Validation Report

Florida, SPS-1

Task Order 15, CLIN 2
September 11 and 12, 2006

List of Tables

List of Figures

1 Executive Summary

A visit was made to the Florida SPS-1 on September 11 and 12, 2006 for the purposes of conducting a Validation of the WIM system located on US Route 27, located 13.8 miles south of SR 80, milepost 12.03. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide (SPS WIM DCG) dated August 21, 2001.

This is the third validation visit we have made to this site, the previous visit being February 28 to March 1, 2005. At that time, this site met the precision requirements for research quality data.

This site meets LTPP precision requirements for loading data. The classification data is also of research quality.

The site is instrumented with Kistler quartz piezo sensors and IRD/PAT Traffic electronics. It is installed in asphalt concrete pavement. At this site, Florida has instrumented all four lanes. Lane 1 and Lane 4 are instrumented for WIM, while Lanes 2 and 3 are instrumented for classification only. The LTPP Lane is identified as Lane 1 in the equipment controller.

The validation used the following trucks:

1) 5-axle tractor semi-trailer vehicle with a tractor having an air suspension tandem and a trailer with standard rear tandem and air suspension loaded to 74,680 lbs.
2) 5-axle tractor semi-trailer vehicle with a tractor having an air suspension tandem and a trailer with standard rear tandem and air suspension loaded to 64,850 lbs.

The validation speeds ranged from 54 to 65 miles per hour. The pavement temperatures ranged from 103 to 119 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was not achieved.

Table 1-1 Post-Validation results – 120100 – 12-Sep-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	$\pm$20 percent	-0.7 + 11.2%	Pass
Tandem axles	$\pm$15 percent	-3.3 + 6.5%	Pass
GVW	$\pm$10 percent	-2.8 + 5.5%	Pass
Speed	$\pm$1 mph [2 km/hr]	0.1 + 0.4 mph	Pass
Axle spacing	$\pm$ 0.5 ft [150mm]	0.0 + 0.1 ft	Pass

The pavement condition has deteriorated significantly since the last validation. Pavement distress exists prior to, in the area of, and after the WIM scale area. The pavement condition was therefore nominally satisfactory for conducting a validation. The moderate pavement damage in the left wheel-path approximately two feet after the trailing WIM sensor and on the right edge of the travel lane, approximately ten feet following the trailing WIM sensor observed during the last validation have increased in severity. These distresses may influence truck motions as they approach and transverse the WIM scales. However, a visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area.

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

If data is submitted for 2005 and the remainder of 2006, this site will have two years of research quality data. An additional three years of data (2007-2009) will be required to meet the goal of five years of research quality data.

2 Corrective Actions Recommended

Although the equipment passed all of the performance weight and spacing validation performance specifications, pavement remediation in the area of the current WIM installation as well as the pre-existing installation immediately following the present WIM scales is recommended. At the present WIM location, there is cracking at the WIM sensors and pavement deterioration at the corners of the loop sensor.

Pavement that has broken away at the old WIM location should be repaired. Significant cracking in the approach area should be sealed and the cracking and pavement deterioration at the present WIM installation sensors should be repaired. There are no other corrective actions are required at this time.

3 Post Calibration Analysis

This final analysis is based on test runs conducted September 12, 2006 from late morning to mid-afternoon at test site 120100 on US Route 27, 13.8 miles south of SR 80. This SPS-1 site is at milepost 12.03 on the southbound, right hand lane of a divided four-lane highway. No auto-calibration was used during test runs. The two trucks used for initial calibration and for the subsequent testing included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and air suspension loaded to 74,680 lbs.; the golden truck.
2. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and air suspension loaded to 64,850 lbs.; the partial loaded truck.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 54 to 65 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 103 to 119 degrees Fahrenheit. 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 for weight and spacing. Calibrations of the equipment reduced error variability in all weights for the post-validation when compared to the pre-validation.

Table 3-1 Post-Validation Results - 120100 – 12-Sep-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-0.7 + 11.2%	Pass
Tandem axles	±15 percent	-3.3 + 6.5%	Pass
GVW	±10 percent	-2.8 + 5.5%	Pass
Speed	±1 mph [2 km/hr]	0.1 + 0.4 mph	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 + 0.1 ft	Pass

The test runs were conducted primarily during the late morning to mid-afternoon hours, resulting in a moderate 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. Lower speeds were increased from the 45 mph used during the last validation to 55 mph for this validation. This was based on the current speed of free flow truck traffic, and the lack of trucks traveling below 55 mph.

To investigate these effects, the dataset was split into three speed groups and two 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 not achieved for this set of validation runs. Due to cloud cover, pavement temperatures did not vary sufficiently to obtain a 30 degree Fahrenheit range.

The speed groups were divided as follows: Low speed – 50 to 57 mph, Medium speed – 58 to 62 mph and High speed - 63+ mph. The two temperature groups were created by splitting the runs between those at 103 to 109 degrees Fahrenheit for Low temperature and 110 to 119 degrees Fahrenheit for High temperature.

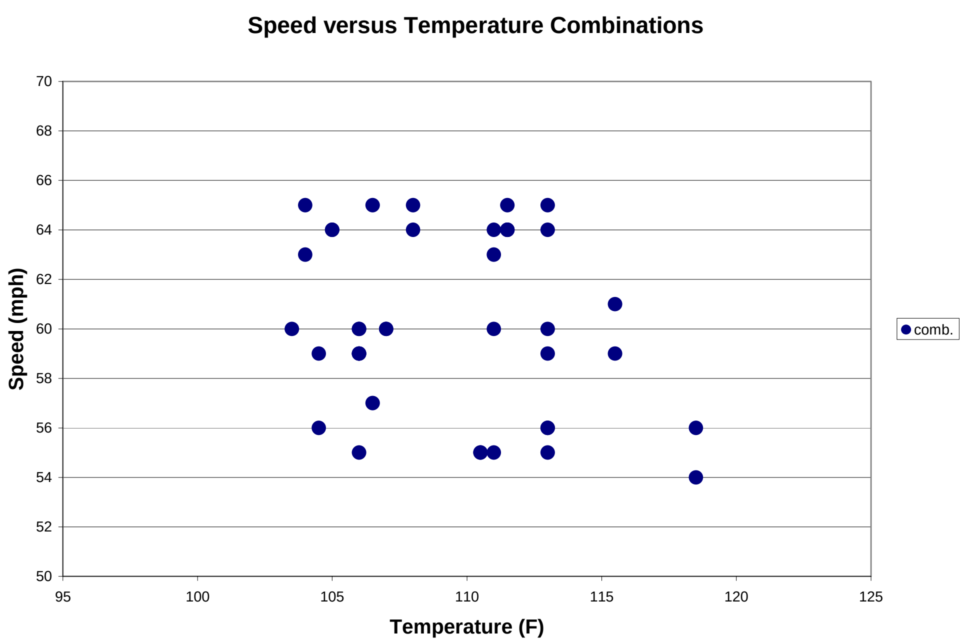


Figure 3-1 Post-Validation Speed-Temperature Distribution – 120100 – 12-Sep-2006

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 variability in GVW errors is consistent throughout the entire speeds range, with a slight decrease at low speeds. The equipment generally underestimates GVW at all speeds.

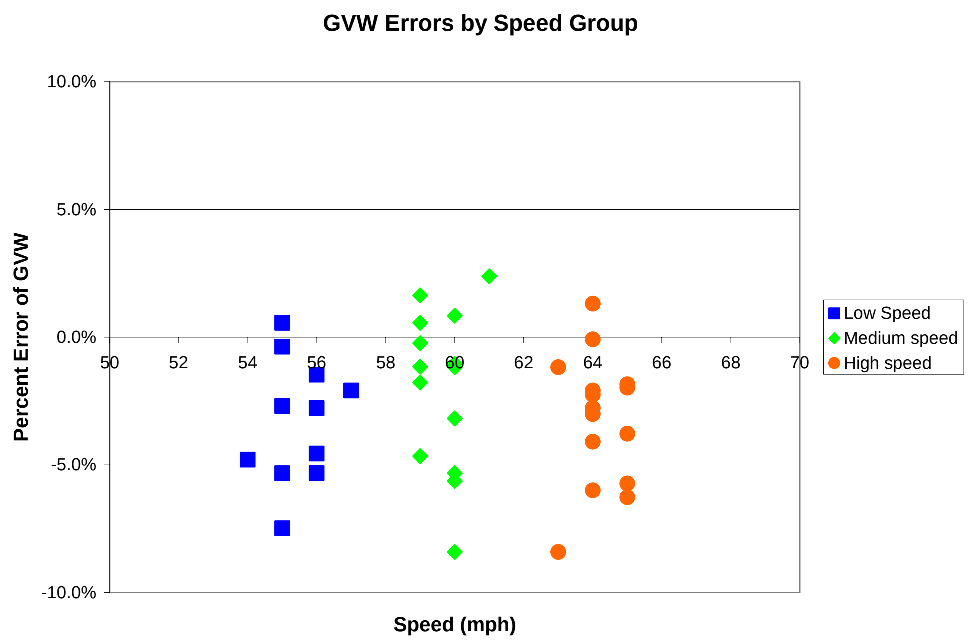


Figure 3-2 Post-validation GVW Percent Error vs. Speed – 120100 – 12-Sep-2006

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

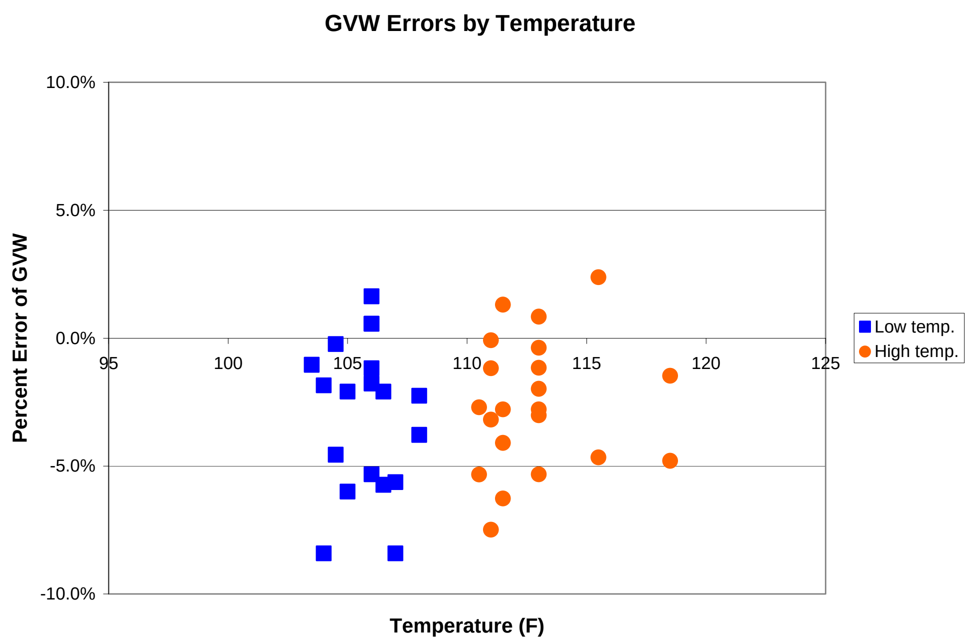


Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 120100 – 12-Sep-2006

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 generally not affected by changes in speed.

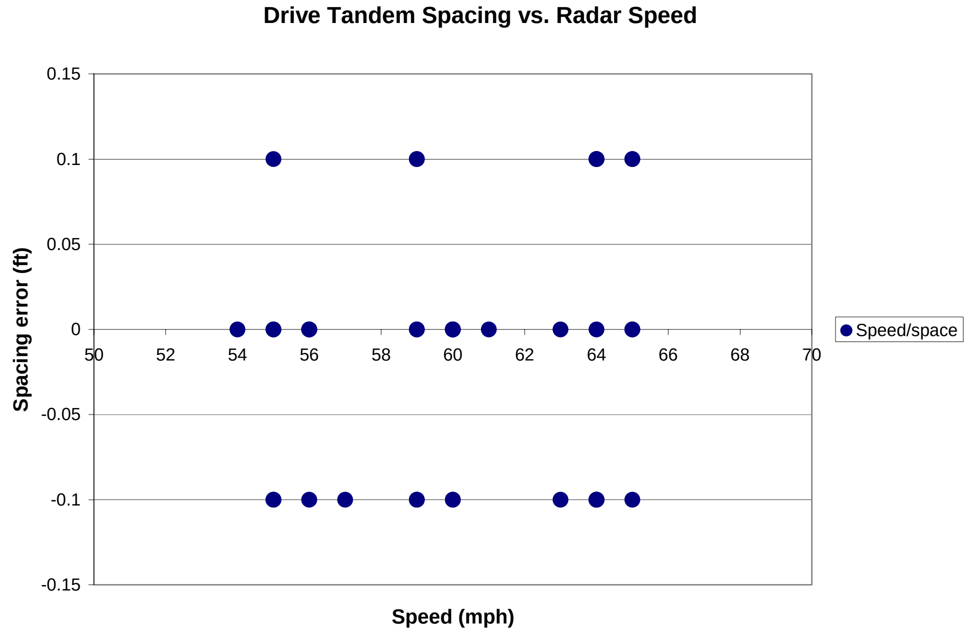


Figure 3-4 Post-Validation Spacing vs. Speed - 120100 – 12-Sep-2006

3.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 103 to 109 degrees Fahrenheit for Low temperature and 110 to 119 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 120100 –12-Sep-2006

Element	95% Limit	Low Temperature 103 - 109 °F	High Temperature 110 - 119 °F
Steering axles	±20 %	-1.1 + 12.7%	-0.3 + 10.7%
Tandem axles	±15 %	-3.4 + 7.0%	-3.2 + 6.2%
GVW	±10 %	-3.0 + 6.2%	-2.6 + 5.4%
Speed	±1 mph	0.0 + 0.0mph	0.1 + 0.6mph
Axle spacing	± 0.5 ft	0.0 + 0.2ft	0.0 + 0.1ft

From Figure 3-5, it appears that mean error is not particularly affected by temperature. There is some decrease, numerically in variability at higher temperatures.

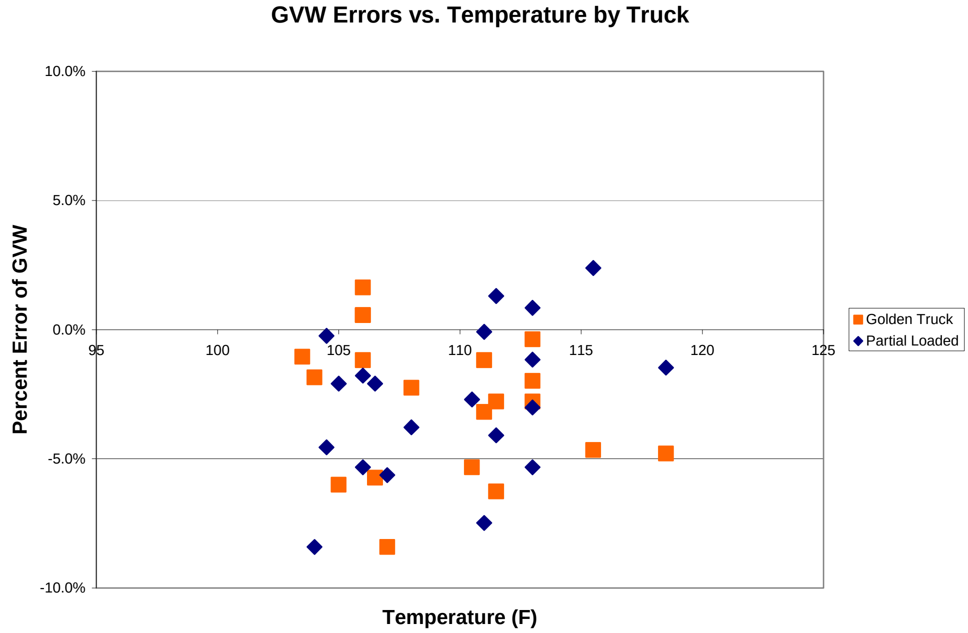


Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 120100 – 12-Sep-2006

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 variability in steering axle errors imitate that of GVW error variability illustrated in the preceding figure. It appears that this system estimates steering axle weights accurately.

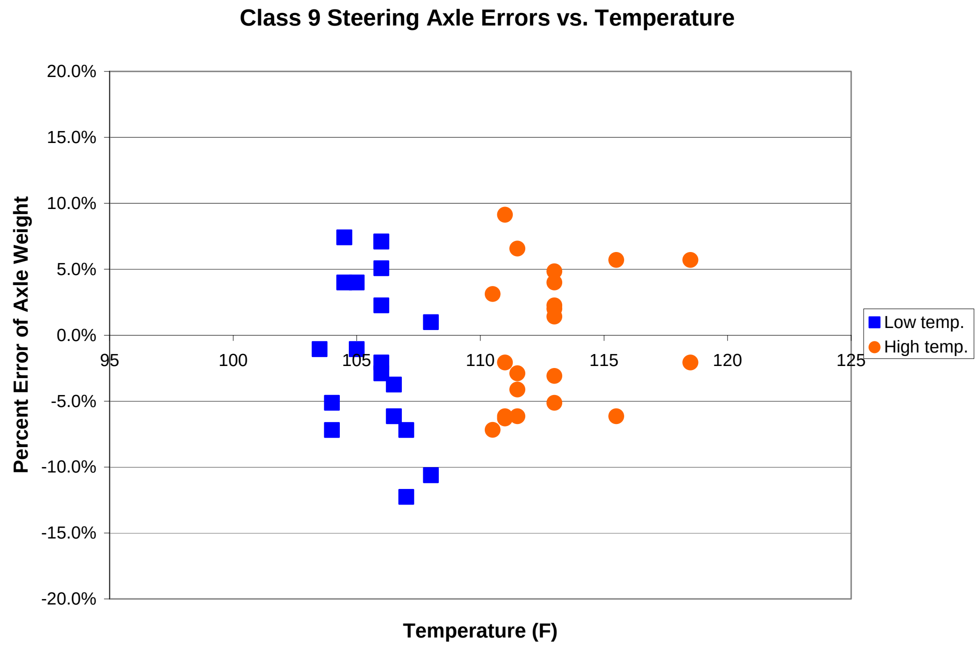


Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group - 120100 – 12-Sep-2006

3.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 54 to 57 mph, Medium speed – 58 to 62 mph and High speed - 63+ mph.

