5	59	2	9	11:08	42521	59	5.5/5.5	6.8/6.8	5.8/8.1	6.7/6.2	6.3/7.1		65.0	16.0	4.3	26.9	10.1		
~~100.5~~	~~63~~	~~1~~	~~9~~	~~11:08~~	~~42533~~	~~63~~	~~4.1/5.3~~	~~5.9/6.3~~	~~5.7/6.9~~	~~6.4/9.4~~	~~6.5/8.5~~		~~65.0~~	~~15.4~~	~~4.3~~	~~21.9~~	~~4.1~~		missed sensors
102.5	65	2	10	11:23	43135	65	5.4/4.9	7.4/6.5	6.9/7.1	7.9/7.1	7.3/8.0		68.5	15.9	4.3	26.8	10.1		
102.5	67	1	9	11:24	43160	67	5.2/5.2	7.1/7.7	7.2/7.6	8.4/10.0	8.3/10.0		76.6	15.4	4.3	21.8	4.1		
105	69	2	11	11:43	43884	67	5.5/4.8	7.6/6.8	7.5/6.3	8.0/7.0	7.9/7.4		68.7	15.9	4.3	24.7	16.0		
105	70	1	10	11:43	43889	70	5.1/5.1	7.2/6.8	7.1/7.4	8.5/9.7	8.0/10.5		75.4	15.4	4.3	21.7	4.1		
107.5	59	2	12	11:59	44473	58	5.5/5.0	6.8/6.7	6.9/7.1	7.7/7.0	7.5/7.5		67.7	16.0	4.4	26.8	10.1		
107.5	62	1	11	11:59	44479	61	5.0/5.2	7.0/7.5	6.8/7.3	8.5/10.3	8.2/9.9		75.8	15.4	4.4	21.8	4.1		
108.5	65	2	13	12:15	45134	65	5.3/5.1	6.8/7.0	7.1/7.4	7.8/7.2	7.4/7.6		68.7	15.9	4.3	26.8	10.1		
108.5	71	1	12	12:15	45140	71	5.0/4.9	7.4/7.3	7.5/7.5	8.8/9.5	9.0/9.8		76.8	15.4	4.3	21.7	4.1		
110.5	69	2	14	12:30	45758	68	5.3/4.8	7.3/6.3	7.4/6.3	7.7/6.8	7.8/7.3		67.0	15.9	4.3	26.7	10.1		
110.5	61	1	13	12:31	45769	61	5.0/5.1	7.1/7.4	7.4/7.3	8.7/9.8	8.7/9.6		76.0	15.4	4.3	21.8	4.1		
110.5	60	2	15	12:46	46381	60	5.3/5.0	7.2/7.1	7.0/7.1	8.1/7.2	7.9/7.7		69.6	15.9	4.4	26.9	10.1		

