Validation Report

Florida, SPS-5
Task Order 27, CLIN 2
September 23 to 24, 2008

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1 Executive Summary

A visit was made to the Florida 0500 on September 23 to 24, 2008 for the purposes of conducting a validation of the WIM system located on U.S. 1, 4.5 miles north of SR 706. The SPS-5 is located in the righthand, southbound lane of a four-lane divided facility. The posted speed limit at this location is 55 mph. The LTPP lane is one of 4 lanes instrumented at this site. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This is the fifth validation visit to this location. The site was installed on June 2003 by the agency.

This site fails to produce research quality loading data under the observed conditions. The failure is due to a combination of between truck variability, speed and pavement conditions. The classification data is also not of research quality.

The site is instrumented with quartz piezo and DAW 190 electronics. It is installed in asphalt concrete.

The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 73,940 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 an air suspension loaded to 66,130 lbs., the "partial" truck.

The validation speeds ranged from 48 to 61 miles per hour. The pavement temperatures ranged from 81 to 92 degrees Fahrenheit. The desired speed range was not achieved during this validation. The desired 30 degree Fahrenheit temperature range also was not achieved.

Table 1-1 – Post-Validation Results – 120500 – 24-Sep-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	4.7 ± 7.8%	Pass
Tandem axles	±15 percent	2.0 ± 11.9%	Pass
GVW	**±10 percent**	**2.4 ± 9.2%**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.0 ft	Pass

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The pavement condition did not appear to be satisfactory for conducting a performance evaluation. There was rutting observed that influenced test truck motions significantly. A visual survey found discernable bouncing and side to side motion of trailers on trucks through the WIM area. The WIM index did not exceed the upper threshold at any

location and the SRI and Peak SRI values fell below the lower threshold for 12 of the values calculated.

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

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

Characteristic	Limits for Allowable Error	Percent within Allowable Error	Pass/Fail
Single Axles	± 20%	100 %	Pass
Axle Groups	± 15%	97 %	Pass
GVW	± 10%	96 %	Pass

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Upon our arrival at the site, we found some of the system parameters were not the same as we left them at the conclusion of our last validation on May 23, 2007. This is an agency controlled and monitored site. We have no information on the rationale or reason for the parameter adjustments.

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

2 Corrective Actions Recommended

There is rutting at this site beginning 681 feet prior to the sensors. The drivers of the test trucks perceived the rutting as having their vehicles pull towards the shoulder. Possible remedies include grinding the pavement smooth while retaining an acceptable cross-section or resurfacing should be considered if this site is expected to meet LTPP research data criterion in the future.

It is not thought that a different pair of trucks would automatically improve the results although most of the observed variability is associated with between truck differences.

3 Post Calibration Analysis

This final analysis is based on test runs conducted September 24, 2008 in the afternoon at test site 120500 on U.S. 1. This SPS-5 site is on the southbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for the calibrations 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 air suspension loaded to 73,940 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 an air suspension loaded to 66,130 lbs., the "partial" truck.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 48 to 61 miles per hour. The desired speed range was not achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 81 to 92 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range also was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1. The failure observed in this validation is linked different responses from the two trucks to rutting in the pavement and the resulting variability of the error.

Table 3-1 - Post-Validation Results – 120500 – 24-Sep-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	4.7 ± 7.8%	Pass
Tandem axles	±15 percent	2.0 ± 11.9%	Pass
GVW	**±10 percent**	**2.4 ± 9.2%**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.0 ft	Pass

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The test runs were conducted primarily during the afternoon hours, resulting in a very narrow range of pavement temperatures. The temperature difference from the start of calibrations to the start of the validation runs was less than the difference over the validation runs. The runs were conducted at various speeds to determine the effects of

these variables on the performance of the WIM scale. To investigate these effects, the data set was split into three speed groups and two temperature groups. The distribution of runs by speed and temperature is illustrated in Figure 3-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs. A much smaller range of speeds than the optimal to validate this type of installation was selected for validation to attempt to validate the site for the most common operating condition.

The three speed groups were divided as follows: Low speed – 48 to 52 mph, Medium speed – 53 to 56 mph and High speed – 57 + mph. The two temperature groups were created by splitting the runs between those at 81 to 87 degrees Fahrenheit for Low temperature and 88 to 92 degrees Fahrenheit for High temperature.

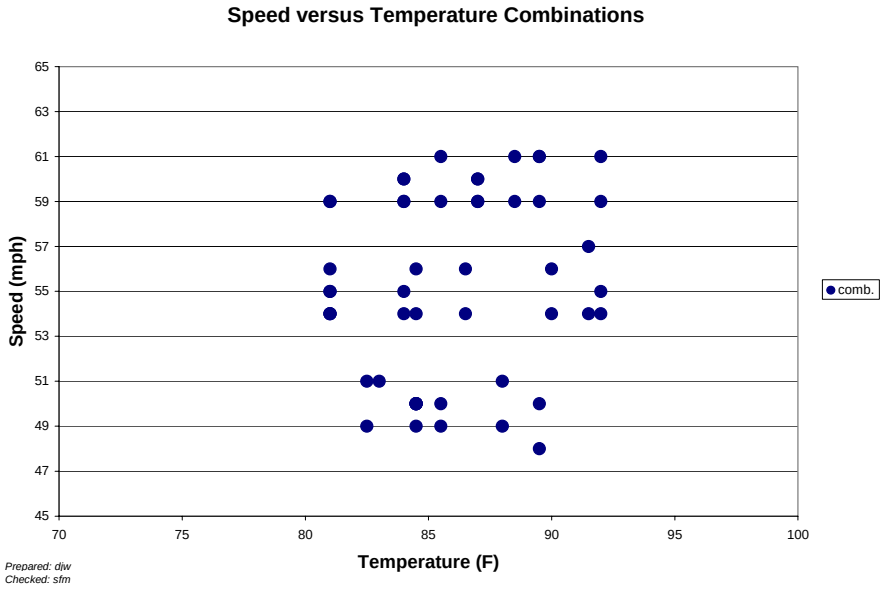

Figure 3-1 - Post-Validation Speed-Temperature Distribution – 120500 – 24-Sep-2008

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 outliers which are large underestimates of actual loads were verified as true and not data entry errors. It should be noted that with increasing speed the observed variability diminishes if the outliers are not considered.

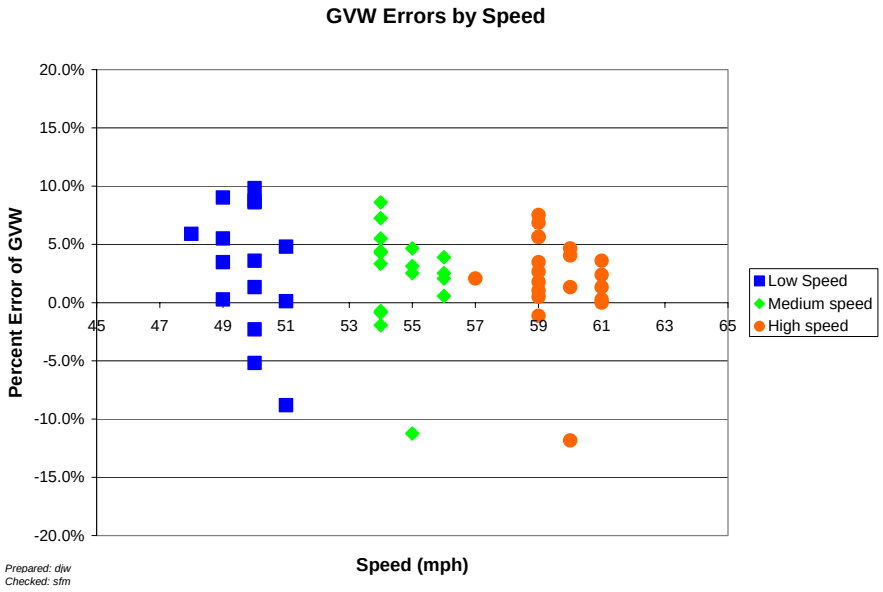

Figure 3-2 - Post-validation GVW Percent Error vs. Speed – 120500 – 24-Sep-2008

Figure 3-3 shows the relationship between temperature and GVW percentage error. There is no apparent relationship between temperature and GVW errors in the observed temperature range.

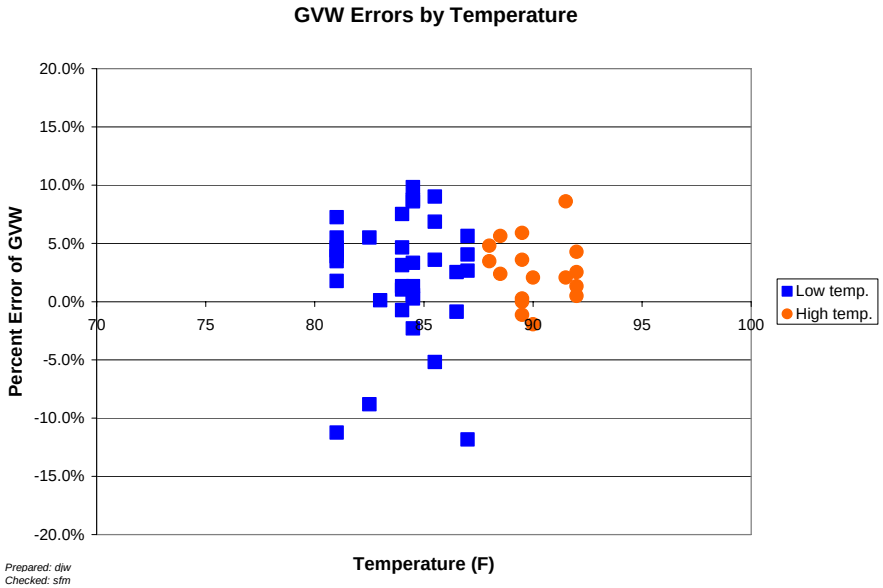

Figure 3-3 - Post-Validation GVW Percent Error vs. Temperature – 120500 – 24-Sep-2008

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. Speed has no apparent influence on spacing measurements.

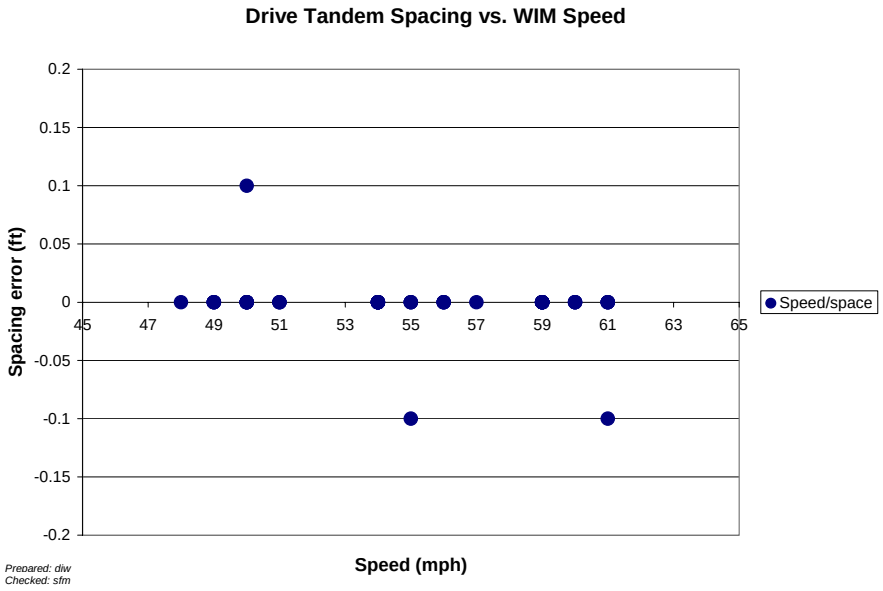

Figure 3-4 - Post-Validation Spacing vs. Speed – 120500 – 24-Sep-2008

3.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 81 to 87 degrees Fahrenheit for Low temperature and 88 to 92 degrees Fahrenheit for High temperature.

Table 3-2 - Post-Validation Results by Temperature Bin – 120500 – 24-Sep-2008

Element	95% Limit	Low Temperature 81 to 87 °F	High Temperature 88 to 92 °F
Steering axles	±20 %	4.2 ± 8.5%	5.7 ± 6.6%
Tandem axles	±15 %	1.9 ± 13.4%	2.1 ± 8.6%
GVW	±10 %	2.3 ± 10.6%	2.8 ± 5.8%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.0 ft

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In Table 3-2 there is little difference in the bias in estimates with respect to temperature. The variability is thought to be linked to the existence of outliers rather than any particular temperature effect.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. There is no apparent difference in the test trucks response to temperature.

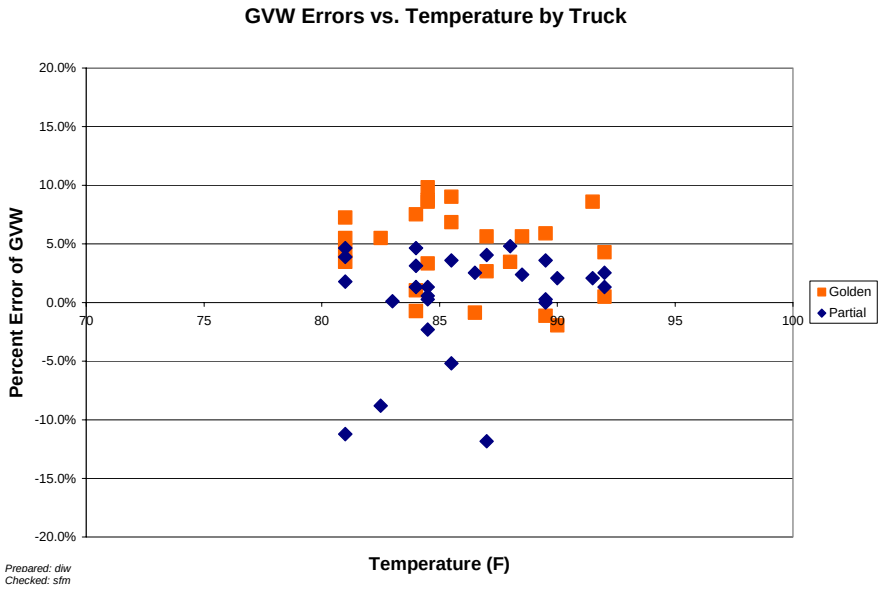

Figure 3-5 - Post-Validation GVW Percent Error vs. Temperature by Truck – 120500 – 24-Sep-2008

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. There is no apparent relationship between temperature and steering axle errors.

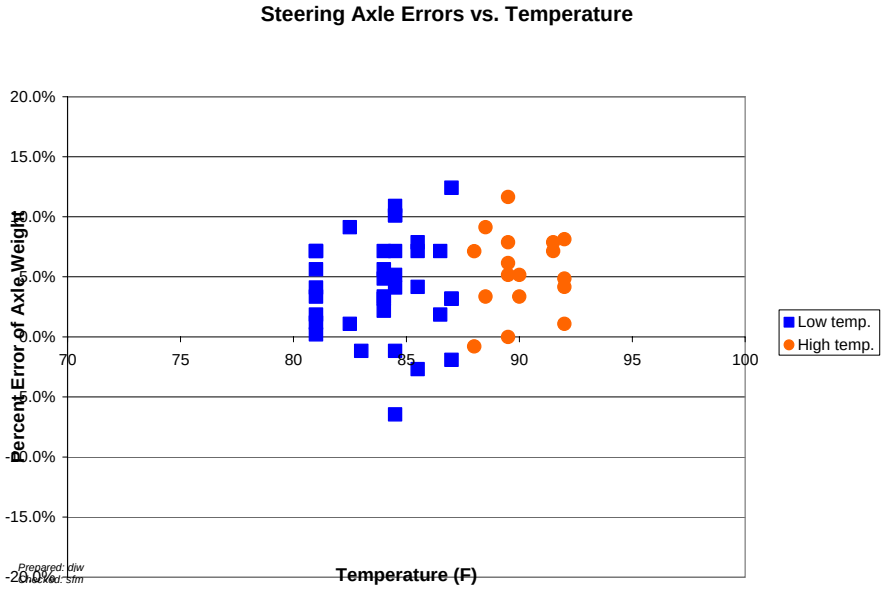

Figure 3-6 - Post-Validation Steering Axle Error vs. Temperature by Group – 120500 – 24-Sep-2008

3.2 Speed-based Analysis

The three speed groups were created using 48 to 52 mph for Low speed, 53 to 56 mph for Medium speed and 57+ mph for High speed.

Table 3-3 - Post-Validation Results by Speed Bin – 120500 – 24-Sep-2008

Element	95% Limit	Low Speed 48 to 52 mph	Medium Speed 53 to 56 mph	High Speed 57+ mph
Steering axles	±20 %	4.2 ± 11.9%	4.3 ± 4.7%	5.5 ± 7.5%
Tandem axles	±15 %	2.7 ± 13.6%	1.9 ± 12.2%	1.5 ± 11.4%
GVW	±10 %	3.0 ± 11.7%	2.2 ± 9.4%	2.2 ± 8.6%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.0 ft

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Table 3-3 shows the differences in statistics as a function of speed. There is a slight downward trend in errors with increasing speed for tandem axles and GVW. There is also less variability with increasing speeds for those two statistics.