Table 3-3 Post-Validation Results by Speed Bin – 120100 – 12-Sep-2006

Element	95% Limit	Low Speed 54 to 57 mph	Medium Speed 58 to 62 mph	High Speed 63+ mph
Steering axles	+20 %	-0.1 + 10.2%	0.3 + 13.3%	-2.1 + 12.0%
Tandem axles	+15 %	-4.0 + 6.8%	-2.5 + 6.4%	-3.5 + 6.7%
GVW	+10 %	-3.3 + 5.4%	-1.9 + 6.7%	-3.2 + 5.5%
Speed	+1 mph	0.0 + 0.0mph	0.1 + 0.6mph	0.1 + 0.6mph
Axle spacing	+ 0.5 ft	0.0 + 0.1ft	0.0 + 0.1ft	0.0 + 0.2ft

From Table 3-3, it appears that the estimation of all weights by the equipment increases at medium speeds. GVW variability is higher at the medium range speeds. Variability in steering axle and tandem errors appear to be consistent throughout the entire speed range.

Figure 3-7 illustrates the tendency for the system to underestimate GVW for both trucks over the entire speed range. Variability appears to be fairly consistent at all speeds, with only a slight increase at the medium speeds.

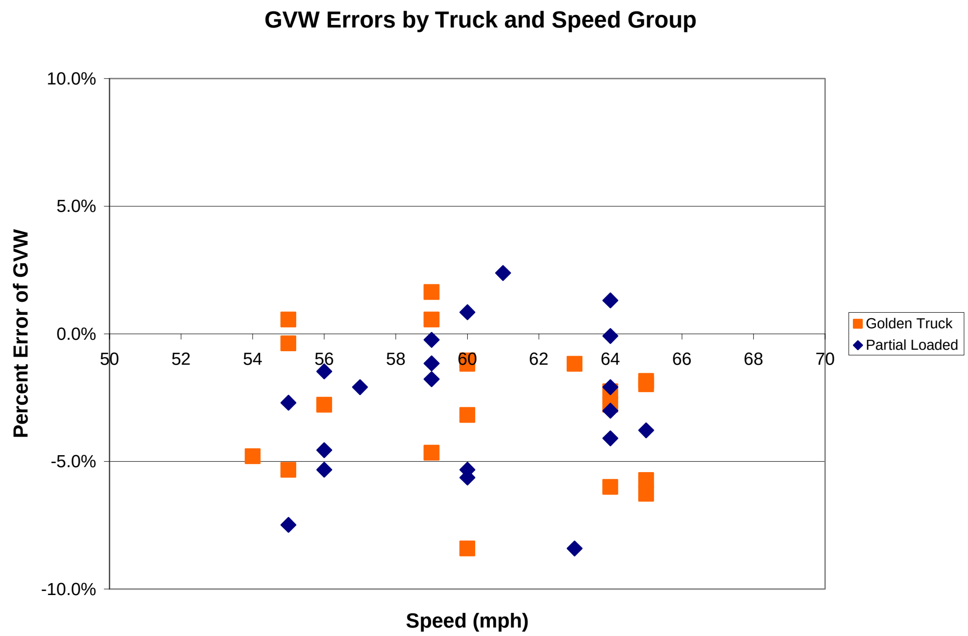


Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 120100 – 12-Sep-2006

Figure 3-8 shows the relationship 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, it appears that the WIM equipment produces a higher variability in steering axle error at medium and high speeds when compared to low speeds. The system appears to estimate steering axle weights accurately. Mean error appears to remain consistent throughout the entire speed range.

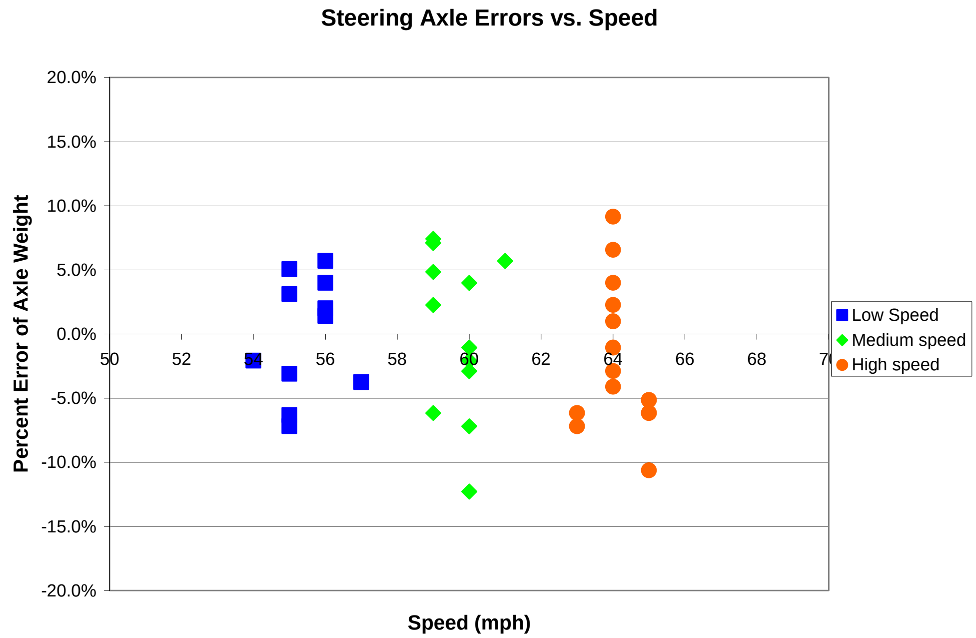


Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group- 120100 – 12-Sep-2006

3.3 Classification Validation

The agency uses a modified FHWA 13 bin classification scheme. The modification utilizes a Class 15 for unknown vehicles.

A post-validation classification validation was not required since the pre-validation speed and classification check produced no misclassified or unclassified vehicles.

3.4 Evaluation by ASTM E-1318 Criteria

The ASTM E-1318 standard 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 3-4 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

Since the previous Validation visit on February 28, 2005, the pavement condition in the approach, WIM scale and following areas have significantly diminished. Significant cracking and rutting in the approach area, cracks and pavement deterioration at the present WIM sensor installations, and pavement distresses associated with the old WIM installation that immediately follows the WIM scale area were observed.

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

4.1 Profile Analysis

The WIM site is a section of pavement that is 305 meters long with the WIM scale located at 274.5 meters from the beginning of the test section. An ICC profiler was used to collect longitudinal profiles of the test section with a sampling interval of 25 millimeters.

Profile data collected at the SPS WIM location by Fugro South, Inc. on July 26, 2006 were processed through the LTPP SPS WIM Index software, version 1.1. This WIM scale is installed on a flexible pavement.

A total of 8 profiler passes were conducted over the WIM site. Since the issuance of the LTPP directive on collection of longitudinal profile data for SPS WIM sections, the requirements have been a minimum of 3 passes in the center of the lane and one shifted to each side. For this site the RSC has completed 4 passes at the center of the lane, 2 passes shifted to the left side of the lane, and 2 passes shifted to the right side of the lane. Shifts to the sides of the lanes were made such that data were collected as close to the lane edges as was safely possible. For each profiler pass, profiles were recorded under the left wheel path (LWP) and the right wheel path (RWP).

The SPS WIM Index software was developed with four different indices: LRI, SRI, Peak LRI and Peak SRI. The LRI incorporates the pavement profile starting 25.8 m prior to the scale and ending 3.2 m after the scale in the direction of travel. The SRI incorporates a shorter section of pavement profile beginning 2.74 m prior to the WIM scale and ending 0.46 m after the scale. The LRI and SRI are the index values for the actual location of the WIM scale. Peak LRI is the highest value of LRI, within 30 m prior to the scale. Peak SRI indicates the highest value of SRI that is located between 2.45 m prior to the scale and 1.5 m after the scale. Also, a range for each of the indices was developed to provide the smoothness criteria. The ranges are shown in Table 4-1. When all of the values are below the lower thresholds, it is presumed unlikely that pavement smoothness will significantly influence sensor output. When one or more values exceed an upper threshold there is a reasonable expectation that the pavement smoothness will influence the outcome of the validation. When all values are below the upper threshold but not all below the lower threshold, the pavement smoothness may or may not influence the validation outcome.

Table 4-1 Thresholds for WIM Index Values

Index	Lower Threshold (m/km)	Upper Threshold (m/km)
LRI	0.50	2.1
SRI	0.50	2.1
Peak LRI	0.50	2.1
Peak SRI	0.75	2.9

Table 4-2 shows the computed index values for all 8 profiler passes for this WIM site. The average values over the passes in each path were also calculated when three or more passes were completed. These are shown in the right most column of the table. Values below the lower index limits are presented in italics and values above the upper index limits are presented in bold.

Table 4-2 WIM Index Values - 120100 – 26-Jul-2006

Profiler Passes			Pass 1	Pass 2	Pass 3	Pass 4	Ave.
Center	LWP	LRI (m/km)	0.799	0.794	1.099	1.026	0.930
		SRI (m/km)	0.783	0.753	1.555	1.358	1.112
		Peak LRI (m/km)	0.929	0.891	1.122	1.046	0.997
		Peak SRI (m/km)	0.890	0.774	2.227	1.945	1.459
	RWP	LRI (m/km)	0.978	1.042	1.085	1.063	1.042
		SRI (m/km)	1.879	1.761	2.078	1.991	1.927
		Peak LRI (m/km)	1.105	1.202	1.180	1.066	1.138
		Peak SRI (m/km)	2.354	2.291	2.424	2.424	2.373
Left Shift	LWP	LRI (m/km)	1.148	0.965			
		SRI (m/km)	2.097	1.889			
		Peak LRI (m/km)	1.148	1.097			
		Peak SRI (m/km)	2.482	2.221			
	RWP	LRI (m/km)	0.859	0.812			
		SRI (m/km)	1.272	1.237			
		Peak LRI (m/km)	0.859	0.816			
		Peak SRI (m/km)	1.303	1.302			
Right Shift	LWP	LRI (m/km)	1.581	1.883			
		SRI (m/km)	1.093	1.910			
		Peak LRI (m/km)	2.048	1.883			
		Peak SRI (m/km)	1.604	2.660			
	RWP	LRI (m/km)	0.954	0.741			
		SRI (m/km)	1.028	0.820			
		Peak LRI (m/km)	0.991	0.779			
		Peak SRI (m/km)	1.049	0.895			

From Table 4-2 it can be seen that all of indices computed from the profiles are between the upper and lower threshold values. However, because the site was validated, no remediation is recommended at this time.

Table 4-3 shows the computed index values for the prior site validation. Although the computations were done with an earlier version of the software, the difference in LRI and SRI values between the two versions has been found to be less than 3 percent. All of the values computed for the prior visit were between the upper and lower threshold values. The other item to note in comparing Table 4-3 to Table 4-2 is that all of the index values have increased from the previous visit to the site indicating that the overall pavement condition is deteriorating.

Table 4-3 Long Range Index (LRI) and Short Range Index (SRI) - 120100 – 05 Apr 2004

Profiler Passes			**Pass 1**	**Pass 2**	**Pass 3**	**Pass 4**	**Ave.**
Center	LWP	LRI (m/km)	0.570	0.582	0.609	0.757	0.630
		SRI (m/km)	0.760	0.749	0.700	1.041	0.813
	RWP	LRI (m/km)	1.597	0.845	1.601	0.868	1.228
		SRI (m/km)	1.682	0.766	0.696	0.738	0.971
Left Shift	LWP	LRI (m/km)	0.836	0.803			
		SRI (m/km)	0.605	0.594			
	RWP	LRI (m/km)	0.608	0.670			
		SRI (m/km)	0.764	0.775			
Right Shift	LWP	LRI (m/km)	0.830	0.934			
		SRI (m/km)	1.173	0.983			
	RWP	LRI (m/km)	0.978	0.793			
		SRI (m/km)	1.135	0.674			

4.2 Distress survey and any applicable photos

During the distress survey, numerous pavement distresses were observed throughout the approach, WIM scale and exit areas. In the approach area, significant cracking, rutting, and exposed aggregate were noted and are shown in Figure 4-1 and Figure 4-2. In the WIM scale area, cracking was observed at the ends of the WIM sensors (Figure 4-3) and the pavement has deteriorated at the corner of the loops (Figure 4-4). At the old WIM installation immediately following the present site, there is significant pavement deterioration at the old sensor installations (Figure 4-5 and Figure 4-7), as well as at the right edge of the travel lane, where small sections of overlay have broken out (Figure 4-6).

The current pavement condition does not appear to significantly influence truck movement, but crack sealing and minor pavement remediation is recommended.

Figure 4-1 - Pavement Distress in Approach – 120100 – 11 Sep 2006

Figure 4-2 - Pavement Distress in Approach 2 – 120100 – 11 Sep 2006

Figure 4-3 – Cracking at WIM Sensor – 120100 – 11 Sep 2006

Figure 4-4 - Pavement Deterioration at Loop Sensor – 120100 – 11 Sep 2006

Figure 4-5 - Pavement Distress at Old Installation – 120100 – 11 Sep 2006

Figure 4-6 - Pavement Distress at Right Edge of Lane – 120100 – 11 Sep 2006

Figure 4-7 - Pavement Distress at Old WIM Installation – 120100 – 11 Sep 2006

4.3 Vehicle-pavement interaction discussion

There appears to be a slight bouncing of trucks approximately 350 feet prior to the WIM scale area. However, the trucks appear to stabilize prior to entering the WIM scale area and do not appear to display significant vertical movement while approaching, traversing or exiting the WIM scale area. Trucks track down the wheel path. Daylight is not apparent between the tires and any of the sensors for the equipment.

5 Equipment Discussion

The traffic monitoring equipment at this location includes Kistler quartz piezo sensors and an IRD/PAT Traffic DAW-190 controller. The sensors are installed in a staggered array, twelve feet apart in asphalt concrete pavement.

Calibrations of the equipment at this site have been performed by the vendor or a state contractor since the installation of the equipment.

Since the last Validation visit on February 28, 2005, the agency has instituted a new classification scheme that is a modified FHWA 13-bin scheme. Axle spacings for Class 3 and Class 5 vehicles were adjusted in an attempt to prevent cross-classification of these vehicle types. New classes incorporated in the vehicle classification table dated August 31, 2006 include FHWA 4S4 and 2S3 vehicles. The results of these changes were not discernable during the classification verification. Results of the last validation produced 14.5 and 0.0 Class 5 misclassification percentages for the Pre- and Post-Validation classification verifications respectively.

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 validation. All sensors and system components were found to be within operating parameters, however, both sensors comprising the trailing WIM sensor indicated insulation resistances approaching the minimum allowable values.

A complete visual inspection of all WIM system and support components was also performed. All components appeared to be in good physical condition.

5.2 Calibration Process

Calibration iterations were not required, however, the pre-validation produced a discernable GVW underestimation at low speeds so further adjustments were suggested to the Agency, who concurred and made the required changes to system parameters in order to improve the weight statistics.

The equipment then required two iterations of the calibration process between the initial 40 runs and the final 40 runs to improve data quality.

5.2.1 Calibration Iteration 1

The results of the 40 pre-calibration runs performed by the two test trucks produced a range of -8.0% to +7.0% for the average GVW error. The factor that was adjusted was the low speed point factor, which is modified so that if weights are underestimated at low speeds, it is increased. If weights are overestimated at low speeds, it is decreased. The adjustment increment used was the absolute value of the percent errors. The value of the low speed correction factor was increased by 8.0 % from 960 to 1030 to reduce the size of the underestimate for GVW weights.

The first 12 calibration runs were performed by the two test trucks and produced an average error of -3.9% for GVW. Based on this result and the values for the single and tandem axles it was determined that further adjustments were desirable.

Table 5-1 Calibration Iteration 1 Results - 120100 – 12-Sep-2006 (beginning 10:40 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.9 + 14.7%	Pass
Tandem axles	±15 percent	-4.4 + 5.6%	Pass
GVW	±10 percent	-3.9 + 4.8%	Pass
Speed	±1 mph	**-0.3 + 3.4mph**	**Fail**
Axle spacing	± 0.5 ft	0.0 + 0.2ft	Pass

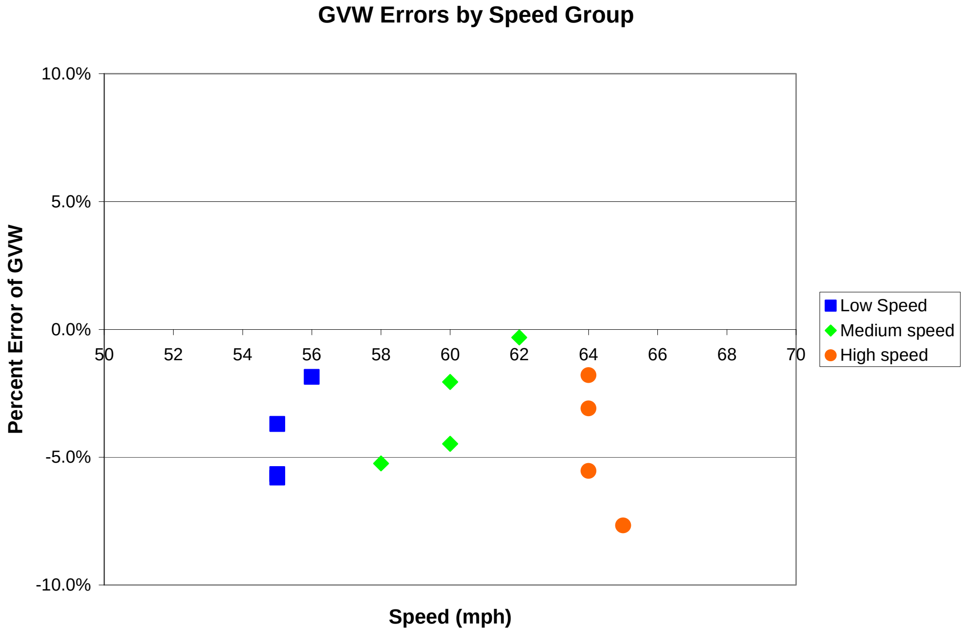


Figure 5-1 Calibration Iteration 1 GVW Percent Error vs. Speed Group - 120100 – 12-Sep-2006 (beginning 10:40 AM)

5.2.2 Calibration Iteration 2

The results of the first calibration runs performed by the two test trucks produced a range of -8.0% to -1.0% for the average GVW error. The factor to be adjusted was the overall compensation factor to reduce the overall GVW underestimation. The overall compensation factor is modified so that if GVW weights are underestimated it is increased. If GVW weights are overestimated it is decreased. The adjustment increment used was the absolute value of the percent error. The value of the overall compensation factor was increased by approximately 3.0 % from 760 to 780 to reduce the size of the underestimate for GVW.