Recorded by DJW

Checked by MVT

Sheet 21	* STATE_CODE	47
LTPP Traffic Data	*SPS PROJECT_ID	0600
WIM System Test Truck Records 3 of 3	* DATE	06/13/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
110.5	62	1	14	12:46	46385	61	5.0/4.9	7.6/7.2	7.5/7.2	8.8/9.5	8.6/8.4		74.7	15.4	4.3	21.7	4.1	
114.5	68	2	16	13:21	47781	67	5.3/5.0	7.5/7.2	6.8/6.6	7.7/7.2	7.4/7.8		68.5	15.9	4.3	26.8	10.1	
114.5	71	1	15	13:21	47790	71	5.4/4.7	7.6/7.4	7.4/7.2	8.6/9.2	8.9/9.4		75.8	15.4	4.3	21.7	4.1	
113	61	2	17	13:37	48511	60	5.4/4.9	7.2/7.2	6.8/6.5	7.9/7.1	7.8/7.8		68.5	16.0	4.4	26.9	10.1	
113	62	1	16	13:37	48524	62	4.9/4.8	7.4/7.1	7.5/7.5	8.9/9.6	7.7/10.0		75.2	15.4	4.3	21.8	4.1	
112.5	64	2	18	13:53	49269	64	5.3/4.9	7.2/7.1	6.8/6.9	7.7/7.4	7.7/7.8		68.8	16.0	4.4	26.8	10.1	
~~112.5~~	~~69~~	~~1~~	~~17~~	~~13:53~~	~~49239~~	~~72~~	~~5.3/5.7~~	~~7.3/6.2~~	~~6.9/6.5~~	~~8.6/7.5~~	~~6.9/7.9~~		~~68.8~~					wrong record
112.5	69	1	19	13:53	49238	69	5.0/4.8	6.9/7.3	7.5/7.2	8.7/9.9	7.9/8.8		74.1	15.4	4.3	21.7	4.1	
111.5	69	2	18	14:08	49864	68	5.2/4.8	7.3/6.6	6.9/6.4	8.3/6.5	8.3/7.1		67.5	16.0	4.4	26.9	10.1	
111.5	70	1	18	14:09	49870	70	4.8/5.0	7.4/7.4	7.0/7.5	8.4/10.1	8.6/10.4		76.7	15.4	4.4	21.8	4.0	
107	61	2	20	14:24	50459	60	5.2/5.0	6.8/7.0	6.6/7.5	8.0/7.1	7.9/7.9		69.1	16.0	4.4	26.9	10.1	
107	62	1	19	14:24	50461	63	4.8/4.8	7.2/7.7	7.8/7.8	8.8/9.6	8.4/9.0		75.9	15.4	4.3	21.8	4.1	
113.5	65	2	21	14:40	51196	64	5.2/5.1	6.7/6.9	6.9/7.3	7.7/7.4	7.9/7.6		68.6	16.0	4.3	26.9	10.1	
113.5	71	1	20	14:41	51221	71	4.9/5.0	6.9/7.3	7.2/7.6	8.2/9.6	8.3/10.5		75.6	15.4	4.3	21.8	4.1	