Figure 3-7 shows that the variability with speed is linked to the two test truck's responses. In the case of the golden truck (squares) the errors decrease with increasing speed. The variability of the golden truck is fairly consistent through the speed range. The partial truck (diamonds) has essentially the same level of error through the speed range. It is somewhat less variable as speeds increase but would appear to be more strongly influenced by the pavement conditions. The outliers are associated only with the partial truck.

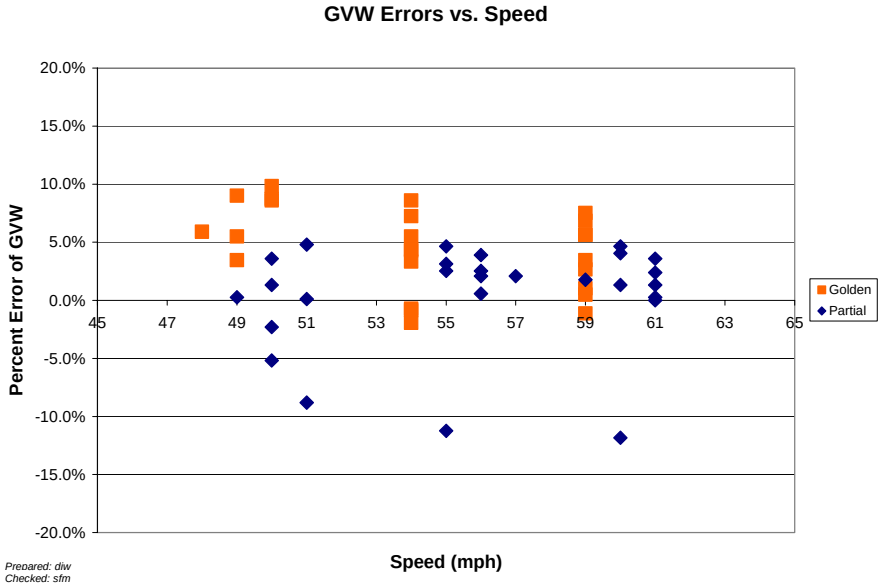

Figure 3-7 - Post-Validation GVW Percent Error vs. Speed by Truck – 120500 – 24-Sep-2008

Figure 3-8 shows the relationship between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. The steering axle error trends slightly upward with increasing speed. The variability shows no definite trend with speed being greater at the lower and upper ends of the validation range.

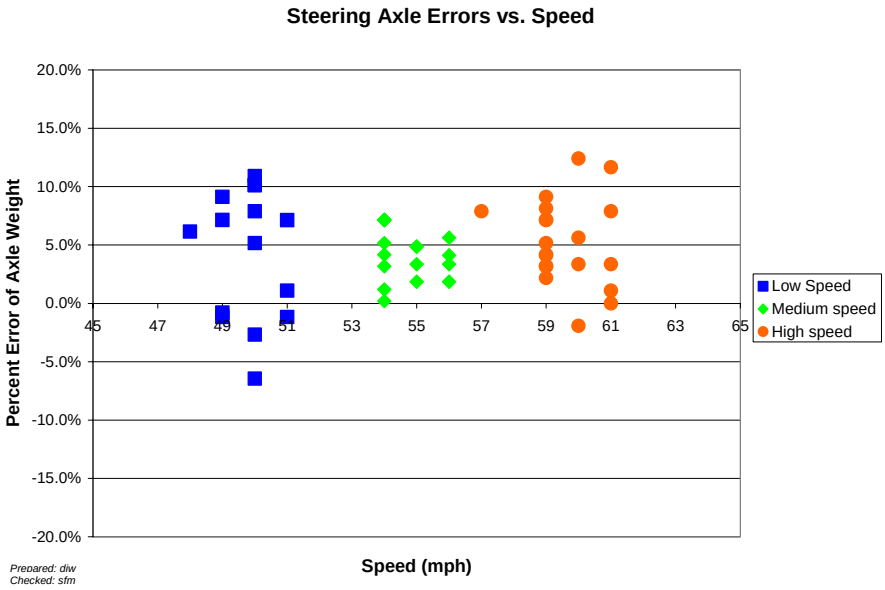

Figure 3-8 - Post-Validation Steering Axle Percent Error vs. Speed by Group – 120500 – 24-Sep-2008

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 three hours (19 trucks) was collected at the site. 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 3-4 has the classification error rates by class. The overall misclassification rate is 27.3 percent. The sample is extremely small being limited by duration rather than number of trucks. This has a tendency to inflate the size of the observed errors. In this particular case the error for Class 4s and Class 5s is also related to the length definition in the agency's algorithm.

Table 3-4 - Truck Misclassification Percentages for 120500 – 24-Sep-2008

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	75	5	30	6	0
7	N/A				
8	0	9	0	10	N/A
11	N/A	12	N/A	13	N/A

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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 120500 – 24-Sep-2008

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	- 75	5	43	6	0
7	N/A				
8	0	9	0	10	N/A
11	N/A	12	N/A	13	N/A

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

A limited investigation of the precision and bias of the speeds reported by the equipment was undertaken. The values were not within the expected tolerances. The persistent failure to classify vehicles that are at the border of the length differentiation between Class 4 and Class 5 is more strongly linked to a conscious decision on the algorithm than errors in speed measurement of the WIM equipment. This classification failure has been observed at more than one validation.

3.4 Evaluation by ASTM E-1318 Criteria

The ASTM E-1318 criteria for a successful validation of Type I sites is 95% of the observed errors within the limits for allowable errors for each of the relevant statistics. If this site had been evaluated using ASTM E-1318-02 it would have met the conditions for

a Type I site exclusive of wheel loads. LTPP does not validate WIM performance with respect to wheel loads.

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

Characteristic	Limits for Allowable Error	Percent within Allowable Error	Pass/Fail
Single Axles	± 20%	100 %	Pass
Axle Groups	± 15%	97 %	Pass
GVW	± 10%	96 %	Pass

Prepared: bko *Checked:jrn*

4 Pavement Discussion

The pavement smoothness may or may not have contributed to out-of-range results.

The pavement condition (rutting) did influence truck movement across the sensors based on driver perceptions of vehicle handling.

4.1 Profile Analysis

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

Profile data collected at the SPS WIM location by Fugro South, Inc. on September 2, 2008 were processed through the LTPP SPS WIM Index software, version 1.1. This WIM scale is installed on asphalt pavement.

A total of 11 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 Regional Support Contractor has completed 5 passes at the center of the lane, 3 passes shifted to the left side of the lane, and 3 passes shifted to the right side of the lane. Shifts to the sides of the lanes were made such that data were collected as close to the lane edges as was safely possible. For each profiler pass, profiles were recorded under the left wheel path (LWP) and the right wheel path (RWP).

The SPS WIM Index software, 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

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Table 4-2 shows the computed index values for all 11 profiler passes for this WIM site. The average values over the passes in each path were also calculated when three or more passes were completed. These are shown in the right most column of the table. Values above the upper index limits are presented in bold and values below the lower index limits are presented in italics.

Table 4-2 - WIM Index Values – 120500 –02-Sep-2008

Profiler Passes			**Pass 1**	**Pass 2**	**Pass 3**	**Pass 4**	**Pass 5**	**Ave.**
Center	LWP	LRI (m/km)	0.681	0.690	0.650	0.845	0.897	0.753
		SRI (m/km)	0.501	0.724	0.643	0.672	0.712	0.650
		Peak LRI (m/km)	0.683	0.696	0.657	0.901	0.917	0.771
		Peak SRI (m/km)	*0.681*	*0.725*	0.770	1.027	0.909	0.822
	RWP	LRI (m/km)	0.806	0.813	0.814	1.007	1.018	0.892
		SRI (m/km)	*0.475*	*0.433*	0.549	0.697	0.635	0.558
		Peak LRI (m/km)	0.811	0.826	0.853	1.063	1.109	0.932
		Peak SRI (m/km)	*0.683*	*0.655*	0.771	1.080	0.825	0.803
Left Shift	LWP	LRI (m/km)	0.762	0.654	0.826			0.747
		SRI (m/km)	0.501	0.516	0.505			0.507
		Peak LRI (m/km)	0.865	0.709	0.843			0.806
		Peak SRI (m/km)	*0.688*	*0.563*	*0.675*			*0.642*
	RWP	LRI (m/km)	0.865	0.680	0.794			0.780
		SRI (m/km)	0.539	*0.191*	0.705			*0.478*
		Peak LRI (m/km)	0.870	0.801	0.813			0.828
		Peak SRI (m/km)	0.896	*0.355*	0.818			*0.690*
Right Shift	LWP	LRI (m/km)	1.083	1.122	1.079			1.095
		SRI (m/km)	0.584	0.768	0.889			0.747
		Peak LRI (m/km)	1.083	1.140	1.163			1.129
		Peak SRI (m/km)	0.938	0.943	0.891			0.924
	RWP	LRI (m/km)	0.995	1.159	1.140			1.098
		SRI (m/km)	0.663	*0.496*	0.910			0.690
		Peak LRI (m/km)	1.018	1.206	1.162			1.129
		Peak SRI (m/km)	1.040	0.910	1.522			1.157

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From Table 4-2 it can be seen that 12 of the indices computed from the profiles are below the lower threshold values with the remaining values falling between the upper and lower limits. All of the calculated values falling below the lower limits are the SRI or Peak SRI indicating that most of the roughness that may interfere with calibration of the scale is located further out from the scale. It does not appear that this roughness interfered with the operation of the scale.

Table 4-3 shows the computed index values for the prior site validation. The profile data collected at the SPS WIM location by Fugro South, Inc. on July 27, 2006 were processed through the LTPP SPS WIM Index software, version 1.1. From Table 4-3 it can be seen that most of indices computed from the profiles were between the upper and lower threshold values. Seventeen of the SRI and Peak SRI values are below the lower threshold limit indicating that conditions close to the scale are highly unlikely to impact the measurements made by the scale.

Table 4-3 - WIM Index Values - 120500 – 27-Jul-2006

Profiler Passes			**Pass 1**	**Pass 2**	**Pass 3**	**Pass 4**	**Ave.**
Center	LWP	LRI (m/km)	0.793	0.634	0.760	0.586	0.693
		SRI (m/km)	0.642	*0.475*	0.623	*0.480*	0.555
		Peak LRI (m/km)	0.822	0.742	0.822	0.685	0.768
		Peak SRI (m/km)	0.753	0.798	0.806	0.831	0.797
	RWP	LRI (m/km)	0.680	0.833	0.710	0.820	0.761
		SRI (m/km)	0.603	*0.486*	*0.435*	*0.410*	*0.484*
		Peak LRI (m/km)	0.840	0.848	0.743	0.849	0.820
		Peak SRI (m/km)	*0.684*	*0.660*	*0.616*	*0.602*	*0.640*
Left Shift	LWP	LRI (m/km)	0.843	0.812			
		SRI (m/km)	*0.383*	0.604			
		Peak LRI (m/km)	0.855	0.848			
		Peak SRI (m/km)	*0.558*	*0.613*			
	RWP	LRI (m/km)	0.591	0.527			
		SRI (m/km)	*0.284*	*0.308*			
		Peak LRI (m/km)	0.627	0.566			
		Peak SRI (m/km)	*0.499*	*0.548*			
Right Shift	LWP	LRI (m/km)	0.962	0.803			
		SRI (m/km)	0.801	0.721			
		Peak LRI (m/km)	0.964	0.980			
		Peak SRI (m/km)	1.015	0.845			
	RWP	LRI (m/km)	0.626	0.711			
		SRI (m/km)	0.558	0.808			
		Peak LRI (m/km)	0.632	0.720			
		Peak SRI (m/km)	*0.700*	0.845			

The results of the calculations as shown in Table 4-2 and Table 4-3 are similar. Both sets indicate that the primary roughness exists more than 5.19 m in front of the scale as the SRI and Peak SRI values are generally under the lower threshold value.

4.2 Distress Survey and Any Applicable Photos

Rutting was observed in the pavement starting 681 feet prior to the WIM sensor. The rutting continues past the sensors. Photo 4-1 shows the approximate start of the rutting affecting this WIM section. The thin line across the top of the picture is the end of the prior pavement section marked for profiling purposes.

Photo 4-1 - Rutting at the End of the Upstream Pavement Section - 120500 - 24-Sep-2008

Photo 4-2 illustrates the extent of the rutting in the WIM section. The sign in the middle ground on the left is the approximate location of Photo 4-1. The WIM sensors are directly behind the photographer.

Photo 4-2 - Looking Upstream at Length of Rutting - 120500 - 24-Sep-2008

4.3 Vehicle-pavement Interaction Discussion

Test trucks traveling through the section pulled right towards the shoulder according to their drivers. The trailers on the vehicles were observed to sway from side to side while traveling through the section.

5 Equipment Discussion

The traffic monitoring equipment at this location includes quartz piezo sensors and DAW 190 electronics. The sensors are installed in asphalt concrete pavement.

There were no changes in basic equipment operating condition since the validation on May 23, 2007.

5.1 Pre-Evaluation Diagnostics

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

5.2 Calibration Process

Upon our arrival at the site, we found some of the system parameters were not the same as we left them at the conclusion of our last validation on May 23, 2007. Apparently the site has had equipment maintenance work or factor adjustments made remotely between our last Validation visit and this one by the agency.

The equipment was subjected to three iterations of the calibration process between the initial 40 runs and the final 40 runs.

The operating system weight compensation parameters that were in place prior to the Pre-Validation are in Table 5-1.

Table 5-1 - Initial System Parameters - 120500 - 23-Sep-2008

Factor		Speed Correction	
Overall Sensitivity	830	Factor 1	1020
Front Axle Correction	1000	Factor 2	1080
Piezo 1	1065	Factor 3	1030
Piezo 2	1000		

Prepared: bko *Checked:jrn*

5.2.1 Calibration Iteration 1

As a result of the Pre-Validation, where there was consistent and significant underestimation throughout the speed range, the compensation factors were adjusted as shown in Table 5-2.

Table 5-2 - Calibration Iteration 1 - Change in Parameters - 120500 - 24-Sep-2008

Factor	New	Change	Speed Correction	New	Change
Overall Sensitivity	1052	28.1%	Factor 1	1049	2.9 %
Front Axle Correction	953	-4.7 %	Factor 2	1043	-3.4 %
Piezo 1	1065	N/A	Factor 3	1038	0.8 %
Piezo 2	1000	N/A			

Prepared: bko *Checked:jrn*

As shown in Table 5-3 the persistent underestimation across the speed range was removed. However, the variability in the errors resulted in another failure to meet LTPP's research quality criteria.

Table 5-3 - Calibration Iteration 1 - Results – 120500 – 24-Sep-2008 (10:23 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	**±20 percent**	**-1.4 ± 23.2%**	**Fail**
Tandem axles	**±15 percent**	**-0.3 ± 19.7%**	**Fail**
GVW	**±10 percent**	**-0.4 ± 20.7%**	**Fail**
Axle spacing	± 0.5 ft	0.0 ± 0.0 ft	Pass

Prepared: bko *Checked:jrn*

The pattern of the variability is shown in Figure 5-1. To look at a possible explanation for the variability, Figure 5-2 was used. It can be seen that the between truck variability is the cause of the failure condition. Over the entire speed range the load of the golden truck (squares) is overestimated and that of the partial truck (diamonds) is underestimated. The between truck differences appear to decrease as the speeds increase.

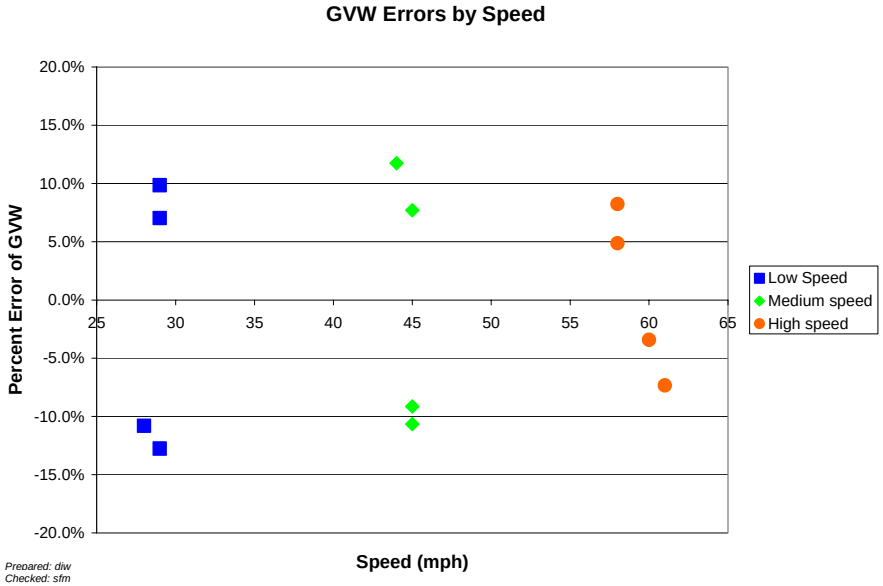

Figure 5-1 - Calibration Iteration 1 - GVW Percent Error vs. Speed Group – 120500 – 24-Sep-2008 (10:23 AM)

Figure 5-2 - Calibration Iteration 1 - GVW Percent Error by Truck – 120500 – 24-Sep-2008 (10:23 AM)

5.2.2 Calibration Iteration 2

As a result of the first calibration, where the between truck variability drove the results it was decided to narrow the speed range to fall within the 15th to 85th percentile speeds. The initial speed range was chosen based on the optimal conditions for calibration of this particular electronics and sensor combination. The narrower range was considered appropriate to meet quality considerations for the majority of the data collected.