The second calibration was checked after 12 runs to get a sense of the final validation results. They showed an average error of -3.0% for GVW. The agency elected to leave the factors as set rather than potentially over-correct on the next adjustment and have over-estimates of weights. An additional 28 runs were performed to complete the required minimum 40 post calibration runs.

Table 5-2 shows the results of Calibration 2 adjustment. The runs were conducted at the predetermined test speeds. It appears that although the mean errors were generally consistent over the entire range of speeds, the variability of GVW error was higher in the middle speed range.

Table 5-2 Calibration Iteration 2 Results - 120100 – 12-Sep-2006 (beginning 11:46 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-0.9 ± 12.5%	Pass
Tandem axles	±15 percent	-3.6 ± 6.8%	Pass
GVW	±10 percent	-3.0 ± 6.3%	Pass
Speed	±1 mph [2 km/hr]	0.0 ± 0.0 mph	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.2 ft	Pass

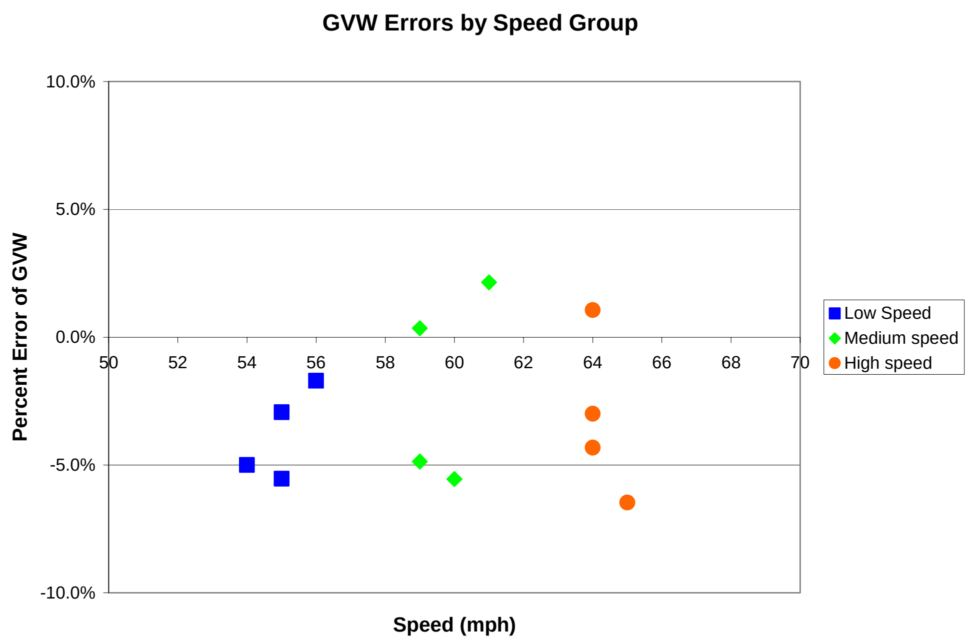


Figure 5-2 Calibration Iteration 2 GVW Percent Error vs. Speed Group - 120100 – 12-Sep-2006 (beginning 11:46 AM)

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 5-3 has the information found in TRF_CALIBRATION_AVC for site visits and Sheet 16s submitted prior to this validation as well as the information for the current visit. Shaded blocks indicate the dates when a research quality data determination was made.

Table 5-3 Classification Validation History - 120100 – 12-Sep-2006

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Class 5	Other 2	
9/12/06	No. of Trucks	0	0			
9/11/06	No. of Trucks	0	0			0
3/1/05	No. of Trucks	0	0			3
2/28/05	No. of Trucks	0	0			1
12/16/03	Video	-10	-3	-25		2
12/03/03	No. of Trucks	1	0	25		1

Table 5-4 has the information found in TRF_CALIBRATION_WIM for site visits and Sheet 16s submitted prior to this validation as well as the information for the current visit.

Table 5-4 Weight Validation History - 120100 – 12-Sep-2006

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
9/12/06	Test Trucks	-2.8(2.7)	-0.7(5.5)	-3.3(3.2)
9/11/06	Test Trucks	-2.2(3.6)	0.2(7.5)	-2.7(3.8)
3/1/05	Test trucks	0.5 (4.1)	2.3 (5.1)	0.2 (5.1)
2/28/05	Test Trucks	1.5 (3.7)	5.3 (4.1)	0.8 (5.2)
12/17/03	Test Trucks	1.0 (7.2)	3.5 (12.7)	-2.1 (10.7)
12/16/03	Test Trucks	-15 (9.0)	-9.3 (9.0)	-17.8 (11.7)
7/9/03	Test Trucks	1.6 (3.9)	-2.9 (2.9)	2.2 (4.9)

Since the initial installation of the site the WIM system has utilized an IRD/PAT Traffic controller. The in-road sensors in the LTPP lane were changed from BL piezo sensor to Kistler quartz sensors in the summer of 2003. At this time, the WIM controller was also upgraded.

5.4 Projected Maintenance/Replacement Requirements

Due to the possible failure of the degraded sensor, the operation of the collected data should be analyzed weekly to ensure timely discovery of system failure in the event of sensor failure. Also, the degraded sensor should be checked monthly to determine if it has degraded further and if failure of the sensor is forthcoming. These practices will ensure timely replacement and avoid significant equipment down town and data loss.

No other corrective measures need to be performed at this time for the equipment.

6 Pre-Validation Analysis

This initial analysis is based on test runs conducted mid-day on September 11, 2006 at test site 120100 on US Route 27, 13.8 miles south of SR 80.

For the initial validation, each truck made a total of 21 passes over the WIM scale at speeds ranging from approximately 54 to 66 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 106 to 121 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are shown in Table 6-1.

As seen in Table 6-1, the site passed all of the performance criteria for research quality data except speed. A -5.0% bias was observed for both test trucks at the low speeds. It was determined that additional adjustment could further improve the overall quality of the data.

No auto-calibration was used during test runs. The two trucks used for initial calibration and for the subsequent testing included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and air suspension loaded to 75,030 lbs.; the golden truck.
2. 5-axle tractor semi-trailer combination with a tractor having air suspension and trailer with standard rear tandem and air suspension loaded to 64,630 lbs.; the partial loaded truck.

For the initial validation, each truck made a total of 21 passes over the WIM scale at speeds ranging from approximately 54 to 65 miles per hour. The desired range of speeds was obtained. Pavement surface temperatures were recorded during the test runs ranging from about 106 to 121 degrees Fahrenheit. The desired 30 degree Fahrenheit range for temperatures was not achieved. The computed values of 95% confidence limits of each statistic for the total population are within Table 6-1.

As seen in Table 6-1, the site passed all of the performance criteria for research quality data except speed. A -5.0% bias was observed for both test trucks at the low speeds. It was decided that additional adjustment could further improve the overall quality of the data.

Table 6-1 Pre-Validation Results - 120100 – 11-Sep-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	0.2 + 15.2%	Pass
Tandem axles	±15 percent	-2.7 + 7.6%	Pass
GVW	±10 percent	-2.2 + 7.4%	Pass
Speed	**±1 mph [2 km/hr]**	**0.7 + 2.3mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 + 0.2ft	Pass

The test runs were conducted primarily during the mid-day hours, resulting in a fairly narrow 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 two 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. Due to cloud cover, pavement temperatures did not vary by a significant degree.

The speed groups were divided as follows: Low speed – 54 to 57 mph, Medium speed – 58 to 62 mph and High speed - 63+ mph. The two temperature groups were created by splitting the runs between those at 105 to 115 degrees Fahrenheit for Low temperature and 116 to 125 degrees Fahrenheit for High temperature.

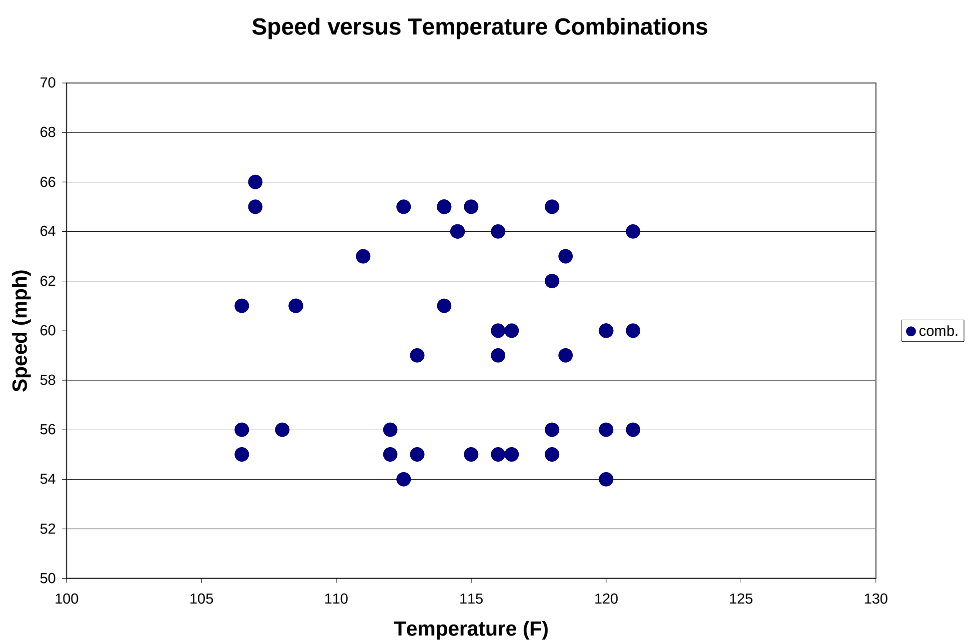


Figure 6-1 Pre-Validation Speed-Temperature Distribution – 120100 – 11-Sep-2006

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. The system underestimates GVW at low speeds. The underestimation progressively decreases as the speed increases. Variability in error appears to be greater at medium and high speeds when compared to low speeds.

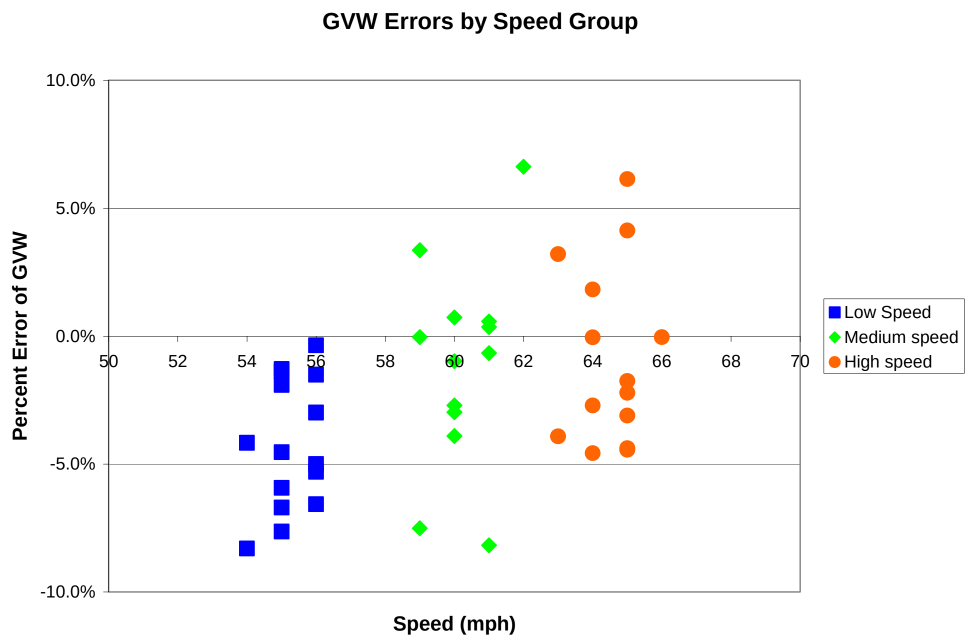


Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 120100 – 11-Sep-2006

Figure 6-3 shows the relationship between temperature and GVW percentage error. From the figure it appears that the GVW variability in error is fairly consistent over the entire temperature range. There appears to be a slight upwards trend to the estimates as temperatures increase.

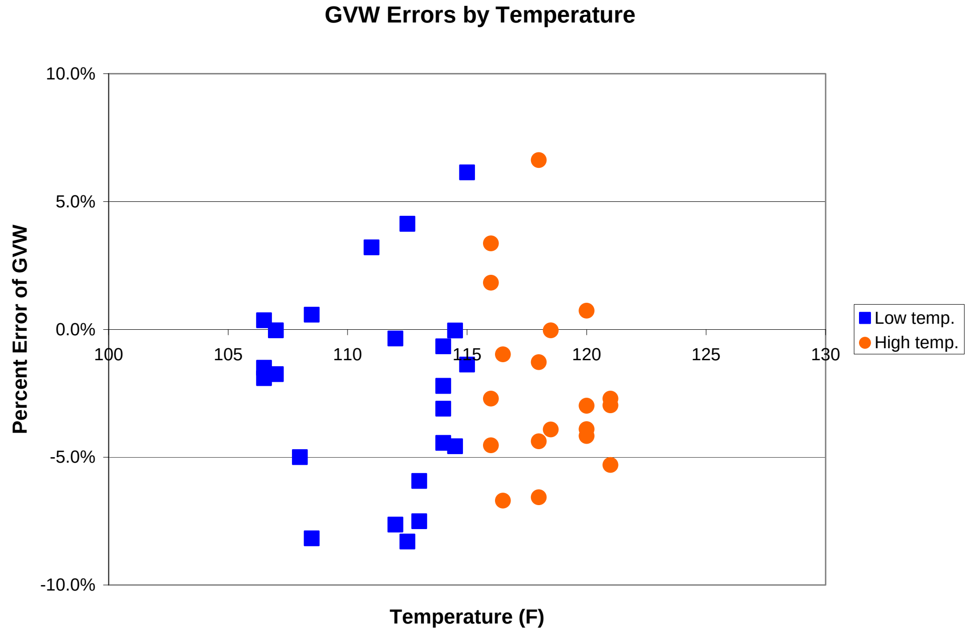


Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 120100 – 11-Sep-2006

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 affected by changes in speed.

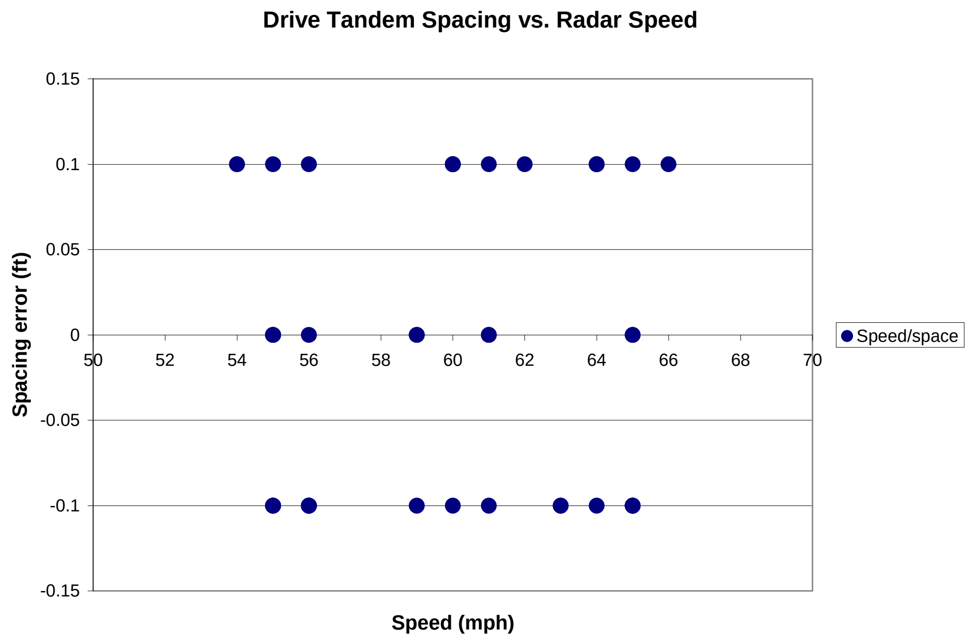


Figure 6-4 Pre-Validation Spacing vs. Speed - 120100 – 11-Sep-2006

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 106 to 115 degrees Fahrenheit for Low temperature and 116 to 121 degrees Fahrenheit for High temperature.

Table 6-2 Pre-Validation Results by Temperature Bin - 120100 – 11-Sep-2006

Element	95% Limit	Low Temperature 106 - 115 °F	High Temperature 116 - 121 °F
Steering axles	±20 %	0.1 + 17.5%	0.3 + 13.7%
Tandem axles	±15 %	-2.7 + 7.7%	-2.6 + 7.7%
GVW	±10 %	-2.2 + 8.1%	-2.1 + 7.2%
Speed	±1 mph	0.2 + 1.2mph	1.3 + 2.7mph
Axle spacing	± 0.5 ft	0.0 + 0.2ft	0.0 + 0.2ft

From Table 6-2 it can be seen that weights are estimated consistently throughout the entire temperature range. Variability in steering axle appears to be much higher at the lower end of the temperature range when compared to the higher end.

Figure 6-5 shows the distribution of GVW errors versus temperature by truck. The equipment appears to produce generally the same estimation errors for GVW weights for both trucks over the observed temperature range.