Recorded by DJW

Checked by MVT

6420060018_SPSWIM_TO_16_47_2.82_0600_Post_Sheet_21.doc

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

June 12 and 13, 2007

STATE: Tennessee

SHRP ID: 0600

Photo 1 - Truck_1_Tractor_ 47_0600_06_13_07.JPG

Photo 2 - Truck_1_Trailer_Load_1_47_0600_06_13_07.JPG

Photo 3 - Truck_1_Suspension_1_47_0600_06_13_07.JPG

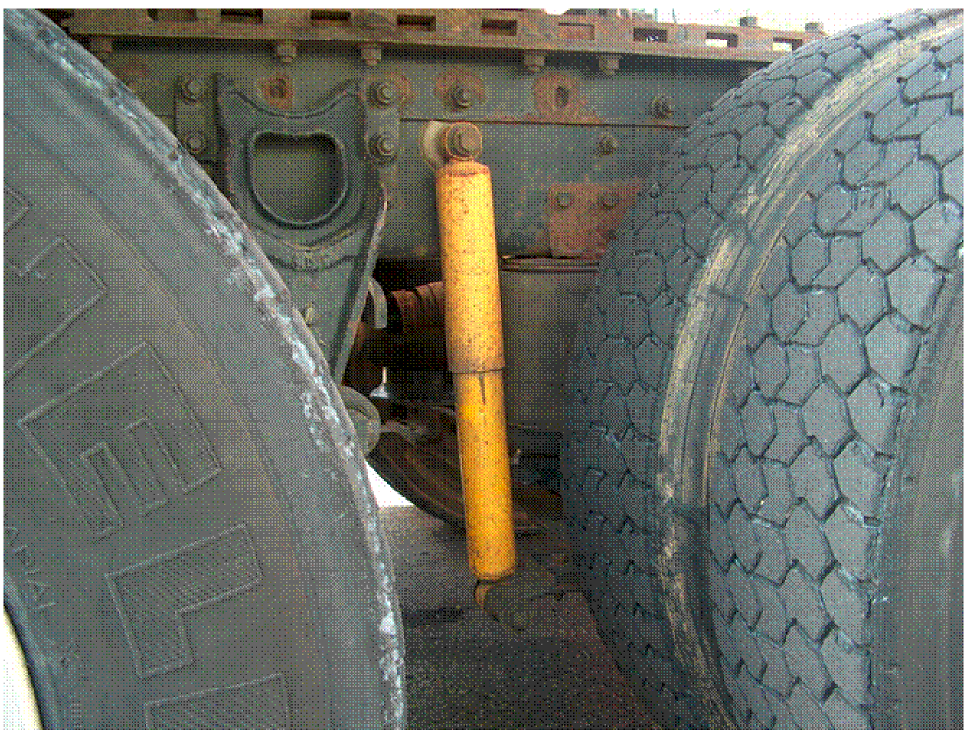

Photo 4 - Truck_1_Suspension_2_47_0600_06_13_07.JPG

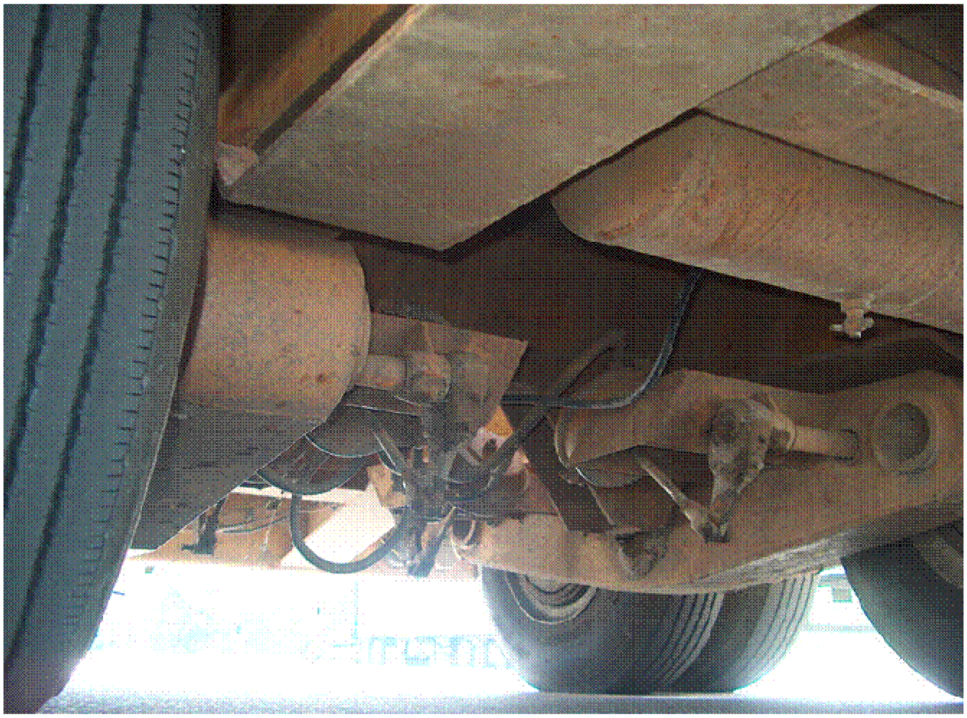

Photo 5 - Truck_1_Suspension_3_47_0600_06_13_07.JPG

Photo 6 - Truck_2_Tractor_47_0600_06_13_07.JPG

Photo 7 - Truck_2_Trailer_47_0600_06_13_07.JPG

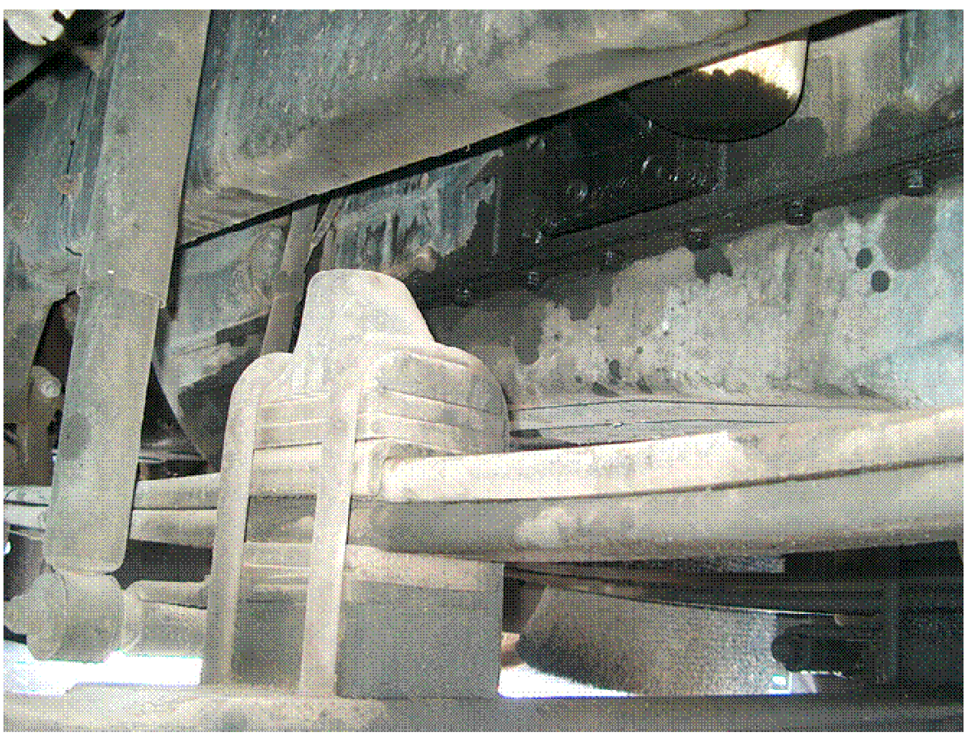

Photo 8 - Truck_2_Suspension_1_47_0600_06_13_07.JPG

Photo 9 - Truck_2_Suspension_2_47_0600_06_13_07.JPG

Photo 10 - Truck_2_Suspension_3_47_0600_06_13_07.JPG

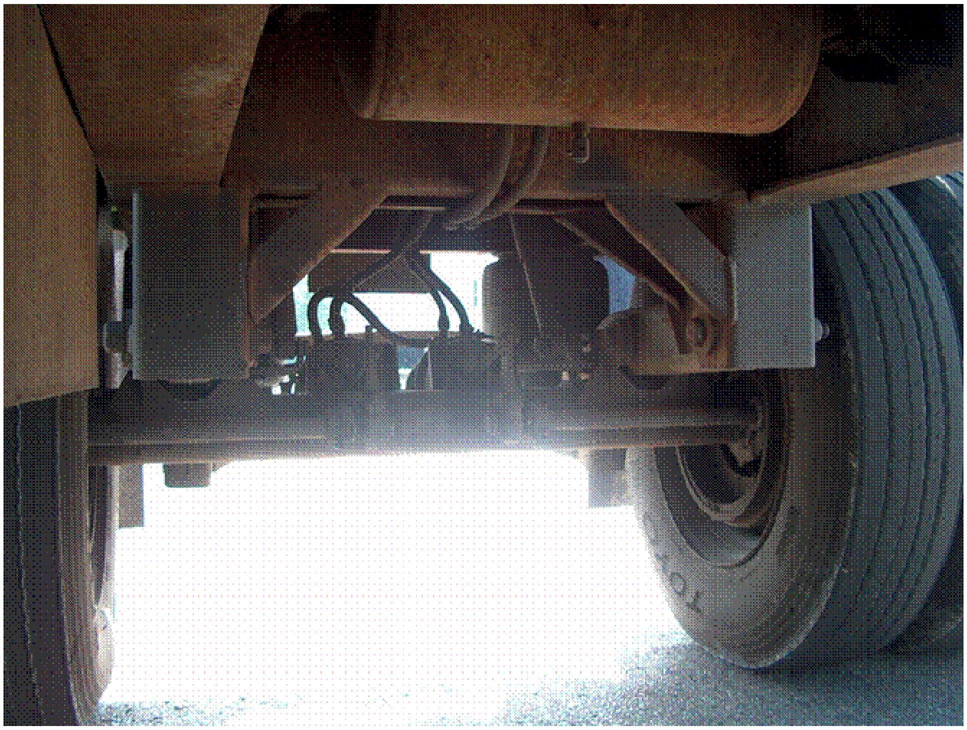

Photo 11 - Truck_2_Suspension_4_47_0600_06_13_07.JPG

ETG LTPP CLASS SCHEME, MOD 3

Class	Vehicle Type	No. Axles	Spacing 1	Spacing 2	Spacing 3	Spacing 4	Spacing 5	Spacing 6	Spacing 7	Spacing 8	Gross Weight Min-Max	Axle 1 Weight Min *
1	Motorcycle	2	1.00-5.99								0.10-3.00	
2	Passenger Car	2	6.00-10.10								1.00-7.99	
