Validation Report

Florida, SPS-1
Task Order 19, CLIN 2
May 21 to 22, 2007

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1 Executive Summary

A visit was made to the Florida 0100 on May 21 to 22, 2007 for the purposes of conducting a validation of the WIM system located on U.S. Route 27 at 13.8 miles south of SR 80. The SPS-1 is located in the righthand, southbound lane of a four-lane divided facility. At this site, the LTPP lane is one of 4 lanes instrumented at this site. Lanes 1 and 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 posted speed limit at this location is 65 mph. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This is the fourth validation visit to this location, the previous visit being September 11 and 12, 2006. The site was installed during June 2003 by the agency.

This site fails to meet the LTPP criteria for research quality traffic data. It does not produce steering axle weight or gross vehicle weight estimates that meet the LTPP criteria for research quality data. The failure is due to high levels of variability in the measurements, most likely due to rough and distressed pavement upstream from and at the sensor locations.

The site is instrumented with quartz piezo and IRD/PAT DAW 190 electronics. It is installed in asphalt concrete, 400 feet long.

The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 74,490 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a steel leaf suspension loaded to 65,530 lbs., the partial truck.

The validation speeds ranged from 42 to 65 miles per hour. The pavement temperatures ranged from 80 to 93 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 – 22-May-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	**±20 percent**	**-4 ± 16.6%**	**Fail**
Tandem axles	±15 percent	-3.9 ± 9.5%	Pass
GVW	**±10 percent**	**-3.8 ± 8.9%**	**Fail**
Speed	**±1 mph [2 km/hr]**	**-0.4 ± 1.7 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The pavement condition was such that it may have contributed to an inability to calibrate the system to obtain research quality data. 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 not 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. There is a rough area of pavement approximately 350 to 400 feet prior to the leading sensor. Visual observations of trucks passing this area indicate that it most likely does have an effect on scale dynamics. The drivers also indicated that they could feel the effects of this area and that they were not damped by the suspensions until the trucks had passed through the scale area.

The following remedial actions are recommended so that this site may meet LTPP precision requirements. The asphalt pavement surface should be milled and replaced. Sensors can then be placed in the new asphalt or ideally, a concrete pavement should be constructed in the sensor location for this purpose.

If this site had been evaluated using ASTM E-1318-02 it would not 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%	98%	Pass
Axle Groups	± 15%	99%	Pass
GVW	**± 10%**	**90%**	**Fail**

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

2 Corrective Actions Recommended

Replacement of the pavement in the area of the current WIM installation is recommended. At the present WIM location, there is cracking and pavement deterioration throughout the areas around the WIM sensors and the loop sensors. The replacement should include the rough area from 350 to 400 feet in advance of the lead sensor. Care should be taken to ensure that smoothness requirements for LTPP WIM installations are met.

Replacement of the pavement will necessitate the installation of new sensors at this location.

3 Post Calibration Analysis

This final analysis is based on test runs conducted May 22, 2007 during the morning at test site 120100 on U.S. Route 27. This SPS-1 site is at milepost 12.3 on the southbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for the calibration and for the subsequent validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and an air suspension loaded to 74,490 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a steel leaf suspension loaded to 65,530 lbs., the partial truck.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 42 to 65 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 80 to 93 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

Table 3-1 Post-Validation Results – 120100 – 22-May-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	**±20 percent**	**-4 ± 16.6%**	**Fail**
Tandem axles	±15 percent	-3.9 ± 9.5%	Pass
GVW	**±10 percent**	**-3.8 ± 8.9%**	**Fail**
Speed	**±1 mph [2 km/hr]**	**-0.4 ± 1.7 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The test runs were conducted during the morning hours with pavement temperatures in the 80s and 90s. 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 one temperature group. 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. Cloudy conditions limited pavement temperature conditions during the late morning. It was unlikely that much higher temperatures would be achieved during the day.

The three speed groups were divided as follows: Low speed – 40 to 49 mph, Medium speed – 50 to 58 mph and High speed – 59 + mph. The one temperature group was created by using 80 to 93 degrees Fahrenheit for Medium temperature.

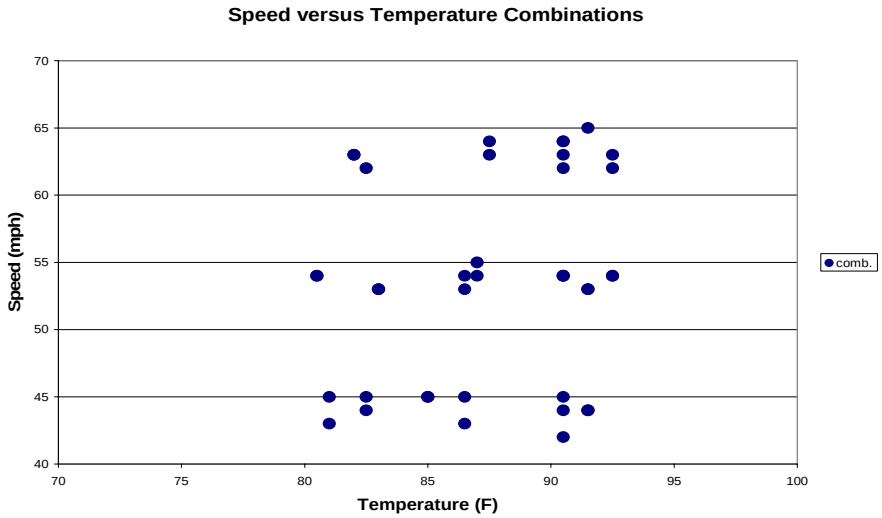


Figure 3-1 Post-Validation Speed-Temperature Distribution – 120100 – 22-May-2007

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

Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. The errors were insensitive to speed and are a few percentage points low across the range of measured truck speeds.

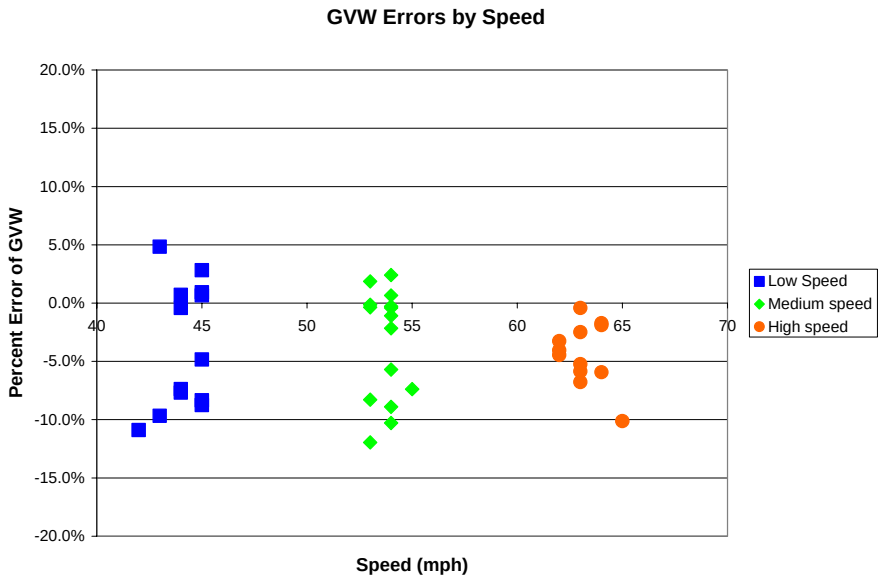


Figure 3-2 Post-validation GVW Percent Error vs. Speed – 120100 – 22-May-2007

Figure 3-3 shows the relationship between temperature and GVW percentage error. The narrow range of pavement temperatures precludes making any conclusions about their effects on the scale performance.

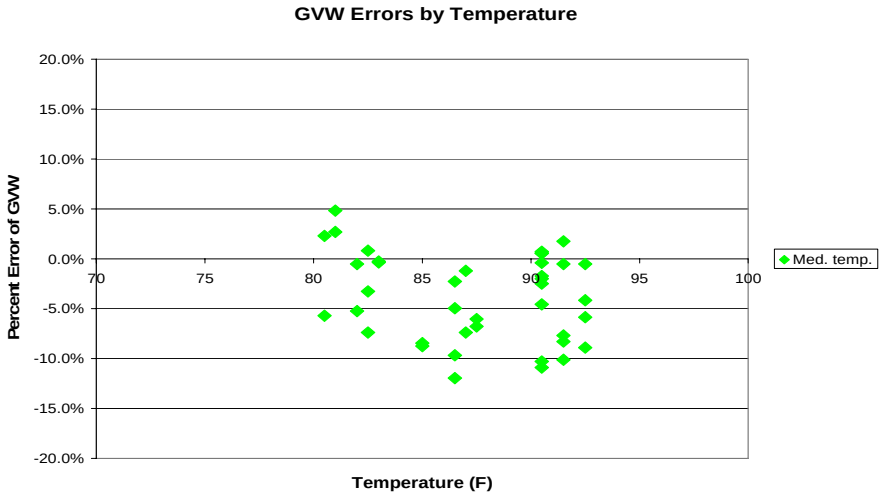


Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 120100 – 22-May-2007

Figure 3-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the

drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. There is no apparent influence of speed on axle spacing error at this location.

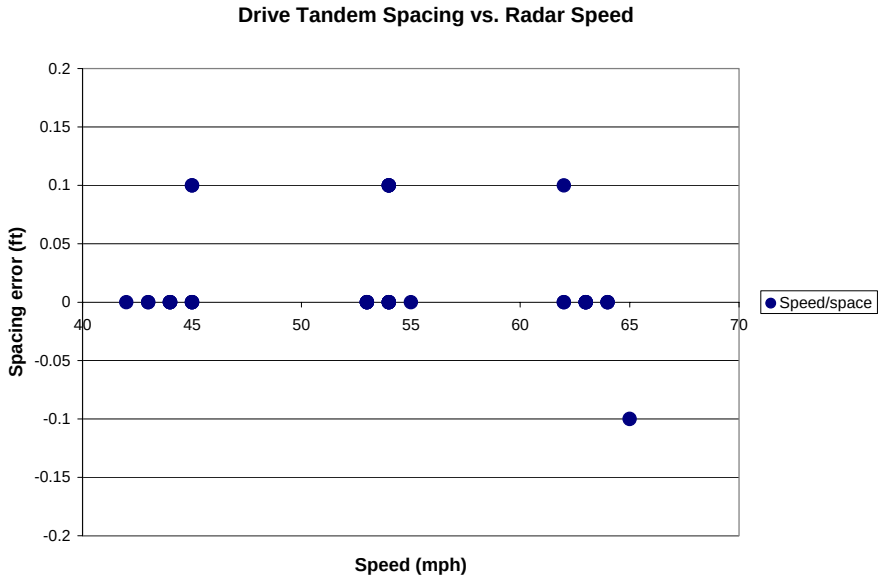


Figure 3-4 Post-Validation Spacing vs. Speed – 120100 – 22-May-2007

3.1 Temperature-based Analysis

The one temperature group was created using the runs between 80 to 93 degrees Fahrenheit as "Medium".

Table 3-2 Post-Validation Results by Temperature Bin – 120100 – 22-May-2007

Element	95% Limit	Medium Temperature 80 to 93 °F
Steering axles	±20 %	-4 ± 16.6%
Tandem axles	±15 %	-3.9 ± 9.5%
GVW	±10 %	-3.8 ± 8.9%
Speed	±1 mph	-0.4 ± 1.7 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. The percent error in weighing the "Partial" truck (diamonds) is slightly more than for the "Golden" truck (squares). The response of the scale to temperature effects seems to be the same for both trucks, at least over the narrow range of measured pavement temperatures. Accuracy is slightly better at 80 degrees Fahrenheit than at higher temperatures.

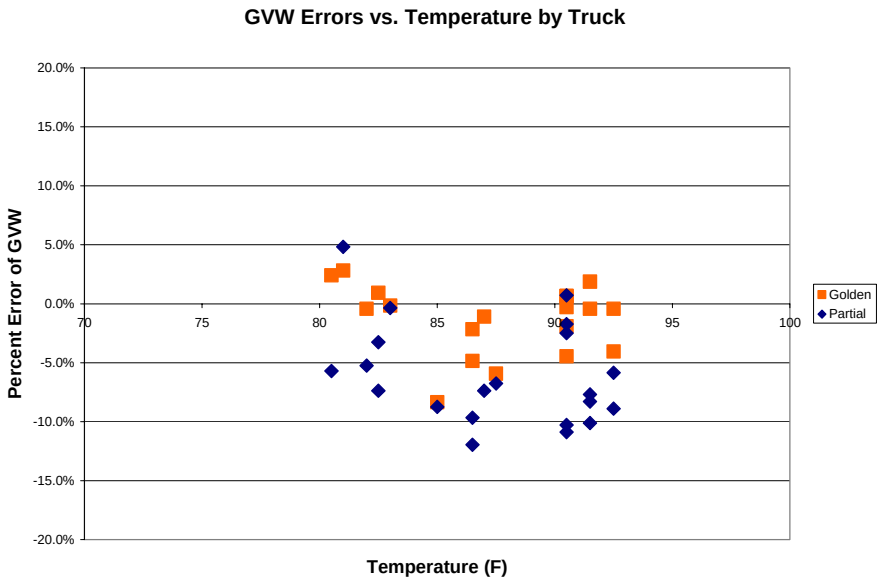


Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 120100 – 22-May-2007

Figure 3-6 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. Although the range of temperatures is narrow it is appears that the steering axle weights were more accurate at 80 degrees Fahrenheit than at higher temperatures. This pattern is consistent with the behavior of GVW errors over the same temperature range.

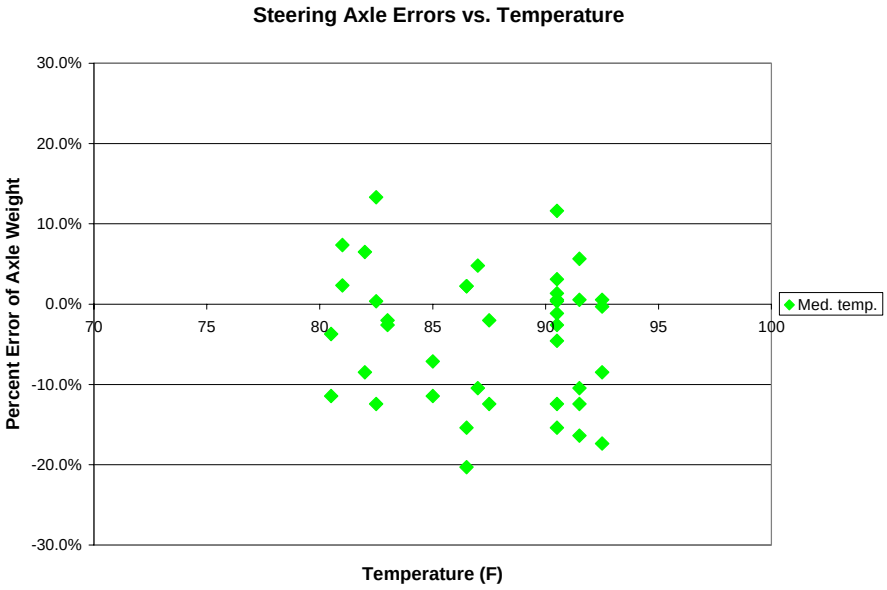


Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 120100 – 22-May-2007

3.2 Speed-based Analysis

The three speed groups were divided using 40 to 49 mph for Low speed, 50 to 58 mph for Medium speed and 59+ mph for High speed.

Table 3-3 Post-Validation Results by Speed Bin – 120100 – 22-May-2007

Element	95% Limit	Low Speed 40 to 49 mph	Medium Speed 50 to 58 mph	High Speed 59+ mph
Steering axles	±20 %	-2.3 ± 22.2%	-5.5 ± 16.9%	-4 ± 14.1%
Tandem axles	±15 %	-4.1 ± 11.6%	-3.3 ± 10.3%	-4.5 ± 7.1%
GVW	±10 %	-3.7 ± 11.8%	-3.5 ± 10.2%	-4.3 ± 5.9%
Speed	±1 mph	-0.2 ± 1.5 mph	-0.1 ± 1.4 mph	-1.0 ± 2.1 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Overall weight errors were slightly negative for all three speed groups. This is a result of adjusting the calibration to optimize the accuracy of the "Golden" truck weights. Since the weight errors for the other truck were typically lower than for the "Golden" truck, the overall errors tended to be slightly negative. The decision to optimize for the "Golden" truck for the third calibration attempt was done after the previous two calibration attempts to optimize for both trucks failed to produce results that met LTPP criteria for scale performance. Although accuracy tended to decrease with speed, the precision was better at higher speeds. LTPP criteria for scale performance were not met for any of these speed groups. It should be noted that at high speed, where most of the trucks run

according to the post validation Sheet 20 speed distribution, the overall GVW error is only out by 0.2%.