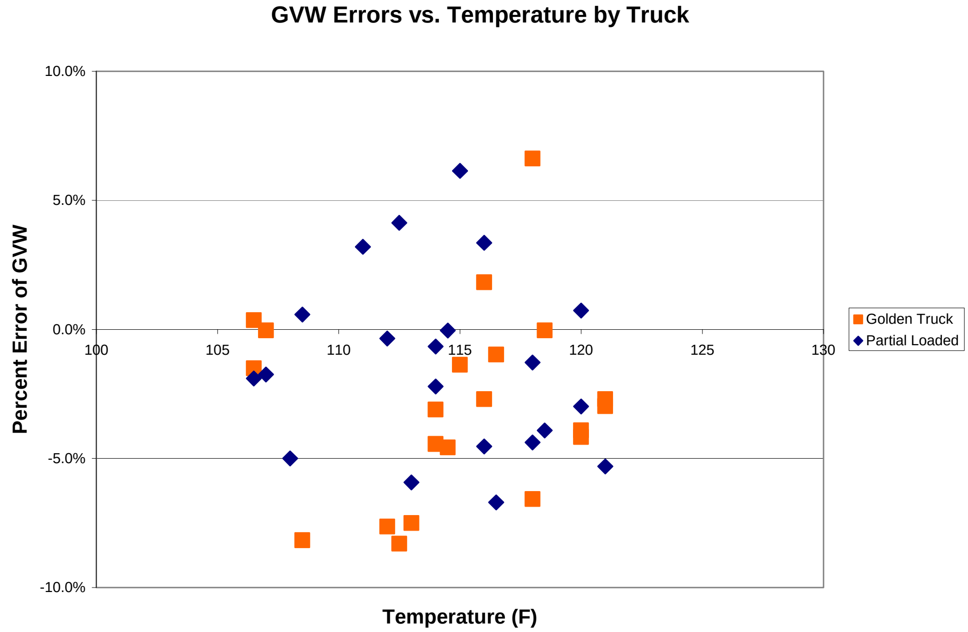


Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 120100 – 11-Sep-2006

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 calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From Figure 6-6, it appears that steering axle estimation by the equipment is consistent over the temperature range; however, variability in error appears to be higher at the low end of the temperature range when compared to high end.

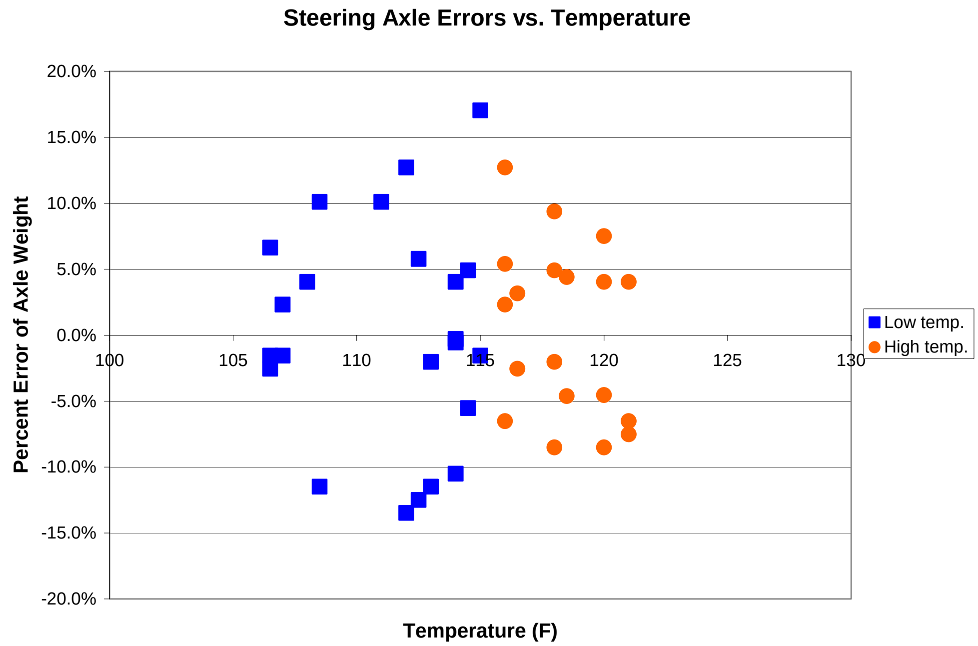


Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group - 120100 – 11-Sep-2006

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 54 to 57 mph, Medium speed – 58 to 62 mph and High speed - 63+ mph.

Table 6-3 Pre-Validation Results by Speed Bin - 120100 – 11-Sep-2006

Element	95% Limit	Low Speed 54 to 57 mph	Medium Speed 58 to 62 mph	High Speed 63+ mph
Steering axles	+20 %	-0.3 + 16.5%	-0.4 + 17.6%	1.3 + 15.7%
Tandem axles	+15 %	-5.1 + 5.8%	-1.4 + 7.8%	-1.3 + 7.3%
GVW	+10 %	-4.2 + 5.5%	-1.2 + 8.8%	-0.8 + 7.5%
Speed	+1 mph	0.6 + 2.0 mph	1.0 + 3.3 mph	0.5 + 1.9 mph
Axle spacing	+ 0.5 ft	0.0 + 0.2 ft	0.0 + 0.2 ft	0.0 + 0.2 ft

From Table 6-3, it can be seen that steering axle mean error and variability are generally consistent throughout the entire speed range. For GVW and tandem weights, the equipment underestimates the weights more and variability is less at low speeds when compared to medium and high speeds

Figure 6-7 illustrates the tendency of the equipment to underestimate GVW for both trucks at low speeds. The underestimation decreases as the speeds increase. At medium speeds it appears the GVW of the partially loaded truck (diamonds) is estimated accurately, whereas the GVW for the golden truck (squares) is underestimated by approximately 3 percent. Variability in GVW error appears to be greater for the golden truck at medium and high speeds when compared to low speeds, however, variability for the partially loaded truck is less at medium speeds when compared to low and high speeds.

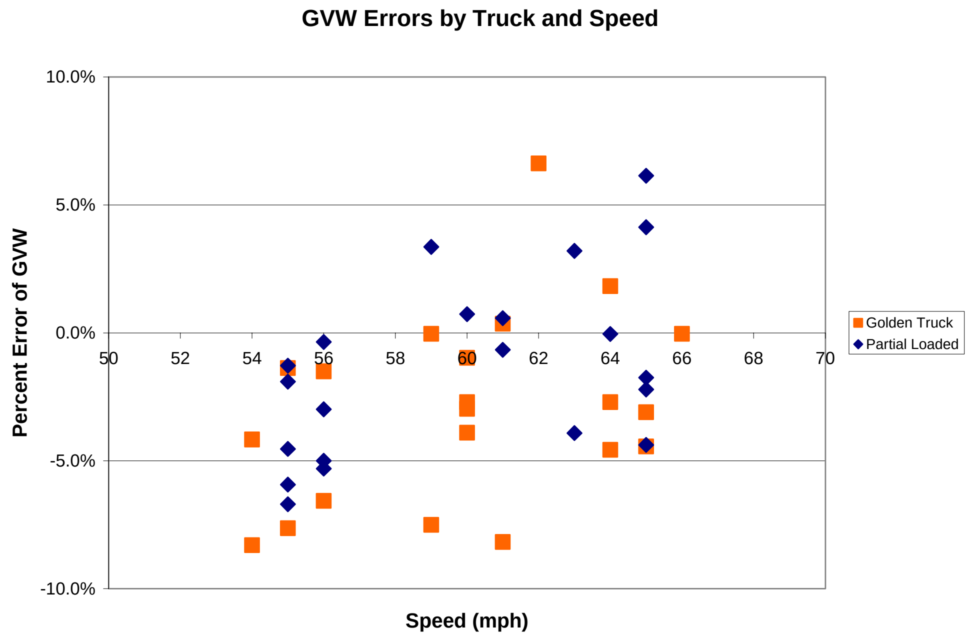


Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 120100 – 11-Sep-2006

Figure 6-8 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 Figure 6-8, it appears that the equipment generally estimates steering axle weights accurately throughout the entire speed range.

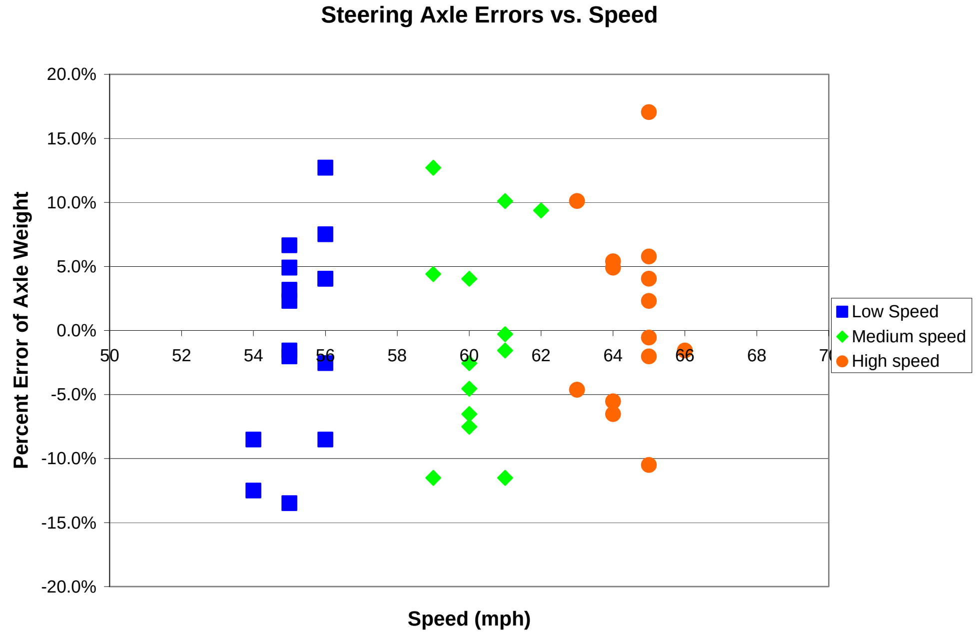


Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 120100 – 11-Sep-2006

6.3 Classification Validation

The agency uses a modified FHWA 13 bin classification scheme. The modification utilizes a Class 15 for unknown vehicles.

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 were zero percent unknown vehicles and zero 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 zero in this sample.

Table 6-4 Truck Misclassification Percentages for 120100 - 11-Sep-2006

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	N/A	5	0	6	0
7	0				
8	0	9	0	10	0
11	0	12	N/A	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 6-5 Truck Classification Mean Differences for 120100 - 11-Sep-2006

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	N/A	5	0	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 are those identified by the equipment but no vehicles of the type were seen the observer. There is no way to tell how many more than those that might actually present exist. N/A means no vehicles of the class recorded by either the equipment or the observer.

6.4 Evaluation by ASTM E-1318 Criteria

The ASTM E-1318 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
GWV	± 10%	100%	Pass

6.5 Prior Validations

The last validation at this site was complete March 1, 2005. The outcome is graphed in Figure 6-9. The prior validation was conducted with similar golden truck loaded to 78,440 lbs. The second truck had a spring leaf suspension on the tractor and an air suspension on the trailer. It was more lightly loaded that the second truck for this case, 45,930 lbs.

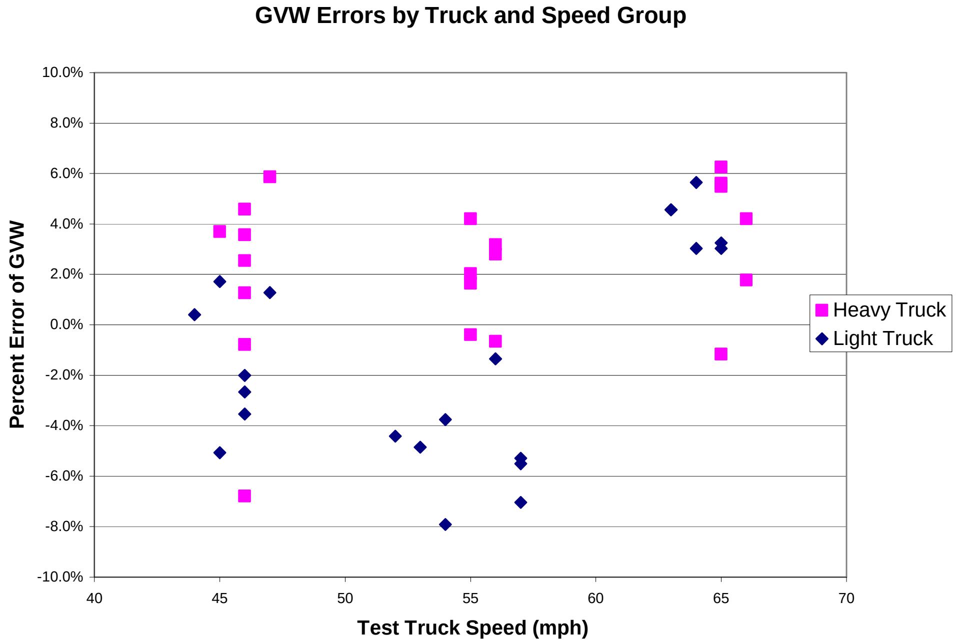


Figure 6-9 Post-validation GVW Percent Error vs. Speed by Truck – 120100 – 01 Mar 2005

The overall statistics for the prior validation are shown in Table 6-7. In comparison to this information the pre-validation for this visit showed an under estimation of loads and a somewhat smaller amount of variation.

Table 6-7 Post-Validation Results - 120100 – 01 Mar 2005

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	±20 percent	2.3%±10.2%	Pass
Loaded tandem axles	±15 percent	0.2%±10.1%	Pass
Gross vehicle weights	±10 percent	0.5%±8.2%	Pass
Vehicle speed	±1 mph [2 km/hr]	N/A	Pass
Axle spacing length	± 0.5 ft [150 mm]	-0.1±0.2 ft	Pass

Table 6-8 contains the prior validation's results by speed group. These speed groups are wider than those for the current validation. It was determined that a smaller speed range should be used based on the prevailing distribution of speeds at the site.

Table 6-8 Post-Validation Results by Speed Bin – 120100 – 01 Mar 2005

Element	95% Limit	Low Speed 44 to 51 mph	Med. Speed 52 to 58 mph	High Speed 59+ mph
Single axles	±20 %	0.4%±10.0%	1.3%±10.8%	5.9%±8.4%
Tandem axles	±15 %	0.5%±11.6%	-2.6%±8.9%	3.3%±6.1%
GVW	±10 %	0.3%±7.9%	-1.8%±8.6%	3.9%±4.6%
Speed	±1 mph	N/A	N/A	N/A
Axle spacing	± 0.5 ft	0.2±0.2 ft	-0.1±0.2 ft	-0.1±0.2 ft

Previous validations have occurred with ranges of 77 to 95 degrees and 61 to 89 degrees (the first validation). The values in Table 6-9 apply to prior validation.

Table 6-9 Post-Validation Results by Temperature Bin – 120100 – 01 Mar 2005

Element	95% Limit	Low Temperature 77 - 85F	High Temperature 86 - 95F
Single axles	±20 %	2.3%±11.9%	2.3%±9.5%
Tandem axles	±15 %	0.6%±11.3%	-0.2%±9.3%
GVW	±10 %	0.9%±9.5%	0.2%±7.6%
Speed	±1 mph	N/A	N/A
Axle spacing	± 0.5 ft	0.0±0.1 ft	-0.1±0.2

7 Data Availability and Quality

As of September 12, 2006, 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 Table 5-3 and Table 5-4, we can only describe the data since the sensor change in 2003 as research quality data. As of this report, no data has been submitted from this site for 2005. Upon submission of that data, we will still need at least three additional years to meet the goal of a minimum of 5 years of research quality data. The site validation in December 2003 did not determine that research quality WIM data was being produced.

Table 7-1 Amount of Traffic Data Available 120100 –12-Sep-2006

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1996	215	11	Full Week	319	12	Full Week
1997	219	10	Full Week	249	10	Full Week
1998	208	12	Full Week	232	12	Full Week
1999	145	6	Full Week	193	8	Full Week
2000	263	11	Full Week	276	11	Full Week
2001	325	12	Full Week	226	8	Full Week
2002	223	10	Full Week	247	11	Full Week
2003	229	10	Full Week	248	10	Full Week
2004	328	12	Full Week	332	12	Full Week
2006	120	4	Full Week	120	4	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 RSC 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 - 120100 – 12-Sep-2006

Characteristic	Class 9
Percentage Overweights	1.2%
Percentage Underweights	0.2%
Unloaded Peak	38,000 lbs
Loaded Peak	76,000 lbs

The expected percentage of unclassified vehicles is 1.4%. 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.