As can be seen in Table 5-4 the statistics show that the site went from slightly underestimating weights to overestimating them. The variability was somewhat reduced as the portion of the speed range with the greatest difference between trucks was removed from consideration.

Table 5-4 - Calibration Iteration 2 - Results – 120500 – 24-Sep-2008 (10:58 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	3.5 ± 14.9%	Pass
Tandem axles	**±15 percent**	**2.7 ± 18.2%**	**Fail**
GVW	**±10 percent**	**2.9 ± 16.5%**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.0 ft	Pass

Prepared: bko *Checked:jrn*

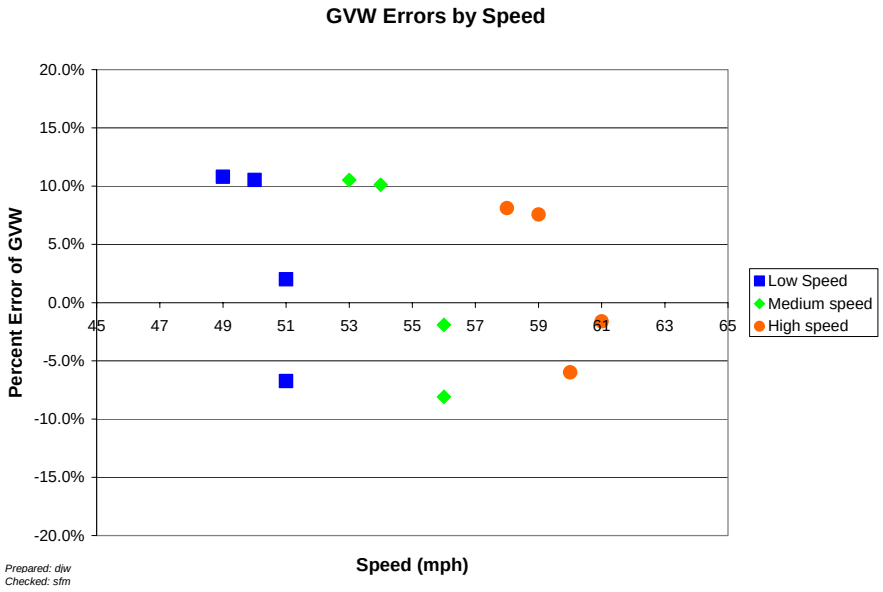

Figure 5-3 - Calibration Iteration 2 - GVW Percent Error vs. Speed Group – 120500 – 24-Sep-2008 (10:58 AM)

As expected, the by truck trends seen in the first calibration persisted. In Figure 5-4 the variability of the golden truck (squares) is slight compared to the partial truck (diamonds).

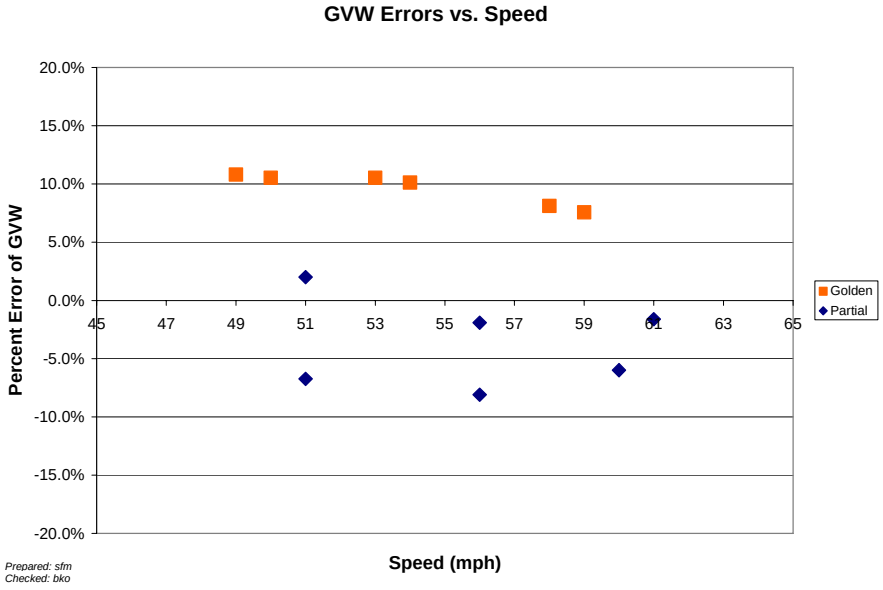

Figure 5-4 - Calibration Iteration 2 - GVW Percent Error by Truck Group – 120500 – 24-Sep-2008 (10:58 AM)

5.2.3 Calibration Iteration 3

As a result of the second calibration, where a more limited speed range was used, the compensation factors were adjusted as shown in Table 5-5.

Table 5-5 - Calibration Iteration 3 - Change in Parameters - 120500 - 24-Sep-2008

Factor	New	Change	Speed Correction	New	Change
Overall Sensitivity	1018	-3.4%	Factor 1	1041	-0.8 %
Front Axle Correction	953	N/A	Factor 2	1050	0.7 %
Piezo 1	1065	N/A	Factor 3	1039	0.1 %
Piezo 2	1000	N/A			

Prepared: bko *Checked:jrn*

The results of the third iteration are shown in Table 5-6. Instead of being overestimated the loading tends to be underestimated.

Table 5-6 - Calibration Iteration 3 Results – 120500 – 24-Sep-2008 (11:36 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	1.9 ± 8.1%	Pass
Tandem axles	**±15 percent**	**-1.1 ± 15.5%**	**Fail**
GVW	**±10 percent**	**-0.4 ± 12.3%**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.0 ft	Pass

Prepared: bko *Checked:jrn*

Figure 5-5 shows the individual run results for the final calibration iteration. Note that the spread in errors is decreasing with increasing speed. Figure 5-6 shows that it is the between truck differences that contribute most to the outcome of the calibration. With a maximum of three calibration iterations programmed, the factors were not changed prior to doing the final validation.

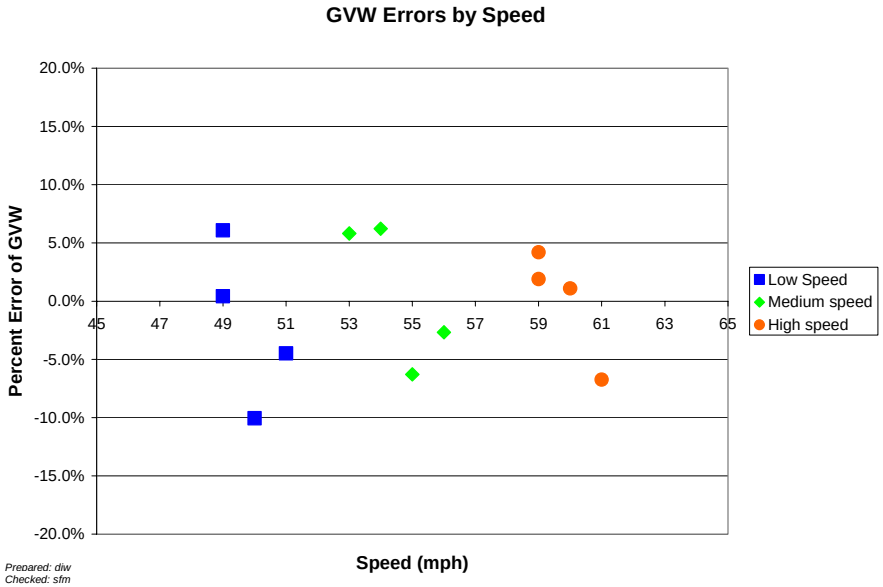

Figure 5-5 - Calibration Iteration 3 - GVW Percent Error vs. Speed Group – 120500 – 24-Sep-2008 (11:36 AM)

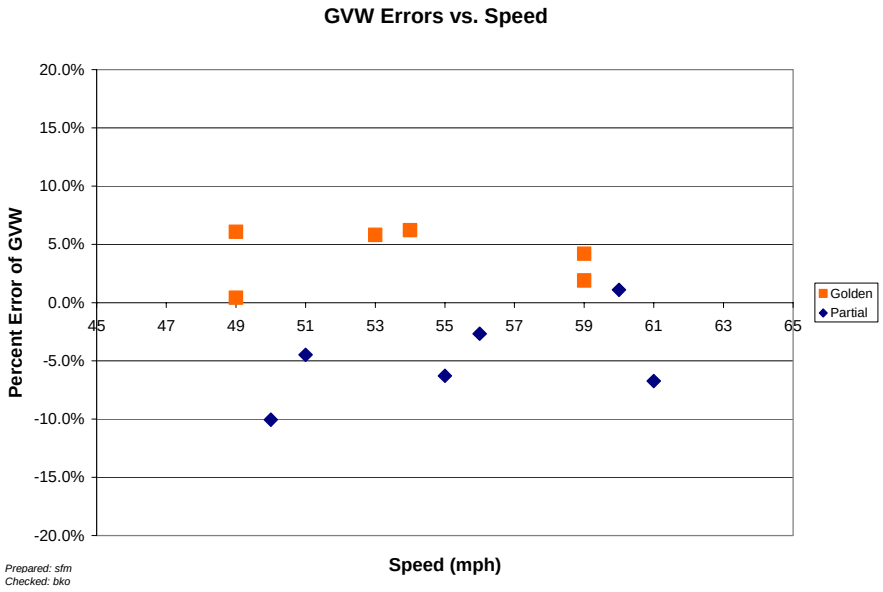

Figure 5-6 - Calibration Iteration 3 - GVW Percent Error by Truck – 120500 – 24-Sep-2008 (11:36 AM)

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 5-7 has the information for TRF_CALIBRATION_AVC for Sheet 16s submitted prior to this validation as well as the information for the current visit. The Sheet 16s available reflect only this contractor's validation visits.

Table 5-7 - Classification Validation History – 120500 – 24-Sep-2008

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
9/24/08	Manual	0	0	-75 (Cl 4)	43 (Cl 5)	0
9/23/08	Manual	N/A**	0	-11 (Cl 5)	0 (Cl 6)	0
5/24/07*	Manual	0	-67			0
5/23/07	Manual	-50	-78			0
9/13/06	Manual	0	0	0		0
3/03/05	Manual	0	0	-5		3
3/02/05	Manual	0	0	-5		1
12/04/03	Manual	0	0	36		2

Prepared: bko *Checked:jrn*

*The date following the site visit is used for the post-validation to avoid database data entry problems.
** There were no Class 9s in the sample which is possible for this particular site.

Table 5-8 has the information for TRF_CALIBRATION_WIM for Sheet 16s submitted prior to this validation as well as the information for the current visit. The Sheet 16s available reflect agency and this contractor's validation visits.

Table 5-8 - Weight Validation History – 120500 – 24-Sep-2008

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
9/24/08	Test Trucks	2.4 (4.6)	4.7 (3.9)	2.0 (6.0)
9/23/08	Test Trucks	-22.0 (7.6)	-16.9 (7.9)	-23.0 (8.5)
5/24/07*	Test Trucks	-1.1 (3.5)	2.8 (6)	-1.8 (4.5)
5/23/07	Test Trucks	-11 (3.2)	-9.8 (6.3)	-11.3 (4.3)
9/13/06	Test Trucks	0.0 (3.8)	0.0 (5.6)	0.6 (3.7)
9/13/06	Test Trucks	-4.4 (3.7)	-3.2 (6.0)	-4.6 (3.3)
3/3/05	Test Trucks	-1.6 (3.2)	1.7 (4.9)	-3.0 (2.9)
3/2/05	Test trucks	-1.2 (3.6)	2.0 (4.4)	-1.8 (3.1)
12/18/03	Test Trucks	-0.6 (2.6)	3.4 (4.5)	-0.3 (3.3)
7/10/03	Test Trucks	0.9 (2.5)	4.1 (3.1)	0.4 (3.3)

Prepared: bko *Checked:jrn*

*The date following the site visit is used for the post-validation to avoid database data entry problems.

5.4 Projected Maintenance/Replacement Requirements

There are no equipment maintenance issues identified at this time.

6 Pre-Validation Analysis

Upon our arrival at the site, we found the system parameters were not the same as we left them at the conclusion of our last validation on May 23, 2007. Apparently the site has had equipment maintenance work or factor adjustments made remotely between our last Validation visit and this one. This is an agency monitored and maintained site.

The factors in place at the end of our last Validation visit and those found prior to validation are shown Table 6-1.

Table 6-1 Calibration Factor Change – 120500 – since 23-May-2007

Validation Visit	23 September 2008	23 May 2007
Overall Sensitivity	830	900
Front Axle Correction Factor	1000	1000
Sensitivity Piezo 1	1065	1065
Sensitivity Piezo 2	1000	1000
Speed Correction Factor 1	1020	1040
Speed Correction Factor 2	1080	1080
Speed Correction Factor 3	1030	1030

Prepared: bko Checked:jrn

This pre-validation analysis is based on test runs conducted September 23, 2008 in the afternoon at test site 120500 on U.S. 1. This SPS-5 site is on the southbound, righthand of

a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for initial validation included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and an air suspension loaded to 74,200 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 an air suspension loaded to 66,310 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 28 to 60 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 96 to 111degrees 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 6-2.

Table 6-2 shows failure for estimates of all loading characteristics. The failure is both for bias and variation. The results of the pre-validation required that this site be calibrated; although the extent of the variability made validation for research quality data problematic.

Table 6-2 - Pre-Validation Results – 120500 – 23-Sep-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	**±20 percent**	**-16.9 ± 16.0%**	**Fail**
Tandem axles	**±15 percent**	**-23.0 ± 17.0%**	**Fail**
GVW	**±10 percent**	**-22.0 ± 15.3%**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.0 ft	Pass

Prepared: bko *Checked:jrn*

The test runs were conducted throughout the afternoon hours, resulting in a limited range of pavement temperatures. The runs were conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed groups and two temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs due to the limited temperature range.

The three speed groups were divided into 28 to 32 mph for Low speed, 33 to 56 mph for Medium speed and 57+ mph for High speed. The speed range was selected to provide the greatest allowable difference in speeds which is a significant consideration in calibrating DAW 190 electronics. The two temperature groups were created by splitting the runs between those at 96 to 103 degrees Fahrenheit for Low temperature and 104 to 111 degrees Fahrenheit for High temperature.

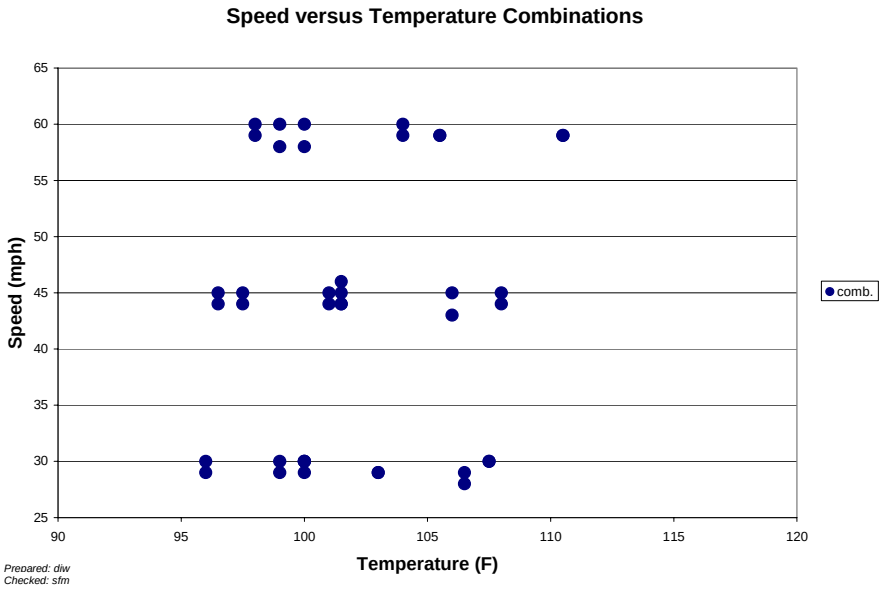

Figure 6-1 - Pre-Validation Speed-Temperature Distribution – 120500 – 23-Sep-2008

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 GVW is considerably underestimated at all speeds. It would appear that there is slightly less variability at the middle speed in the pre-validation range. The degree of variability is visually masked by the grid of the scale.