Figure 3-7 clearly shows the results of optimizing the calibration for the "Golden" truck(squares). The percent error for this vehicle is near zero at all three speed levels. For the other truck (diamonds), measured GVW figures are more than 5% below the actual values at low and medium speeds. They are more accurate at higher speeds, almost matching the "Golden" truck data points. It appears that the errors for the more lightly loaded truck are more sensitive to speed than for the fully loaded truck and that the effects of speed on error are in the opposite direction for the two trucks that were used for this validation.

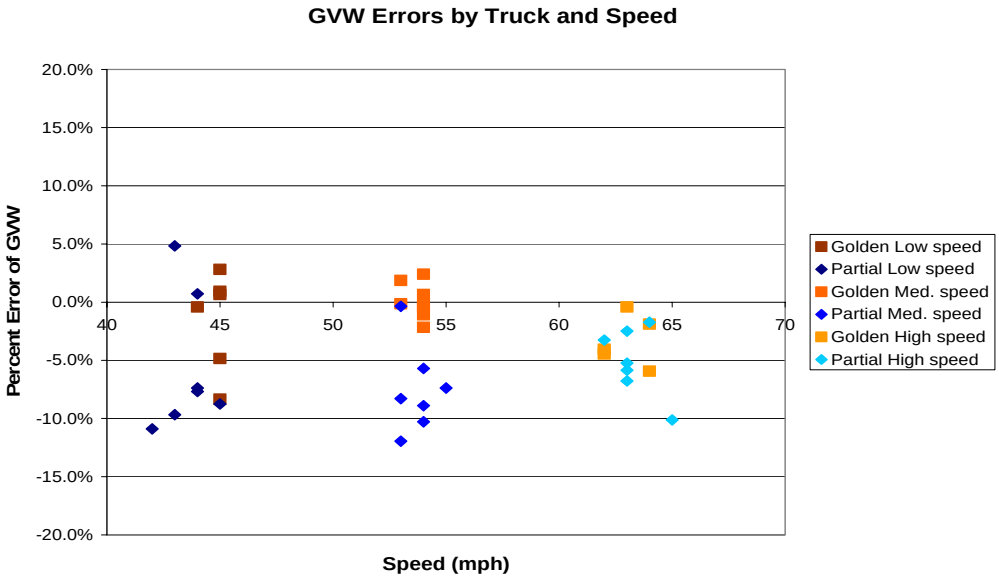


Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 120100 – 22-May-2007

Figure 3-8 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 auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

As with Figure 3-7, it is apparent that there is separation between the two trucks at low speeds and that the errors come together near zero at higher speeds.

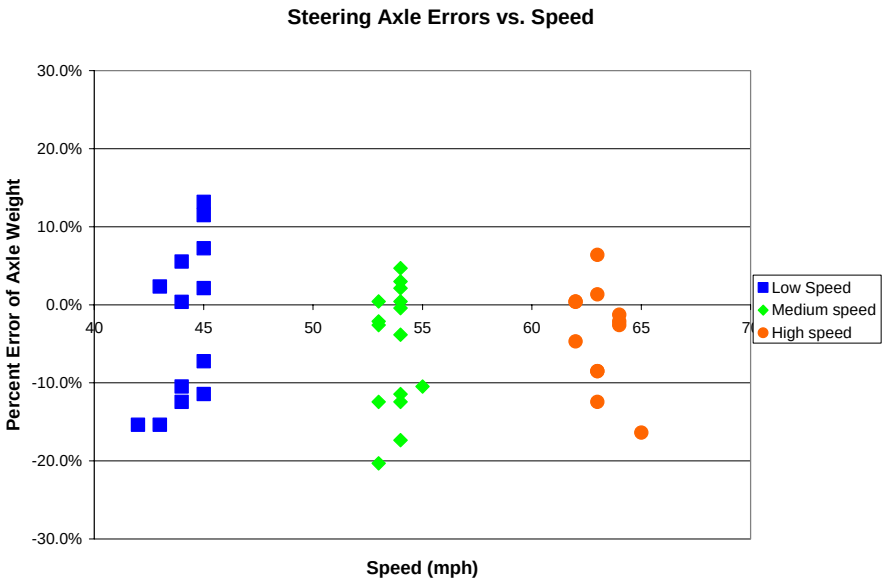


Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group – 120100 – 22-May-2007

3.3 Classification Validation

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

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

Observed volumes of all vehicle classes with the exception of class 9 trucks were rare and the misclassification percentages and mean differences computed are based on very small absolute numbers of observed trucks. The equipment did sometimes fail to distinguish between class 5 and 3, and between class 5 and 8 with some regularity.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 3-4 has the classification error rates by class. The overall misclassification rate is 5.9 percent.

Table 3-4 Truck Misclassification Percentages for 120100 – 22-May-2007

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	N/A	5	11	6	13
7	33				
8	25	9	1	10	N/A
11	0	12	N/A	13	N/A

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

Table 3-5 Truck Classification Mean Differences for 120100 – 22-May-2007

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	N/A	5	- 11	6	14
7	-33				
8	33	9	-1	10	N/A
11	0	12	N/A	13	N/A

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

3.4 Evaluation by ASTM E-1318 Criteria

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

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

Characteristic	Limits for Allowable Error	Percent within Allowable Error	Pass/Fail
Single Axles	± 20%	98%	Pass
Axle Groups	± 15%	99%	Pass
GVW	± 10%	**90%**	**Fail**

4 Pavement Discussion

The pavement smoothness may have contributed to out-of-range results.

The pavement condition did appear to influence truck movement across the sensors.

It should also be noted, that the profile data provided below is the same profile data we had available at our last validation visit and while we were able to validate the site during our previous visit on September 11 and 12, 2006; we were unable to do so during the current visit. Visually, there appears to be increased deterioration in the pavement condition since our last visit.

4.1 Profile Analysis

The WIM site is a section of pavement that is 305 m long with the WIM scale located at approximately 274.5 m 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 mm.

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 lane 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, version 1.0 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 value was calculated when three or more passes were completed and are presented in the right-most column of the table. Values below the lower limit are presented in italics and values above the upper limit are presented in bold font.

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 were between the upper and lower threshold values. The pavement roughness may have contributed to the inability of this site to meet the expected performance characteristics.

4.2 Distress Survey and Any Applicable Photos

During the last validation, moderate pavement damage was observed 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 beyond the trailing WIM sensor. These distresses have increased in severity and may influence truck motions as they approach and transverse the WIM scales.

To illustrate the general condition of the location Figure 4-1 is included. The photograph has the left wheelpath sensor visible in the middle left hand side. The next sensor is the loop followed by the right wheelpath sensor on the middle right edge of the photo. Figure 4-2 is close up of the pavement distress at the end of the left wheel path sensor. Figure 4-3 is a close up of the distress around the right wheel path sensor. There is also deterioration around the loops as shown in Figure 4-4 and Figure 4-5.

Figure 4-1 Overview of WIM Site Pavement Condition – 120100 – 21-May-2007

Figure 4-2 Distress at Left Wheelpath Sensor– 120100 – 21-May-2007

Figure 4-3 illustrates the state of the pavement surface near the right wheelpath sensors.

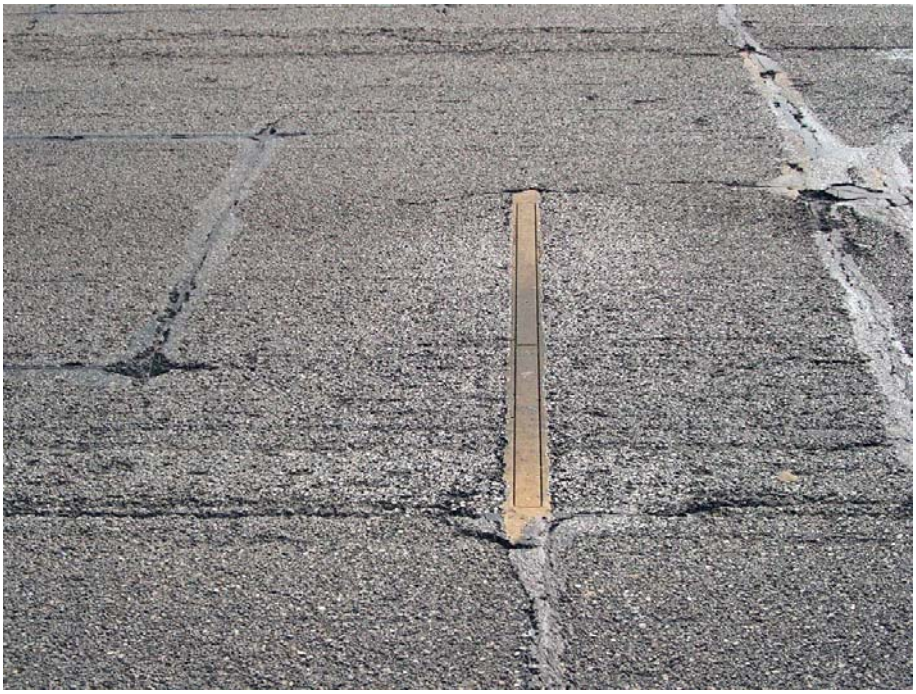


Figure 4-3 Distress Near the Right Wheelpath Sensor – 120100 – 21-May-2007

Figure 4-4 Loop Deterioration – Example 1– 120100 – 21-May-2007

Figure 4-5 Loop Deterioration - Example 2 – 120100 – 21-May-2007

4.3 Vehicle-pavement Interaction Discussion

There is a rough area of pavement approximately 350 to 400 feet prior to the leading sensor. Visual observations of trucks passing this area indicate that it most likely does have an effect on scale dynamics. The drivers also indicated that they could feel the effects of this area and that they were not dampened by the suspensions until the trucks had passed through the scale area. Areas of high pavement distress are shown in Figure 4-6 through Figure 4-9

Figure 4-6 Distress Observed 360 feet Prior to WIM Site – 120100 – 21-May-2007

Figure 4-7 Distress Observed 270 feet Prior to WIM Site – 120100 – 21-May-2007

Figure 4-8 Distress Observed 180 feet Prior to WIM Site – 120100 – 21-May-2007

Figure 4-9 Distress Observed 90 feet Prior to WIM Site – 120100 – 21-May-2007

5 Equipment Discussion

The traffic monitoring equipment at this location includes quartz piezo and IRD/PAT DAW 190. These sensors are installed in a asphalt concrete pavement about 400 ft in length.

There were no changes in basic equipment operating condition since the validation completed on September 12, 2006.

5.1 Pre-Evaluation Diagnostics

Broken pavement was observed around the WIM sensors. There were small pieces of pavement missing near the corners of the loops. Some roughness was observed in the area prior to the WIM sensors and vehicles could be observed bouncing about 400 feet before the lead sensor. These conditions were illustrated in sections 4.2 and 4.3.

Some corrosion was found on battery terminals within the cabinet. All static equipment measurements were within tolerances although the left side, trailing quartz sensor indicated low insulation resistance ($<10^9$ ohms).

5.2 Calibration Process

The equipment required three iterations of the calibration process between the initial 40 runs and the final 40 runs.

When it was determined that the variability of the site was such that the validation would not be successful, the third iteration was performed to provide the best information for loaded trucks.

5.2.1 Calibration Iteration 1

The initial calibration brought mean errors very near to zero but large variability at higher speed levels resulted in a Fail rating for GVW measurements.

Table 5-1 Calibration Iteration 1 Results – 120100 – 21-May-2007 (2:30 PM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	0.6 ± 15.2%	Pass
Tandem axles	±15 percent	0.7 ± 10.9%	Pass
GVW	**±10 percent**	**0.8 ± 9.6%**	**Fail**
Speed	**±1 mph**	**0.0 ± 1.6 mph**	**Fail**
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	Pass

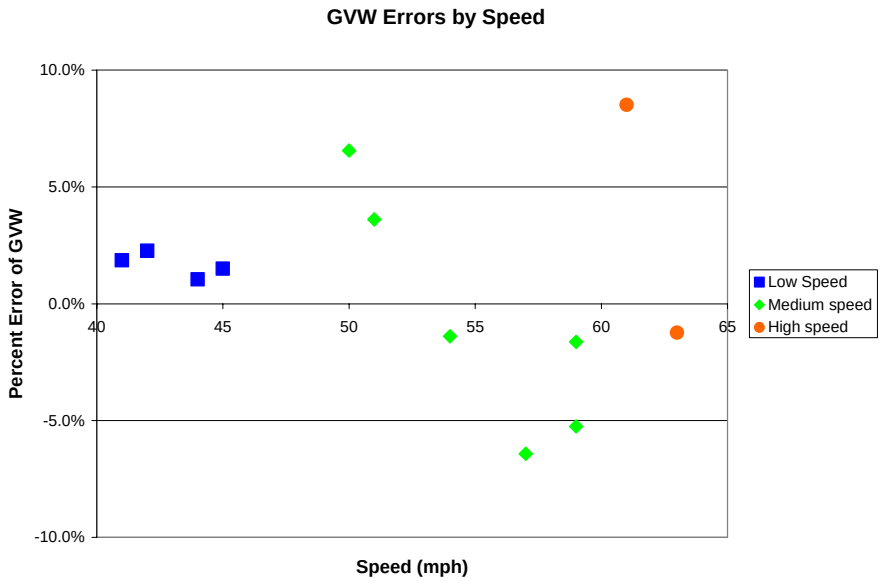


Figure 5-1 Calibration Iteration 1 GVW Percent Error vs. Speed Group – 120100 – 21-May-2007 (2:30 PM)

5.2.2 Calibration Iteration 2

Small adjustments brought the GVW measurements within tolerances but high variability in steering axle weights resulted in another Fail rating.

Table 5-2 Calibration Iteration 2 Results – 120100 – 21-May-2007 (3:17 PM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	**±20 percent**	**-2.1 ± 21.7%**	**Fail**
Tandem axles	±15 percent	-2.1 ± 9.0%	Pass
GVW	±10 percent	-1.9 ± 7.3%	Pass
Speed	**±1 mph [2 km/hr]**	**-0.5 ± 1.8 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

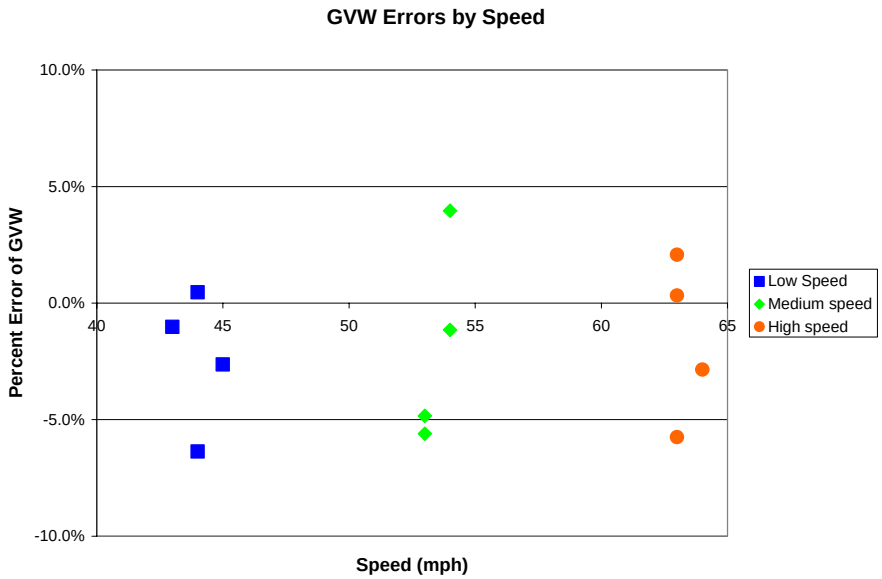


Figure 5-2 Calibration Iteration 2 GVW Percent Error vs. Speed Group – 120100 – 21-May-2007 (3:17 PM)

5.2.3 Calibration Iteration 3

All weight measures yielded a Pass rating but high variability in each categories meant that the validation crew had little confidence that the Pass rating would hold. It appeared that this successful calibration was more a matter of chance than of the consistent, accurate measurement capabilities of the equipment.