3	Other (Pickup/Van)	2	10.11-23.09								1.00-7.99	
4	Bus	2	23.10-40.00								12.00 >	
5	2D Single Unit	2	6.00-23.09								8.00 >	2.5
2	Car w/ 1 Axle Trailer	3	6.00-10.10	6.00-25.00							1.00-11.99	
3	Other w/ 1 Axle Trailer	3	10.11-23.09	6.00-25.00							1.00-11.99	
4	Bus	3	23.10-40.00	3.00-7.00							20.00 >	
5	2D w/ 1 Axle Trailer	3	6.00-23.09	6.30-30.00							12.00-19.99	2.5
6	3 Axle Single Unit	3	6.00-23.09	2.50-6.29							12.00 >	3.5
8	Semi, 2S1	3	6.00-23.09	11.00-45.00							20.00 >	3.5
2	Car w/ 2 Axle Trailer	4	6.00-10.10	6.00-30.00	1.00-11.99						1.00-11.99	
3	Other w/ 2 Axle Trailer	4	10.11-23.09	6.00-30.00	1.00-11.99						1.00-11.99	
5	2D w/ 2 Axle Trailer	4	6.00-26.00	6.30-40.00	1.00-20.00						12.00-19.99	2.5
7	4 Axle Single Unit	4	6.00-23.09	2.50-6.29	2.50-12.99						12.00 >	3.5
8	Semi, 3S1	4	6.00-26.00	2.50-6.29	13.00-50.00						20.00 >	5.0
8	Semi, 2S2	4	6.00-26.00	8.00-45.00	2.50-20.00						20.00 >	3.5
3	Other w/ 3 Axle Trailer	5	10.11-23.09	6.00-25.00	1.00-11.99	1.00-11.99					1.00-11.99	
5	2D w/ 3 Axle Trailer	5	6.00-23.09	6.30-35.00	1.00-25.00	1.00-11.99					12.00-19.99	2.5
7	5 Axle Single Unit	5	6.00-23.09	2.50-6.29	2.50-6.29	2.50-6.30					12.00 >	3.5
9	Semi, 3S2	5	6.00-30.00	2.50-6.29	6.30-65.00	2.50-11.99					20.00 >	5.0