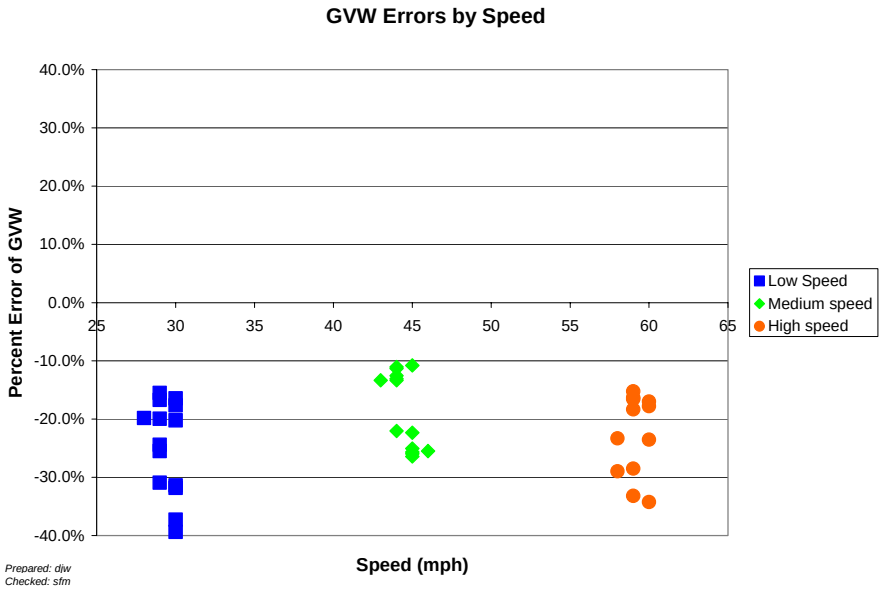

Figure 6-2 - Pre-Validation GVW Percent Error vs. Speed – 120500 – 23-Sep-2008

Figure 6-3 shows the relationship between temperature and GVW percentage error. There is no apparent relationship between temperature and GVW error.

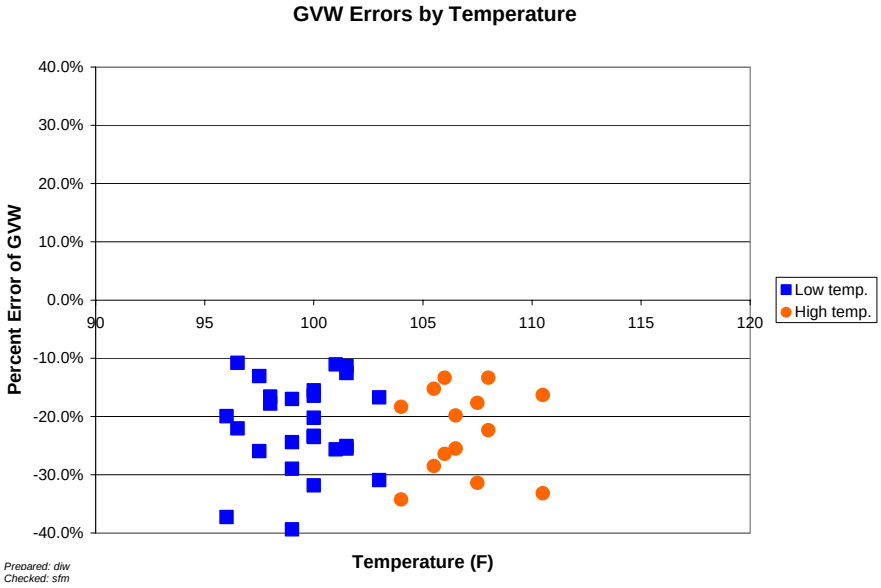

Figure 6-3 - Pre-Validation GVW Percent Error vs. Temperature – 120500 – 23-Sep-2008

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. There is no apparent relationship between speed and spacing error with the observed errors being well within the allowable spacing error.

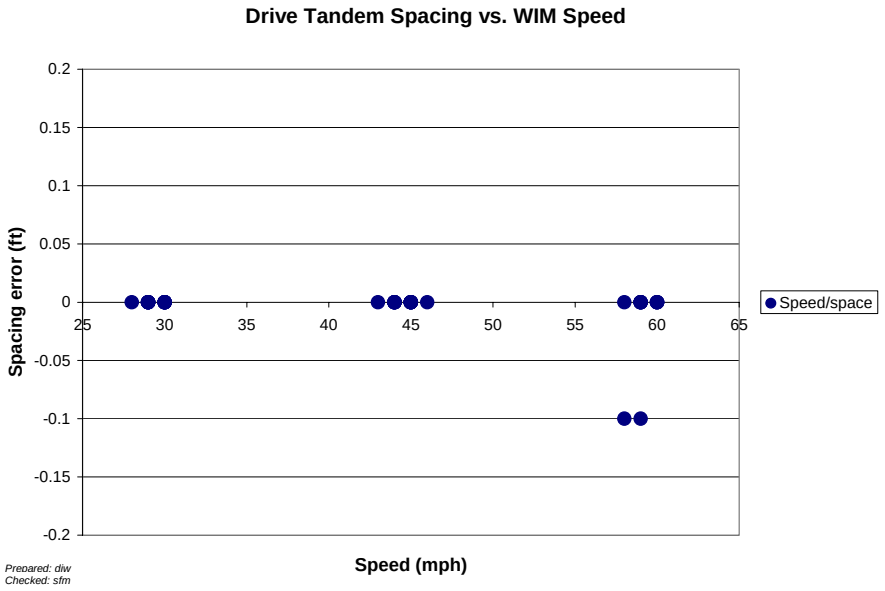

Figure 6-4 - Pre-Validation Spacing vs. Speed - 120500 – 23-Sep-2008

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 96 to 103 degrees Fahrenheit for Low temperature and 104 to 111 degrees Fahrenheit for High temperature.

Table 6-3 - Pre-Validation Results by Temperature Bin – 120500 – 23-Sep-2008

Element	95% Limit	Low Temperature 96 to 103 °F	High Temperature 104 to 111 °F
Steering axles	±20 %	-16.6 ± 17.1%	-17.6 ± 15.9%
Tandem axles	±15 %	-22.7 ± 17.5%	-23.6 ± 17.0%
GVW	±10 %	-21.6 ± 16.1%	-22.5 ± 15.8%
Axle spacing	± 0.5 ft	0.0 ± 0.0 ft	0.0 ± 0.1 ft

Prepared: bko *Checked:jrn*

The results in Table 6-3 are essentially the same for both temperature groups.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. There appears to be slightly more variability in the errors for the partial truck (diamonds) than the golden truck (squares) in Figure 6-3. The more noticeable element of the figure is the relatively small variability for each truck compared with the combined variability when using both trucks.

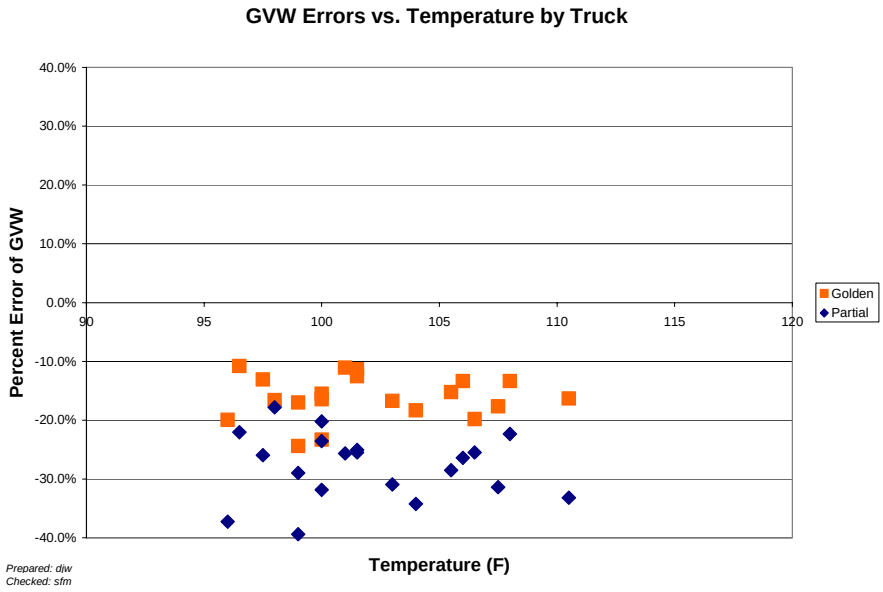

Figure 6-5 – Pre-Validation GVW Percent Error vs. Temperature by Truck – 120500 – 23-Sep-2008

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. There is no apparent trend in steering axle errors with temperature.

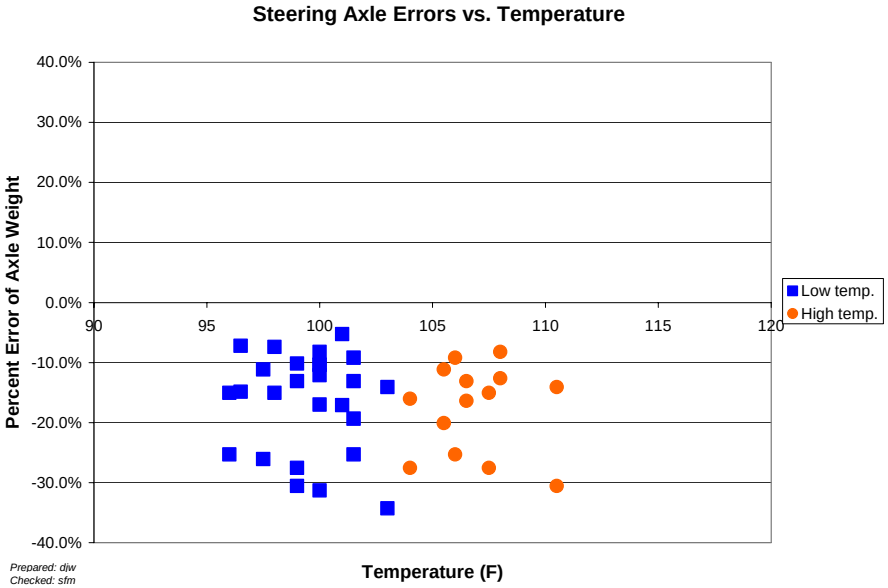

Figure 6-6 - Pre-Validation Steering Axle Error vs. Temperature by Group – 120500 – 23-Sep-2008

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 28 to 32 mph, Medium speed – 33 to 56 mph and High speed – 57+ mph.

Table 6-4 - Pre-Validation Results by Speed Bin – 120500 – 23-Sep-2008

Element	95% Limit	Low Speed 28 to 32 mph	Medium Speed 33 to 56 mph	High Speed 57+ mph
Steering axles	±20 %	-19.7 ± 17.8%	-14.6 ± 15.3%	-16.5 ± 17.8%
Tandem axles	±15 %	-25.8 ± 18.8%	-19.3 ± 14.8%	-24.1 ± 16.5%
GVW	±10 %	-24.8 ± 17.4%	-18.5 ± 14.3%	-22.7 ± 15.2%
Axle spacing	± 0.5 ft	0.0 ± 0.0 ft	0.0 ± 0.0 ft	0.0 ± 0.1 ft

Prepared: bko *Checked:jrn*

Table 6-4 shows the difference in results by speed group. The smallest degree of error in terms of both bias and variation occurs in the middle speed group. This is the 15th percentile speed for the site.

Figure 6-7 shows the results by speed. The scale masks the high degree of variation with between trucks and minimizes the within truck variation in error.

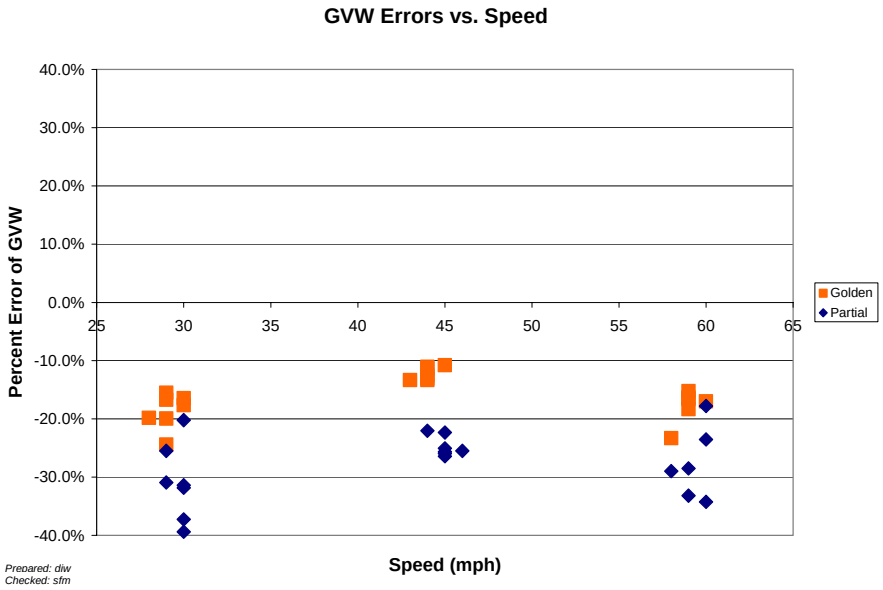

Figure 6-7 - Pre-Validation GVW Percent Error vs. Speed Group - 120500 –23-Sep-2008

Figure 6-8 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. There is no apparent trend in steering axle error with speed beyond a slightly smaller error at the middle speed.

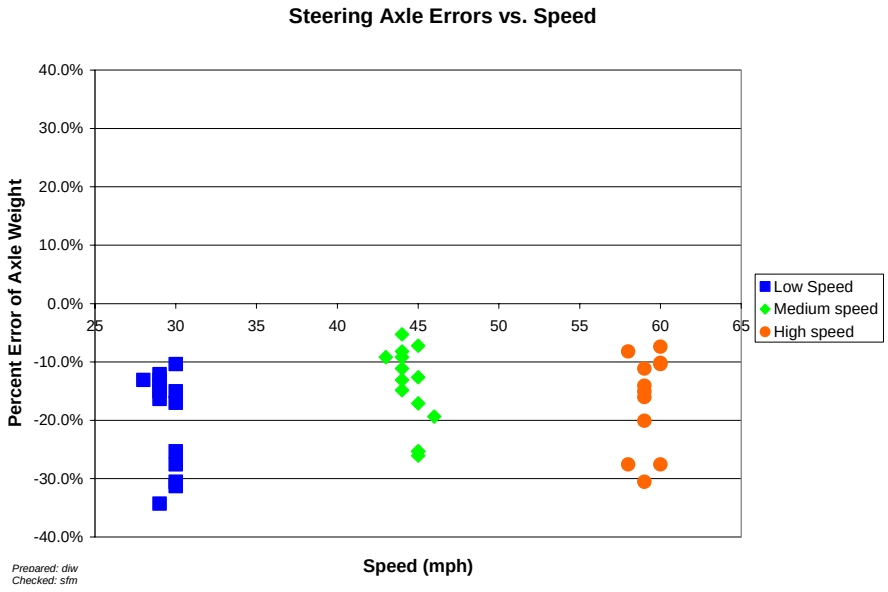

Figure 6-8 - Pre-Validation Steering Axle Percent Error vs. Speed Group - 120500 – 23-Sep-2008

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 three hours (28 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 6-5 has the classification error rates by class. The overall misclassification rate is 7.1 percent. The size of the misclassification rate is strongly influenced by the sample size. The misclassification of only Class 5s is because they are the outcome of a Class 3/5 issue and errors in Class 3s are not reported.

Table 6-5 - Truck Misclassification Percentages for 120500 – 23-Sep-2008

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

Prepared: bko *Checked:jrn*

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

Table 6-6 - Truck Classification Mean Differences for 120500 – 23-Sep-2008

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

Prepared: bko *Checked:jrn*

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

A limited investigation of the precision and bias of the speeds reported by the equipment was undertaken. The values were not within the expected tolerances. This may have been influenced by sample size.

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 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 6-7 - Results of Validation Using ASTM E-1318-02 Criteria

Characteristic	Limits for Allowable Error	Percent within Allowable Error	Pass/Fail
Single Axles	**± 20%**	**70%**	**Fail**
Axle Groups	**± 15%**	**18.8%**	**Fail**
GVW	**± 10%**	**0%**	**Fail**

Prepared: bko *Checked:jrn*

6.5 Prior Validations

The last validation for this site was done 23-May-2007. It was the fourth 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 was loaded to 74,490 lbs. The "partial" truck, which had air suspension on the tractor and steel spring suspension on the trailer, was loaded to 65,600 lbs.