Table 5-3 Calibration Iteration 3 Results – 120100 – 22-May-2007 (8:25 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.5 ± 17.7%	Pass
Tandem axles	±15 percent	-1.2 ± 9.3%	Pass
GVW	±10 percent	-1.2 ± 8.6%	Pass
Speed	±1 mph [2 km/hr]	**-0.3 ± 1.0 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

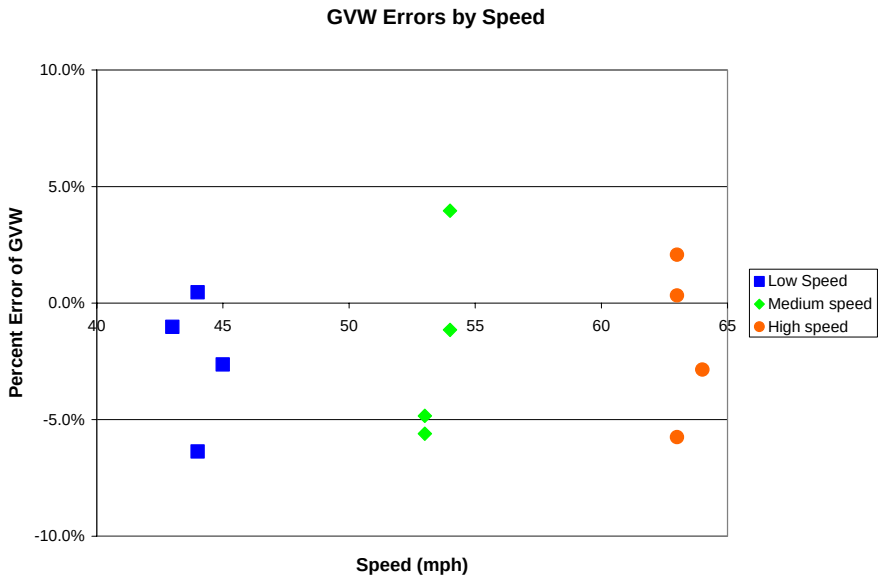


Figure 5-3 Calibration Iteration 3 GVW Percent Error vs. Speed Group – 120100 – 22-May-2007 (8:25 AM)

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 5-4 has the information available for TRF_CALIBRATION_AVC from the Sheet 16s submitted prior to this validation as well as the information for the current visit. Shaded blocks indicate when a research quality data determination was made.

Table 5-4 Classification Validation History – 120100 – 22-May-2007

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
5/22/07	No. of Trucks	0	0			0
5/21/07	No. of Trucks	-1	33			0
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 5-5 has the information available for TRF_CALIBRATION_WIM from the Sheet 16s submitted prior to this validation as well as the information for the current visit.

Table 5-5 Weight Validation History – 120100 – 22-May-2007

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
5/22/07	Test Trucks	-3.9 (4.4)	-4.0 (8.3)	-4.0 (4.8)
5/21/07	Test Trucks	2.1 (4.6)	1.6 (7.4)	2.0 (5.2)
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	-15.0 (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)

5.4 Projected Maintenance/Replacement Requirements

The inability of this site to pass LTPP accuracy and precision requirements is due in large part to the pavement condition. It is recommended that the pavement and sensors be replaced.

6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted May 21, 2007 from mid-morning to early afternoon at 120100 on 13.8 miles south of SR 80. This SPS-1 site is at milepost 12.3 on U.S. Route 27 in the southbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for initial validation and for the subsequent calibration included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and an air suspension loaded to 74,510 lbs.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a steel leaf suspension loaded to 65,610 lbs., the partial truck.

For the initial validation each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 40 to 63 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 97 to 107degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 6-1.

The mean errors of each weight measure are impressively small indicating a well-calibrated condition, but variability of the measures is high in all cases. Since the results for GVW did not pass the LTPP criteria the decision was made to attempt a calibration to achieve a Pass result.

Table 6-1 Pre-Validation Results – 120100 – 21-May-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	1.6 ± 15%	Pass
Tandem axles	±15 percent	2 ± 10.4%	Pass
GVW	**±10 percent**	**2.1 ± 9.3%**	**Fail**
Speed	**±1 mph [2 km/hr]**	**-0.2 ± 1.9 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The test runs were conducted during the late morning and early afternoon. Pavement temperatures were between 95 to 108 degrees Fahrenheit. 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 one 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. Pavement temperatures were high and any significant cooling would not occur until late evening.

The three speed groups were divided into 40 to 47 mph for Low speed, 48 to 57 mph for Medium speed and 58+ mph for High speed. The one temperature group had values from 95 to 108 degrees Fahrenheit labeled Medium temperature.

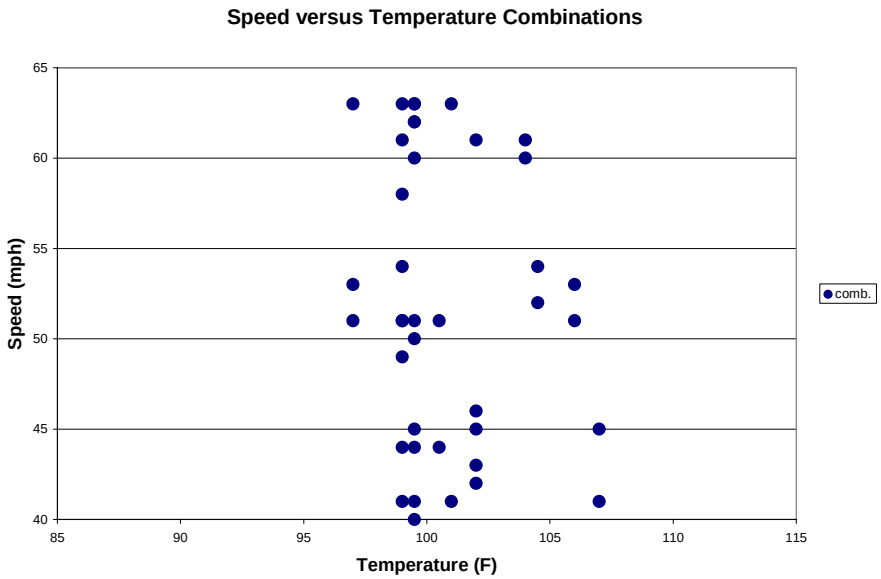


Figure 6-1 Pre-Validation Speed-Temperature Distribution – 120100 – 21-May-2007

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

Figure 6-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. The graph shows a downward trend in Percent Error with increases in speed. This trend is almost obscured by significant variability in the errors.

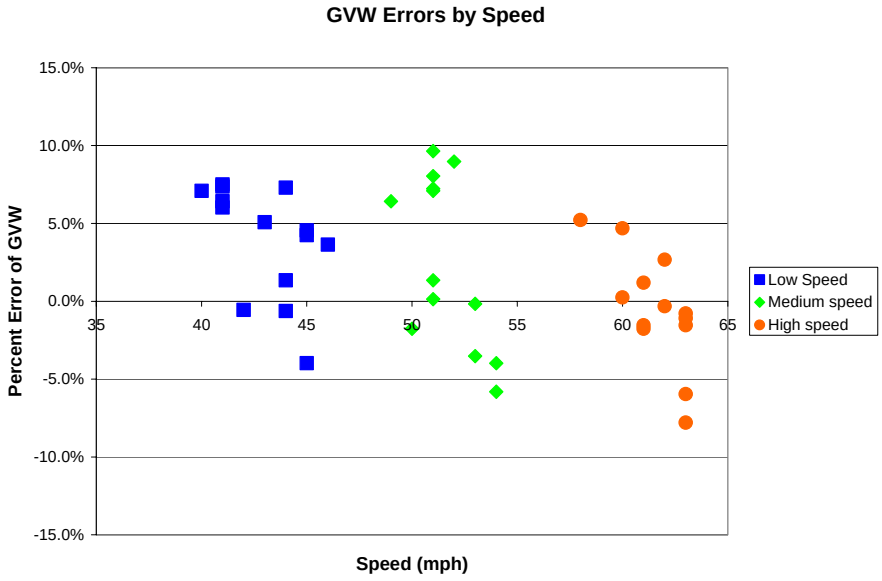


Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 120100 – 21-May-2007

Figure 6-3 shows the relationship between temperature and GVW percentage error. The range of temperatures is too limited to comment on temperature effects.

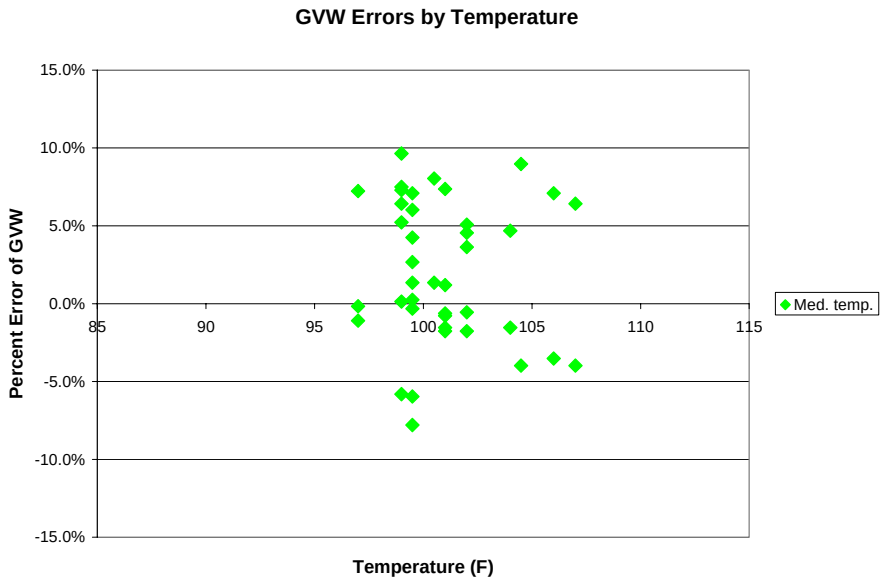


Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 120100 – 21-May-2007

Figure 6-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. The ability of the WIM equipment to accurately measure drive tandem spacing is clear.

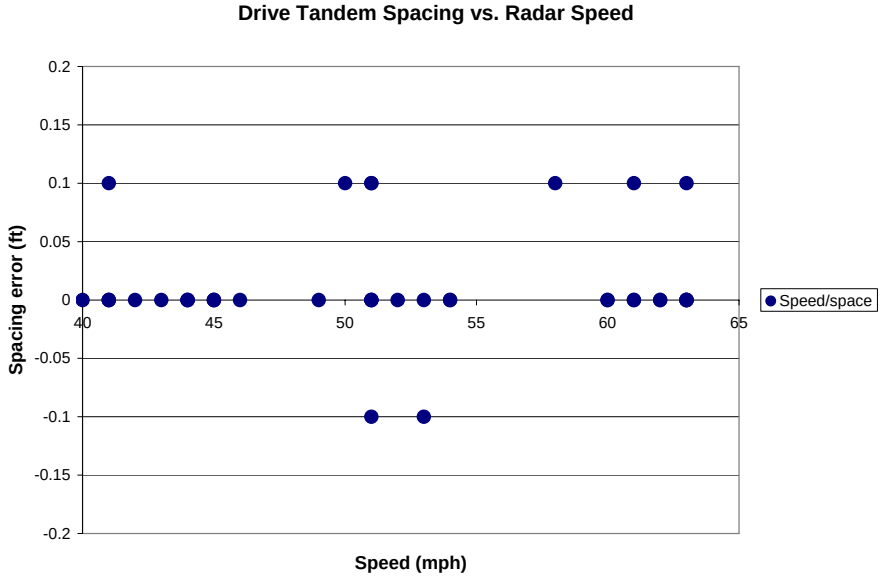


Figure 6-4 Pre-Validation Spacing vs. Speed - 120100 – 21-May-2007

6.1 Temperature-based Analysis

The one temperature group had all the runs between 95 to 108 degrees Fahrenheit as "Medium" temperature.

Table 6-2 Pre-Validation Results by Temperature Bin – 120100 – 21-May-2007

Element	95% Limit	Medium Temperature 95 to 108 °F
Steering axles	±20 %	1.6 ± 15%
Tandem axles	±15 %	2 ± 10.4%
GVW	±10 %	2.1 ± 9.3%
Speed	±1 mph	-0.2 ± 1.9 mph
Axle spacing	± 0.5 ft	0 ± 0.1 ft

Since only one temperature group was used, the results are the same as the overall results that were tabulated within Table 6-1.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. Here it can be seen that the two trucks have differing mean GVW errors. Their relative sensitivity to temperature cannot be determined since the pavement temperature range was small. The mean error of the fully loaded "Golden" truck(squares) is positive while the mean error of the partially loaded truck (diamonds) is near zero.

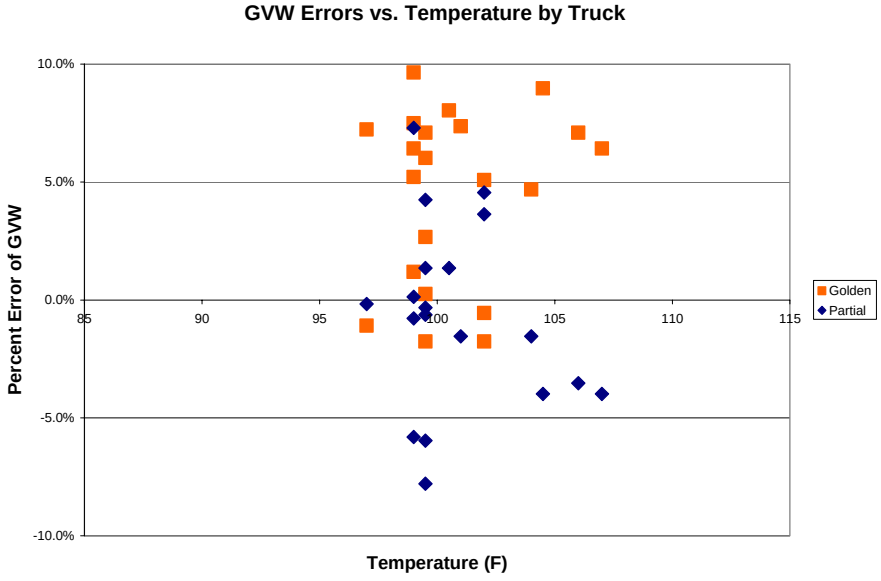


Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 120100 – 21-May-2007

Figure 6-6 shows the relation between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-

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

The figure shows no apparent sensitivity of steering axle weight error to pavement temperature over the limited range of temperatures that were measured during the validation period.

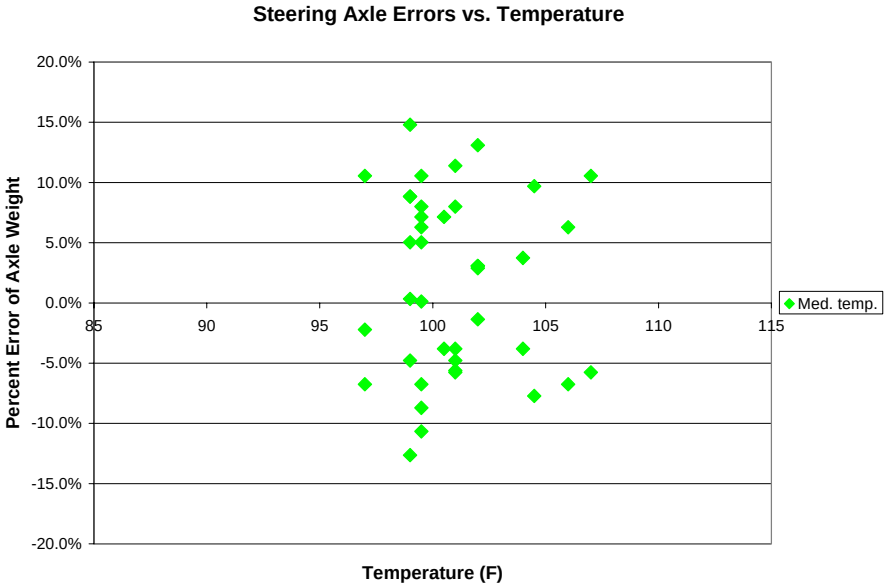


Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group – 120100 – 21-May-2007

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 40 to 47 mph, Medium speed – 48 to 57 mph and High speed – 58+ mph.

Table 6-3 Pre-Validation Results by Speed Bin – 120100 – 21-May-2007

Element	95% Limit	Low Speed 40 to 47 mph	Medium Speed 48 to 57 mph	High Speed 58+ mph
Steering axles	±20 %	5.1 ± 13.9%	0.3 ± 17.4%	-1.5 ± 14.3%
Tandem axles	±15 %	3.8 ± 9.2%	2.7 ± 11.8%	-1.0 ± 8.9%
GVW	±10 %	4.1 ± 7.6%	2.5 ± 11.8%	-1.0 ± 7.4%
Speed	±1 mph	-0.1 ± 1.4 mph	0.0 ± 2.5 mph	-0.4 ± 2.2 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.2 ft	0.0 ± 0.1 ft

For each weight category, mean errors decrease with speed but the high levels of variability almost obscure the trend. Most weights are over-estimated at low speeds and under-estimated at higher ones. The trend can be seen in Figure 6-7.