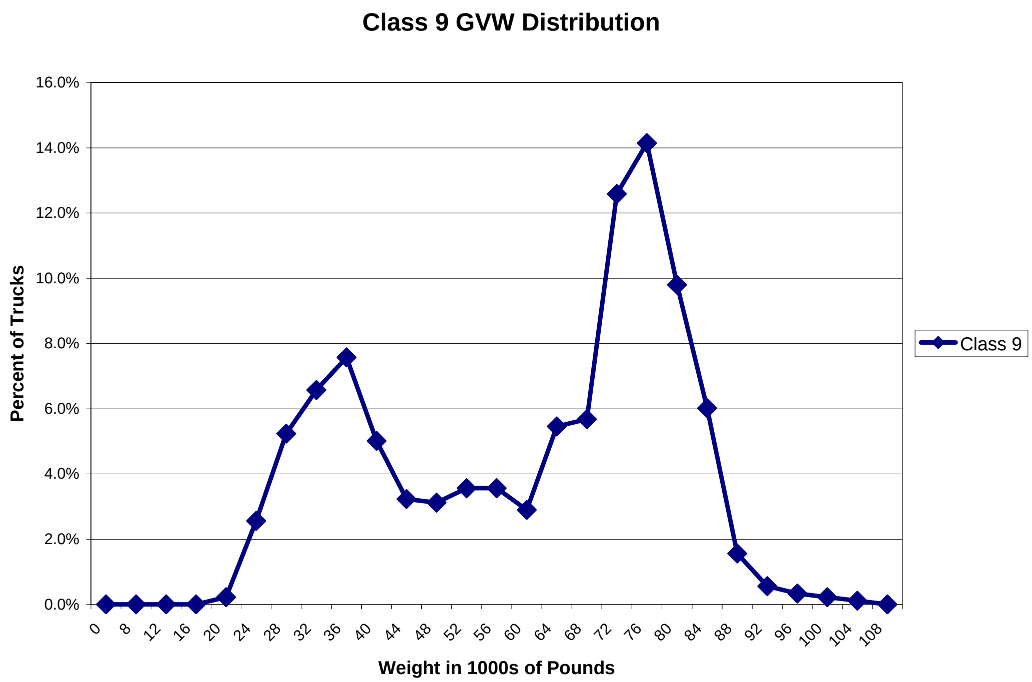


Figure 7-1 Expected GVW Distribution Class 9 – 120100 – 12-Sep-2006

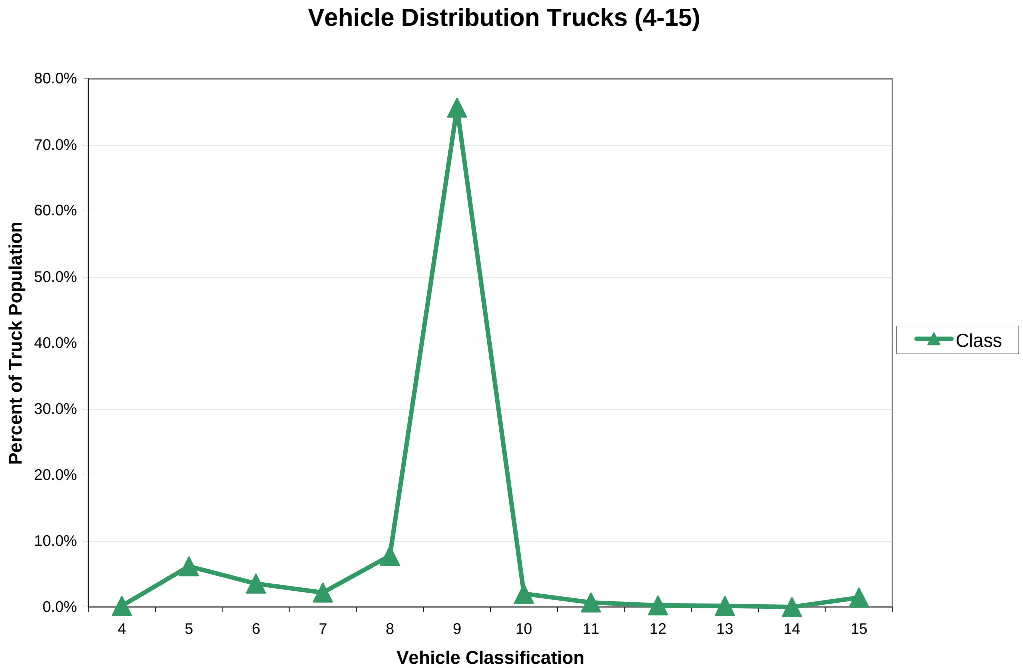


Figure 7-2 Expected Vehicle Distribution - 120100 – 12-Sep-2006

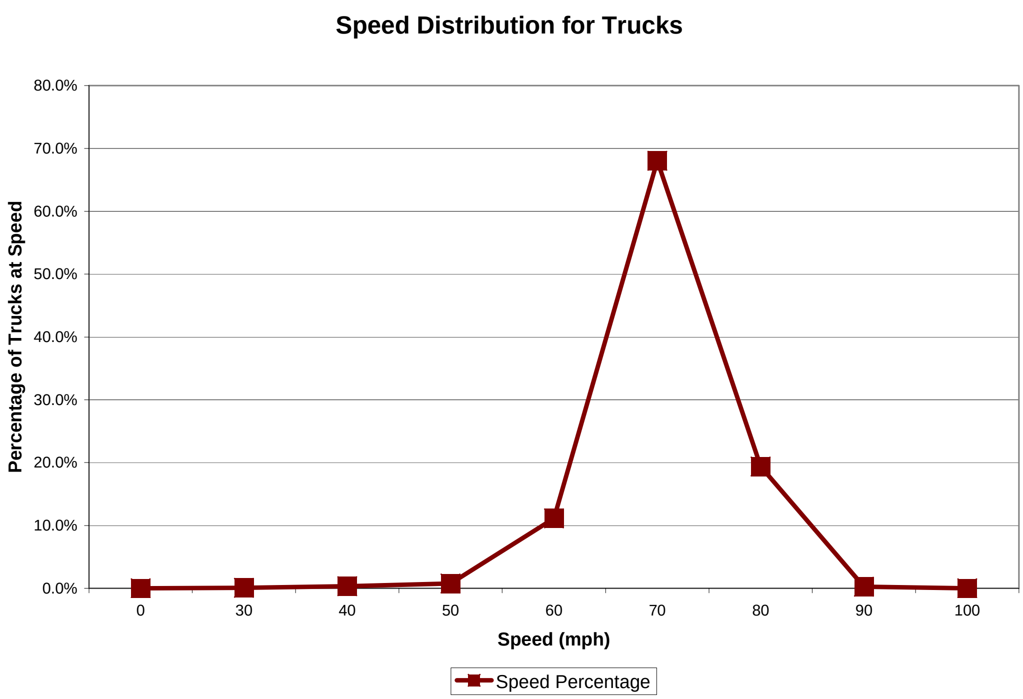


Figure 7-3 Expected Speed Distribution - 120100 – 12-Sep-2006

8 Data Sheets

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

Sheet 19 – Truck 1 – 3S2 loaded air suspension (4 pages)
Sheet 19 – Truck 2 – 3S2 loaded air suspension (4 pages)

Sheet 20 – Speed and Classification verification Pre-Validation (3 pages)

Sheet 21 – Pre-Validation (3 pages)
Sheet 21 – Calibration Iteration 1 (1 page)
Sheet 21 – Calibration Iteration 2 (1 page)
Sheet 21 – Post-Validation (3 pages)

Calibration Iteration 1 Worksheets (1 page)
Calibration Iteration 2 Worksheets (1 page)

Test Truck Photographs (6 pages)

FDOT – Axle Spacing Scheme (1 page)

FDOT – Class Table (7 pages)

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. Other than the location of a new certified CAT Truck Scale, there are no significant changes in the information provided in the Pre-Visit Handout Guide.

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.

PRE-VISIT HANDOUT GUIDE FOR SPS WIM VALIDATION

STATE: Florida

SHRP ID: 0100

Figures

1. General Information

SITE ID: *120100*

LOCATION: *US 27 South, 13.8 miles south of SR 80, South Bay*

VISIT DATE: *September 11th, 2006*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *Richard Reel, 850-414-4709, richard.reel@dot.state.fl*

Walton Jones, 850-414-4726, walton.jones@dot.state.fl.us

Mike Leggett, 850-414-4727, michael.Leggett@dot.state.fl.us

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

FHWA Division Office Liaison: *Norbert Munoz, 850-942-9650, ext. 3036, norbert.munoz@fhwa.dot.gov*

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

3. Agenda

BRIEFING DATE: *None requested.*

ONSITE PERIOD: *September 11 through 12, 2006*

TRUCK ROUTE CHECK: *N/A*

4. Site Location/ Directions

NEAREST AIRPORT: *Palm Beach International Airport, West Palm Beach, Florida or Fort Lauderdale/Hollywood International Airport, Fort Lauderdale, Florida.*

DIRECTIONS TO THE SITE: *13.8 miles south of SR 80, south of South Bay.*

MEETING LOCATION: *On site at 9:00am.*

WIM SITE LOCATION: *US 27, milepost 12.03 (Latitude: 26.48096; Longitude: -80.65128)*

WIM SITE LOCATION MAP:*See Figure 4.1*

Figure 4-1 - Site 120100 in Florida

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *CAT Certified Scales, 255 North Highway 27, South Bay, FL., open 24 hrs; $8.50 first weigh, $1.00 re-weigh, phone – 561-992-4800.*

TRUCK ROUTE:

- *Northbound: Truck Crossing at 0.746 miles from site (26^0 29.396' North and 80^0 39.474' West)(For low speeds).*
- *Northbound: Truck Crossing at 1.372 miles from site (26^0 29.840' North and 80^0 34.817' West)*
- *Southbound: Truck Crossing at 0.848 miles from site (26^0 28.267' North and 80^0 38.599' West).*

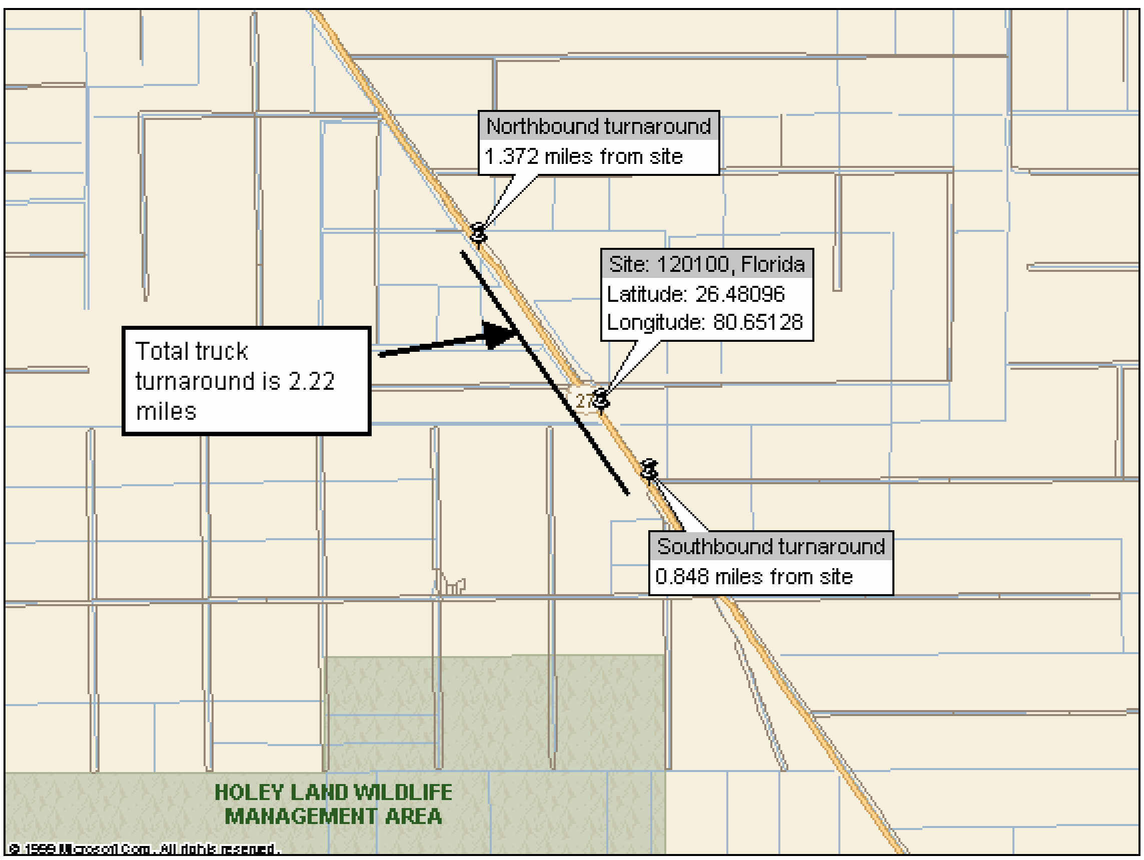


Figure 5-1 - Truck Route Map at 120100

6. Sheet 17 – Florida (120100)

1.* ROUTE ___US 27_____ MILEPOST __12.03___ LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade __<_1_____ % Sag vertical Y / N
Nearest SPS section upstream of the site _0__ _1__ _0__ _8__
Distance from sensor to nearest upstream SPS Section ___ _7__ _2__ _8__ 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 _4*_ ft * 12' Merge Lane between LTPP Lane and Shoulder

4.* PAVEMENT TYPE _____Asphalt Concrete______ ______________

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date _09/11/06_ Filename: Downstream_TO_15_12_2.69_0100_09_11_06.JPG_______
Date _09/11/06_ Filename: Upstream_TO_15_12_2.69_0100_09_11_06.JPG_________
Date _________ Filename ____

6. * SENSOR SEQUENCE _________Quartz Sensor – Loop – Quartz Sensor_____

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 _6_ _8_ ft

Distance from system __7 _5 __ ft

TYPE ______334B_____________________

CABINET ACCESS controlled by LTPP / STATE / JOINT ?

Contact - name and phone number ____Kip Jones (850) 414-4726__

Alternate - name and phone number __Michael Leggett (850) 414-4727

11. * POWER

Distance to cabinet from drop ___ _1__ _5__ ft Overhead / underground / solar / AC in cabinet?

Service provider _____________________ Phone number _____________________

12. * TELEPHONE

Distance to cabinet from drop ___ _4__ _5__ ft Overhead / under ground / cell?

Service provider _____________________ Phone Number _____________________

13.* SYSTEM (software & version no.)- _________DAW – 190 Ver. 3.08-7 4/2/03___

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

14. * TEST TRUCK TURNAROUND time ___6____ minutes DISTANCE _4_. _4_ mi.

15. PHOTOS FILENAME

Power source _ Solar Panel_TO_15_12_2.69_0100_09_11_06.JPG __________

Phone source _ Telephone_Box_TO_15_12_2.69_0100_09_11_06.JPG _______

Cabinet exterior _ Cabinet_Exterior_TO_15_12_2.69_0100_09_11_06.JPG ______

Cabinet interior _ Cabinet_Interior_TO_15_12_2.69_0100_09_11_06.JPG ______

Weight Sensors _ Leading_WIM_Sensor_TO_15_12_2.69_0100_09_11_06.JPG _

_ Trailing_WIM_Sensor_TO_15_12_2.69_0100_09_11_06.JPG _

Classification sensors ____

____

Other sensors _ Loop_Sensor_TO_15_12_2.69_0100_09_11_06.JPG _________

Description _Loop Detector____________________

Downstream direction at sensors on LTPP lane

__ Downstream_TO_15_12_2.69_0100_09_11_06.JPG _______

Upstream direction at sensors on LTPP lane

__ Upstream_TO_15_12_2.69_0100_09_11_06.JPG__________

COMMENTS _______GPS Coordinates: Latitude: 26.48096; Longitude -80.65128____
_ Posted speed limit – 65 mph.
________Amenities:
____________Cleniston (30 miles, Best Western)

____________South Bay (13.5 miles)
____________Chevron, Shell (Mini-Mart)

_____________Belle Glade (17.0) miles)
______________Various Fast Food
______________Bank Of America
______________Various Gas Stations
______________Budget Inn
______________Radio Shack
______________Winn Dixie

_______________West Palm Beach (55 miles)
________________Various Amenities

______Predominant Trucks – Empty Sugar Cane Haulers, Loaded 500 Haulers________

______ ___Types of Trucks: Two Class 9s
__________Expected Weight Ranges: Truck 1 – 72,000 to 80,000 legal limit on gross___
and axles, air suspension; Truck 2 – partially loaded 60,000 – 65,000 lbs no suspension__
requirements

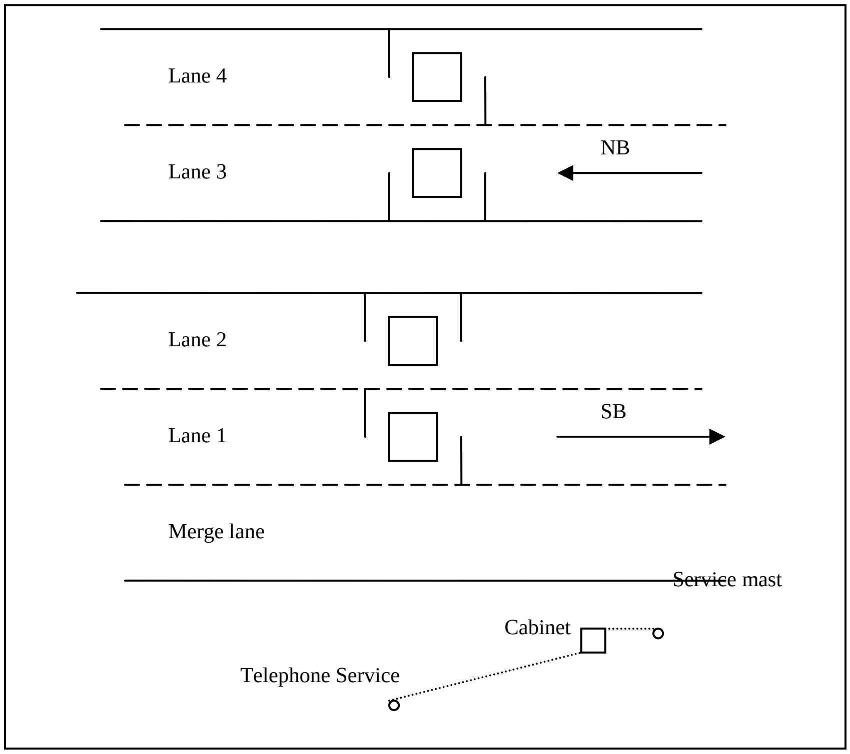
___________Speeds to be run: 55 to 65 mph

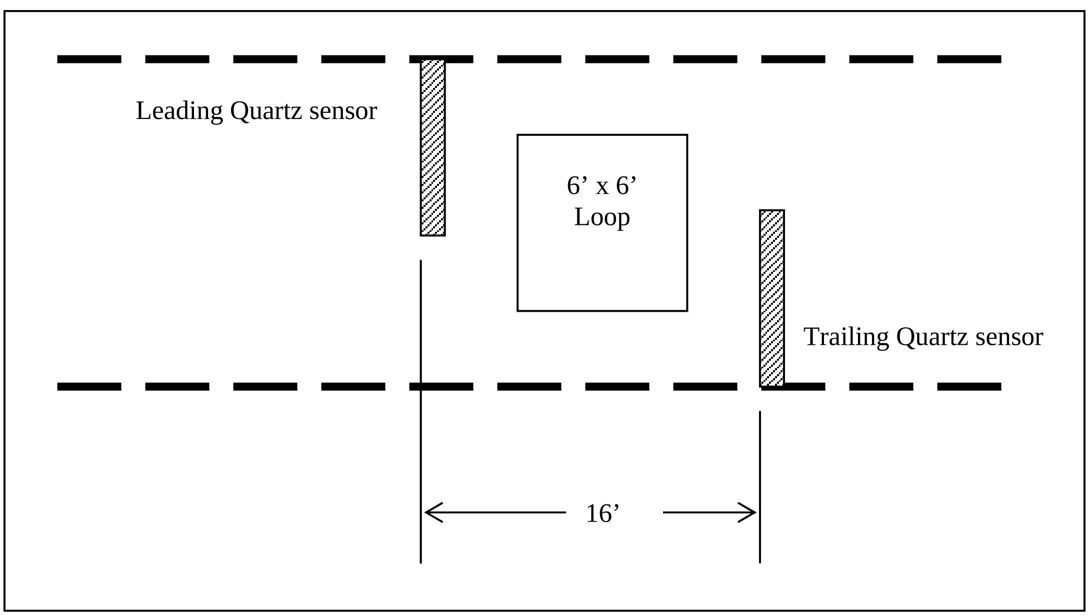
___________Pavement damage in left wheelpath and right edge of lane__(02/28/05)____