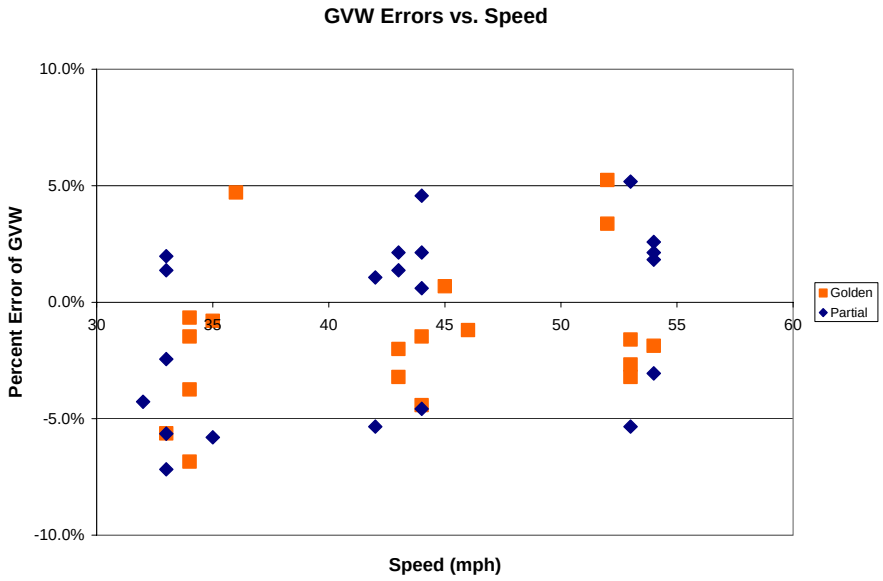

Figure 6-9 - Last Validation GVW Percent Error vs. Speed – 120500 – 23-May-2007

Table 6-8 shows the overall results from the last validation. The GVW and tandem weights were slightly underestimated. There was somewhat greater variability for the partial truck (diamonds) than the golden truck (squares). The same tendency was observed in the current validation efforts. The slight upward trend in error with increasing speed present in the last validation was not apparent in the current one.

Table 6-8 - Last Validation Final Results – 120500 – 23-May-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	2.8 ± 12.2%	Pass
Tandem axles	±15 percent	-1.8 ± 8.9%	Pass
Gross vehicle weights	±10 percent	-1.1 ± 7.1%	Pass
Axle spacing	± 0.5 ft [150 mm]	0.0 ± 0.1 ft	Pass

Prepared: bko *Checked:jrn*

Table 6-9 has the results at the end of the last validation by temperature. The temperature conditions for the prior validation were essentially the same as those for the current validation. Through this validation the equipment has been observed at temperature from 69 to 121 degrees Fahrenheit.

Table 6-9 - Last Validation Results by Temperature Bin – 120500 – 23-May-2007

Element	95% Limit	Low Temperature 100 to 110 °F	High Temperature 111 to 125 °F
Steering axles	±20 %	3.7 ± 9.9%	2.4 ± 13.7%
Tandem axles	±15 %	-1.8 ± 8.8%	-1.8 ± 9.3%
GVW	±10 %	-1.0 ± 8.0%	-1.1 ± 7.2%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: bko *Checked:jrn*

Table 6-10 has the results of the prior post validation by speed groups. The speed range for the final runs at the last validation was nearly as wide as the initial sped range for the preliminary validation on this visit.

Table 6-10 - Last Validation Results by Speed Bin – 120500 – 23-May-2007

Element	95% Limit	Low Speed 30 to 39 mph	Medium Speed 40 to 49 mph	High Speed 50+ mph
Steering axles	±20 %	2.3 ± 7.8%	3.4 ± 13.9%	2.8 ± 17.7%
Tandem axles	±15 %	-3.6 ± 9.3%	-1.4 ± 8.9%	-0.3 ± 8.5%
GVW	±10 %	-2.6 ± 7.8%	-0.7 ± 6.4%	0.2 ± 7.9%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: bko *Checked:jrn*

7 Data Availability and Quality

As of September 23, 2008 this site does not have at least 5 years of research quality data. Research quality data is defined to be at least 210 days in a year of data of known calibration meeting LTPP's precision requirements.

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

The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. As can be seen from the table 1997 to 2007 have a sufficient quantity of classification data to be considered complete years of data. The years 1998, 1999, 2002 through 2007 have sufficient quantity of weight data to be considered complete years of data. **Together with the previously gathered calibration information, it can be seen that at least 1**

additional year of research quality data are needed to meet the goal of a minimum of 5 years of research weight data. The failure of the current validation makes it unlikely that 2008 can be assumed to be research quality for the entire year.

Table 7-1 Amount of Traffic Data Available 120500 – 23-Sep-2008

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1996	98	5	Full Week	84	7	Full Week
1997	215	10	Full Week	21	3	Full Week
1998	359	12	Full Week	345	12	Full Week
1999	257	9	Full Week	270	9	Full Week
2000	356	12	Full Week	31	1	Full Week
2001	352	12	Full Week			
2002	243	9	Full Week	336	12	Full Week
2003	261	10	Full Week	267	11	Full Week
2004	291	11	Full Week	297	10	Full Week
2005	314	12	Full Week	328	12	Full Week
2006	346	12	Full Week	350	12	Full Week
2007	298	10	Full Week	301	11	Full Week
2008	200	5	Full Week	200	5	Full Week

Prepared: bko *Checked:jrn*

Data was not available when this report was written to compare comparison graphs for weight distributions, vehicle classification or speed.

8 Data Sheets

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

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

Sheet 20 – Classification verification – Pre-Validation (1 page)
Sheet 20 – Classification verification – Post-Validation (1 page)

Sheet 21 – Pre-Validation (3 pages)
Sheet 21 – Calibration Iteration 1 – (1 page)
Sheet 21 – Calibration Iteration 2 – (1 page)
Sheet 21 – Calibration Iteration 3 - (1 page)
Sheet 21 – Post-Validation (4 pages)

Calibration Iteration 1 Worksheet – (1 page)
Calibration Iteration 2 Worksheet – (1 page)
Calibration Iteration 3 Worksheet – (1 page)

Test Truck Photographs (6 pages)

Florida Classification Scheme (7 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. There are no significant changes in the information provided.

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: 0500

Figures

Photos

1. General Information

SITE ID: *120500*

LOCATION: *US 1 South, 4.5 miles North of SR 706*

VISIT DATE: *September 23, 2008*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

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: *September 23 and 24, 2008*

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: *4.5 miles north of SR 706, near Tequesta.*

MEETING LOCATION: *On site at 10:30am, September 23, 2008*

WIM SITE LOCATION: *US 1 (Latitude: 26.99734; Longitude: -80.09726)*

WIM SITE LOCATION MAP: *See Figure 4.1*

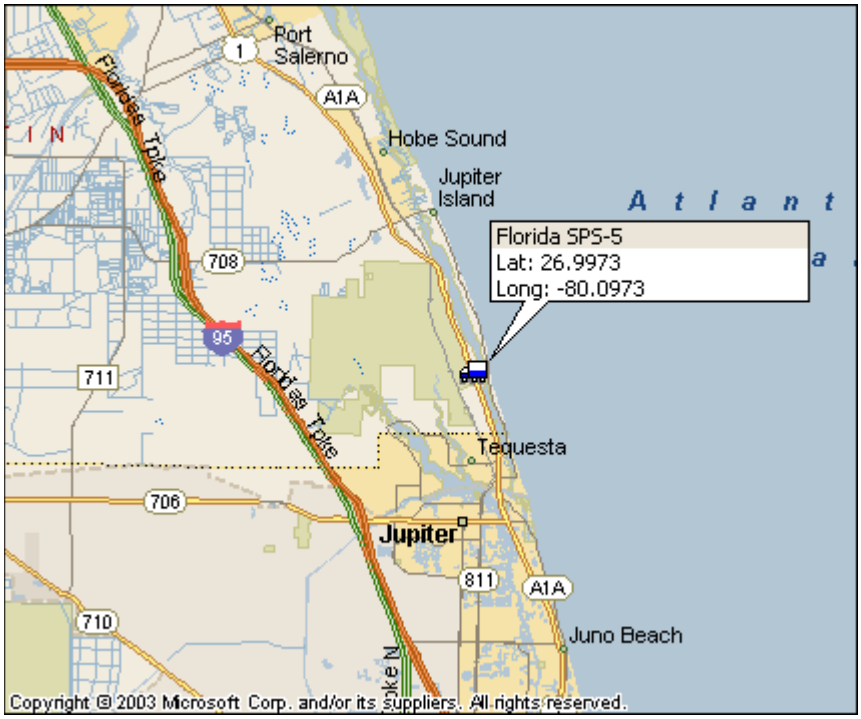

Figure 4-1 - Site 120500 in Florida

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION:

CAT Certified Scales at Pilot Travel Center, I-95 exit 129, Ft. Pierce, FL, 34945 $8.50 per run, reweighs $1.00; Manager - Dennis Rodricks, 561-466-7160, Lat. 27.413770 Long. -80.395260

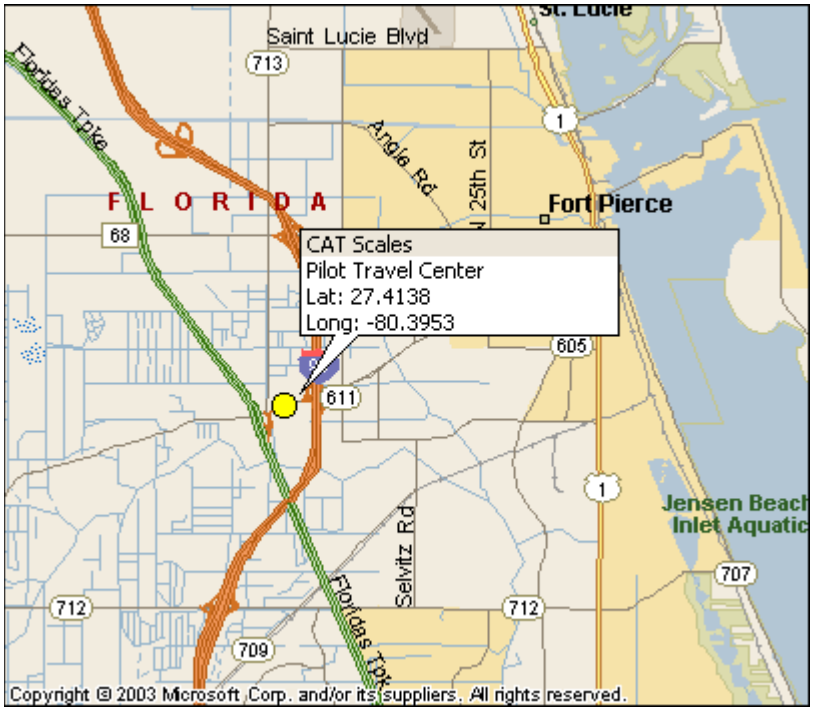

Figure 5-1 - CAT Scale Location for Florida SPS-5

TRUCK ROUTE:

- *Northbound Turnaround: 2.0 miles from the site*
- *Southbound Turnaround: 0.5 miles from the site*

Total distance = 5 miles

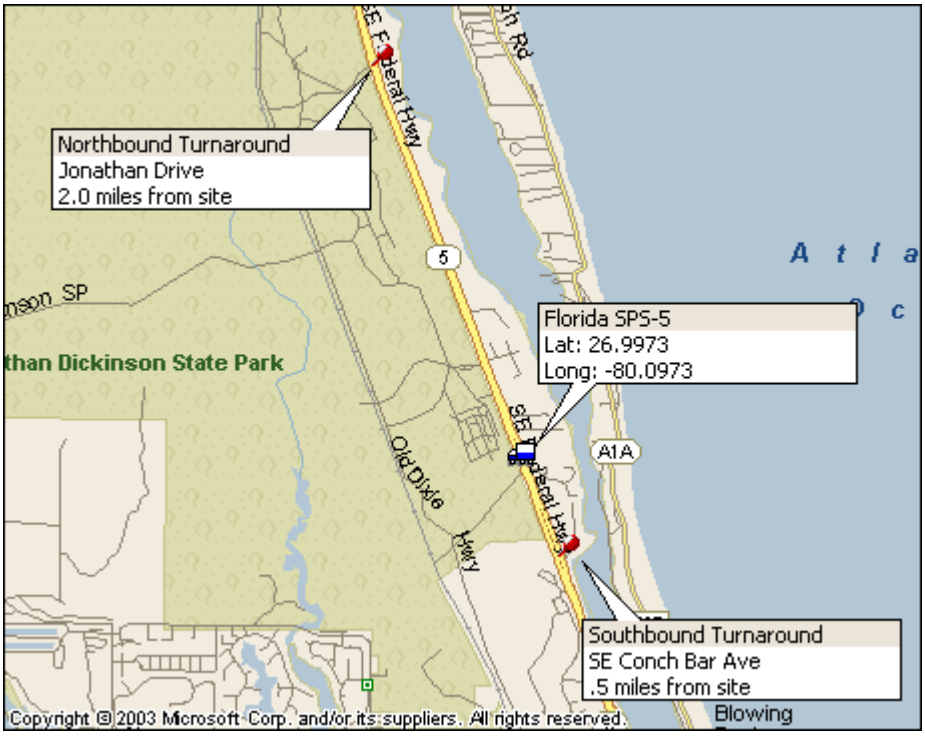

Figure 5-2 - Truck Route Map of 120500

6. Sheet 17 – Florida (120500)

1.* ROUTE ___US 1____ 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 _0554_____
Distance from sensor to nearest upstream SPS Section ____1__8__2__ ft

3.* LANE CONFIGURATION
Lanes in LTPP direction __2__ Lane width _12___ 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

4.* PAVEMENT TYPE _____Asphalt Concrete_____ _____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date 09/24/08 Photo 120500_Pavement_Rutted_Area-1_09_24_08.jpg
Date 09/24/08 Photo 120500_Pavement_Rutted_Area-2_09_24_08.jpg
Date 09/24/08 Photo 120500_Pavement_Rutted_Area-3_09_24_08.jpg
Date 09/24/08 Photo 120500_Close_Up_Of_Rutted_Area_09_24_08.jpg
Date 09/24/08 Photo 120500_Tape_At_Start_Of_Rutted_Area_09_24_08.jpg
Date 09/24/08 Photo 120500_Pavement_Marking_Start_Rutted_Area_09_24_08.jpg
Date 09/24/08 Photo 120500_LTPP_Test_Sec_Sign_Start_Rutted_Area_09_24_08.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 _3__2_ ft
Distance from system __1_2_9__ ft
TYPE _____334 B_____

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) 414-4726__

11. * POWER
Distance to cabinet from drop ___ ____5__ ft Overhead / underground / solar /
AC in cabinet?
Service provider _____ Phone number _____

12. * TELEPHONE
Distance to cabinet from drop ___ ____ ___ ft Overhead / underground / cell?
Service provider _____ Phone Number _____

13.* SYSTEM (software & version no.)- _____PAT DAW 190 _____
Computer connection – RS232 / Parallel port / USB / Other _____

14. * TEST TRUCK TURNAROUND time ___6____ minutes DISTANCE _5.0__ mi.

15. PHOTOS	FILENAME
Power source	120500_Solar_Panel_09_23_08.jpg
	120500_Service_Mast_09_23_08.jpg
Phone source	120500_Phone_Modem_09_23_08.jpg
Cabinet exterior	120500_Cabinet_Exterior_09_23_08.jpg
Cabinet interior	120500_Cabinet_Interior_Front_09_23_08.jpg
	120500_Cabinet_Interior_Rear_09_23_08.jpg
Weight sensors	120500_Leading_WIM_Sensor_09_23_08.jpg
	120500_Trailing_WIM_Sensor_09_23_08.jpg
Classification sensors	
Other sensors	120500__Loop_09_23_08.jpg _
Description	__Loop

Downstream direction at sensors on LTPP lane
12050_Downstream_09_23_08.jpg

Upstream direction at sensors on LTPP lane
120500_Upstream_09_23_08.jpg

COMMENTS GPS Coordinates: Latitude: 26.99734; Longitude: -80.09726

Amenities:

Various Hotels, Restaurants, Gas Stations located 5 miles South of site in Jupiter.

Types of Trucks: Two Class 9s

Expected Weight Ranges: Truck 1 – 72,000 to 80,000 lbs.; legal limit on gross and axles, air suspension; Truck 2 – 60,000 – 65,000 lbs, no suspension requirements

Speeds to be run: 45, 50 and 55 mph

Rutting starting at 681 feet prior to site caused test trucks to push towards the shoulder and their trailers to sway.