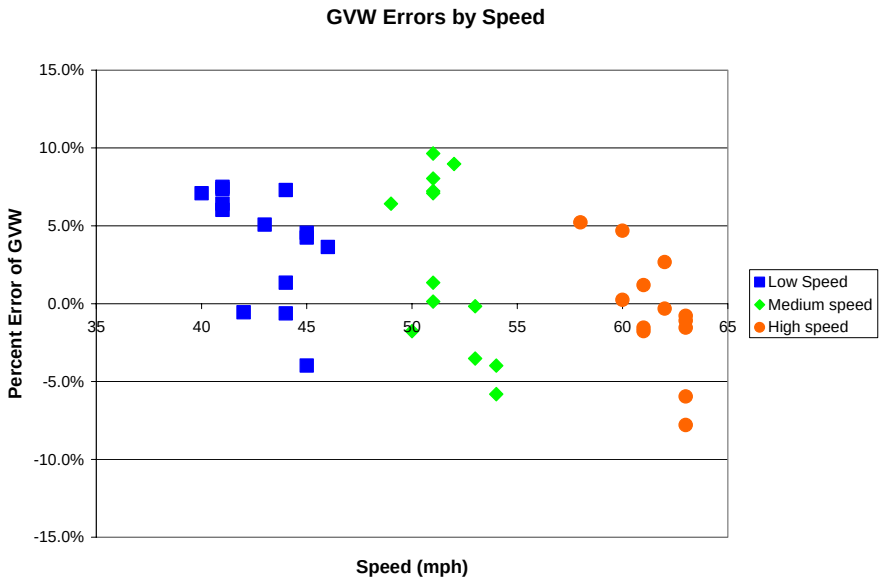


Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 120100 –21-May-2007

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 Class 9 vehicles.

The trend that is apparent within this graph is the same as the one from Figure 6-7, a general decrease in percent error with an increase in speed. However, the variability of steering axle weight errors is much higher than that of GVW errors.

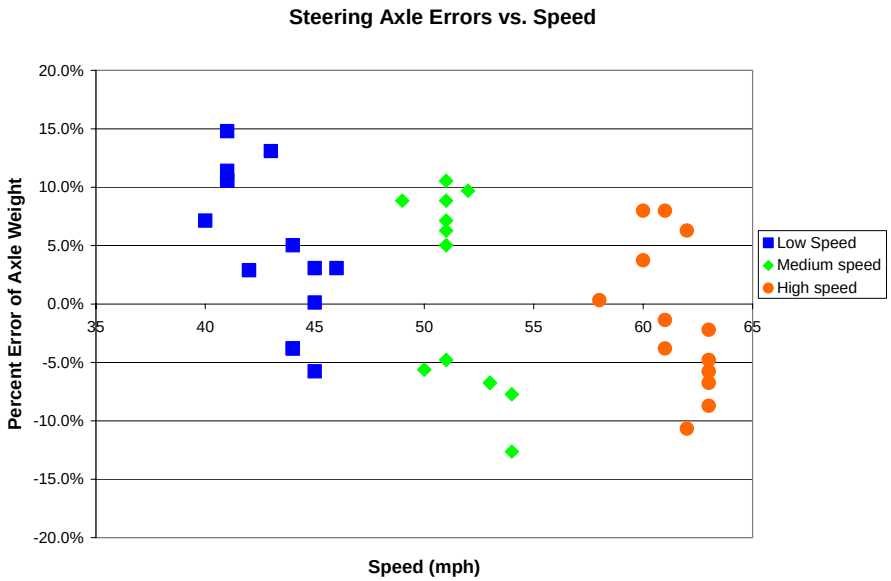


Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 120100 – 21-May-2007

6.3 Classification Validation

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

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. The classification identification is to identify gross errors in classification, not validate the classification algorithm. Video was taken at the site to provide ground truth for the evaluation. Based on the sample it was determined that there are 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 4.9 percent.

Table 6-4 Truck Misclassification Percentages for 120100 – 21-May-2007

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	N/A	5	-11	6	14
7	-33				
8	33	9	-1	10	N/A
11	0	12	N/A	13	N/A

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations with at least one Class 9 and only six of them 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 – 21-May-2007

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	N/A	5	11	6	12
7	33				
8	25	9	1	10	N/A
11	0	12	N/A	13	N/A

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

Although some of the Mean Difference values are large, their significance is not great since, with the exception of Class 9 trucks, the numbers are based on very small numbers of observed vehicles. Of the 100 reported vehicles, a total of only three were misclassified by this equipment.

6.4 Evaluation by ASTM E-1318 Criteria

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

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

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

6.5 Prior Validations

The last validation for this site was done September 11 and 12, 2006. It was the third validation of the site. The site was producing research quality data. Figure 6-9 shows the GVW Percent Error vs. Speed for the post validation runs. The site was validated with

two trucks. The "Golden" truck with air suspensions on both tandems was loaded to 74,680 lbs. The "partial" truck which also had air suspensions on both tandems was loaded to 64,850 lbs.

Figure 6-9 Last Validation GVW Percent Error vs. Speed – 120100 – 12-Sep-2006

Table 6-7 shows the overall results from the last validation. The site was producing research quality data when the validation was completed.

Table 6-7 Last Validation Final 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

Through the course of this validation the equipment has been observed at temperatures ranging from 61 to 121 degrees Fahrenheit.

Table 6-8 has the results at the end of the last validation by temperature. It appeared that mean error was not particularly affected by temperature. There was some decrease, numerically in variability at higher temperatures.

.

Table 6-8 Last 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 + 0.0 mph	0.1 + 0.6 mph
Axle spacing	± 0.5 ft	0.0 + 0.2ft	0.0 + 0.1ft

Table 6-9 has the results of the prior validation by speed groups. 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.

Table 6-9 Last Validation Results by Speed Bin – 120100 – 12-Sep-2006

Element	95% Limit	Low Speed 40 to 49 mph	Medium Speed 50 to 58 mph	High Speed 59+ 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 + 0.0 mph	0.1 + 0.6 mph	0.1 + 0.6 mph
Axle spacing	± 0.5 ft	0.0 + 0.1 ft	0.0 + 0.1 ft	0.0 + 0.2 ft

7 Data Availability and Quality

As of May 21, 2007 this site does not have at least 5 years of research quality data. Research quality data is defined to be at least 210 days in a year of data of known calibration meeting LTPP's precision requirements.

Data that has validation information available has been reviewed in light of the patterns present in the two weeks immediately following a validation/calibration activity. A determination of research quality data is based on the consistency with the validation pattern. Data that follows consistent and rational patterns in the absence of calibration information may be considered nominally of research quality pending validation information with which to compare it. Data that is inconsistent with expected patterns and has no supporting validation information is not considered research quality.
The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. In the case of this site, validations failed in 2003 and passed in 2005 and 2006, meaning that data from 2003 and 2004 cannot be considered to be or research quality but the 2005 and 2006 data

(if a complete year) can be considered research quality. Data from prior to 2003 lacks calibration information so the conclusion is that two years of research quality data are available with three more required to meet the five year goal for SPS-1 sites.

Table 7-1 Amount of Traffic Data Available 120100 – 21-May-2007

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1996	215	11	Full Week	319	12	Full Week
1999	144	6	Full Week	193	8	Full Week
2000	253	11	Full Week	276	11	Full Week
2001	325	12	Full Week	226	8	Full Week
2002	221	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
2005	335	12	Full Week	337	12	Full Week
2006*		6	Full Week			

*Data processing for 2006 is incomplete.

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.

Classes 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 – 22-May-2007

Characteristic	Class 9
Percentage Overweights	0.4%
Percentage Underweights	0.1%
Unloaded Peak	36 kips
Loaded Peak	76 kips

The expected percentage of unclassified vehicles is 1.2%. 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.

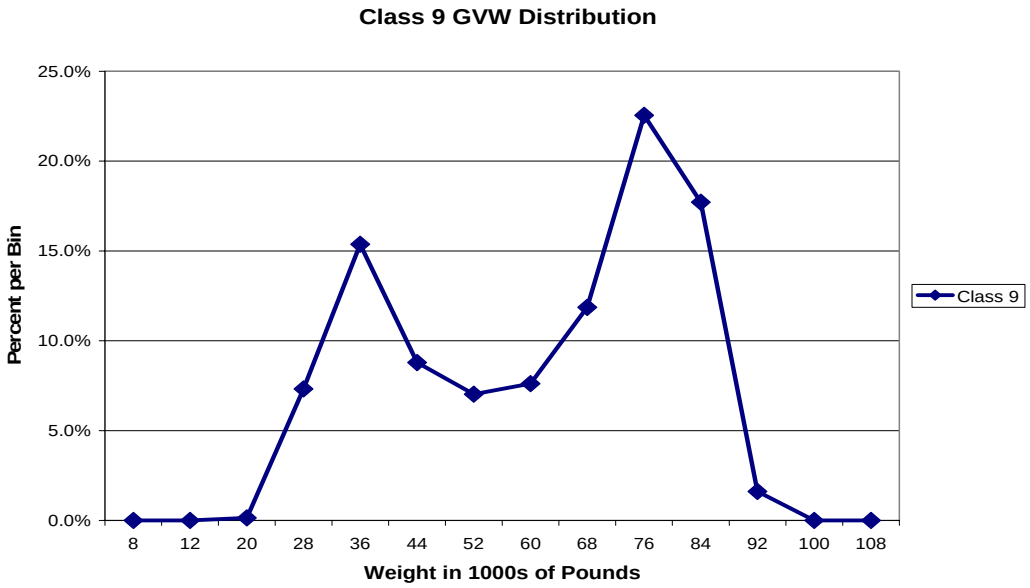


Figure 7-1 Expected GVW Distribution Class 9 – 120100 – 22-May-2007

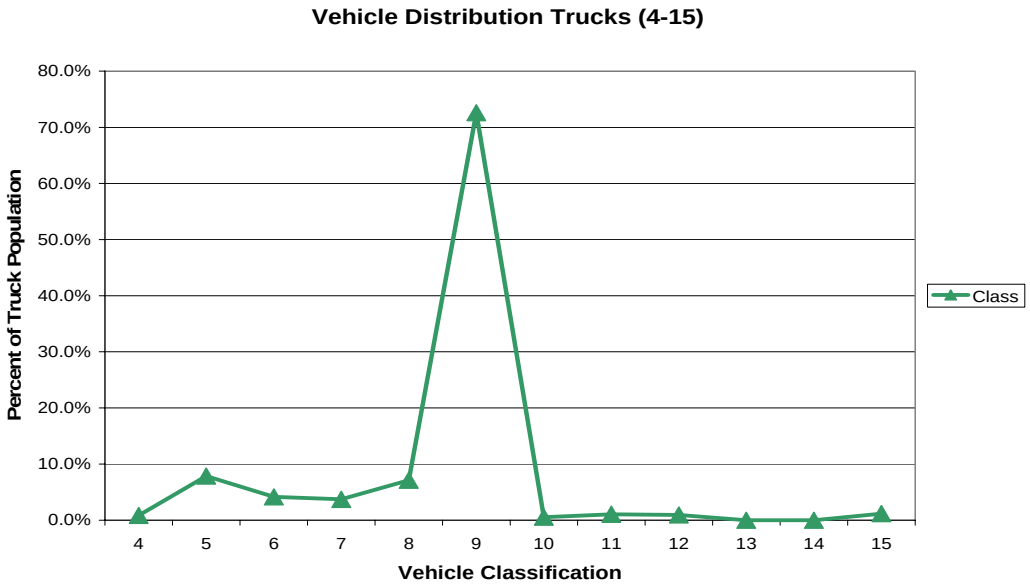


Figure 7-2 Expected Vehicle Distribution – 120100 – 22-May-2007

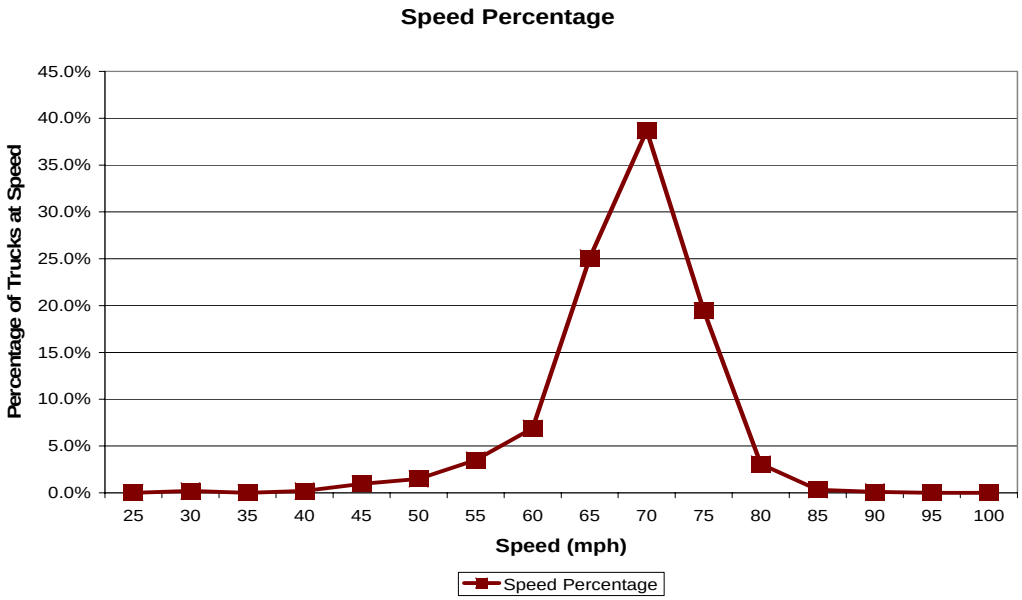


Figure 7-3 Expected Speed Distribution – 120100 – 22-May-2007

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 partially loaded (4 pages)

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

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

Calibration Iteration 1 Worksheets (1 page)
Calibration Iteration 2 Worksheets (1 page)
Calibration Iteration 3 Worksheets (1 page)

Test Truck Photographs (6 pages)

Final System Parameters (1 page)

9 Updated Handout Guide and Sheet 17

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

10 Updated Sheet 18

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

11 Traffic Sheet 16(s)

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

POST-VISIT HANDOUT GUIDE FOR SPS WIM VALIDATION

STATE: Florida

SHRP ID: 0100

Figures

Photos

1. General Information

SITE ID: *120100*

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

VISIT DATE: *May 21st & 22nd, 2007*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

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

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

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

Bouzid Choubane, 352-955-6302, bouzid.choubane@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: *May 21st and 22nd, 2007*

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, May 21st, 2007.*

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, 225 North Highway 27, South Bay, FL, open 24 hours; $8.50 first weigh, $1.00 re-weigh, Phone No: (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).*

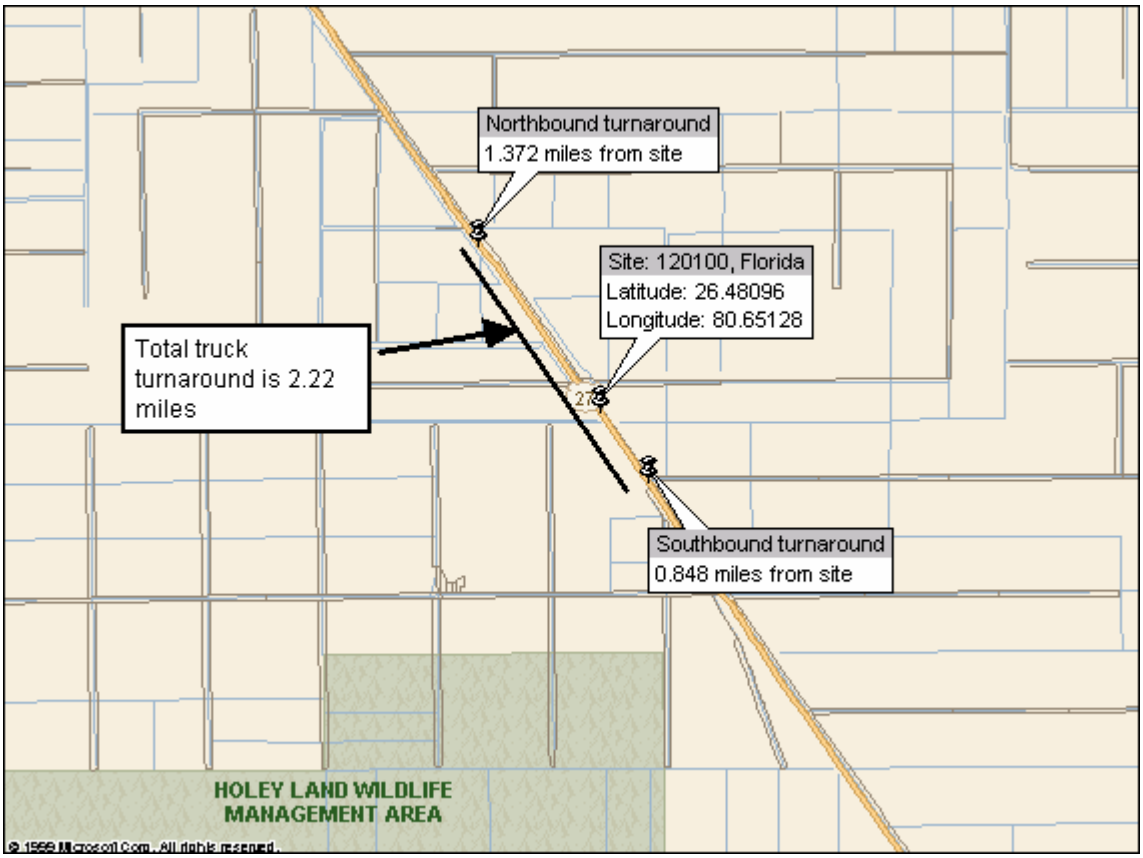


Figure 5-1 - Truck Route Map at 120100

6. Sheet 17 – Florida (120100)

1.* ROUTE ___US 27____ MILEPOST __N/A__ ___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 _5/22/2007_ Photo Filename
6420060018_SPSWIM_TO_19_12_2.87_0100_Distress_90_feet_prior.JPG
Date _5/22/2007_ Photo Filename
6420060018_SPSWIM_TO_19_12_2.87_0100_Distress_180_feet_prior.JPG
Date _5/22/2007_ Photo Filename
6420060018_SPSWIM_TO_19_12_2.87_0100_Distress_270_feet_prior.JPG
Date _5/22/2007_ Photo Filename
6420060018_SPSWIM_TO_19_12_2.87_0100_Distress_360_feet_prior.JPG
Date _5/22/2007_ Photo Filename
6420060018_SPSWIM_TO_19_12_2.87_0100_WIM_Site.JPG