COMPLETED BY ______Dean J. Wolf

PHONE __301-210-5105___________ DATE COMPLETED _0_9_ /_1_1_ / _2_0_0_6_

Sketch of equipment layout





Site Map

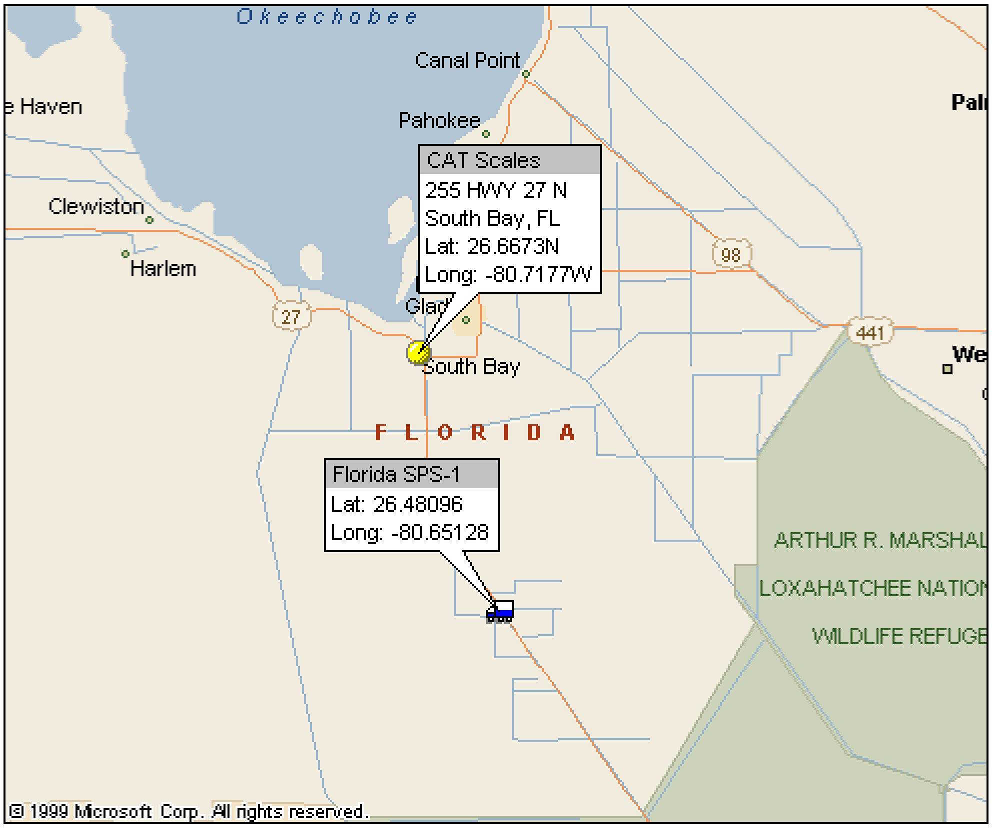


Figure 6-1 - Site Map at 120100

Figure 6-2 - Solar Panel_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-3 - Telephone_Box_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-4 Cabinet_Exterior_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-5 Cabinet_Interior_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-6 Leading_WIM_Sensor_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-7 Trailing_WIM_Sensor_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-8 Loop_Sensor_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-9 Downstream_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-10 Upstream_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-11 - Leading_Sensor_Cracking_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-12 - Trailing_Sensor_Cracking_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-13 - Loop_Damage_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-14 - Pavement_Distress_1_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-15 - Pavement_Distress_2_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-16 - Pavement_Distress_3_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-17 - Pavement_Distress_4_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-18 - Old_Install_Damage_1_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-19 - Old_Install_Damage_2_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-20 - Old_Install_Damage_3_TO_15_12_2.69_0100_09_11_06.JPG

Figure 6-21 - Old_Loop_Damage_TO_15_12_2.69_0100_ 09_11_06.jpg

Figure 6-22 - Old_Site_Pavement_TO_15_12_2.69_0100_ 09_11_06.jpg

SHEET 18	STATE CODE [_1_2_]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [_0_1_0_0]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) _0_9_ / _1_1_ / _2_0_0_6_

Rev. 05/25/04

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

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

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

2. EQUIPMENT –
   a. Purchase –
      X State
      ☐ LTPP

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

   c. Maintenance –
      ☐ Contract with purchase – Expiration Date ________
      ☐ Separate contract LTPP – Expiration Date ________
      X Separate contract State – Expiration Date ________
      ☐ State personnel

   d. Calibration –
      X Vendor
      ☐ State
      ☐ LTPP

   e. Manuals and software control –
      X State
      ☐ LTPP

   f. Power –
      i. Type –
         ☐ Overhead
         ☐ Underground
         X Solar
      ii. Payment –
         ☐ State
         ☐ LTPP
         ☐ N/A

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

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

4. ON SITE ACTIVITIES –
   a. WIM Validation Check - advance notice required ___14__ X days ☐ weeks
   b. Notice for straightedge and grinding check - ___4___ ☐ days X weeks
      i. On site lead –
         X State
         ☐ LTPP
      ii. Accept grinding –
         X State
         ☐ LTPP
   c. Authorization to calibrate site –
         X State only
         ☐ LTPP
   d. Calibration Routine –
         X LTPP – ☐ Semi-annually X Annually
         ☐ State per LTPP protocol – ☐ Semi-annually ☐ Annually
         X State other – ____________________________

e. Test Vehicles
   i. Trucks –
      1st – Air suspension 3S2 ☐ State X LTPP
      2nd – 3S2 Partially Loaded ☐ State X LTPP
      3rd – ________________ ☐ State ☐ LTPP
      4th – ________________ ☐ State ☐ LTPP
   ii. Loads – ☐ State X LTPP
   iii. Drivers – ☐ State X LTPP

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

_______FTE, DTS, MACTEC Engineering and Consulting, Inc.________________

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

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

i. Traffic Control Required – ☐Yes X No

j. Enforcement Coordination Required – ☐Yes X 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: ___Michael Leggett_______ Phone: __(850) 414-4727____

      Agency: ____ARA________________________________

b. Maintenance (equipment) –

Name: ___Kip Jones___________ Phone: __(850) 414-4726___

Agency: ______________________

c. Data Processing and Pre-Visit Data –

Name: ______________________ Phone: ______________

Agency: ______________________

d. Construction schedule and verification –

Name: ______________________ Phone: ______________

Agency: ______________________

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

Name: __Billy Graham__________ Phone: __(352) 210-5032___

Agency: ______Graham Trucking______________________

f. Traffic Control –

Name: ______________________ Phone: ______________

Agency: ______________________

g. Enforcement Coordination –

Name: ______________________ Phone: ______________

Agency: ______________________

h. Nearest Static Scale

Name:__CAT Scales__ Location: __255N US 27 in South Bay, FL__

Phone: ______(561) 992-4800________________________

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [__9_9_3_5_] *STATE CODE [_1_2_] *SHRP SECTION ID [__0_1_0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_9_ / _1_1_ / _2_0_0_6__]

2. * TYPE OF EQUIPMENT CALIBRATED _x_ WIM __ CLASSIFIER ___ 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 ____ BENDING PLATES
____ CHANNELIZED ROUND PIEZO ____ LOAD CELLS _x__ 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

__2_0__ 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 ___ ___ _ - 2 . 2_ STANDARD DEVIATION __ _3 . 6_
DYNAMIC AND STATIC SINGLE AXLES ___ ___ __ 0 . 2_ STANDARD DEVIATION __ _7 . 5_
DYNAMIC AND STATIC DOUBLE AXLES ___ ___ _ - 2 . 7_ STANDARD DEVIATION __ _3 . 8_

8. ___3____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) ______ ____55, _ 60, _ 65______ ______ ______ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___ __7_6_0___ ___

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____ FHWA CLASS ____ ____ ____ ____ ____
*** FHWA CLASS 8 ____ ___0____ FHWA CLASS ____ ____ ____ ____ ____
FHWA CLASS ____ ____ ____ ____ ____
FHWA CLASS ____ ____ ____ ____ ____

*** PERCENT "UNCLASSIFIED" VEHICLES: ____ ___0 . 0___

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, __MACTEC E&C______________________________
CONTACT INFORMATION: __301-210-5105____ rev. November 9, 1999

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [__9_9_3_5_] *STATE CODE [_1_2_] *SHRP SECTION ID [__0_1_0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_9_ / _1_2_ / _2_0_0_6__]

2. * TYPE OF EQUIPMENT CALIBRATED _x_ WIM __ CLASSIFIER ___ 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 ____ BENDING PLATES
____ CHANNELIZED ROUND PIEZO ____ LOAD CELLS _x__ 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

__2_0__ 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 ___ ___ _ - 2 . 8_ STANDARD DEVIATION __ _2 . 7_
DYNAMIC AND STATIC SINGLE AXLES ___ ___ _ - 0 . 7_ STANDARD DEVIATION __ _5 . 5_
DYNAMIC AND STATIC DOUBLE AXLES ___ ___ _ - 3 . 3_ STANDARD DEVIATION __ _3 . 2_

8. ___3____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) ______ ____55, _ 60, _ 65______ ______ ______ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___ __7_8_0___ ___

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____ FHWA CLASS ____ ____ ____ ____ ____
*** FHWA CLASS 8 ____ ___0____ FHWA CLASS ____ ____ ____ ____ ____
FHWA CLASS ____ ____ ____ ____ ____
FHWA CLASS ____ ____ ____ ____ ____
*** PERCENT "UNCLASSIFIED" VEHICLES: ____ ___0 . 0___

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, __MACTEC E&C______________________________
CONTACT INFORMATION: __301-210-5105____ rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	9-11-06

Rev. 08/31/01

PART I.

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		10130	9700	D / C
B		16590	16800	D / C
C		16590	16500	D / C
D		15930	15910	D / C
E		15930	15910	D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW ______________

*b) Average Pre-Test Loaded weight 75180
*c) Post Test Loaded Weight 74520
*d) Difference Post Test – Pre-test -660

GEOMETRY

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

9. a) * Make: KENWORTH b) * Model: W900

10.* Trailer Load Distribution Description:

CONCRETE BLOCKS FROM FRONT TO 3/4, STEEL BEAMS OVER REAR TANDEM

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

b). Trailer Tare Weight (units): ______________

Sheet 19	* STATE_CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	9-11-06

Rev. 08/31/01

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

A to B 19.1 B to C 4.4 C to D 32.3

D to E 4.2 E to F ______

Wheelbased (measured A to last) ______ Computed 60.0

13. *Kingpin Offset From Axle B (units) +3.0 (______)__

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R24.5	4 full leaf springs
B	11R24.5	air
C	11R24.5	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	12
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	9-11-06

Rev. 08/31/01

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 12
LTPP Traffic Data	* SPS PROJECT ID 0100
*CALIBRATION TEST TRUCK # 1	* DATE 9.11.06

Rev. 08/31/01

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.											

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10180	16580	16580	15930	15930		75200
2	10120	16600	16600	15920	15920		75160
3	10100	16600	16600	15940	15940		75180
Average	10130	16590	16590	15940	15940		75180
day 1 post	9980	16550	16550	15900	15900		74880

Table 6. Raw data – Axle scales – day 2 post validation/pre

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9860	16560	16560	15920	15920		74820
2	9840	16580	16580	15920	15920		74840
3	10020	16490	16490	15930	15930		74860
Average	9910	16540	16540	15920	15920		74840
day 2 post	9700	16500	16500	15910	15910		74520

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

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

Measured By DJW

Verified By ______________________

Sheet 19	* STATE_CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 2	* DATE	9-11-06

Rev. 08/31/01

PART I.

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		11630	11600	D / C
B		13070	13000	D / C
C		13070	13000	D / C
D		13490	13550	D / C
E		13490	13550	D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW ______________

*b) Average Pre-Test Loaded weight 64760
*c) Post Test Loaded Weight 64700
*d) Difference Post Test – Pre-test -60

GEOMETRY

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

9. a) * Make: MACK b) * Model: CL700

10.* Trailer Load Distribution Description:

STEEL BEAMS LOADED EVENLY ALONG TRAILER. FORKLIFT WEIGHTS (4) LOADED CENTERLINE ABOUT MIDWAY

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

b). Trailer Tare Weight (units): ______________

Sheet 19	* STATE_CODE 12
LTPP Traffic Data	* SPS PROJECT ID 0100
*CALIBRATION TEST TRUCK # 2	* DATE 9-11-06

Rev. 08/31/01

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

A to B 14.9 B to C 4.4 C to D 30.7

D to E 4.1 E to F ______

Wheelbased (measured A to last) ______ Computed 54.1

13. *Kingpin Offset From Axle B (units) +2.1 (______)
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	65R22.5	3 FULL SPRINGS
B	11R24.5	AIR
C	11R24.5	AIR
D	80R22.5	AIR
E	75R22.5	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 12
LTPP Traffic Data	* SPS PROJECT ID 0100
*CALIBRATION TEST TRUCK # 2	* DATE 9.11.06

Rev. 08/31/01

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 12
LTPP Traffic Data	* SPS PROJECT ID 0100
*CALIBRATION TEST TRUCK # 2	* DATE 9.11.06

Rev. 08/31/01

Table 4 . Axle and GVW computations - day 1 - pre-validation

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11720	13000	13000	13510	13510		64740
2	11580	13110	13110	13490	13490		64780
3	11580	13110	13110	13480	13480		64760
Average	11630	13070	13070	13490	13490		64760
day 1 post	11440	13070	13070	13460	13460		64500

Table 6. Raw data – Axle scales – day 2 post -validation/pre

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11700	13190	13190	13460	13460		65000
2	11600	13150	13150	13560	13560		65020
3	11720	13180	13180	13460	13460		65000
Average	11670	13170	13170	13490	13490		65010
day 2 post	11600	13000	13000	13550	13550		64700

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

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

Measured By [signature] Verified By ____________

Sheet 20	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 1 of* 3	* DATE 09/11/2006

Rev. 08/31/2001….

PRE-VALIDATION

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
64	9	4730	63	9	59	9	4859	58	9
64	9	4735	64	9	72	5	4864	72	5
62	11	4737	62	11	68	8	4875	68	8
71	9	4741	70	9	59	9	4876	58	9
57	9	4743	57	9	67	9	4879	67	9
56	9	4744	56	9	73	9	4885	73	9
63	11	4763	63	11	78	10	4893	78	10
67	9	4767	67	9	68	9	4895	68	9
65	5	4770	64	5	66	9	4896	65	9
70	9	4781	70	9	60	9	4898	60	9
65	9	4783	65	9	69	9	4906	69	9
65	9	4792	65	9	67	9	5202	67	9
62	9	4794	62	9	67	9	5207	67	9
66	6	4795	66	6	67	8	5212	67	8
65	3	4803	65	3	37	8	5215	37	8
54	8	4804	54	8	66	8	5218	66	8
64	9	4808	64	9	64	6	5230	64	6
64	9	4817	64	9	69	9	5243	68	9
76	9	4819	76	9	61	9	5246	61	9
61	9	4820	61	9	63	9	5250	63	9
67	9	4825	66	9	66	9	5254	66	9
62	9	4828	62	9	69	9	5256	68	9
66	9	4829	66	9	64	9	5258	64	9
61	9	4834	61	9	67	9	5263	66	9
61	7	4848	62	7	64	7	5264	64	7

Recorded by DJW Direction S Lane 1 Time from 13:00 to 2:16

Sheet 20	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 2 of* 3	* DATE 09/11/2006

Rev. 08/31/2001….

PRE-VALIDATION

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
68	6	5265	68	6	63	8	5420	63	8
64	9	5294	64	9	64	9	5430	64	9
51	9	5301	51	9	67	3	5431	68	3
59	9	5305	59	9	66	9	5434	65	9
65	9	5307	65	9	55	9	5437	55	9
67	9	5315	67	9	58	9	5446	58	9
68	5	5324	68	5	52	5	5453	52	5
68	8	5328	68	8	55	3	5457	55	3
67	8	5330	67	8	58	5	5459	58	5
65	9	5333	65	9	67	9	5460	66	9
65	9	5339	65	9	66	3	5465	65	3
63	9	5344	63	9	64	5	5491	64	5
67	9	5351	67	9	50	6	5493	50	6
62	9	5366	62	9	64	9	5500	64	9
long truck 61	15	5364	60	15	69	5	5501	69	5
62	9	5370	61	9	61	9	5504	61	9
59	7	5384	59	7	62	8	5508	61	8
67	7	5394	67	7	69	8	5517	69	8
68	7	5395	68	7	64	9	5523	64	9
67	7	5398	67	7	68	9	5530	68	9
66	9	5403	66	9	69	9	5535	69	9
63	10	5406	63	10	64	9	5542	64	9
67	9	5413	67	9	70	9	5545	70	9
60	3	5416	60	3	67	9	5549	66	9
66	9	5418	66	9	67	9	5550	66	9

Recorded by DJW Direction S Lane 1 Time from 2:16 to 2:49

Sheet 20	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 3 of* 3	* DATE 09/11/2006

Rev. 08/31/2001….