COMPLETED BY Dean J. Wolf

PHONE 301-210-5105 DATE COMPLETED 09/23/2008

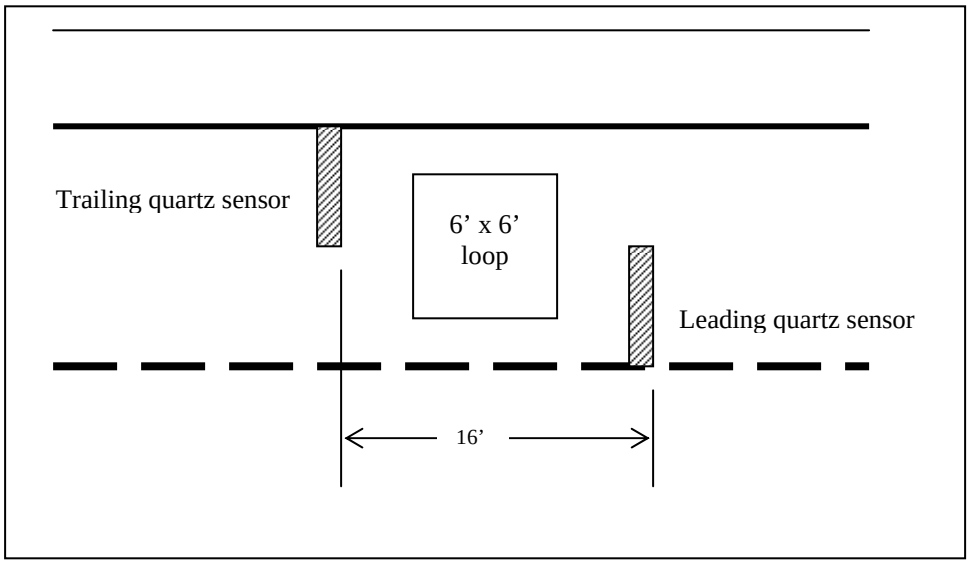

Figure 6-1 - Sketch of Equipment Layout - 120500

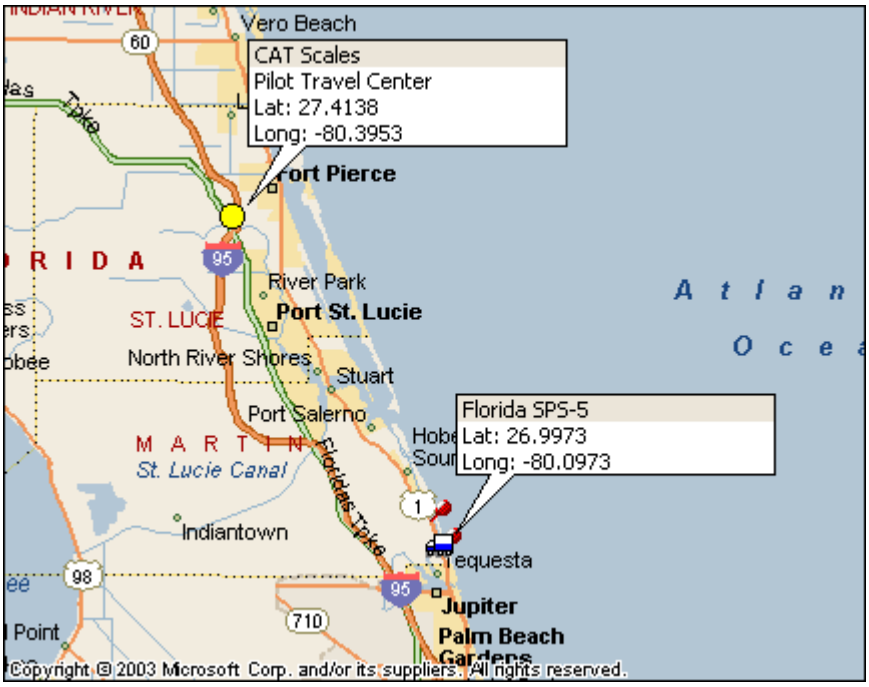

Figure 6-2 - Site Map of 120500

Photo 1 - 120500_Pavement_Rutted_Area-1_09_24_08.jpg

Photo 2 - 120500_Pavement_Rutted_Area-2_09_24_08.jpg

Photo 3 - 120500_Pavement_Rutted_Area-3_09_24_08.jpg

Photo 4 - 120500_Close_Up_Of_Rutted_Area_09_24_08.jpg

Photo 5 - 120500_Tape_At_Start_Of_Rutted_Area_09_24_08.jpg

Photo 6 - 120500_Pavement_Marking_Start_Rutted_Area_09_24_08.jpg

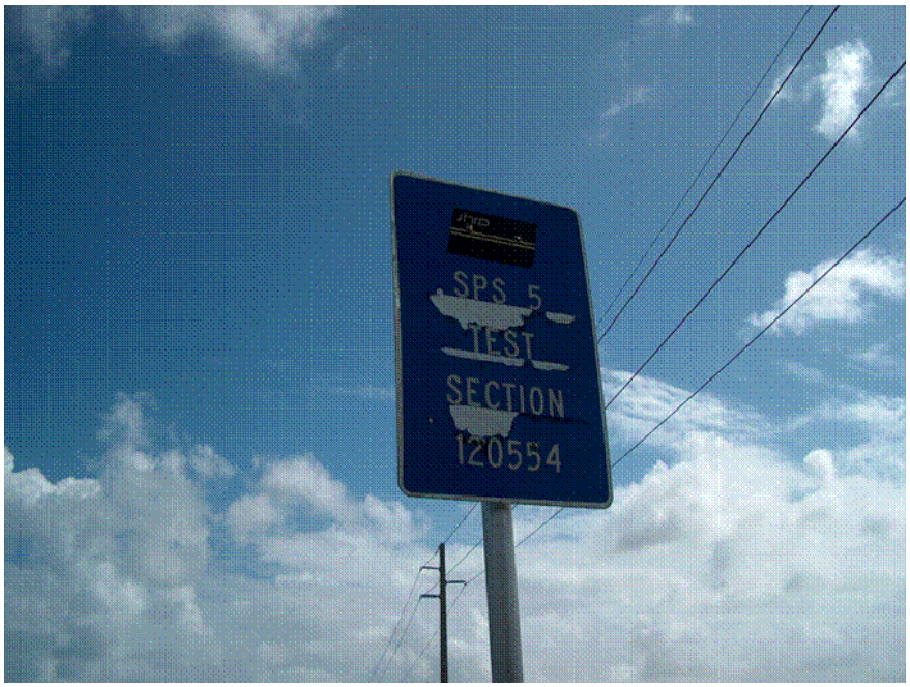

Photo 7 - 120500_LTPP_Test_Sec_Sign_Start_Rutted_Area_09_24_08.jpg

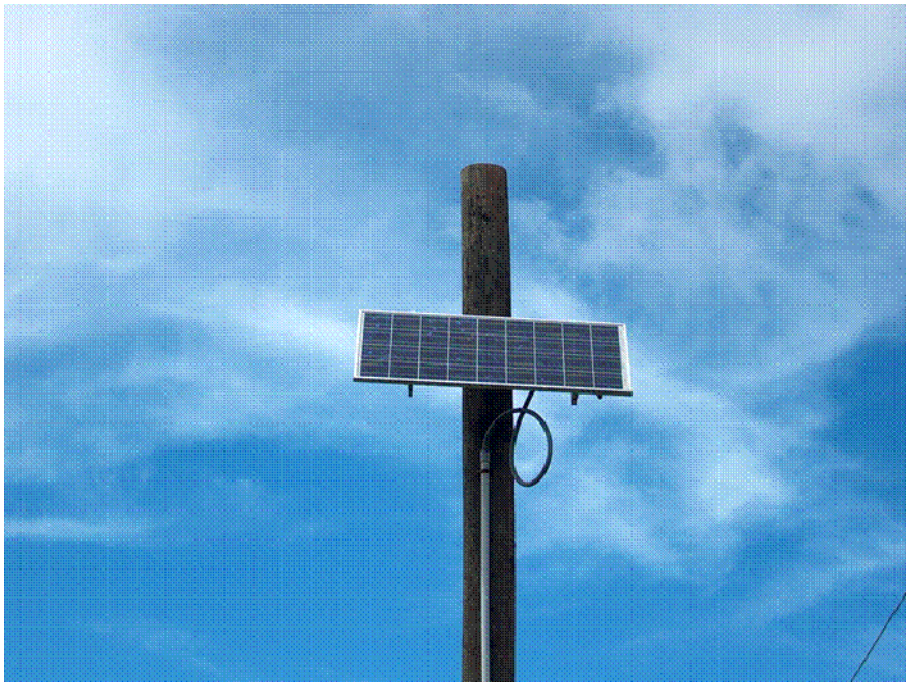

Photo 8 - 120500_Solar_Panel_09_23_08.jpg

Photo 9 - 120500_Service_Mast_09_23_08.jpg

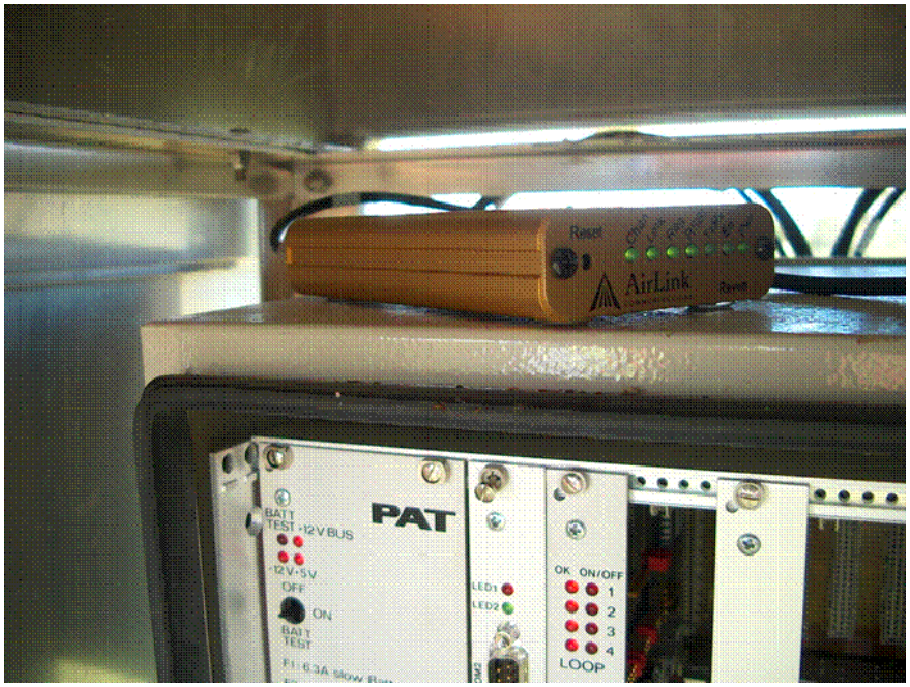

Photo 10 - 120500_Phone_Modem_09_23_08.jpg

Photo 11 - 120500_Cabinet_Exterior_09_23_08.jpg

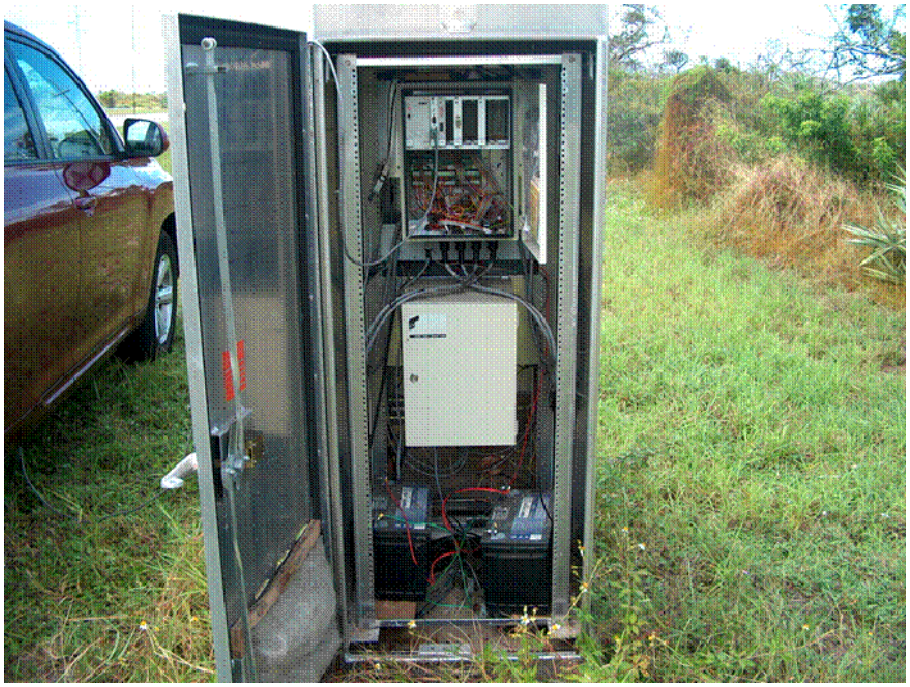

Photo 12 - 120500_Cabinet_Interior_Front_09_23_08.jpg

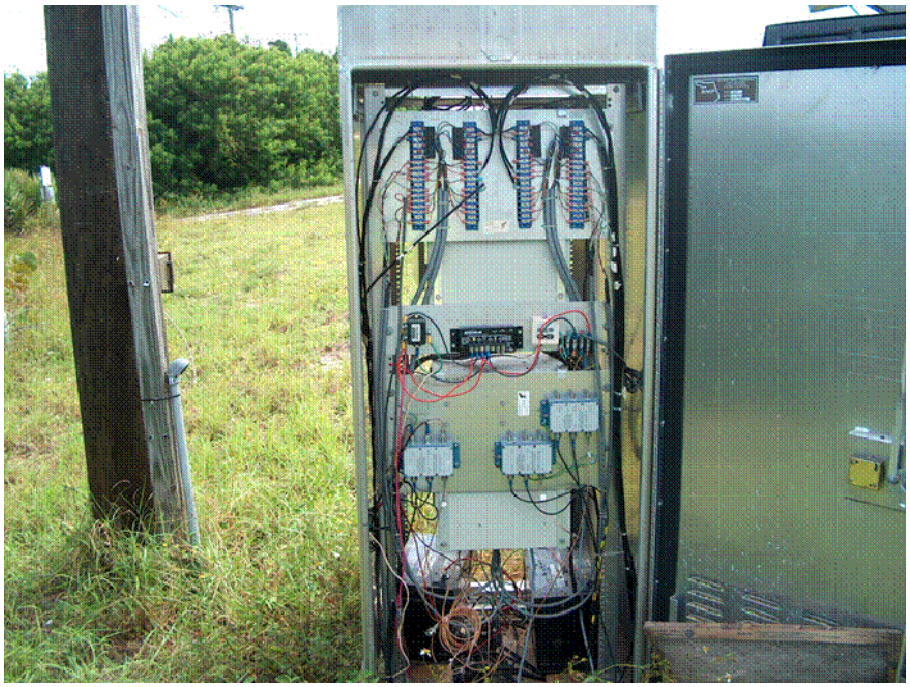

Photo 13 - 120500_Cabinet_Interior_Rear_09_23_08.jpg

Photo 14 - 120500_Leading_WIM_Sensor_09_23_08.jpg

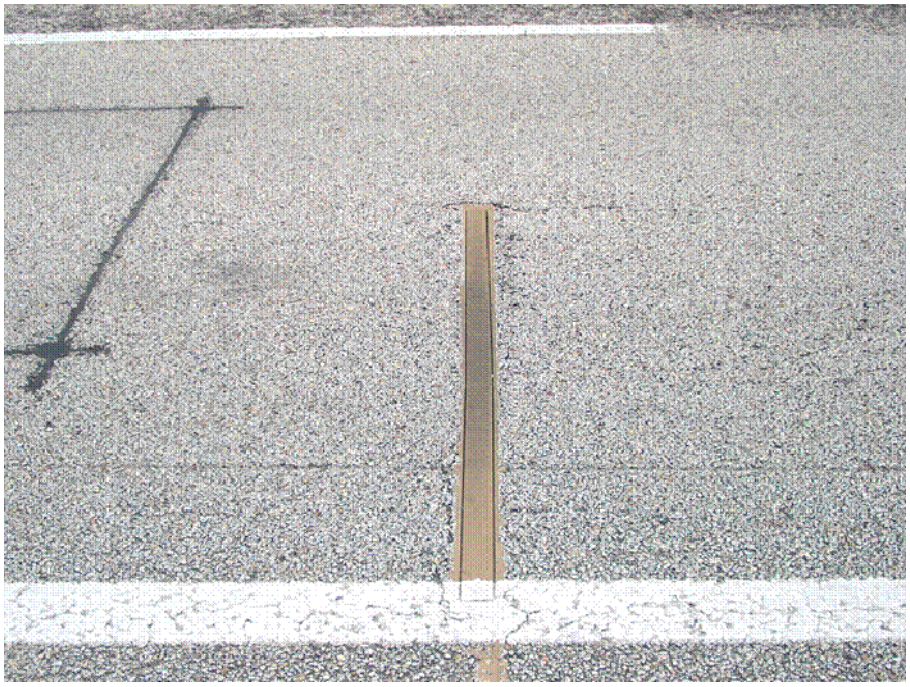

Photo 15 - 120500_Trailing_WIM_Sensor_09_23_08.jpg

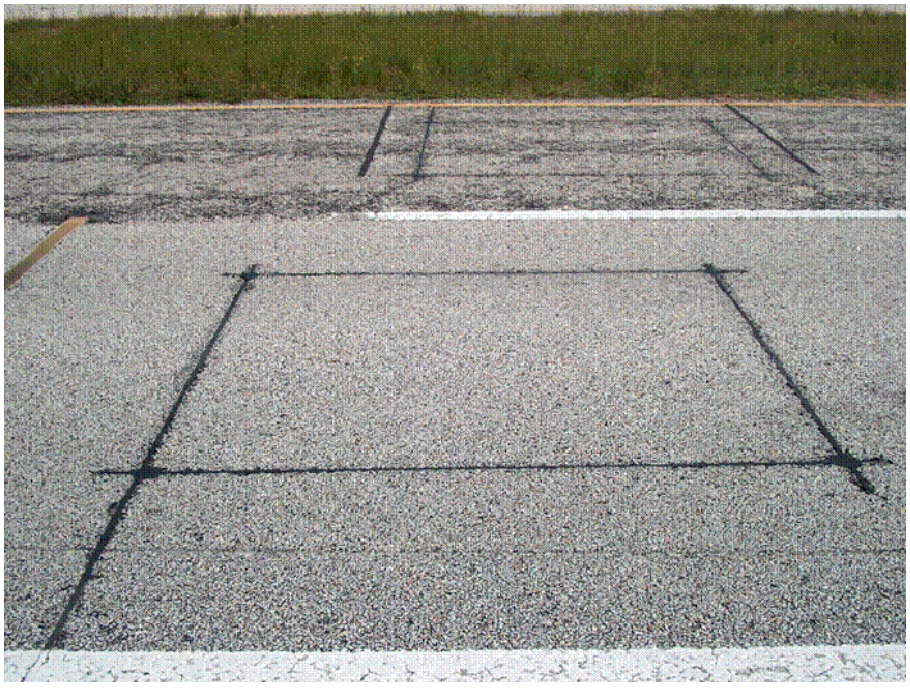

Photo 16 - 120500_Loop_09_23_08.jpg

Photo 17 - 12050_Downstream _09_23_08.jpg

Photo 18 - 120500_Upstream_09_23_08.jpg

SHEET 18	STATE CODE [12]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0500]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 9/23/2008

Rev. 05/15/07

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

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

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

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

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

   c. Maintenance –
      - ☐ Contract with purchase – Expiration Date _____
      - ☐ Separate contract LTPP – Expiration Date _____
      - ☒ Separate contract State – Expiration Date _Unk_
      - ☐ State personnel

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

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

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

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

g. Communication –

i. Type –
- ☐ Landline
- ☒ Cellular
- ☐ Other

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

3. PAVEMENT –

a. Type –
- ☐ Portland Concrete Cement
- ☒ Asphalt Concrete

b. Allowable rehabilitation activities –
- ☐ Always new
- ☒ Replacement as needed
- ☐ Grinding and maintenance as needed
- ☐ Maintenance only
- ☐ No remediation

c. Profiling Site Markings –
- ☐ Permanent
- ☒ Temporary

4. ON SITE ACTIVITIES –

a. WIM Validation Check - advance notice required _14__ ☒ days ☐ weeks

b. Notice for straightedge and grinding check - __4_ ☐ days ☒ weeks

i. On site lead –
- ☒ State
- ☐ LTPP

ii. Accept grinding –
- ☒ State
- ☐ LTPP

c. Authorization to calibrate site –
- ☒ State only
- ☐ LTPP

d. Calibration Routine –
- ☒ LTPP – ☐ Semi-annually ☒ Annually
- ☐ State per LTPP protocol – ☐ Semi-annually ☐ Annually
- ☒ State other – _____

e. Test Vehicles
   i. Trucks –
      1st – Air suspension 3S2 ☐ State ☒ LTPP
      2nd – Class 9 ☐ State ☒ LTPP
      3rd – _____ ☐ State ☐ LTPP
      4th – _____ ☐ State ☐ LTPP
   ii. Loads – ☐ State ☒ LTPP
   iii. Drivers – ☐ State ☒ LTPP

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

FTE, DTS, MACTEC Engineering and Consulting, Inc.

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

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

i. Traffic Control Required – ☐Yes ☒No

j. Enforcement Coordination Required – ☐Yes ☒No

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

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

      Name: Michael Leggett Phone:(850) 414-4727

      Agency: ARA

b. Maintenance (equipment) –

Name: Kip Jones Phone:(850) 414-4726

Agency: FL DOT

c. Data Processing and Pre-Visit Data –

Name: Richard Reel Phone:(850) 414-4709

Agency: IRD

d. Construction schedule and verification –

Name: Kip Joes Phone:(850) 414-4726

Agency: _____

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

Name: Billy Graham Phone:(352) 748-6066

Agency: Graham Trucking Lines, Coleman FL 33521

f. Traffic Control –

Name: _____ Phone:_____

Agency: _____

g. Enforcement Coordination –

Name: _____ Phone:_____

Agency: _____

h. Nearest Static Scale

Name: CAT Scales Falcon Citgo Truck Stop Location:I-95 Exit 129, Ft. Pierce FL 34945

Phone: (561) 466-7160

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [12] *SHRP SECTION ID [0500]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [9/23/2008]

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_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

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

   __ 20__ PASSES PER TRUCK

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

TRUCK	TYPE	SUSPENSION
1	9	1
2	9	1
3		

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW -22.0 STANDARD DEVIATION 7.6
   DYNAMIC AND STATIC SINGLE AXLES -16.9 STANDARD DEVIATION 7.9
   DYNAMIC AND STATIC DOUBLE AXLES -23.0 STANDARD DEVIATION 8.5

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ 30 45 60 _____ __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___821___

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 _X_ TIME __ NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   *** FHWA CLASS 9 ____ N/A
   *** FHWA CLASS 8 ____ 0

FHWA CLASS	5	____ ____	-11
FHWA CLASS	6	____ ____	0
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 [0500]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [9/24/2008]

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_____

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

   __ 25__ PASSES PER TRUCK

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

TRUCK	TYPE	SUSPENSION
1	9	1
2	9	1
3		

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW 2.4 STANDARD DEVIATION 4.6
   DYNAMIC AND STATIC SINGLE AXLES 4.7 STANDARD DEVIATION 3.9
   DYNAMIC AND STATIC DOUBLE AXLES 2.0 STANDARD DEVIATION 6.0

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ 50 55 60 _____ __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) 1018

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 _X_ TIME __ NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   *** FHWA CLASS 9 ____ 0 FHWA CLASS 4 ____ ____ -75
   *** FHWA CLASS 8 ____ 0 FHWA CLASS 5 ____ ____ 43
   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	1 2
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 1	* DATE	9/23/08

Rev. 08/31/01

PART I.

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

AXLES - units - (lbs) / 100s lbs / kg

GEOMETRY

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

9. a) * Make: KENWORTH b) * Model: 600

10.* Trailer Load Distribution Description:

CONCRETE BLOCKS LOADED EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): _____