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 / underground / cell?
   Service provider _____ Phone Number _____

13.* SYSTEM (software & version no.)- __DAW – 190 Ver. 3.18 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 TO_19_12_0100_Solar_Panel_05_021_07.JPG
   TO_19_12_0100_Service_Mast_05_21_07.JPG
   TO_19_12_0100_Battery_Corrosion_05_21_07.JPG

Phone source TO_19_12_0100_Telephone_Service_Box_05_21_07.JPG

Cabinet exterior TO_19_12_0100_Cabinet_Exterior_05_21_07.JPG

Cabinet interior TO_19_12_0100_Cabinet_Interior_Front_05_21_07.JPG
   TO_19_12_0100_Cabinet_Interior_Back_05_21_07.JPG

Weight Sensors TO_19_12_0100_Leading_WIM_Sensor_05_21_07.JPG
   TO_19_12_0100_Trailing_WIM_Sensor_05_21_07.JPG

Classification sensors _____

Other sensors Description TO_19_12_0100_Loop_Sensor_05_21_07.JPG

Downstream direction at sensors on LTPP lane
TO_19_12_0100_Downstream_05_21_07.JPG

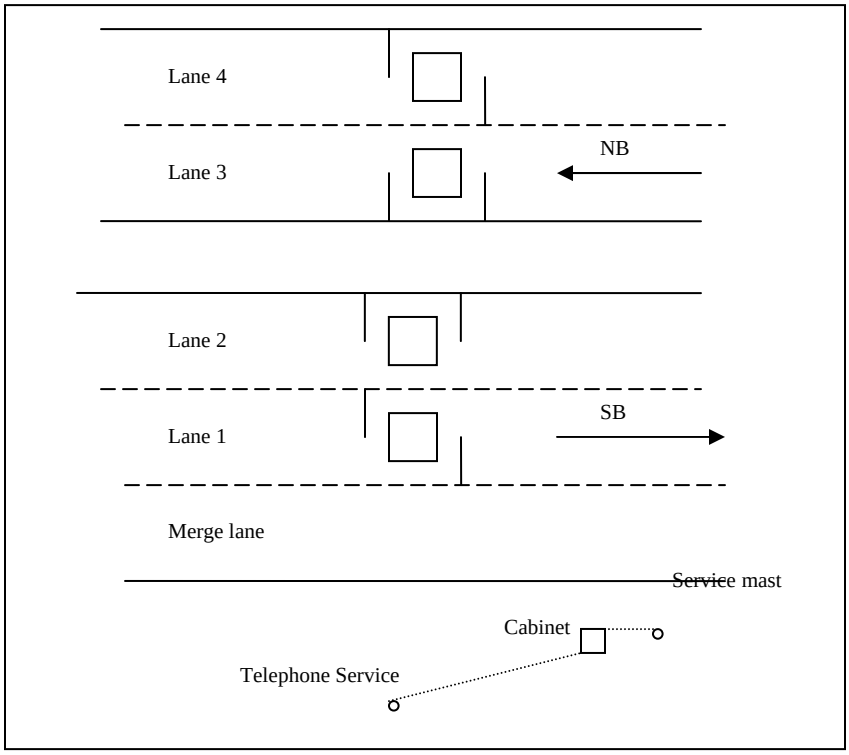
Upstream direction at sensors on LTPP lane TO_19_12_0100_Upstream_05_21_07.JPG

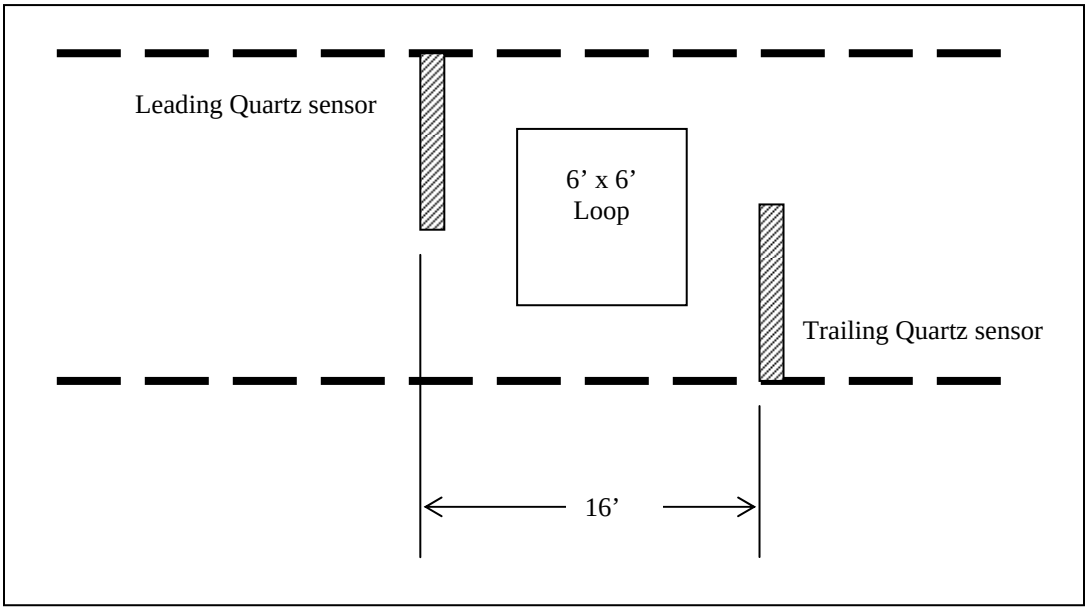
COMMENTS _____GPS Coordinates: Latitude: 26.48096; Longitude -80.65128____
_ Posted speed limit – 65 mph._____
_____Amenities:_____
_____Clewiston (30 miles, Best Western)_____
_____
_____South Bay (13.5 miles)_____
_____Chevron, Shell (Mini-Mart)_____
_____
_____Belle Glade (17.0) miles)_____
_____Various 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: 45, 55 and 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_5_ /_2_1_ / _2_0_0_7_