PRE-VALIDATION

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
64	9	5556	64	9					
74	9	5559	74	9					
67	5	5564	66	5					
69	3	5569	69	3					
64	13	5577	65	13					
66	10	5579	66	10					
67	9	5585	67	9					
68	9	5587	68	9					
65	9	5590	65	9					

Recorded by DJW Direction S Lane 1 Time from 2:49 to 2:53

Sheet 21	
LTPP Traffic Data	* STATE_CODE 12
WIM System Test Truck Records 1 of 3	*SPS PROJECT_ID 0100
	* DATE 09/11/2006

Rev. 08/31/2001

PRE-VALIDATION

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
106.5	56	1	1	11:16:13	3651	56	4.7/5.1	8.4/7.9	8.4/6.9	8.7/7.8	8.4/7.6		73.9	19.1	4.5	32.2	4.1	
106.5	55	2	1	11:17:29	3663	55	6/6.3	6.1/6.3	6.1/6.2	6.4/5.8	6.8/7.3		63.4	14.8	4.3	30.7	4	
106.5	61	1	2	11:20:24	3695	61	4.8/5.1	9.3/7.8	9.4/7.6	8.1/7.3	8/7.8		75.3	19.1	4.5	32.2	4.1	
~~106.5~~	~~60~~	~~2~~	~~2~~	~~11:21:41~~	~~3708~~								~~58.4~~			~~30.7~~		
107.0	66	1	3	11:24:57	3734	66	4.8/5.1	9.1/8.1	9/7.9	7.6/7.4	7.7/8.2		75.0	19.1	4.5	32.3	4	
107.0	65	2	3	11:25:47	3742	65	5.9/5.9	6.9/6.4	6.5/6	6.9/5.5	6.8/6.8		63.5	14.9	4.4	30.8	4	
~~108.0~~	~~55~~	~~1~~	~~4~~	~~11:28:52~~	~~3769~~								~~68.2~~			~~32.2~~		
108.0	56	2	4	11:29:55	3773	56	6.1/5.9	6.1/6.3	6/5.8	6.3/5.3	6.4/7.3		61.4	14.9	4.3	30.8	4	
108.5	61	1	5	11:32:13	3791	61	5/3.9	9.5/6.6	9.6/5.8	8/5.5	8.6/6.3		68.9	19	4.4	32.2	4	
108.5	61	2	5	11:32:55	3795	60	5.8/6.9	6.7/6.6	6/5.8	7.5/5.4	6.8/7.5		65.0	14.9	4.3	30.7	3.9	
114.0	65	1	6	11:35:15	3816	65	5.3/4.7	8.6/7.5	9.1/6.9	8.3/7.2	7.9/7.3		72.7	19.1	4.4	32.2	4.1	
114.0	65	2	6	11:37:24	3838	65	6.1/5.9	7.1/6.1	6.5/5.8	7.1/5.3	6.8/6.6		63.2	14.8	4.3	30.7	4	
112.0	55	1	7	11:38:40	3853	55	4.8/3.9	9.4/6.3	9.2/6.2	8.5/5.9	8.4/6.8		69.3	19	4.4	32.1	4	
112.0	56	2	7	11:40:23	3875	56	6.4/6.6	6.3/6.5	5.9/6.5	6.2/6.3	6.8/7		64.4	14.9	4.3	30.8	4	
~~111.0~~	~~60~~	~~1~~	~~8~~	~~11:43:11~~	~~3902~~								~~67.6~~			~~32.2~~		
111.0	63	2	8	11:44:19	3913	63	5.9/6.8	6.4/6.5	6.7/6.5	7.3/6.1	6.8/7.7		66.7	14.9	4.3	30.7	4	

Recorded by D Johnson

Checked by ______

Sheet 21	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 2 of 3	* DATE 09/11/2006

Rev. 08/31/2001

PRE-VALIDATION

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
114.5	64	1	9	11:47:01	3948	65	4.7/4.8	9/7.3	9.2/6.7	7.4/6.9	8.2/7.4		71.6	19.1	4.5	32.2	4.1	
114.5	64	2	9	11:49:35	3971	64	5.7/6.4	6.5/6.7	6.1/6	7.2/5.5	7.4/7.1		64.5	14.9	4.3	30.8	4	
112.5	54	1	10	11:52:17	4002	55	4.8/4	9.5/6.2	8.7/5.7	8.2/6.2	8.6/7		68.8	19.1	4.5	32.2	4	
112.5	65	2	10	11:53:38	4016	65	5.6/6.6	6.6/7.4	6.5/7.3	6.9/5.7	7.2/7.5		67.3	14.8	4.3	30.7	3.9	
113	59	1	11	11:55:34	4034	61	4.7/4.2	9.1/6.2	9.5/6.3	7.9/6.3	8.4/7		69.A	19.1	4.4	32.2	4	
113	55	2	11	11:59:30	4061	56	5.3/6	6.6/6.2	6/5.7	5.8/5.3	6.6/7.3		60.8	14.9	4.4	30.9	3.9	
114	65	1	12	12:00:12	4082	65	4.6/4.4	9.3/7.4	9.1/7.1	7.8/7.2	7.7/7.1		71.7	19.1	4.5	32.1	4.1	
114	61	2	12	12:01:24	4099	61	5.8/5.7	7/6.6	6.4/5.7	7.3/5.7	6.7/7.2		64.2	14.9	4.4	30.7	4	
115	55	1	13	12:04:57	4132	56	5.2/4.7	9/7.7	8.4/6.8	8.5/7.3	8.6/7.9		74.0	19	4.5	32.1	4	
115	65	2	13	12:06:45	4146?	65	5.9/7.6	6.9/6.8	6.8/6.6	7/6.3	7/7.7		68.6	14.9	4.3	30.8	3.9	
116.0	60	1	14	12:08:33	4170	60	4.9/4.5	9.4/7.3	9.1/6.8	8/7.2	8/7.8		73.0	19	4.5	32.2	4	
116.0	55	2	14	12:10:55	~~[illegible]~~ 4192?	56	5.6/6.2	6.2/6	6.2/5.9	5.9/5.5	6.9/7.3		66.3	14.9	4.3	30.9	3.9	
120.0	60	1	15	12:13:15	4217	64	5.1/4.5	9.3/7.1	9.2/6.6	8/7.1	8.2/7.1		72.1	19	4.5	32.2	4	
120.0	56	2	15	12:14:08	4224?	59	6.2/6.2	7.1/5.9	6.5/5.4	6.4/5.5	6.3/7.1		62.7	14.8	4.3	30.7	4	
118	56	1	16	12:17:52	4267	56	4.8/4.4	9.1/6.5	9/5.8	8.3/6.4	8.7/7.2		72.2	19.1	4.4	32.2	4	
118	65	2	14	12:19:27	4281	65	5.5/5.8	6.6/5.8	6.1/5.3	7.2/5.8	6.6/7.2		61.8	14.9	4.3	30.7	4	

Recorded by D. Johnson

Checked by ____________

Sheet 21	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 3 of 3	* DATE 09/11/2006

Rev. 08/31/2001

PRE-VALIDATION

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
116.5	60	1	17	12:21:10	4295	60	4.8/5	8.8/7.2	9.1/7.3	8.2/7.6	8.1/8.2		74.3	19	4.5	32.1	4.1	
116.5	55	2	17	12:23:28	4307	56	6.1/5.8	6.2/5.9	5.7/5.6	6.1/5.4	6.7/6.8		60.3	14.9	4.4	30.8	4	
116	64	1	18	12:24:06	4311	65	4.9/5.7	9/7.9	8.8/7.9	7.7/7.7	8/8.9		76.4	19.1	4.5	32.2	4	
116	59	2	18	12:26:22	4338	62	6.3/6.7	6.8/6.7	6.6/6.6	7/5.8	6.8/7.6		66.8	14.9	4.3	30.8	4	
~~118~~	~~54~~	~~1~~	~~19~~	~~12:28:48~~	~~4352~~								~~67.9~~			~~32.3~~		
118.5	63	2	19	12:31:45	4374?	66	5.8/5.2	6.8/5.7	6.8/6.1	6.9/5.4	7/6.3		~~75.0~~ 62.1	14.8	4.3	~~32.1~~ 30.8	4	
118.5	59	1	20	12:32:28	4381	61	5.4/4.9	9/7.6	9.3/7	8.4/7.1	8.1/7.9		75.0	19.1	4.4	32.2	4.1	
118	55	2	20	12:36:11	4425	56	5.6/6.5	6.2/7	6/6.3	6.2/6	6.4/7.5		63.9	14.9	4.3	30.9	4	
118	62	1	21	12:37:32	4442	65	5.1/5.9	8.7/9	9.1/8.3	8.2/8.4	8/9.3		80.0	19.1	4.5	32.3	4.1	
120.0	60	2	21	12:39:28	4454	60	5.6/6.4	6.5/6.4	6.7/6.3	7.4/5.6	6.8/7.6		65.1	14.9	4.3	30.8	4	
120.0	54	1	22	12:42:19	4481 2,	55	4.9/4.3	9.1/6.9	8.9/6.7	8.6/7	8.6/7.1		71.9	19.1	4.5	32.2	4.1	
~~120~~	~~65~~	~~2~~	~~22~~	~~12:44:49~~	~~4499~~								~~59.5~~			~~30.7~~		
121	60	1	23	12:45:54	4509?	61	4.7/4.6	9.6/6.9	9.6/6.8	7.9/6.7	8.3/7.7		72.8	19.1	4.5	32.2	4	
121.0	56	2	23	12:49:37	4552	56	6.1/5.9	6.7/5.9	5.8/5.7	6.4/5.4	6.2/7.1		61.2	14.9	4.3	30.8	4	
121	64	1	24	12:51:11	4566	65	4.7/4.7	8.7/7.8	9/7.2	8.2/7	7.6/8.1		73.0	19.1	4.5	32.3	4.1	

65

Recorded by D Johnson

Checked by ____________

cal 1

Sheet 21	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 1 of 1	* DATE 09/12/2006

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	~~56~~	2	1	10:40:49	3220	56	5961/6665	[illegible]	5.9/6.2	6.8/5.8	7/7		63.8	14.9	4.3	30.8	4.0	
97.5	55	1	1	10:41:24	3233	55	5144/6667	[illegible]	9.0/6.2	8.5/6.8	8.8/6.4		70.5	19.1	4.5	32.2	4.1	
[illegible]																		
102.5	58	2	2	10:45:30	3280	59	59/51	68/63	60/57	65/56	64/73		61.6	14.8	4.4	30.8	4.0	
102.5	60	1	2	10:47:17	3301	60	45/47	92/75	89/73	81/74	80/79		73.3	19.1	4.5	32.3	4.0	
103.5	62	2	3	10:50:20	3329	63	60/71	66/60	66/56	70/58	70/70		64.8	14.9	4.3	30.7	4.0	
103.5	64	1	3	10:52:54	3353	64	44/44	90/74	89/68	79/67	81/71		70.7	19.1	4.5	32.2	4.0	
98.5	55	2	4	10:55:43	3387	55	63/55	67/64	64/63	62/47	69/72		62.6	14.9	4.3	30.8	3.9	
98.5	55	1	4	10:56:57	3394	55	46/45	86/65	89/65	85/70	87/70		70.6	19.1	4.5	32.2	4.1	
104.5	60	2	5	10:58:42	3411	60	63/57	71/61	64/53	68/53	63/69		62.1	14.8	4.3	30.7	4.0	
104.5	64	1	5	11:01:03	3429	59	5.0/4.9	9.0/7.4	8.7/6.7	8.1/8.0	8.0/7.8		73.5	19.1	4.5	32.2	4.1	
108.5	64	2	6	11:03:36	3449	64	6.1/5.9	6.8/5.7	6.7/6.2	7.2/4.7	6.8/7.0		63.0	14.9	4.3	30.7	3.9	
108.5	65	1	6	11:05:14	3462	65	4.8/4.3	8.4/6.8	9.4/6.6	7.9/6.2	7.7/6.5		69.1	19.1	4.4	32.2	4.0	
		2																
		1																
		2																

Recorded by R Johnson

Checked by ______

Sheet 21	* STATE_CODE 12
LTPP Traffic Data Cal 2	*SPS PROJECT_ID 0800
WIM System Test Truck Records 1 of 1	* DATE 09/12/2006

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
118.5	56	2	1	11:46:50	3835	56	65/58	67/63	61/59	69/58	69/70		63.9	14.9	4.4	30.8	4.0	
118.5	54	1	1	11:48:45	3846	54	52/44	94/64	97/63	84/61	87/64		71.1	19.0	4.4	32.1	4.1	
115.5	61	2	2	11:50:11	3868	61	63/60	72/62	66/60	68/63	73/76		66.4	14.9	4.4	30.8	4.0	
115.5	59	1	2	11:52:46	3893	59	49/43	97/63	97/61	86/64	84/64		71.2	19.0	4.5	32.1	4.1	
111.5	64	2	3	11:53:40	3897	64	58/55	66/58	63/59	68/59	67/68		62.2	14.9	4.3	30.9	4.0	
111.5	65	1	3	11:55:59	3922	65	55/37	99/66	98/57	84/55	88/61		70.0	19.0	4.5	32.0	4.0	
110.5	55	2	4	11:57:57	3934	55	63/57	66/63	65/61	60/60	64/71		63.1	14.9	4.3	30.8	4.0	
110.5	55	1	4	12:01:07	3959	55	46/45	88/64	94/64	87/60	87/72		70.7	19.1	4.4	32.2	4.1	
106.0	60	2	5	12:02:44	3969	60	58/55	69/56	66/58	65/48	66/72		61.4	14.9	4.3	30.8	3.9	
106.0	59	1	5	12:05:29	4003	59	54/51	86/75	92/68	81/79	87/78		75.1	19.1	4.4	32.3	4.1	
111.5	64	2	6	12:07:10	4020	64	67/57	66/64	64/58	78/62	70/71		65.7	14.8	4.3	30.7	4.0	
111.5	64	1	6	12:09:34	4046	64	48/46	95/71	92/67	79/72	75/79		72.6	19.1	4.5	32.2	4.0	
		2																
		1																
		2																
		1																

Recorded by D Johnson

Checked by ____________

Sheet 21 POST - Validation

LTPP Traffic Data

WIM System Test Truck Records 1 of 3

* STATE_CODE	12
*SPS PROJECT_ID	0100
* DATE	09/12/2006

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
113.0		2			~~4338~~													
113.0		1		12:46:32	4378	56	55/45	91/62	93/63	88/68	86/74		72.6	19.0	4.4	32.1	4.0	
113.0	60	2		12:49:16	4409	60	62/59	65/66	65/61	64/63	68/76		65.4	14.9	4.3	30.8	4.0	
113.0		1																
113.0		2		12:53:27	4443	64	62/57	67/58	68/58	69/52	71/67		62.9	14.9	4.3	30.8	4.0	
113.0		1		12:54:17	4449	65	50/43	93/72	95/65	86/72	84/70		73.2	19.0	4.5	32.1	4.1	
113.0		2		12:57:32	4485	56	61/57	70/59	64/53	62/53	68/67		61.4	14.8	4.4	30.7	4.0	
113.0		1		12:59:32	4507	55	50/45	88/73	89/73	88/74	87/78		74.4	19.1	4.4	32.2	4.1	
111.0	59	2		13:01:52	4532	60	62/60	69/68	63/60	70/49	69/71		64.1	14.8	4.4	30.8	4.0	
111.0		1		13:02:45	4539	60	53/43	95/62	97/66	81/70	80/76		72.3	19.0	4.4	32.1	4.1	
		2		13:06:30	4577	64	60/67	67/64	63/60	70/59	68/70		64.8	14.9	4.4	30.8	4.0	
	63	1		13:07:49	4589	64	46/46	94/72	92/71	86/75	82/74		73.8	19.0	4.4	32.1	4.1	
111.0		2		13:11:35	4632	55	57/52	65/59	63/54	61/54	64/70		60.0	14.9	4.3	30.8	4.0	
111.0		1																
107.0		2		13:15:55	4664	60	58/50	73/57	65/51	65/52	71/64		61.2	14.8	4.4	30.7	4.0	
107.0		1		13:16:34	4670	60	45/41	95/60	93/62	85/61	74/63		68.4	19.0	4.4	32.2	4.1	

Recorded by D Johnson

Checked by ____________

Sheet 21 Post-Validation	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 2 of 3	* DATE 09/12/2006

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		2		13:19:57	4696	65	54/50	74/55	73/52	73/54	74/64		62.4	14.8	4.3	30.7	4.0	
108.0		1		13:20:34	4703	64	54/45	96/77	91/64	74/70	84/74		73.0	19.0	4.5	32.2	4.1	
106.5		2		13:24:11	4734	57	60/52	67/62	61/59	70/65	69/71		63.5	14.8	4.3	30.7	4.0	
106.5		1		13:25:35	4746 x	54	51/62	94/41	89/89	83/91	85/93		82.9	19.1	4.4	32.3	4.1	
103.5		2		13:28:10	4769 x	60	65/72	67/71	67/68	74/64	68/81		69.5	14.9	4.3	30.8	4.0	
103.5		1		13:28:46	4777	60	52/45	89/71	93/70	84/75	84/78		73.9	19.1	4.4	32.1	4.0	
104.0		2		13:32:28	4822	63	61/47	67/55	64/47	74/43	71/63		59.4	14.8	4.3	30.7	3.9	
104.0		1		13:34:50	4850	65	49/44	88/73	104/64	80/66	82/72		73.3	19.1	4.4	32.2	4.0	
104.5		2		13:37:19	4876	56	63/58	64/59	67/55	63/53	68/69		61.9	14.9	4.3	30.8	4.0	
104.5		1		13:39:32	4899 x	58	46/54	84/55	88/86	84/93	85/93		81.3	19.1	4.5	32.3	4.1	
104.5		2		13:40:11	4906	59	59/64	65/66	61/59	69/58	68/75		64.7	14.9	4.3	30.8	4.0	
104.5		1		13:			/	/	/	/	/		.	.	.	.	.	
105.0		2		13:44:24	4943	64	64/57	64/62	63/60	67/59	69/70		63.5	14.9	4.3	30.8	4.0	
105.0		1		13:45:30	4949	64	54/43	95/65	94/	85/55	79/68		70.2	19.0	4.5	32.1	4.0	
		2																
		1		13:50:05	4998	55	55/48	85/79	84/74	86/75	86/78		75.1	19.1	4.5	32.2	4.0	

Recorded by D Johnson

Checked by ______________

Sheet 21	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 3 of 3	* DATE 09/12/2006

Rev. 08/31/2001

POST - VALIDATION

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
106.0		2		13:50:14	5021	59	64/55	69/60	67/55	69/54	68/72		63.7	14.8	4.3	30.7	4.0	
106.0		1		13:53:37	5035	59	53/52	91/81	92/72	81/74	85/79		75.9	19.0	4.5	32.2	4.1	
106.0		2		13:55:41	5055	63	59/55	68/56	65/50	67/53	68/67		60.8	14.9	4.3	30.8	4.0	
106.0		1		13:59:09	5091	60	49/47	93/74	92/65	80/80	77/78		73.8	19.1	4.4	32.2	4.1	
106.5		2		14:00:19	5097	60	57/61	71/65	57/56	63/60	64/72		62.6	14.8	4.4	30.8	4.0	
106.5		1		14:03:16	5114	65	53/39	94/68	101/62	83/59	89/61		70.4	19.1	4.4	32.2	4.1	
105 105.0		2		14:05:24	5148	55	61/60	68/63	67/55	63/54	64/69		62.6	14.9	4.3	30.8	4.0	
105 105.0		1		14:08:41	5177	56	47/42	94/74	90/70	83/71	92/75		73.7	19.0	4.5	32.3	4.0	