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

A to B 19.0 B to C 4.5 C to D 32.3

D to E 4.1 E to F _____

Wheelbase (measured A to last) _____ Computed 59.9

13. *Kingpin Offset From Axle B (units) +2.9 (_____)

(+ 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	2 FULL LEAF
B	11R24.5	AIR
C	11R24.5	AIR
D	11R24.5	AIR
E	11R24.5	AIR
F		

Sheet 19	* STATE_CODE	1 2
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 1	* DATE	09/23/08

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 74350
*c) Post Test Loaded Weight 74050
*d) Difference Post Test – Pre-test -300

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10320	15090	15090	16930	16930		74360
2	10280	15110	15110	16920	16920		74340
3							
Average	10300	15100	15100	16925	16925		74350

Table 6. Raw data – Axle scales –

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10160	15030	15030	16910	16910		74040
2	10200	15020	15020	16910	16910		74060
3							
Average	10180	15025	15025	16910	16910		74050

Measured By djw Verified By sfm Weight date 9/23/08

Sheet 19	* STATE_CODE 1 2
LTPP Traffic Data	* SPS PROJECT ID 0 5 0 0
*CALIBRATION TEST TRUCK # 1	* DATE

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 74190

*c) Post Test Loaded Weight 73680

*d) Difference Post Test – Pre-test -510

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10180	15060	15060	16950	16950		74200
2	10140	15080	15080	16940	16940		74180
3							
Average	10160	15070	15070	16945	16945		74190

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10000	14940	14940	16910	16910		73700
2	10000	14930	14930	16900	16900		73660
3							
Average	10000	14935	14935	16905	16905		73680

Measured By dfw Verified By sfm Weight date 9/24/08

Sheet 19	* STATE_CODE 1 2
LTPP Traffic Data	* SPS PROJECT ID 0 5 0 0
*CALIBRATION TEST TRUCK # 2	* DATE 9/03/08

Rev. 08/31/01

PART I.

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

AXLES - units - (lbs) / 100s lbs / kg

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:

CONCRETE BLOCKS LOADED EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): _____

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

A to B 17.4 B to C 4.3 C to D 31.0

D to E 4.0 E to F _____

Wheelbase (measured A to last) _____ Computed 56.7

13. *Kingpin Offset From Axle B (units) +2.4 (_____)

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	425R 22.5	2 FULL LEAF
B	11R 24.5	AIR
C	11R 24.5	AIR
D	275R 22.5	AIR
E	275R 22.5	AIR
F	_____	_____

Sheet 19	* STATE_CODE 1 2
LTPP Traffic Data	* SPS PROJECT ID 0 5 0 0
*CALIBRATION TEST TRUCK # 2	* DATE

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 66450
*c) Post Test Loaded Weight 66160
*d) Difference Post Test – Pre-test -290

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	13480	13300	13300	13190	13190		66460
2	13420	13310	13340	13200	13200		66440
3							
Average	13450	13305	13305	13195	13195		66450

Table 6. Raw data – Axle scales –

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	13280	13230	13230	13210	13210		66160
2	13380	13150	13150	13240	13240		66160
3							
Average	13330	13190	13190	13225	13225		66160

Measured By dw Verified By sfm Weight date 9/23/08

Sheet 19	* STATE_CODE 1 2
LTPP Traffic Data	* SPS PROJECT ID 0 5 0 0
*CALIBRATION TEST TRUCK # 2	* DATE

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 66370
*c) Post Test Loaded Weight 65880
*d) Difference Post Test – Pre-test -490

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	13500	13120	13120	13320	13320		66380
2	13340	13250	13250	13260	13260		66360
3							
Average	~~13370~~ 13420	13185	13185	13290	13290		66370

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	13060	13140	13160	13240	13240		65860
2	13120	13190	13190	13250	13250		65900
3							
Average	13090	13150	13150	13245	13245		65880

Measured By djw Verified By sfm Weight date 9/24/08

Sheet 20	* STATE_CODE 1 2
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
Speed and Classification Checks * 1 of* 21 5 fm	* DATE 0 9 / 2 3 / 2 0 0 8

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
41	8	8177	41	8	63	5	10809	63	5
52	5	8283	52	5	63	3	10835	63	5
56	5	8504	56	5	56	3	11361	52	5
57	6	8581	56	6					
46	5	8626	40	5					
53	5	8824	53	5					
58	5	8863	58	5					
57	5	8916	54	5					
53	4	9335	52	4					
55	5	9344	55	5					
45	8	9664	45	8					
64	5	9671	64	5					
50	5	9726	50	5					
58	8	9769	58	8					
58	5	9869	59	5					
57	6	9891	57	6					
56	7	9943	56	7					
64	5	10031	65	5					
59	5	10189	59	5					
54	5	10225	54	5					
60	6	10260	60	6					
62	5	10380	61	5					
56	5	10510	56	5					
43	5	10628	43	5					
51	6	10693	50	6					

Recorded by MARK B Direction S Lane 4 Time from 1:10PM to 4:10PM

Sheet 20	* STATE_CODE 1 2
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
Speed and Classification Checks * 1 of* 1	* DATE 0 9 / 2 4 / 2 0 0 8

Rev. 08/31/2001

	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
*	53	5	7489	53	4					
	55	4	7519	55	4					
	55	5	7734	56	5					
	54	9	7770	54	9					
	54	5	7906	55	5					
	~~58~~	~~3~~		~~58~~	~~5~~					
	58	9	8132	58	9					
	66	8	8153	66	8					
	69	5	8306	69	5					
*	47	5	8573	48	4					
	55	6	9020	55	6					
	49	5	9027	50	5					
	54	9	9108	54	9					
	59	5	9227	58	5					
*	56	5	9407	58	4					
	58	9	9467	58	9					
	55	8	9499	55	8					
	51	5	9537	50	5					
	59	8	9549	59	8					
	61	5	10112	61	5					

Recorded by MARK B Direction S Lane 4 Time from 12:19PM to 3:19 PM

Sheet 21	* STATE_CODE	1 2
LTPP Traffic Data	*SPS PROJECT_ID	0 5 0 0
WIM System Test Truck Records 1 of 3	* DATE	0 9 / 2 3 / 2 0 0 8

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
96	30	2	1	13:01	7984	30	50/50	41/49	45/46	30/33	27/42		41.6	17.5	4.3	31.0	4.0	
96	28	1	1	13:01	7996	25	45/42	59/62	57/60	55/83	52/79		59.4	19.2	4.5	32.2	4.1	
96.5	44	2	2	13:06	8065	44	61/53	49/54	58/56	42/43	52/54		51.7	17.4	4.3	31.1	4.0	
96.5	46	1	2	13:06	8066	45	47/48	68/67	65/67	58/93	59/91		66.2	19.2	4.5	32.4	4.1	
98	59	2	3	13:12	8158	60	62/62	50/52	57/56	44/50	62/55		54.5	17.4	4.3	30.9	4.0	
98	59	1	3	13:12	8164	59	41/46	64/61	65/63	61/78	54/87		61.9	19.2	4.5	32.4	4.1	
100	29	2	4	13:16	8214	30	63/57	45/57	53/52	48/52	49/52		52.9	17.4	4.3	31.0	4.1	
100	29	1	4	13:16	8219	29	48/42	62/63	60/61	60/90	55/86		62.7	19.2	4.5	32.3	4.1	
101	47	2	5	13:20	8275	45	57/54	46/52	55/49	42/45	50/46		49.3	17.4	4.3	31.1	4.0	
101	44	1	5	13:21	8279	44	48/40	65/68	62/70	62/86	59/90		66.0	19.3	4.5	32.5	4.1	
104	59	2	6	13:24	8330	60	47/50	43/48	49/49	26/42	34/49		43.6	17.4	4.3	31.1	4.0	
104	59	1	6	13:25	8339	59	42/44	61/65	61/61	51/84	53/83		60.6	19.2	4.5	32.5	4.1	
106.5	29	2	7	13:29	8429	29	61/51	43/50	56/48	38/41	50/55		49.4	17.4	4.3	31.0	4.0	
106.5	29	1	7	13:30	8440	28	47/42	58/63	59/59	56/81	59/80		59.5	19.1	4.5	32.3	4.1	
108	48	2	8	13:32	8462	45	63/54	49/51	57/49	45/48	48/52		51.5	17.4	4.3	31.0	4.0	
108	43	1	8	13:33	8486	44	59/44	68/69	63/69	56/80	54/90		64.3	19.2	4.5	32.4	4.1	

Recorded by MARK B Checked by

Sheet 21	* STATE_CODE	1 2
LTPP Traffic Data	*SPS PROJECT_ID	0 5 0 0
WIM System Test Truck Records 2 of 3	* DATE	0 9 / 2 3 / 2 0 0 8