Sketch of equipment layout





Site Map

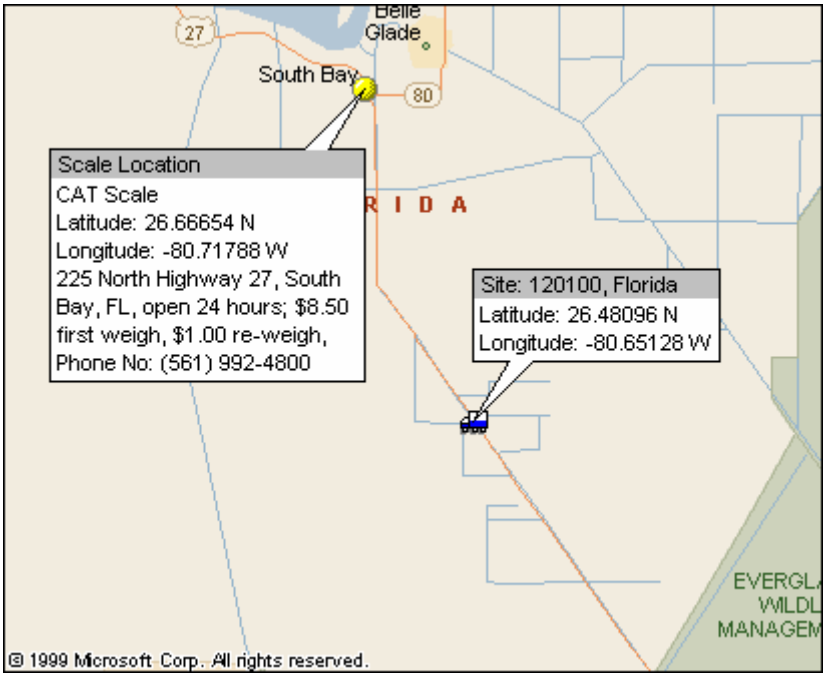


Figure 6-1 - Site Map at 120100

Photo 6-1 TO_19_12_0100_Distress_90_ feet_prior_05_21_07.JPG

Photo 6-2 TO_19_12_0100_Distress_180_ feet_prior_05_21_07.JPG

Photo 6-3 TO_19_12_0100_Distress_270_ feet_prior_05_21_07.JPG

Photo 6-4 TO_19_12_0100_Distress_360_ feet_prior_05_21_07.JPG

Photo 6-5 TO_19_12_0100_WIM_Site_05_21_07.JPG

Photo 6-6 TO_19_12_0100_Solar_Panel_05_21_07.JPG

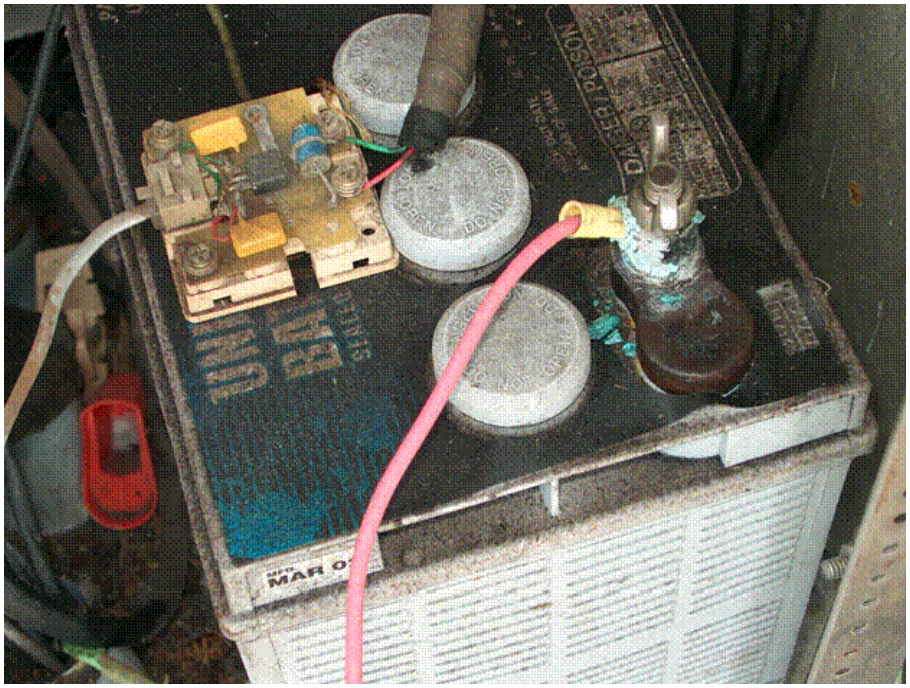


Photo 6-7 TO_19_12_0100_Battery_Corrosion_05_21_07.JPG

Photo 6-8 TO_19_12_0100_Service_Mast_05_21_07.JPG

Photo 6-9 TO_19_12_0100_Telephone_Service_Box_05_21_07.JPG

Photo 6-10 TO_19_12_0100_Cabinet_Exterior_05_21_07.JPG

Photo 6-11 TO_19_12_0100_Cabinet_Interior_Front_05_21_07.JPG

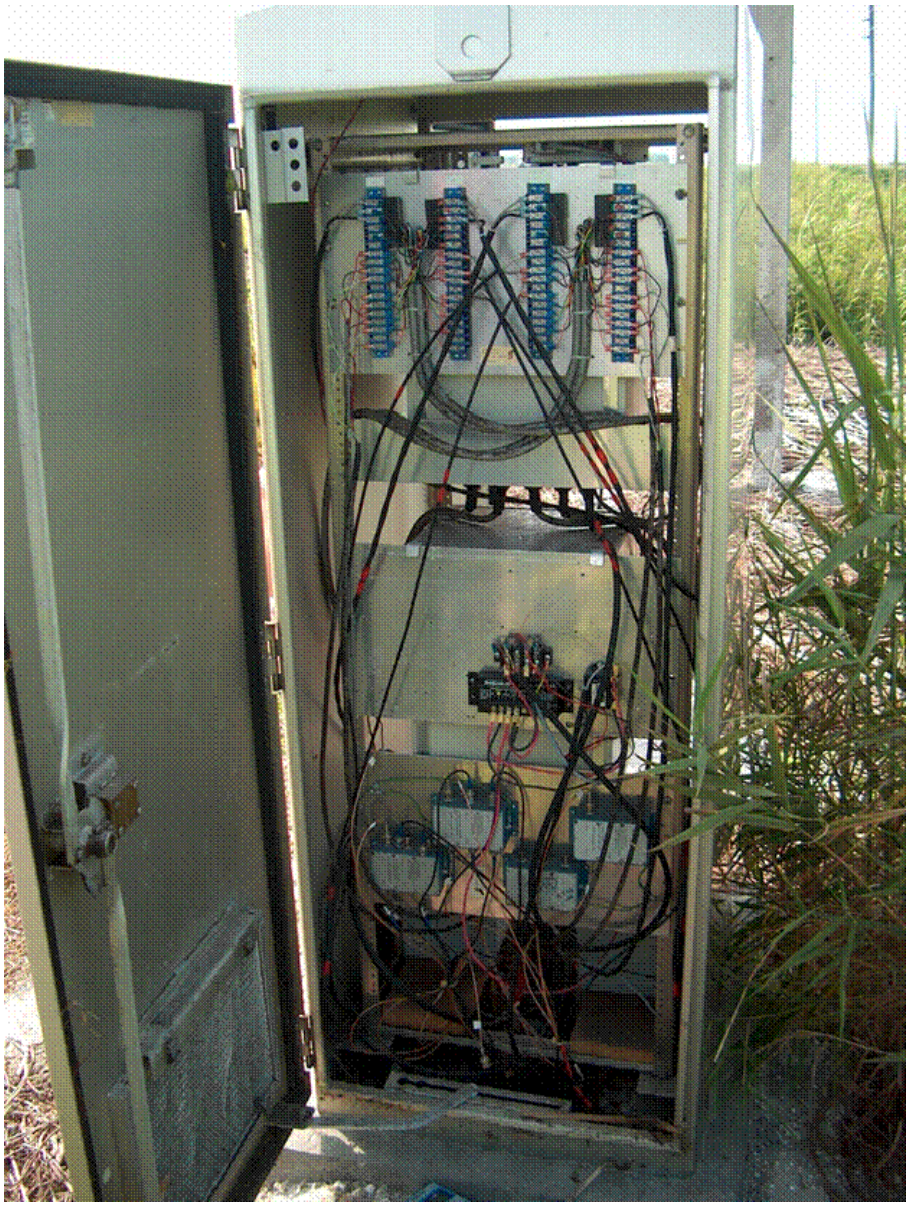


Photo 6-12 TO_19_12_0100_Cabinet_Interior_Back.JPG

Photo 6-13 TO_19_12_0100_Leading_WIM_Sensor_05_21_07.JPG

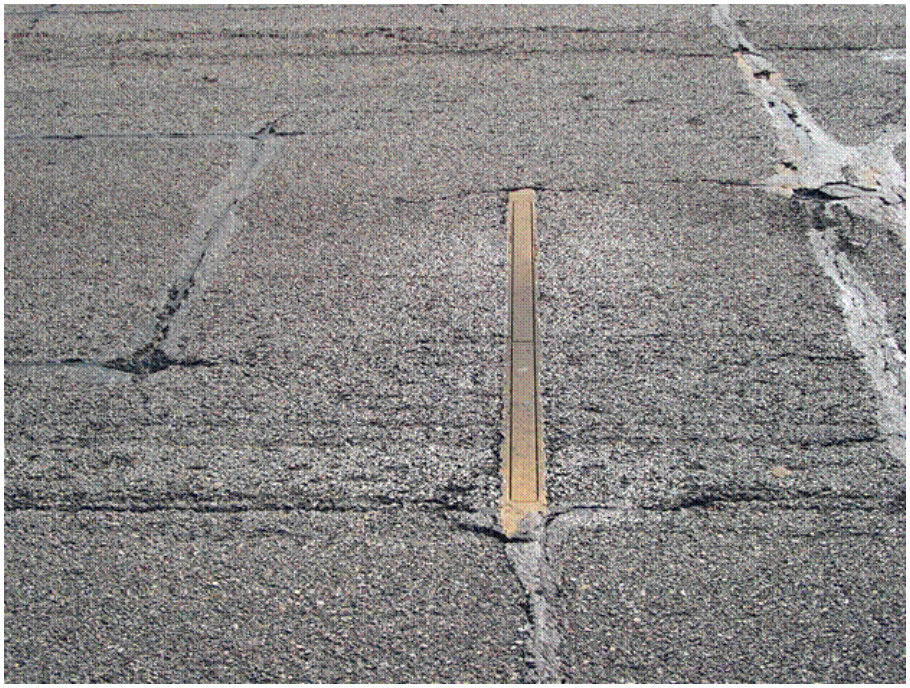


Photo 6-14 TO_19_12_0100_Trailing_WIM_Sensor_05_21_07.JPG

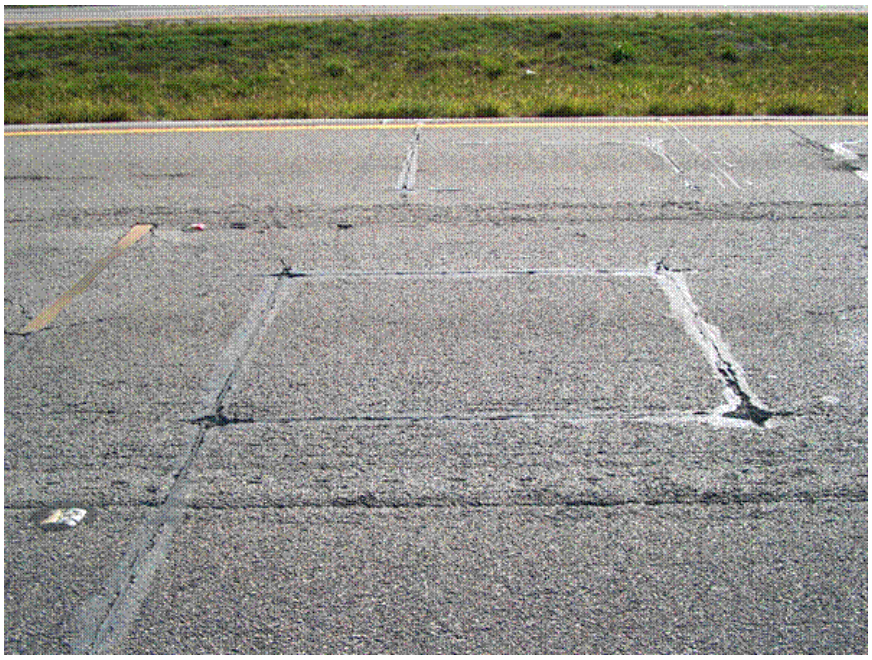


Photo 6-15 TO_19_12_0100_Loop_Sensor_05_21_07.JPG

Photo 6-16 TO_19_12_0100_Downstream_05_21_07.JPG

Photo 6-17 TO_19_12_0100_Upstream_05_21_07.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_5_ / _2_1_ / _2_0 _0_7_

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
         X 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__(for FL DOT)_____

b. Maintenance (equipment) –

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

Agency: ____FL DOT_____

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 [__ __ __ __] *STATE CODE [12] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [5/21/2007]

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

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
   ___ BARE ROUND PIEZO CERAMIC ___ BARE FLAT PIEZO ___ 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 - Kistler (quartz)_____

WIM SYSTEM CALIBRATION SPECIFICS**

6.**CALIBRATION TECHNIQUE USED:
   ___ TRAFFIC STREAM -- ___STATIC SCALE (Y/N) _X_ TEST TRUCKS

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

   __ 20__ PASSES PER TRUCK

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

TRUCK	TYPE	SUSPENSION
1	9	1
2	9	2
3		

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW 2.1 STANDARD DEVIATION 4.6
   DYNAMIC AND STATIC SINGLE AXLES 1.6 STANDARD DEVIATION 7.4
   DYNAMIC AND STATIC DOUBLE AXLES 2.0 STANDARD DEVIATION 5.2

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ 45 55 65 _____ __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) 965

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 ____ -1.3 FHWA CLASS ___ ____ ____ _____
   *** FHWA CLASS 8 ____ 33.3 FHWA CLASS ___ ____ ____ _____
   FHWA CLASS ___ ____ ____ _____
   FHWA CLASS ___ ____ ____ _____
   *** PERCENT "UNCLASSIFIED" VEHICLES: ____ 0.0

PERSON LEADING CALIBRATION EFFORT: Dean J. Wolf, MACTEC
CONTACT INFORMATION: 301-210-5105 rev. November 9, 1999

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [12] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [5/22/2007]

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

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
   ___ BARE ROUND PIEZO CERAMIC ___ BARE FLAT PIEZO ___ 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 - Kistler (quartz)_____

WIM SYSTEM CALIBRATION SPECIFICS**

6.**CALIBRATION TECHNIQUE USED:
   ___ TRAFFIC STREAM -- ___STATIC SCALE (Y/N) _X_ TEST TRUCKS

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

   __ 20__ PASSES PER TRUCK

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

TRUCK	TYPE	SUSPENSION
1	9	1
2	9	2
3		

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW -3.9 STANDARD DEVIATION 4.4
   DYNAMIC AND STATIC SINGLE AXLES -4.0 STANDARD DEVIATION 8.3
   DYNAMIC AND STATIC DOUBLE AXLES -4.0 STANDARD DEVIATION 4.8

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ 45 55 65 _____ __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) 951

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

CLASSIFIER TEST SPECIFICS***

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

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

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

PERSON LEADING CALIBRATION EFFORT: Dean J. Wolf, MACTEC
CONTACT INFORMATION: 301-210-5105 rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	5-21-07

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		11760	11500	(D) / C
B		19980	14970	D / (C)
C		19980	14970	D / (C)
D		16897	16880	D / (C)
E		16897	16880	D / (C)
F				D / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 74515

*c) Post Test Loaded Weight 74200

*d) Difference Post Test – Pre-test 315

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:

LONGEST MOVE WAS JUST TO THE REAR OF TRACTOR TANDEM

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	05-21-07

Rev. 08/31/01

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

A to B 14.9' B to C 4.3' C to D 31.8

D to E 4.1 E to F

Wheelbased (measured A to last) Computed 55.1

13. *Kingpin Offset From Axle B (units) (+2.3)

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	425/65R22.5	~~Air~~ 4-LEAF STEEL SPRING
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 5-21-07

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.											

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*CALIBRATION TEST TRUCK # 1	* DATE	5-21-07

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11740	14490	14490	16900	16900		74520
2	11820	14490	14940	16900	16900		74500
3	11720	14580	14510	16890	16890		74520
Average	11760	14480	14480	16897	16897		74515
POST	11500	14470	14470	16880	16880		74200

Table 6. Raw data – Axle scales – Day 2

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11880	14380	14380	16930	16930		74500
2	~~11740~~	~~14740~~	~~14740~~	~~16890~~	~~16890~~		~~75000~~
3	11760	14470	14470	16900	16900		74500
Average	11820	14425	14425	16915	16915		74500
POST	11680	14440	14440	16880	16880		74320

PRE 5/22/07

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 KP

Sheet 19	* STATE CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 2	* DATE	5-21-07

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 day 1	6.* Measured D)irectly or C)alculated?
A		10187	10060	(D) / C
B		13080	13030	D / (C)
C		13080	13030	D / (C)
D		19633	19600	D / (C)
E		19633	19600	D / (C)
F				D / C

GVW (same units as axles)

7. a) Empty GVW XL

*b) Average Pre-Test Loaded weight 65613
*c) Post Test Loaded Weight 65320
*d) Difference Post Test – Pre-test 293

GEOMETRY

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

9. a) * Make: KENWORTH b) * Model: S600

10.* Trailer Load Distribution Description:

CONCRETE BLOCKS SPREAD EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE_CODE	12
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*CALIBRATION TEST TRUCK # 2	* DATE	5-21-07

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

A to B 19.0' B to C 4.5 C to D 30.7

D to E 4.0 E to F _____

Wheelbased (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) _____(+ 2.8)__
(+ 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 LEAF STEEL SPRING
B	11R24.5	AIR
C	11R24.5	AIR
D	295/75R22.5	STEEL SPRING
E	295/75R22.5	STEEL SPRING
F	_____	_____

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

Steering Axle	Axle B	Axle C	Axle D	Axle E
_____	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
_____	_____	_____	_____	_____

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*CALIBRATION TEST TRUCK # 2	* DATE	05-21-07

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PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

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*CALIBRATION TEST TRUCK # 2	* DATE	5-21-07

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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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10100	13140	13140	14620	14620		65620
2	10240	13030	13030	14650	14650		65600
3	10220	13070	13070	14630	14630		65620
Average	10187	13080	13080	14633	14633		65613
PAST	10060	13030	13030	14600	14600		65320

Table 6. Raw data – Axle scales – DAY 2

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10220	13060	13060	14640	14640		65620
2	10180	13110	13110	14600	14600		65600
3	10220	13070	13070	14620	14620		65600
Average	10207	13080	13080	14620	14620		65607
POST	10120	13070	13070	14600	14600		65460

PAGE 5/22/07

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 _____ Verified By _____

Sheet 20	* STATE_CODE 12
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 1 of* 2	* DATE 05/21/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
69	8	8081	68	8	57	9	8219	58	9
64	9	8091	63	9	58	9	8233	58	9
56	9	8093	55	9	54	8	8236	53	8
65	9	8095	64	9	71	9	8275	79	9
63	9	8104	61	9	60	9	8281	59	9
61	9	8109	61	9	71	9	8265	68	9
60	9	8112	61	9	66	9	8287	65	9
66	9	8120	65	9	63	5	8289	62	5
66	9	8121	65	9	62	9	8295	61	9
64	9	8125	64	9	59	9	8298	59	9
66	9	8126	65	9	72	5	8305	70	5
52	9	8136	52	9	66	9	8315	66	9
55	9	8138	54	9	68	9	8316	67	9
61	8	8149	61	8	~~33~~	~~15~~	~~8321~~	~~60~~	~~10~~
64	7	8151	64	7	60	9	8327	60	9
69	9	8154	69	9	68	9	8355	68	9
63	9	8159	63	9	65	9	8351	67	9
64	6	8162	64	6	60	9	8365	66	9
68	9	8171	69	9	60	6	8366	60	6
62	9	8176	61	9	62	11	8370	62	11
70	9	8194	70	9	64	9	8379	63	9
71	9	8195	70	9	67	9	8419	67	9
60	5	8204	60	5	62	5	8421	62	5
67	9	8205	67	9	70	6	8436	70	6
65	9	8210	64	9	62	9	8448	61	9

OHL SCALE

Recorded by RP Direction SB Lane 1 Time from 15:00 to 1620

71 9 8456 71 9

Sheet 20	* STATE_CODE	12
LTPP Traffic Data	*SPS PROJECT_ID	0100
Speed and Classification Checks * 2 of* 2	* DATE	05/21/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
68	9	8464	70	9	66	9	8653	66	9	
69	9	8465	68	9	57	9	8660	57	9	
65	9	8467	64	9	69	9	8664	69	9	
64	9	8470	64	9	68	9	8680	68	9	
70	9	8479	69	9	64	9	8683	64	9	
62	9	8485	62	9	68	9	8684	67	9	
43	9	8487	41	9	66	9	8689	63	9	
67	9	8487	66	9	67	9	8701	66	9	
59	5	8493	58	5	62	9	8705	65	9	
64	9	8496	62	9	65	9	8707	65	9	
63	9	8498	63	9	69	9	8796	69	9	
67	9	8508	67	9	69	6	8768	64	7	
69	9	8512	68	9	66	3	8779	66	5	
63	6	8542	63	6	77	8	8780	69	9	missed axle
67	9	8548	67	9	64	9	8784	64	9	
72	5	8554	72	5	55	9	8793	55	9	
70	9	8574	70	9	61	6	8805	61	6	
58	6	8578	59	6	61	9	8811	62	9	
64	9	8588	66	9	64	9	8826	65	9	
54	5	8612	56	5	64	7	8833	63	7	
63	9	8618	64	9	61	9	8834	57	9	
63	9	8620	63	9	72	5	8838	71	5	
66	6	8629	65	6	61	9	8850	61	9	
63	9	8635	63	9	72	9	8865	71	9	
65	9	8648	65	9	61	9	8867	62	9	

Recorded by RP Direction SB Lane 1 Time from 16:20 to _____

Sheet 20	* STATE_CODE	12
LTPP Traffic Data	*SPS PROJECT_ID	0100
Speed and Classification Checks * 1 of* 2	* DATE	05/22/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
64	9	4206	64	9	64	9	4535	64	9
63	9	4209	64	9	63	8	4536	63	8
62	9	4225	62	9	69	9	4547	69	9
69	6	4227	69	6	65	9	4555	64	9
62	9	4241	62	9	66	9	4556	65	9
52	9	4246	53	9	68	9	4557	67	9
65	9	4258	65	9	60	7	4558	60	7
75	7	4296	75	7	65	4	4559	63	6
70	7	4301	69	7	62	9	4587	62	9
49	9	4384	48	9	66	9	4586	66	9
48	9	4386	48	9	62	9	4596	62	9
65	9	4395	65	9	52	9	4599	51	9
68	9	4412	67	9	68	9	4605	68	9
67	9	4430	67	9	67	5	4617	66	5
67	9	4432	70	9	74	9	4620	M ~~67~~	9
70	9	4440	70	9	72	7	4626	71	7
62	7	4443	61	7	67	9	4638	67	9
59	9	4475	59	9	57	9	4641	57	9
68	9	4486	68	9	68	9	4652	68	9
68	9	4488	67	9	69	9	4656	70	9
75	9	4494	74	9	59	9	4666	60	9
72	6	4498	72	6	69	9	4667	70	9
64	8	4501	63	8	64	5	4677	66	5
67	9	4511	67	9	65	9	4678	65	9
64	7	4533	66	7	65	9	4722	61	9

SPACE 24.4/1:

Recorded by RP Direction SB Lane 1 Time from 10:30 to 11:45

POST

Sheet 20	* STATE_CODE	12
LTPP Traffic Data	*SPS PROJECT_ID	0100
Speed and Classification Checks * 2 of* 2	* DATE	05/22/2007

Rev. 08/31/2001....