Recorded by D Johnson Checked by ______

Calibration Worksheet **Site:** 120100

Calibration Iteration 1 Date 9/12/06

Beginning factors:

Speed Point (mph)	**Name**	**Value**
Overall	overall sens.	~~1000~~ 760
Front Axle	f/a	1000
1 – (45)	cf1	960
2 – (60)	cf2	980
3 – (75)	cf 3	970
4 – ( )		
5 – ( )		

Errors:

	Speed Point 1	Speed Point 2	Speed Point 3	Speed Point 4	Speed Point 5
F/A	-7%	0%	+7%		
Tandem	-10%	-1%	+3%		
GVW	-12%	-2%	+7%		

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☐	
Front Axle	☐	☐	~~[illegible]~~
Speed Point 1	☑	☐	8%
Speed Point 2	☐	☐	
Speed Point 3	☐	☐	
Speed Point 4	☐	☐	
Speed Point 5	☐	☐	

End factors:

Speed Point (mph)	**Name**	**Value**
1 -45	cf1	1030

Calibration Worksheet

Site: 120100

Calibration Iteration 2 Date 9/12/06

Beginning factors:

Speed Point (mph)	Name	Value
Overall	✓	760
Front Axle	✓	1000
1 – (45)		1030
2 – (60)		980
3 – (75)		970
4 – ( )		
5 – ( )		

Errors:

	Speed Point 1	Speed Point 2	Speed Point 3	Speed Point 4	Speed Point 5
F/A	-2%	0%	-4%		
Tandem	-5%	-5%	-5%		
GVW	-4%	-4%	-4%		

Adjustments:

	Raise	Lower	Percentage
Overall	☑	☐	3%
Front Axle	☐	☐	
Speed Point 1	☐	☐	
Speed Point 2	☐	☐	
Speed Point 3	☐	☐	
Speed Point 4	☐	☐	
Speed Point 5	☐	☐	

End factors:

Speed Point (mph)	Name	Value
overall	Overall Sens.	780

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

September 11 and 12, 2006

STATE: Florida

SHRP ID: 0100

Photo 1 - Truck_1_Tractor_TO_15_12_2.69_0100_09_11_06.JPG

Photo 2 - Truck_1_Trailer_TO_15_12_2.69_0100_09_11_06.JPG

Photo 3 - Truck_1_Suspension_1_TO_15_12_2.69_0100_09_11_06.JPG

Photo 4 - Truck_1_Suspension_2_TO_15_12_2.69_0100_09_11_06.JPG

Photo 5 - Truck_1_Suspension_3_TO_15_12_2.69_0100_09_11_06.JPG

Photo 6 - Truck_2_Tractor_TO_15_12_2.69_0100_09_11_06.JPG

Photo 7 - Truck_2_Trailer_TO_15_12_2.69_0100_09_11_06.JPG

Photo 8 - Truck_2_Suspension_1_TO_15_12_2.69_0100_09_11_06.JPG

Photo 9 - Truck_2_Suspension_2_TO_15_12_2.69_0100_09_11_06.JPG

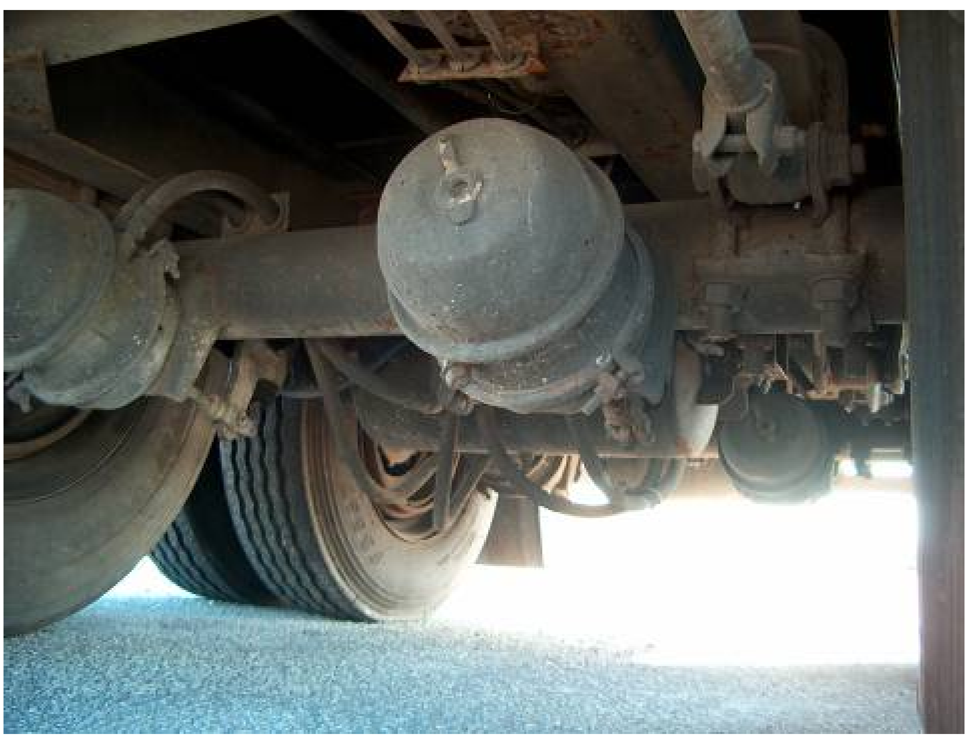


Photo 10 - Truck_2_Suspension_3_TO_15_12_2.69_0100_09_11_06.JPG

FLORIDA DOT NEW CLASSIFIER AXLE SPACING SCHEME 8-31-06

ORDER	CLASS	VECHICLE DESCRIPTION	# AXLE	SPACING	SPACING	SPACING	SPACING	SPACING	SPACING	SPACING	SPACING
1	1	MOTORCYCLE	2	0.1 - 6.0							
2	2	AUTO , PICKUP	2	6.01- 9.49							
3	5	2 D	2	13.29-23.00							
4	3	OTHER(VAN, RV)	2	9.50-13.28							
5	4	BUS	2	23.01-40.00							
1	8	2S1, 21	3	6.01- 23.0	11.0 - 40.0						
2	4	BUS	3	23.01-40.0	0.1 - 6.0						
3	6	3 AXLE	3	6.01 - 23.0	0.1 - 5.99						
4	5	2D W 1 AXLE TRLR	3	13.29-23.00	6.0 - 28.40						
5	3	OTHER W/1 AXLE TRAILER	3	9.50-13.28	6.0 -28.40						
6	2	AUTO W /1 AXLE TRAILER	3	6.01-9.49	6.0-28.40						
1	8	2S2	4	6.01-23.0	11.0 - 40.0	0.10 - 10.99					
2	8	3S1 , 31	4	6.01 - 23.0	0.1 - 6.0	6.01 - 44.0					
3	7	4 AXLE	4	6.01 - 23.0	0.1 - 6.0	0.1-13.00					
4	5	2D W / 2 AXLE TRLR	4	13.29 - 23.00	6.0 - 28.4	0.1 - 8.7					
5	3	OTHER W/ 2 AXLE TRAILER	4	9.5 - 13.28	6.0 - 28.4	0.1 - 8.7					
6	2	AUTO W / 2 AXLE TRLR	4	6.01-9.49	6.0 - 28.4	0.1 - 8.7					
1	9	3S2	5	6.01 - 26.0	0.1 - 6.0	6.01 - 46.0	0.1 - 12.00				
2	9	32	5	6.01 - 26.0	0.1 - 6.0	6.01- 23.0	11.0 - 27.0				
3	9	2S3(NEW)	5	6.01-27.00	6.01 -46.0	0.1-6.00	0.1-6.00				
4	11	2S12	5	6.00 - 26.0	11.0 - 26.0	6.10 - 20.0	11.01 - 26.0				
5	5	2D W / 3 AXLE TRLR	5	13.29-23.00	6.00-28.40	0.10-8.70	0.10-8.70				
6	3	OTHER W / 3 AXLE TRLR	5	9.50-13.28	6.0-28.40	0.1-8.70	0.10-8.70				
1	10	3S3 , 33	6	6.01 - 26.0	0.1 - 6.0	0.1 - 46.0	0.1 - 11.0	0.1 - 11.0			
2	12	3S12	6	6.01 - 26.0	0.1 - 6.0	11.01 - 26.0	6.01 - 24.0	11.01 - 26.0			
1	10	3S4	7	6.01-21.00	0.1 - 6.0	13.3 - 40.0	0.1 - 6.0	0.1 - 6.0	0.1 - 6.0		
2	10	4S4(NEW)	7	6.01-21.00	0.1 - 6.0	0.1-6.0	13.3-40.0	0.1 - 6.0	0.1- 6.0		
3	13	2S23,3S22,3S13	7	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0		
1	13	3S23	8	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	
1	13	PERMIT	9	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0	1.0 - 45.0
	15	ERROR / UNCLASSIFIED	ALL	VEHICLES	NOT MEETING	AXLE CONFIG	SPACINGS	FOR CLASS 1	THROUGH	CLASS 13	
		VEHICLE	AXLE #	ONE-TWO	TWO-THREE	THREE-FOUR	FOUR-FIVE	FIVE-SIX	SIX-SEVEN	SEVEN-EIGHT	EIGHT-NINE

No. of axles: 2

Vehicle type:	1
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Vehicle weight (lower limit):	10
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

Vehicle type:	2
Axle distance (lower limit):	601
Axle distance (upper limit):	949
Vehicle weight (lower limit):	100
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

Vehicle type:	5
Axle distance (lower limit):	1271
Axle distance (upper limit):	2300
Vehicle weight (lower limit):	100
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

Vehicle type:	3
Axle distance (lower limit):	950
Axle distance (upper limit):	1270
Vehicle weight (lower limit):	0
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

Vehicle type:	4
Axle distance (lower limit):	2301
Axle distance (upper limit):	4000
Vehicle weight (lower limit):	1200
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

```
No. of axles: 3

Vehicle type:                        8
Axle distance (lower limit):       601
Axle distance (upper limit):      2300
Axle distance (lower limit):      1100
Axle distance (upper limit):      4000
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        4
Axle distance (lower limit):      2301
Axle distance (upper limit):      4000
Axle distance (lower limit):        10
Axle distance (upper limit):       600
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        6
Axle distance (lower limit):       601
Axle distance (upper limit):      2300
Axle distance (lower limit):        10
Axle distance (upper limit):       599
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        5
Axle distance (lower limit):      1271
Axle distance (upper limit):      2300
Axle distance (lower limit):       600
Axle distance (upper limit):      2840
Vehicle weight (lower limit):      100
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        3
Axle distance (lower limit):       950
Axle distance (upper limit):      1270
Axle distance (lower limit):       600
Axle distance (upper limit):      2840
Vehicle weight (lower limit):      100
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        2
Axle distance (lower limit):       601
Axle distance (upper limit):       949
Axle distance (lower limit):       600
Axle distance (upper limit):      2840
Vehicle weight (lower limit):      100
Vehicle weight (upper limit):        0
max. gross weight limit:          8000
```

```
No. of axles: 4
Vehicle type:                        8
Axle distance (lower limit):       601
Axle distance (upper limit):      2300
Axle distance (lower limit):      1100
Axle distance (upper limit):      4000
Axle distance (lower limit):        10
Axle distance (upper limit):      1099
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        8
Axle distance (lower limit):       601
Axle distance (upper limit):      2300
Axle distance (lower limit):        10
Axle distance (upper limit):       600
Axle distance (lower limit):       601
Axle distance (upper limit):      4400
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        7
Axle distance (lower limit):       601
Axle distance (upper limit):      2300
Axle distance (lower limit):        10
Axle distance (upper limit):       600
Axle distance (lower limit):        10
Axle distance (upper limit):      1300
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        5
Axle distance (lower limit):      1271
Axle distance (upper limit):      2300
Axle distance (lower limit):       600
Axle distance (upper limit):      2840
Axle distance (lower limit):        10
Axle distance (upper limit):       870
Vehicle weight (lower limit):      100
Vehicle weight (upper limit):        0
max. gross weight limit:          8000
Vehicle type:                        3
Axle distance (lower limit):       950
Axle distance (upper limit):      1270
Axle distance (lower limit):       600
Axle distance (upper limit):      2840
Axle distance (lower limit):        10
Axle distance (upper limit):       870
Vehicle weight (lower limit):      100
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                        2
Axle distance (lower limit):       601
Axle distance (upper limit):       949
Axle distance (lower limit):       600
Axle distance (upper limit):      2840
Axle distance (lower limit):        10
Axle distance (upper limit):       870
Vehicle weight (lower limit):      100
Vehicle weight (upper limit):        0
max. gross weight limit:          8000
```

```
No. of axles: 5

Vehicle type:                       9
Axle distance (lower limit):      601
Axle distance (upper limit):     2600
Axle distance (lower limit):       10
Axle distance (upper limit):      600
Axle distance (lower limit):      601
Axle distance (upper limit):     4600
Axle distance (lower limit):       10
Axle distance (upper limit):     1090
Vehicle weight (lower limit):    1200
Vehicle weight (upper limit):       0
max. gross weight limit:         8000

Vehicle type:                       9
Axle distance (lower limit):      601
Axle distance (upper limit):     2600
Axle distance (lower limit):       10
Axle distance (upper limit):      600
Axle distance (lower limit):      601
Axle distance (upper limit):     2300
Axle distance (lower limit):     1100
Axle distance (upper limit):     2700
Vehicle weight (lower limit):    1200
Vehicle weight (upper limit):       0
max. gross weight limit:         8000

Vehicle type:                       9
Axle distance (lower limit):      601
Axle distance (upper limit):     2600
Axle distance (lower limit):      601
Axle distance (upper limit):     4600
Axle distance (lower limit):       10
Axle distance (upper limit):      600
Axle distance (lower limit):       10
Axle distance (upper limit):      600
Vehicle weight (lower limit):    1200
Vehicle weight (upper limit):       0
max. gross weight limit:         8000


Vehicle type:                      11
Axle distance (lower limit):      601
Axle distance (upper limit):     2600
Axle distance (lower limit):     1100
Axle distance (upper limit):     2600
Axle distance (lower limit):      610
Axle distance (upper limit):     2000
Axle distance (lower limit):     1101
Axle distance (upper limit):     2600
Vehicle weight (lower limit):    1200
Vehicle weight (upper limit):       0
max. gross weight limit:         8000
Vehicle type:                       5
Axle distance (lower limit):     1271
Axle distance (upper limit):     2300
Axle distance (lower limit):      600
Axle distance (upper limit):     2840
Axle distance (lower limit):       10
Axle distance (upper limit):      870
Axle distance (lower limit):       10
Axle distance (upper limit):      870
Vehicle weight (lower limit):     100
Vehicle weight (upper limit):       0
max. gross weight limit:         8000
```

```
Vehicle type:                        3
Axle distance (lower limit):       950
Axle distance (upper limit):      1270
Axle distance (lower limit):       600
Axle distance (upper limit):      2840
Axle distance (lower limit):        10
Axle distance (upper limit):       870
Axle distance (lower limit):        10
Axle distance (upper limit):       870
Vehicle weight (lower limit):      100
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

No. of axles: 6

Vehicle type:                       10
Axle distance (lower limit):       601
Axle distance (upper limit):      2600
Axle distance (lower limit):        10
Axle distance (upper limit):       600
Axle distance (lower limit):        10
Axle distance (upper limit):      4600
Axle distance (lower limit):        10
Axle distance (upper limit):      1100
Axle distance (lower limit):        10
Axle distance (upper limit):      1100
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000

Vehicle type:                       12
Axle distance (lower limit):       601
Axle distance (upper limit):      2600
Axle distance (lower limit):        10
Axle distance (upper limit):       600
Axle distance (lower limit):      1101
Axle distance (upper limit):      2600
Axle distance (lower limit):       601
Axle distance (upper limit):      2400
Axle distance (lower limit):      1101
Axle distance (upper limit):      2600
Vehicle weight (lower limit):     1200
Vehicle weight (upper limit):        0
max. gross weight limit:          8000
```

No. of axles: 7

Vehicle type:	10
Axle distance (lower limit):	601
Axle distance (upper limit):	1670
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Axle distance (lower limit):	1330
Axle distance (upper limit):	4000
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Vehicle weight (lower limit):	1200
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

Vehicle type:	10
Axle distance (lower limit):	601
Axle distance (upper limit):	1670
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Axle distance (lower limit):	1330
Axle distance (upper limit):	4000
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Axle distance (lower limit):	10
Axle distance (upper limit):	600
Vehicle weight (lower limit):	1200
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

Vehicle type:	13
Axle distance (lower limit):	100
Axle distance (upper limit):	4500
Axle distance (lower limit):	100
Axle distance (upper limit):	4500
Axle distance (lower limit):	100
Axle distance (upper limit):	4500
Axle distance (lower limit):	100
Axle distance (upper limit):	4500
Axle distance (lower limit):	100
Axle distance (upper limit):	4500
Axle distance (lower limit):	100
Axle distance (upper limit):	4500
Vehicle weight (lower limit):	1200
Vehicle weight (upper limit):	0
max. gross weight limit:	8000

No. of axles: 8

```
Vehicle type:                        10
Axle distance (lower limit):        601
Axle distance (upper limit):       1670
Axle distance (lower limit):         10
Axle distance (upper limit):        600
Axle distance (lower limit):         10
Axle distance (upper limit):        600
Axle distance (lower limit):       1330
Axle distance (upper limit):       4000
Axle distance (lower limit):         10
Axle distance (upper limit):        600
Axle distance (lower limit):         10
Axle distance (upper limit):        600
Axle distance (lower limit):         10
Axle distance (upper limit):        600
Vehicle weight (lower limit):      1200
Vehicle weight (upper limit):         0
max. gross weight limit:           8000


Vehicle type:                        13
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Vehicle weight (lower limit):      1200
Vehicle weight (upper limit):         0
max. gross weight limit:           8000
```

No. of axles: 9

```
Vehicle type:                        13
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Axle distance (lower limit):        100
Axle distance (upper limit):       4500
Vehicle weight (lower limit):      1200
Vehicle weight (upper limit):         0
max. gross weight limit:           8000
```