9	Truck+FullTrailer (3-2)	5	6.00-30.00	2.50-6.29	6.30-50.00	12.00-27.00					20.00>	3.5
9	Semi, 2S3	5	6.00-30.00	16.00-45.00	2.50-6.30	2.50-6.30					20.00 >	3.5
11	Semi+FullTrailer, 2S12	5	6.00-30.00	11.00-26.00	6.00-20.00	11.00-26.00					20.00 >	3.5
10	Semi, 3S3	6	6.00-26.00	2.50-6.30	6.10-50.00	2.50-11.99	2.50-10.99				20.00 >	5.0
12	Semi+Full Trailer, 3S12	6	6.00-26.00	2.50-6.30	11.00-26.00	6.00-24.00	11.00-26.00				20.00 >	5.0
13	7 Axle Multi's	7	6.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00			20.00 >	5.0
13	8 Axle Multi's	8	6.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00		20.00 >	5.0
13	9 Axle Multi's	9	6.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	3.00-45.00	20.00 >	5.0

Spacings in feet
Weights in kips (Lbs/1000)
* Suggested Axle 1 minimum weight threshold if allowed by WIM system's class algorithm programming

System Operating Parameters

Tennessee SPS-6 (Lane 4)

Validation Visit – 13 June, 2007

Calibration factor for sensors #1 and 3 (left side):

88 kph:	2764
96 kph:	2764
104 kph:	2764
112 kph:	2764
120 kph:	2764

Calibration factor for sensor #2 and 4 (right side):

88 kph:	2934
96 kph:	2934
104 kph:	2934
112 kph:	2934
120 kph:	2934