START HERE

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
61	8	4882	61	8	55	9	4733	54	9
64	9	4885	63	9	64	8	4735	63	3
76	6	4894	76	6	70	9	4749	70	9
63	9	4899	63	9	62	8	4752	62	8
57	9	4906	56	9	67	9	4758	68	9
68	9	4913	68	9	65	9	4760	67	9
68	9	4915	68	9	67	5	4768	67	5
72	8	4925	71	8	68	6	4769	68	6
55	9	4930	54	9	59	9	4771	58	9
47	9	4936	46	9	58	6	4785	57	6
67	9	4940	68	9	64	3	4789	65	5
71	8	4944	70	8	67	9	4791	65	9
64	9	4947	64	9	63	9	4799	63	9
59	9	4949	59	9	68	9	4801	68	9
67	9	4952	69	9	65	9	4805	65	9
67	9	4953	67	9	74	9	4806	74	9
65	9	4957	66	9	66	9	4810	66	9
71	9	4959	70	9	69	9	4815	69	9
65	8	4972	66	8	63	9	4822	65	9
56	9	4979	56	9	66	5	4830	67	8
59	9	4982	61	9	69	5	4832	68	5
66	9	4986	66	9	64	9	4845	63	9
62	7	4988	62	7	67	9	4850	67	9
64	5	5008	65	5	67	9	4865	68	9
63	9	5014	63	9	74	8	4878	74	8

Recorded by RP Direction SB Lane 1 Time from 11:46 to 12:15

END HERE

Sheet 21	* STATE_CODE	10
LTPP Traffic Data	*SPS PROJECT_ID	100100
WIM System Test Truck Records 1 of 2	* DATE	05/21/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
~~102~~	~~61~~	~~1~~	~~1~~	~~10:43~~	~~4960~~			~~5.4~~	~~6.2~~	~~7.0~~	~~7.5~~	~~6.5~~	~~73.2~~					
102	61	1	1	10:43	4960	61		5.9/6.2	7.0/7.9	6.5/6.8	7.4/9.9	7.3/9.4	73.2	19.9	4.4	31.9	9.1	
~~	~~63~~	~~2~~	~~1~~	~~10:44~~	~~4975~~	~~63~~		4.8/4.0	7.0/5.0	7.1/4.8	9.1/5.7	8.9/7.3	~~58.5~~	~~19.1~~	~~4.5~~	~~30.8~~	~~3.9~~	
107	41	1	2	10:47	4500	41		6.3/6.4	7.5/8.0	7.1/8.0	8.1/10.2	7.2/10.1	79.3	19.9	4.3	32.0	9.1	
	45	2	2	10:48	4503	45		5.1/4.5	7.0/5.1	6.6/5.0	7.4/6.2	7.9/8.2	63.0	19.2	4.5	30.8	9.0	
106	51	1	3	10:51	4562	51		5.6/6.9	7.2/8.2	7.4/7.5	7.5/11.0	8.2/10.2	79.8	14.8	4.3	31.9	9.0	
	53	2	2	10:52	4584	52		4.6/4.9	7.0/5.0	6.5/5.8	6.8/7.1	7.3/8.2	63.3	19.1	4.5	30.8	9.0	
104	60	1	4	10:55	4602	60		5.4/6.8	7.2/8.2	7.5/7.9	7.0/10.4	7.4/10.2	78.0	14.9	4.3	31.9	9.1	
	61	2	3	10:56	4617	62		4.5/5.3	6.8/6.2	7.1/6.8	3.3/7.2	8.8/8.7	64.6	19.2	4.5	31.0	3.9	
102	42	1	5	10:58	4646	41		6.3/5.8	7.0/7.3	6.9/7.0	7.6/9.2	7.7/9.3	74.1	14.9	4.3	31.9	9.1	
	46	2	4	10:59	4662	46		4.9/5.6	7.0/6.4	6.7/6.5	6.8/6.6	8.6/8.9	68.0	19.2	4.5	30.8	9.0	
99	49	1	6	11:02	4709	49		5.9/6.9	7.2/9.3	7.7/7.4	7.3/10.6	7.9/10.2	79.3	14.9	4.3	31.9	9.0	
	54	2	5	11:03	4714	53		4.9/4.1	7.5/4.5	7.1/4.8	7.0/5.9	8.2/8.0	61.8	19.1	4.5	30.7	4.0	
99.5	62	1	7	11:06	4761	60		5.7/6.8	6.8/7.7	7.0/7.3	7.5/10.2	7.3/10.2	76.5	14.9	4.3	31.9	4.1	
	62	2	6	11:07	4767	62		4.5/4.6	7.2/5.7	7.4/5.8	6.7/6.9	8.9/7.9	65.4	19.1	4.5	30.7	4.0	

Recorded by RP

Checked by

Sheet 21	* STATE_CODE	10
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 2 of 3	* DATE	05/21/2002

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
102	43	1	8	11:10	4814	42	6.9/6.8	7.4/7.9	6.9/7.5	8.0/9.6	8.1/9.6		78.3	14.8	4.3	31.8	4.1	
	45	2	7	11:11	4819	44	5.2/5.3	6.6/6.3	6.5/6.7	7.1/7.2	8.3/8.9		68.1	19.2	4.5	30.9	4.0	
101.5	52	1	9	11:14	4865	52	5.7/7.2	7.0/8.7	7.4/8.3	7.1/11.6	7.2/10.9		81.2	14.9	4.3	31.9	4.1	
	54	2	8	11:15	4882	54	4.9/4.5	6.8/5.2	6.5/5.9	6.6/6.1	8.4/8.0		63.0	19.1	4.5	30.8	4.0	
101	61	1	10	11:17	4908	59	6.1/6.6	6.8/7.9	6.5/7.3	7.0/10.1	6.7/10.3		75.4	14.8	4.3	31.9	4.1	
	63	2	9	11:19	4932	63	4.8/4.9	6.6/5.9	6.9/6.0	6.8/6.7	8.5/8.0		65.1	19.1	4.5	30.7	4.0	
101	63	2	15	12:26	5750	63	4.9/4.8	6.9/6.0	6.6/6.1	6.5/7.3	7.9/7.6		69.6	19.1	4.5	30.8	4.0	
	41	1	17	12:27	5765	41	6.2/6.9	7.4/8.3	7.4/8.1	7.6/10.2	7.5/10.3		80.0	14.9	4.3	31.9	4.1	
	44	2	16	12:29	5808	44	4.8/5.0	6.8/5.7	6.6/6.1	7.1/6.9	7.8/8.5		65.2	19.1	4.5	30.7	4.0	
	50	1	18	12:31	5830	50	5.3/5.8	6.9/7.5	7.0/6.5	7.1/10.0	7.7/9.1		73.2	14.9	4.4	31.9	4.1	
99.5	51	2	17	12:34	5854	54	5.2/5.5	6.4/6.7	6.0/6.6	8.1/7.2	8.3/7.5		66.5	19.1	4.4	30.7	4.0	
	60	1	19	12:35	5874	60	6.1/6.6	7.2/7.2	6.8/8.4	7.2/9.8	7.6/9.7		79.7	14.9	4.3	31.9	4.1	
	63	2	18	12:37	5906	63	4.8/4.7	6.9/5.9	6.7/6.0	3.2/6.0	8.7/7.5		60.5	19.1	4.5	30.9	4.0	
	40	1	20	12:38	5918	41	5.9/6.7	7.4/8.6	7.3/8.3	7.5/10.4	7.1/10.3		79.8	14.9	4.3	31.9	4.1	
100.5	44	2	19	12:40	5940	45	4.8/5.0	6.8/6.0	6.5/6.5	7.3/6.9	8.1/8.5		66.5	19.1	4.5	30.8	4.0	
	51	1	21	12:42	5968	49	5.8/6.8	7.4/8.8	7.7/7.3	7.5/11.5	7.6/10.1		80.5	14.8	4.4	31.8	4.1	

Recorded by RP Checked by

Sheet 21	* STATE_CODE	12
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 3 of 3	* DATE	05/21/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
~~98~~	~~40~~	~~1~~	~~1~~	~~11:54~~	~~5351~~	~~40~~	~~5.9/6.2~~	~~7.2/8.1~~	~~7.5/7.6~~	~~8.9/10.3~~	~~7.5/9.4~~		~~78.6~~	~~19.2~~	~~4.5~~		~~4~~	
	~~44~~	~~1~~	~~1~~	~~11:55~~	~~5363~~	~~45~~	~~4.7/4.8~~	~~6.5/5.4~~	~~6.7/6.2~~	~~7.4/6.6~~	~~8.2/9.0~~		~~66.1~~	~~14.9~~	~~4.3~~	~~31.9~~	~~9.1~~	
	~~53~~	~~1~~	~~2~~	~~11:58~~	~~5401~~		~~5.0/5.5~~	~~7.1/6.0~~	~~6.6/6.5~~	~~7.2/6.9~~	~~8.4/9.3~~		~~68.4~~					
	~~56~~	~~2~~	~~2~~															
99	58	1	8	12:01	5434	58	5.5/6.3	6.9/8.6	6.6/8.5	7.0/11.0	7.1/10.9		78.4	14.9	4.4	32.0	4.1	
	41	1	9	12:05	5486	41	6.0/7.5	7.7/8.2	7.3/7.6	8.1/10.6	7.6/9.6		80.1	14.9	4.4	31.9	4.1	
	41	2	10	12:05	5492	44	5.0/5.7	7.0/6.4	6.7/7.0	7.1/7.9	8.2/9.5		70.4	19.1	4.5	30.8	4.0	
	51	1	13	12:09	5527	51	5.7/7.1	7.2/8.6	7.5/7.8	7.6/11.0	8.2/11.0		81.7	14.9	4.3	31.9	4.1	
	51	2	11	12:09	5528	52	4.7/5.0	7.1/5.8	6.8/6.2	7.8/6.4	7.4/8.4		65.7	19.1	4.5	30.8	4.0	
	~~60~~	~~1~~	~~14~~															
99.5	63	2	12	12:13	5576	63	4.7/4.6	6.7/5.5	6.7/5.5	6.7/5.5	8.1/7.6		61.7	19.1	4.5	30.7	4.0	
	41	1	14	12:16	5608	41	6.2/6.8	7.5/7.8	7.8/7.7	8.9/9.9	8.0/9.9		79.0	14.9	4.3	31.8	4.1	
	45	2	13	12:17	5620	44	4.8/5.4	6.7/6.3	6.4/6.7	7.4/7.3	7.9/9.4		68.4	19.1	4.5	30.8	4.0	
97	51	1	15	12:20	5674	51	5.4/7.6	7.1/9.1	7.2/8.0	7.0/10.7	7.1/10.7		79.9	14.9	4.4	31.9	4.1	
	53	2	14	12:22	5708	53	4.8/4.7	7.4/5.8	6.9/6.3	6.9/6.1	7.9/8.6		65.5	19.1	4.4	30.8	4.0	
	63	1	16	12:23	5713	61	5.7/5.8	7.1/7.9	6.3/6.3	9.1/10.4	7.2/9.8		73.7	14.9	4.4	31.9	4.1	

Recorded by _____ Checked by _____

CAL 1

Sheet 21	* STATE_CODE	12
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 1 of 2	* DATE	05/21/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
102	42	2	1	14:17	7084	43	5.2/5.2	6.6/6.5	6.7/6.6	7.9/8.3	8.9/9.5		68.1	19.1	4.5	30.9	4.0	
	41	1	1	14:17	7080	41	6.0/6.0	7.2/7.5	6.4/6.9	8.0/9.5	7.7/9.2		79.5	14.8	9.3	31.9	9.1	
102	52	2	2	14:20	7114	52	4.8/5.6	6.9/6.2	6.7/6.4	7.5/7.4	8.2/9.0		68.8	19.2	4.5	30.8	4.0	
	51	1	2	14:20	7117	51	5.7/7.5	7.0/8.1	7.0/8.4	7.4/10.9	7.4/10.9		80.2	14.9	9.3	32.8	9.1	
	63	2	3	14:23	7140	64	4.9/5.5	6.5/6.8	6.7/6.9	5.8/7.9	8.7/8.5		67.4	19.2	4.5	30.8	9.0	
	57	1	3	14:24	7147	57	6.3/6.3	7.1/7.5	7.1/6.6	7.0/9.0	7.3/8.8		73.0	14.8	4.3	31.7	9.0	
105	54	2	1	14:30	7209	55	4.9/4.9	6.8/5.7	6.8/5.9	7.8/6.0	8.3/7.8		69.7	19.0	4.4	30.7	9.0	
	51	1	1	14:30	7213	51	6.2/7.0	7.0/7.7	6.5/7.3	7.1/10.7	7.4/10.4		77.2	14.9	4.4	31.9	9.1	
105	63	2	2	14:34	7245	63	4.9/5.3	6.3/6.6	6.8/6.2	5.3/7.1	8.5/7.8		64.8	19.2	4.5	30.9	4.0	
	59	1	2	14:34	7247	58	6.0/6.9	6.9/7.5	6.2/6.5	6.6/9.8	7.2/9.6		73.3	14.9	4.4	31.9	4.1	
105	44	2	3	14:38	7301	44	5.0/5.1	6.7/6.2	5.9/6.3	7.5/6.7	7.7/9.2		66.3	19.1	4.5	30.7	4.0	
	41	1	3	14:38	7303	41	5.0/6.4	7.2/8.0	6.9/7.9	6.6/10.5	6.9/10.4		75.9	14.9	4.4	31.9	4.0	
105	57	2	4	14:42	7345	56	4.6/4.4	7.0/5.3	6.9/5.6	7.0/4.8	8.9/9.5		61.4	19.1	4.5	30.8	4.0	
	50	1	4	14:42	7349	50	6.1/6.8	7.1/8.4	7.5/7.1	7.0/11.0	8.2/10.3		79.4	14.9	4.4	31.9	4.0	
105	61	2	5	14:45	7375	62	4.7/5.7	6.8/6.8	6.4/6.8	9.1/7.1	9.4/8.1		71.2	19.1	4.5	30.8	4.0	
	59	1	5	14:45	7379	60	6.0/5.2	6.9/7.5	6.4/6.2	7.1/9.1	6.9/9.3		70.6	14.9	4.4	31.9	4.0	

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Sheet 21	* STATE_CODE	12
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 2 of 2	* DATE	05/21/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
105	45	2	6	14:48	7406	45	4.8/5.0	6.7/6.3	6.6/6.7	6.8/6.9	8.9/9.0		66.6	19.1	9.5	30.8	4.0	
	42	1	6	14:49	7413	41	5.6/6.4	7.0/8.2	6.7/7.8	6.8/10.7	7.0/10.2		76.2	14.9	4.4	31.9	4.1	

Recorded by RP

Checked by

CAL 2

Sheet 21	* STATE_CODE	12 ~~10~~
LTPP Traffic Data	*SPS PROJECT_ID	0100 ~~0200~~
WIM System Test Truck Records 1 of 1	* DATE	05/21/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
99	44	2	1	15:17	7759	44	4.5/4.5	6.4/5.4	6.1/5.7	6.3/6.4	7.7/8.3		61.3	19.1	4.5	30.8	4.0	
	44	1	1	15:18	7770	44	5.9/5.7	7.5/7.7	6.9/7.3	7.3/9.6	7.5/9.4		74.7	14.8	4.3	31.8	4.1	
99	53	2	2	15:21	7797	53	4.5/4.3	6.9/4.6	6.4/5.2	8.4/6.0	7.6/7.6		61.8	19.1	4.4	30.7	4.0	
	54	1	2	15:21	7802	54	5.6/6.5	6.2/7.5	6.9/7.0	7.1/10.0	7.2/9.6		73.5	14.9	4.3	31.9	4.1	
	63	2	3	15:24	7834	62	4.7/4.3	7.2/5.5	6.5/5.2	5.2/6.5	9.2/7.3		61.7	19.0	4.5	30.6	3.9	
	63	1	3	15:25	7848	61	6.1/7.2	6.5/7.3	6.5/6.5	7.1/10.3	6.7/10.3		74.6	14.9	4.3	31.9	4.1	
104	43	2	4	15:28	7874	43	4.9/4.9	6.3/6.1	6.3/6.2	7.3/6.7	7.5/8.6		64.8	19.1	4.5	30.8	4.0	
	45	1	4	15:29	7883	44	5.1/5.9	7.2/7.2	6.6/6.4	8.0/9.3	7.7/9.0		72.4	14.8	4.4	31.7	4.1	
107	53	2	5	15:31	7921	53	4.5/4.4	6.9/5.5	6.8/5.5	6.7/6.5	7.7/7.9		62.3	19.1	4.5	30.9	4.0	
	63	1	5	15:32	7931	61	6.3/7.3	6.6/7.7	6.7/7.3	6.2/10.4	6.5/10.9		75.9	14.9	4.4	31.9	4.1	
106	64	2	6	15:34	7955	64	5.0/4.9	6.8/5.8	6.6/6.0	6.0/7.2	7.6/7.6		63.6	19.1	4.5	30.8	4.0	
	54	1	6	15:35	7967	54	5.2/6.2	7.0/8.5	6.6/7.9	6.8/11.2	7.5/10.4		77.3	14.9	4.4	32.0	4.1	

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Sheet 21	* STATE_CODE	12
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 12 of 21	* DATE	05/22/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
105	45	2	6	14:48	2406	45	4.8/5.0	6.7/6.3	6.8/6.7	6.8/6.5	8.0/9.0		69.6	19.1	4.5	30.8	4.0	
	42	1	6	14:49	2413	41	5.4/6.1	7.0/8.2	6.7/7.8	6.8/10.7	7.8/10.7		76.2	19.9	4.4	31.9	4.1	
82.5	95	1	1	8:25	2473	95	6.2/7.1	6.8/7.5	6.5/7.3	7.9/9.3	7.6/9.0		75.1	19.9	4.3	31.9	4.1	
	44	2	1	8:26	2482	43	4.7/4.2	6.1/5.5	6.2/5.5	7.9/5.8	7.3/7.8		60.7	19.1	4.5	30.8	4.0	
80.5	54	1	2	8:29	2529	54	4.9/6.9	6.8/8.2	7.2/7.8	6.8/10.7	7.8/10.3		76.2	19.9	4.3	31.9	4.1	
	54	2	2	8:29	2528	54	4.6/4.9	7.0/5.2	6.7/5.2	7.3/6.2	7.6/7.7		61.8	19.1	4.5	30.7	4.1	
82	63	1	3	8:32	2564	62	5.5/7.0	7.2/7.6	6.7/6.8	6.8/9.8	7.5/9.3		79.1	19.9	4.3	31.9	4.1	
	63	2	3	8:32	2567	62	4.8/4.5	6.7/5.2	7.0/5.4	7.0/6.2	8.3/7.1		62.1	19.1	4.5	30.7	4.0	
81	45	1	4	8:36	2617	45	5.9/6.7	7.2/7.9	6.8/7.4	7.3/9.9	7.5/10.0		76.5	19.8	4.4	31.8	4.1	
	43	2	4	8:36	2627	43	5.0/5.4	6.7/6.7	6.0/6.6	7.7/6.8	8.4/9.3		68.7	19.1	4.5	30.8	4.0	
83	53	1	5	8:39	2661	53	5.8/5.7	6.6/8.1	7.0/7.1	7.1/10.3	6.8/9.9		79.3	19.9	4.3	31.8	4.1	
	53	2	5	8:39	2667	53	4.6/5.3	6.9/5.9	6.6/6.1	7.5/6.2	8.0/8.2		65.3	19.1	4.5	30.7	4.0	
82.5	~~64~~	~~1~~	~~6~~	~~8:43~~	~~2709~~	~~63~~	~~5.2/5.0~~	~~7.6/8.1~~	~~7.2/7.5~~	~~7.3/8.9~~	~~7.6/8.2~~		~~67.9~~	~~19.8~~	~~4.3~~			
	62	2	6	8:43	2708	62	4.8/5.4	6.8/6.2	6.5/6.3	4.6/6.0	8.7/9.0		63.9	19.1	4.5	30.9	3.9	

5/22/2007 20100 1 of 1

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Sheet 21

LTPP Traffic Data

WIM System Test Truck Records 1 of 2

Rev. 08/31/2001

* STATE_CODE	~~12~~ 10
*SPS PROJECT_ID	0100 ~~0200~~
* DATE	05/22/2007

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
85	45	1	6	9:03	2934	45	5.7/5.2	6.9/6.7	6.9/6.1	7.3/8.2	7.1/8.1		68.2	19.9	9.3	31.9	4.1	
	45	2	7	9:03	2935	45	4.9/4.5	6.4/5.5	6.3/5.8	5.1/6.0	7.7/8.1		59.8	19.1	9.5	30.8	4.0	
86.5	54	1	7	9:07	2971	54	5.6/6.9	6.4/7.7	6.3/6.8	6.9/9.8	7.2/9.7		72.8	19.9	9.4	32.0	4.0	
	53	2	8	9:07	2907	53	4.5/3.6	6.8/4.4	6.7/4.5	6.7/5.5	8.2/6.8		57.7	19.1	9.5	30.7	4.0	
87.5	64	1	8	9:11	3030	62	6.1/5.4	7.0/6.4	7.1/5.6	7.5/9.0	7.7/9.2		70.0	19.8	9.3	31.7	4.0	
	63	2	9	9:11	3035	63	4.8/4.1	6.5/5.3	6.5/5.0	6.6/6.3	8.2/7.8		61.1	19.1	9.5	30.7	4.0	
86.5	45	1	9	9:14	3075	44	5.5/6.5	6.8/7.0	6.5/6.5	7.7/8.8	7.4/8.1		70.8	19.9	9.4	31.9	4.1	
	43	2	10	9:15	3083	42	4.8/3.8	6.5/4.4	6.2/5.0	6.9/6.0	7.9/7.7		59.2	19.1	9.5	30.8	4.0	
87	54	1	10	9:20	3135	54	6.0/6.3	8.8/9.5	6.5/7.0	6.9/10.1	7.1/9.5		73.6	19.8	9.4	31.8	4.0	
	55	2	11	9:20	3136	53	4.6/4.5	6.5/5.2	6.3/5.9	5.8/6.1	7.6/8.2		60.7	19.2	9.5	30.9	4.0	
90.5	64	1	11	9:23	3169	62	5.8/5.8	6.8/7.6	6.8/6.4	7.0/10.1	7.0/9.6		73.0	19.9	9.3	31.8	4.1	
	64	2	12	9:23	3171	62	4.7/5.2	6.3/6.4	6.6/6.2	4.8/7.2	8.6/8.5		69.4	19.1	9.5	30.9	4.0	
	45	1	12	9:27	3203	44	6.3/6.8	7.1/7.3	6.8/6.8	7.6/9.6	7.8/8.7		74.9	19.8	9.3	31.8	4.1	
	44	2	13	9:27	3207	45	4.7/5.5	6.2/6.1	6.4/6.3	7.0/7.2	8.0/8.6		66.0	19.1	9.5	30.8	4.0	
	54	1	13	9:31	3260	54	5.3/6.5	6.7/7.9	6.5/7.0	7.0/10.3	7.1/9.8		74.2	19.9	9.4	31.8	4.1	
	54	2	14	9:31	3265	54	4.8/4.1	6.8/4.8	6.7/5.0	5.6/5.7	7.9/7.4		58.8	19.1	9.5	30.7	4.0	

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29 RUNS + 14 FROM CAL 3

Sheet 21

LTPP Traffic Data

WIM System Test Truck Records 2 of 2

Rev. 08/31/2001

* STATE_CODE	12
*SPS PROJECT_ID	0100
* DATE	05/22/2007

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
90.5	62	1	14	9:35	3307	62	5.7/5.5	6.8/6.9	6.5/6.4	7.2/9.2	7.1/9.7		71.1	14.9	4.4	31.9	4.1	
	63	2	15	9:35	3312	63	4.9/5.4	6.9/6.2	6.6/6.3	5.5/6.0	8.3/7.8		63.9	19.1	4.5	30.8	4.0	
	54	1	15	9:39	3348	54	5.6/6.5	6.7/8.1	6.6/7.3	7.0/10.4	7.2/9.6		74.9	14.9	4.4	31.9	4.1	
	42	2	16	9:39	3353	43	4.9/3.7	6.9/4.6	6.5/5.1	6.9/5.0	8.0/6.8		58.4	19.1	4.5	30.7	4.0	
92.5	54	1	16	9:42	3390	55	5.5/6.2	6.5/7.9	6.6/7.1	7.1/10.3	6.8/10.0		74.1	14.9	4.3	31.9	4.1	
	54	2	17	9:42	3398	53	4.5/3.9	6.5/5.0	6.5/5.2	6.4/6.1	7.6/8.0		59.7	19.1	4.5	30.8	4.0	
	62	1	17	9:45	3434	60	5.9/5.9	6.9/7.1	6.3/6.1	7.0/9.4	7.4/9.5		71.4	14.8	4.3	31.8	4.0	
	63	2	18	9:45	3437	63	4.7/4.6	6.2/5.5	6.8/5.8	6.9/7.0	7.6/7.1		61.7	19.2	4.5	30.9	4.0	
91.5	44	1	18	9:49	3479	44	6.0/6.9	6.9/7.5	7.1/6.7	7.8/9.4	7.6/8.7		79.1	14.9	4.3	31.9	4.1	
	44	2	19	9:50	3485	44	4.4/4.7	6.5/5.4	6.5/5.6	4.6/6.0	8.2/8.7		60.5	19.0	4.5	30.7	3.9	
	53	1	19	9:53	3524	53	5.7/6.1	6.8/8.1	6.9/7.3	7.2/10.2	7.3/10.3		75.8	14.8	4.3	31.9	4.1	
	53	2	20	9:53	3527	53	4.6/4.3	6.7/5.3	6.1/4.8	6.5/6.4	7.3/7.9		60.1	19.1	4.5	30.7	4.0	
	65	2	21	9:58	3584	63	4.5/4.0	6.4/4.9	7.2/5.1	5.5/6.2	8.1/7.0		58.9	19.1	4.4	30.7	4.0	

Recorded by RP

Checked by

SPS-1

3.11.2. Iteration 1 Worksheet

Date 5-21

Beginning factors:

Speed Point (mph)	Name	Value
Overall	SENSITIVITY	780
Front Axle	FRONT AXLE CORR-FACTOR	1000
1 – ( )	SENSITIVITY PIEZO 1	~~1010~~ 1070
2 – ( )	SENSITIVITY PIEZO 2	~~780~~ 1110
3 – (45)	SPEED CORR-FACTOR 1	1030
4 – (60)	" " 2	980
5 – (75)	" " 3	970

Errors (Pre-Validation):

	Speed Point ~~1~~ (40)	Speed Point ~~2~~ 1 (45)	Speed Point 3 (50)	Speed Point ~~4~~ 2 (60)	Speed Point ~~5~~ (65)	* 3 (70)	* 3 (75)
F/A	+10	+7.2	+3.8	+1.3	-1.5		
Tandem	+5	+4	+3.7	+1	-1		
GVW	+5	+4	+3	+1.5	-1	-3	-5

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☐	
Front Axle	☐	☐	
Speed Point 1	☐	☑	-4.0 %
Speed Point 2	☐	☑	-1.5
Speed Point 3	☑	☐	~~3.2~~ 5.3 %
Speed Point 4	☐	☐	
Speed Point 5	☐	☐	

End factors:

Speed Point (mph)	Name	Value
Overall	SENSITIVITY	780
Front Axle	FRONT AXLE CORR-FACTOR	1000
1 – ( )	SENSITIVITY PIEZO 1	~~1010~~ 1070
2 – ( )	" " 2	~~780~~ 1110
3 – (45)	SPEED CORR-FACTOR 1	989
4 – (60)	" " 2	965
5 – (75)	" " 3	1021

Task Leader Initials: _____

SHRP-1

3.11.3. Iteration 2 Worksheet

Date 5.21.07

Beginning factors:

Speed Point (mph)	Name	Value
Overall	SENSITIVITY	780
Front Axle	FRONT AXLE CORR - FACTOR	1000
1 – ( )	SENSITIVITY PIEZO 1	1090
2 – ( )	" " 2	1110
3 – (45)	SPEED CORR - FACTOR 1	989
4 – (60)	" " 2	965
5 – (75)	" " 3	1021

Errors (Iteration 1):

	Speed Point 1 (45)	Speed Point 2 (60)	Speed Point 3 (75)	Speed Point 4 ( )	Speed Point 5 ( )
F/A	-1	+1	+2		
Tandem	+2	0	-2		
GVW	+2	0	0		

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☐	
Front Axle	☐	☐	
Speed Point 1	☐	☑	2.0%
Speed Point 2	☐	☐	
Speed Point 3	☐	☐	
Speed Point 4	☐	☐	
Speed Point 5	☐	☐	

End factors:

Speed Point (mph)	Name	Value
Overall	SENSITIVITY	780
Front Axle	FRONT AXLE CORR FACTOR	1000
1 – ( )	SENSITIVITY PIEZO 1	1090
2 – ( )	" " 2	1110
3 – (45)	SPEED CORR - FACTOR 1	969
4 – (60)	" " 2	965
5 – (75)	" " 3	1021

Task Leader Initials: _____

515 - 1

3.11.4. Iteration 3 Worksheet

Date 5-22-07

Beginning factors:

Speed Point (mph)	Name	Value
Overall	SENSITIVITY	780
Front Axle	FRONT AXLE CORR - FACTOR	1000
1 – ( )	SENSITIVITY PIEZO 1	1090
2 – ( )	2	1110
3 – (45)	SPEED CORR - FACTOR 1	969
4 – (60)	2	965
5 – (75)	3	1021

Errors (Iteration 2):

	Speed Point 1 (45)	Speed Point 2 (60)	Speed Point 3 (75)	Speed Point 4 ( )	Speed Point 5 ( )
F/A	-5	-5	+10		
Tandem	-2	-2	-4		
GVW	-2	-1	-1		

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☐	
Front Axle	☐	☐	
Speed Point 1	☐	☐	
Speed Point 2	☐	☑	1.5
Speed Point 3	☐	☑	1.0
Speed Point 4	☐	☐	
Speed Point 5	☐	☐	

End factors:

Speed Point (mph)	Name	Value
Overall	SENSITIVITY	780
Front Axle	FRONT AXLE CORR - FACTOR	1000
1 – ( )	SENSITIVITY PIEZO 1	1090
2 – ( )	2	1110
3 – (45)	SPEED CORR FACTOR 1	969
4 – (60)	2	951
5 – (75)	3	1011

Task Leader Initials: _____

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

May 21 and 22, 2007

STATE: Florida

SHRP ID: 0100

Photo 1 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_1_Tractor.JPG

Photo 2 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_1_Trailer.JPG

Photo 3 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_1_Suspension_1.JPG

Photo 4 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_1_Suspension_2.JPG

Photo 5 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_1_Suspension_3.JPG

Photo 6 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_2_Tractor.JPG

Photo 7 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_2_Trailer.JPG

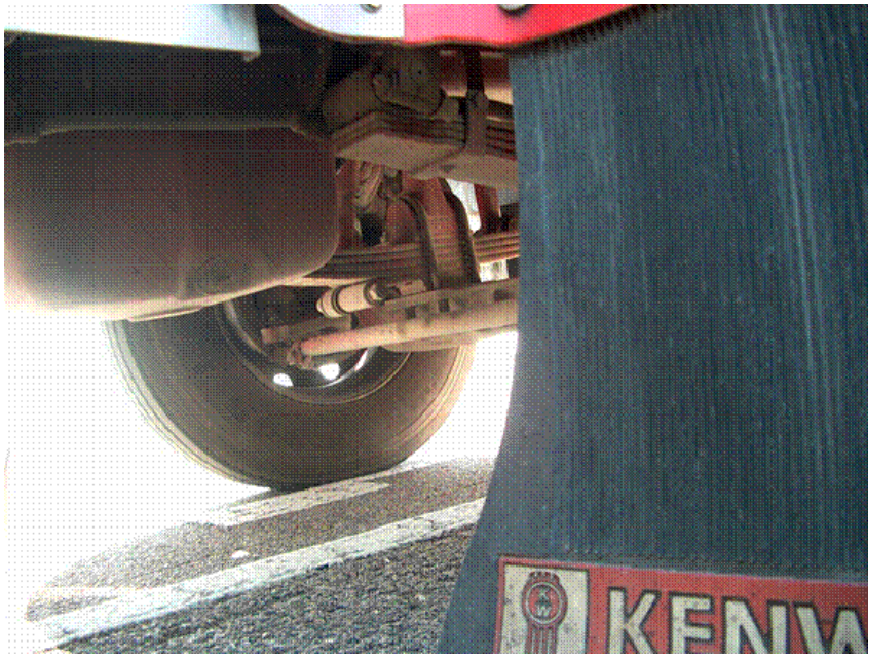

Photo 8 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_2_Suspension_1.JPG

Photo 9 - 6420060018_SPSWIM_TO_19_12_2.87_0100_Truck_2_Suspension_2.JPG

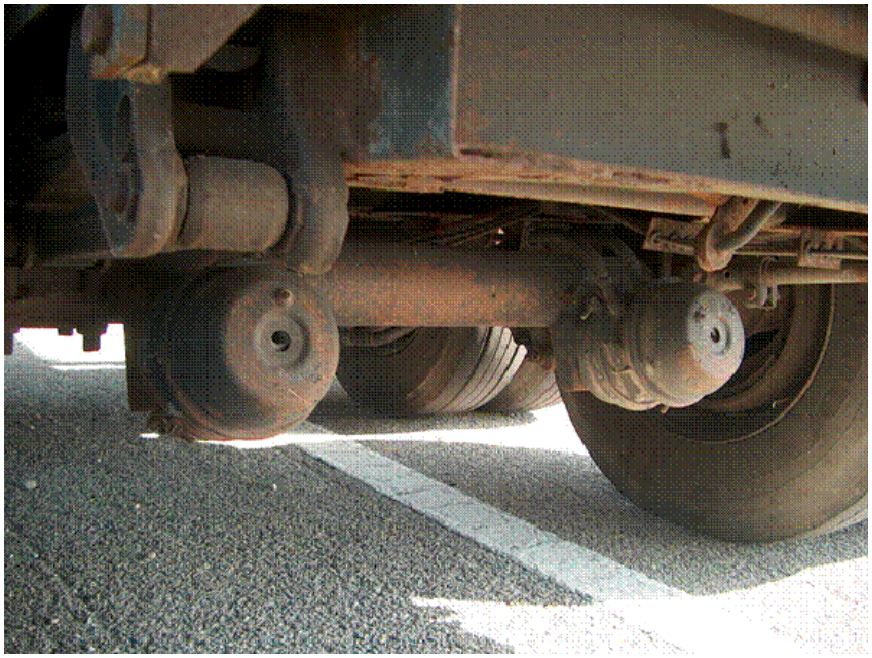

Photo 10 - 420060018_SPSWIM_TO_19_12_2.87_0100_Truck_2_Suspension_3.JPG

System Operating Parameters

Florida SPS-1 (Lane 1)

Validation Visit – 22 May, 2007

Calibration factors for Lane 1

Overall Sensitivity	780
Front Axle Correction Factor	1000
Sensitivity Piezo 1	1090
Sensitivity Piezo 2	1110
Speed Correction Factor 1	969
Speed Correction Factor 2	951
Speed Correction Factor 3	1011