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
110.5	59	2	9	13:36	8552	59	41/52	41/50	52/51	22/45	38/51		414.3	17.4	4.3	31.1	4.0	
110.5	59	1	9	13:38	8574	59	45/43	65/60	63/60	56/89	56/84		62.1	19.2	4.5	32.4	4.1	
107.5	30	2	10	13:42	8635	30	46/51	39/44	51/47	42/48	35/52		45.5	17.4	4.3	30.9	4.0	
107.5	29	1	10	13:42	8639	30	46/41	69/63	61/62	58/83	58/83		61.1	19.2	4.5	32.3	4.1	
106	44	2	11	13:46	8709	45	45/55	43/58	52/54	30/52	41/57		48.8	17.5	4.3	31.1	4.0	
106	43	1	11	13:46	8716	43	49/44	62/67	65/69	56/87	55/90		64.3	19.2	4.5	32.4	4.1	
105.5	59	2	12	13:50	8795	59	49/58	45/41	58/45	42/48	50/45		42.4	17.4	4.2	31.0	4.0	
105.5	59	1	12	13:51	8798	59	39/52	63/65	64/57	63/85	56/86		62.9	19.2	4.5	32.4	4.1	
103	29	2	13	13:55	8883	29	44/44	38/53	51/48	29/47	45/61		45.8	17.4	4.3	31.0	4.0	
103	29	1	13	13:56	8889	29	45/43	61/63	64/58	58/88	58/80		61.8	19.2	4.5	32.3	4.1	
101.5	45	2	14	13:59	8958	45	48/52	48/50	52/48	43/51	50/55		49.7	17.4	4.3	31.0	4.0	
101.5	44	1	14	13:59	8961	44	44/49	64/66	63/68	61/95	61/87		65.8	19.2	4.5	32.3	4.1	
100	59	2	15	14:04	9041	60	60/60	51/50	61/48	38/50	38/53		50.7	17.4	4.3	31.0	4.0	
100	58	1	15	14:05	9051	58	45/43	58/55	65/55	48/65	49/78		56.9	19.3	4.5	32.4	4.0	
100	30	2	16	14:08	9114	30	49/43	38/48	44/47	35/52	45/52		45.2	17.4	4.3	31.0	4.0	
100	29	1	16	14:09	9115	30	44/41	63/62	65/58	56/91	59/81		62.0	19.3	4.5	32.4	4.1	

Recorded by MARK Z Checked by

Sheet 21	* STATE_CODE	1 2
LTPP Traffic Data	*SPS PROJECT_ID	0 5 0 0
WIM System Test Truck Records 3 of 3	* DATE	0 9 / 2 3 / 2 0 0 8

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
97.5	45	2	17	14:13	9222	45	50/49	45/49	54/47	42/50	49/57		49.1	17.5	4.3	31.1	4.0	
97.5	43	1	17	14:14	9244	44	48/43	64/62	63/67	53/94	56/91		64.5	19.2	4.5	32.4	4.1	
99	58	2	18	14:17	9304	58	47/50	42/48	53/50	35/40	45/53		42.1	17.4	4.2	30.9	4.0	
99	60	1	18	14:18	9317	60	49/52	63/60	65/60	58/78	57/82		61.6	19.2	4.5	32.4	4.1	
99	31	2	19	14:22	9405	30	43/50	49/51	48/46	19/29	33/49		40.2	17.3	4.3	30.9	4.0	
99	~~29~~	1	19	14:22	9415	29	44/45	56/55	57/53	52/78	50/70		56.1	19.2	4.5	32.3	4.1	
101.5	44	2	20	14:27	9498	46	56/52	45/46	55/47	42/40	49/54		49.4	17.4	4.3	31.0	4.0	
101.5	44	1	20	14:27	9500	44	44/45	66/71	63/66	55/95	54/88		64.9	19.3	4.5	32.5	4.1	

Recorded by MARK Z

Checked by

Sheet 21	* STATE_CODE
LTPP Traffic Data	*SPS PROJECT_ID
WIM System Test Truck Records 1 of 1	* DATE 9/24/08

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
78	29	1	1	10:23	5709	29	55/52	80/54	62/80	71/11.5	68/10.7		79.4	19.2 ~~17.4~~	4.5 ~~4.3~~	32.4 ~~31.1~~	4.1 ~~4.1~~	
78	29	2	1	10:24	5718	29	58/52	48/64	66/62	39/69	60/60		57.9	17.4	4.3	31.1	4.0	
79	43	1	2	10:27	5754	44	57/54	79/89	80/88	72/123	73/11.5		82.9	19.3	4.5	32.5	4.1	
79	44	2	2	10:28	5758	45	56/55	54/67	64/63	42/63	59/69		59.3	17.4	4.3	31.1	4.0	
79	59	1	3	10:33	5828	58	48/63	74/80	79/82	78/11.5	76/10.7		80.3	19.3	4.5	32.5	4.1	
79	61	2	3	10:35	5872	61	55/64	54/62	79/59	52/60	64/75		61.5	17.5	4.3	31.1	4.0	
78.5	29	1	4	10:37	5900	29	52/58	77/81	81/76	86/12.0	75/11.0		81.5	19.2	4.5	32.4	4.2	
78.5	29	2	4	10:40	5937	28	53/60	49/64	62/58	38/65	65/72		59.2	17.3	4.3	31.1	4.0	
77.5	46	1	5	10:42	5974	45	51/56	76/82	79/85	72/11.1	76/11.8		79.9	19.3	4.5	32.5	4.1	
77.5	45	2	5	10:43	5985	45	62/65	48/58	67/61	53/65	49/74		60.3	17.5	4.3	31.1	4.0	
77.5	58	1	6	10:47	6053	58	48/58	80/79	78/74	74/10.3	77/10.6		77.8	19.2	4.5	32.4	4.1	
77.5	59	2	6	10:49	6082	60	79/70	69/68	71/62	54/49	68/68		64.1	17.5	4.3	31.1	4.0	

Recorded by MARK Z

Checked by

Sheet 21	* STATE_CODE
LTPP Traffic Data	*SPS PROJECT_ID
WIM System Test Truck Records 1 of 1	* DATE 9 / 24 / 08

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
76.5	48	1	1	10:58	6201	49	52/60	82/80	88/75	74/11.9	75/11.7		82.2	19.2	4.5	32.4	4.1	
76.5	51	2	1	10:59	6233	51	63/62	53/61	65/60	51/68	62/73		61.9	17.5	4.3	31.1	4.0	
77.5	54	1	2	11:02	6270	53	46/61	87/85	80/78	74/11.3	78/11.8		82.0	19.3	4.5	32.5	4.1	
77.5	56	2	2	11:04	6304	56	70/64	60/68	74/68	55/59	64/69		65.1	17.4	4.3	31.1	4.0	
77.5	58	1	3	11:07	6355	58	59/57	81/84	86/81	70/11.4	69/11.2		80.2	19.2	4.5	32.5	4.1	
77.5	60	2	3	11:09	6377	61	78/76	64/67	72/62	49/55	77/52	WIM	65.3 68.6	17.4	4.3	31.1	4.0	
78.5	48	1	4	11:11	6407	50	51/58	82/84	86/84	66/12.1	75/11.3		82.0	19.3	4.5	32.5	4.1	
78.5	49	2	4	11:14	6456	51	70/66	66/70	76/72	56/62	72/67		67.7	17.4	4.3	31.1	4.0	
78.5	54	1	5	11:17	6500	54	50/56	85/84	88/79	69/11.2	72/12.0		81.7	19.3	4.5	32.5	4.1	
78.5	56	2	5	11:17	6508	56	57/65	63/60	65/57	51/57	66/70		61.0	17.4	4.3	31.1	4.0	
78	58	1	6	11:22	6595	59	55/55	79/88	84/84	66/10.8	69/11.2		79.8	19.2	4.5	32.5	4.1	
78	60	2	6	11:24	6620	60	67/69	59/68	69/57	45/51	75/65		62.4	17.4	4.3	31.1	4.0	

Recorded by MARK Z

Checked by

Sheet 21	* STATE_CODE
LTPP Traffic Data	*SPS PROJECT_ID
WIM System Test Truck Records 1 of 1	* DATE 9/24/08

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
78	49	1	#1	11:36	6823	49	46/55	81/76	84/74	74/11.8	69/11.0		78.7	19.2	4.5	32.4	4.1	
78	49	2	#1	11:38	6869	51	72/73	59/68	71/58	52/57	61/63		63.4	17.5	4.3	31.1	4.0	
79	53	1	#2	11:40	6897	53	46/57	81/80	81/82	72/10.6	73/10.8		78.5	19.3	4.5	32.5	4.1	
79	55	2	#2	11:43	6949	56	70/71	65/64	70/62	61/56	61/67		64.6	17.4	4.3	31.1	4.0	
80.5	58	1	#3	11:45	6972	59	51/54	74/80	77/85	65/11.1	66/10.9		77.3	19.3	4.5	32.5	4.1	
80.5	60	2	#3	11:49	7042	60	69/64	63/70	75/62	65/61	69/72		67.1	17.4	4.3	31.0	4.0	
82	49	1	#4	11:50	7060	49	51/55	77/71	80/76	63/10.1	66/10.8		74.5	19.3	4.5	32.5	4.1	
82	50	2	#4	11:53	7103	50	67/62	56/63	66/60	53/54	54/61		59.7	17.4	4.3	31.1	4.0	
84.5	53	1	#5	11:54	7112	54	49/53	76/83	84/76	70/11.6	68/11.3		78.8	19.3	4.5	32.5	4.1	
84.5	53	2	#5	11:56	7139	55	63/70	58/63	70/62	54/60	57/65		62.2	17.4	4.3	31.1	4.0	
85.5	59	1	#6	11:58	7184	59	51/50	75/78	79/81	66/10.5	66/10.6		75.6	19.2	4.5	32.5	4.1	
85.5	59	2	#6	12:02	7247	61	69/75	58/65	69/58	50/57	56/61		61.9	17.5	4.3	31.1	4.0	

Recorded by MARK Z

Checked by

Sheet 21	* STATE_CODE 1 2
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
WIM System Test Truck Records 1 of 4	* DATE 0 9 / 2 4 / 2 0 0 8

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
82.5	49	1	1	12:16	7439	49	52/58	76/76	79/78	72/10.9	71/11.0		78.0	19.3	4.5	32.5	4.1	
82.5	50	2	1	12:18	7473	51	64/68	58/60	71/57	48/49	61/65		60.3	17.4	4.3	31.1	4.0	
81	53	1	2	12:20	7507	54	46/55	83/81	85/77	67/10.3	68/11.5		78.0	19.3	4.5	32.5	4.1	
81	55	2	2	12:22	7545	55	68/67	60/60	68/59	49/53	43/61		58.7	17.4	4.3	31.1	4.0	
87	59	1	3	12:24	7582	59	52/52	76/78	78/78	67/10.3	67/10.7		75.9	19.3	4.5	32.5	4.1	
87	59	2	3	12:26	7620	60	62/68	58/55	72/54	44/43	69/61		58.3	17.4	4.3	31.1	4.0	
85.5	49	1	4	12:29	7653	49	55/53	82/77	82/76	68/12.2	79/11.3		80.6	19.2	4.5	32.4	4.1	
85.5	50	2	4	12:31	7689	50	65/64	59/67	72/62	60/53	61/64		62.7	17.5	4.3	31.1	4.0	
84.5	53	1	5	12:33	7732	54	52/56	77/81	79/79	62/10.1	65/11.2		76.4	19.3	4.5	32.6	4.1	
84.5	54	2	5	12:36	7789	56	70/68	60/68	80/69	60/56	62/72		66.5	17.5	4.3	31.2	4.0	
89.5	59	1	6	12:38	7809	59	50/56	74/77	76/76	64/88	68/10.0		73.1	19.3	4.5	32.5	4.1	
off scale	58	2	6	12:40	7839	61	51/69	33/53	50/50	15/49	24/51		44.3	17.6	4.3	31.3	4.0	
89.5	61	2	6	12:45	7917	61	79/69	57/72	74/68	52/62	67/60		66.3	17.5	4.3	31.1	4.0	
92	52	1	7	12:55	8066	54	53/52	78/79	80/76	68/10.3	68/11.3		77.1	19.2	4.5	32.4	4.1	
92	55	2	7	12:57	8104	55	74/68	64/67	72/63	59/65	68/75		67.8	17.4	4.3	31.0	4.0	
85.5	59	1	8	12:59	8139	59	47/58	83/80	83/79	73/11.0	69/10.9		79.0	19.2	4.5	32.5	4.1	

Recorded by MARK Z

Checked by _____

Sheet 21	* STATE_CODE 1 2
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
WIM System Test Truck Records 2 of 4	* DATE 0 9 / 2 4 / 2 0 0 8

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
85.5	60	2	8	13:02	8172	61	77/66	59/67	75/70	65/66	67/73		68.5	17.5	4.2	31.1	4.0	
~~84.5~~	50	1	9	13:03	8178	50	47/59	85/82	86/75	67/118	79/11.5		80.3	19.3	4.5	32.5	4.1	
84.5	50	2	9	13:05	8246	50	48/56	58/72	71/67	63/66	56/70		64.6	17.5	4.3	31.1	4.0	
~~86.5~~	54	1	10	13:07	8249	54	53/55	76/78	80/73	58/96	60/103		73.3	19.3	4.5	32.6	4.1	
86.5	56	2	10	13:09	8281	56	53/82	56/70	72/70	62/68	71/75		67.8	17.5	4.3	31.1	4.0	
87	60	1	11	13:12	8325	59	59/54	82/79	81/80	70/108	72/108		78.1	19.2	4.5	32.5	4.1	
87	61	2	11	13:14	8355	60	75/74	61/67	74/68	53/66	77/73		68.8	17.5	4.3	31.2	4.0	
84.5	48	1	12	13:15	8370	50	53/58	84/81	84/74	73/11.5	73/10.9		80.4	19.3	4.6	32.5	4.1	
84.5	50	2	12	13:17	8395	50	81/66	65/74	75/70	51/50	68/71		67.0	17.4	4.3	31.1	4.0	
84	~~53~~	1	13	13:21	8483	~~54~~	50/54	74/74	76/73	61/10.8	67/98		73.4	19.3	4.5	32.5	4.1	
84	~~55~~	2	13	13:22	8489	~~55~~	72/67	67/65	71/73	68/55	73/72		68.2	17.4	4.3	31.0	4.0	
84	59	1	14	13:25	8546	59	52/56	74/77	73/77	63/10.7	64/10.4		74.7	19.3	4.5	32.5	4.1	
84	59	2	14	13:27	8598	60	70/60	62/75	76/65	56/69	65/66		67.0	17.4	4.3	31.1	4.0	
83	~	1	15	~	~	~	~	~	~	~	~	~	~	~	~	~	~	
83	50	2	15	13:50	8963	51	62/60	58/71	76/64	53/65	72/73		66.2	17.4	4.3	31.1	4.0	
81	54	1	16 15	13:51	8979	54	48/60	79/79	83/76	76/110	74/110		79.3	19.3	4.5	32.6	4.1	

Recorded by MARK Z Checked by

Sheet 21	* STATE_CODE	1 2
LTPP Traffic Data	*SPS PROJECT_ID	0 5 0 0
WIM System Test Truck Records 3 of 4	* DATE	0 9 / 2 4 / 2 0 0 8

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
81	55	2	16	13:54	9034	55	73/64	61/66	78/72	63/71	68/76		69.2	17.4	4.2	31.1	4.0	
84	59	1	17	13:56	9054	59	46/57	83/75	87/79	69/11.2	75/11.3		79.5	19.3	4.5	32.5	4.1	
84	59	2	17	13:59	9122	60	76/64	63/72	73/68	57/65	75/79		69.2	17.4	4.3	31.0	4.0	
89.5	48	1	18	14:00	9133	48	52/55	85/77	79/75	68/11.2	73/10.8		78.3	19.2	4.5	32.4	4.1	
89.5	49	2	18	14:03	9183	50	67/76	60/71	73/68	59/64	72/73		68.5	17.5	4.3	31.1	4.0	
91.5	54	1	19	14:04	9198	54	49/59	78/80	81/80	76/11.3	73/11.4		80.3	19.3	4.5	32.5	4.1	
91.5	55	2	19	14:07	9239	57	75/68	65/68	75/70	55/66	63/68		67.5	17.4	4.3	31.0	4.0	
92	59	1	19	14:08	9274	59	51/58	73/74	77/75	61/10.9	58/10.7		74.3	19.3	4.5	32.5	4.1	
92	60	2	20	14:13	9349	61	69/65	63/70	75/70	50/70	65/72		67.0	17.4	4.3	31.1	4.0	
84.5	49	1	20	14:14	9365	50	51/60	86/81	84/73	74/11.4	74/11.5		81.2	19.2	4.5	32.4	4.1	
84.5	49	2	21	14:20	9478	49	69/62	61/70	74/65	52/67	72/70		66.3	17.5	4.3	31.1	4.0	
81	53	1	21	14:20	9483	54	51/51	78/81	81/78	69/11.1	6.2/10.9		77.2	19.2	4.5	32.4	4.1	
81	55	2	22	14:24	9554	56	74/68	64/72	74/69	59/66	68/76		68.7	17.4	4.3	31.1	4.0	
81	59	1	22	14:25	9569	59	54/54	70/78	77/81	64/11.6	63/10.8		76.5	19.3	4.5	32.5	4.1	
81	57	2	23	14:28	9624	59	68/70	64/71	76/67	63/61	69/66		67.3	17.4	4.3	31.1	4.0	
88	50	1	23	14:46	9737	49	50/50	78/80	82/73	68/10.6	74/10.5		76.5	19.2	4.5	32.4	4.1	

Recorded by MARK Z

Checked by

Sheet 21	* STATE_CODE
LTPP Traffic Data	*SPS PROJECT_ID
WIM System Test Truck Records 4 of 4	* DATE 9/24/08

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
88	50	2	24	14:47	9943	51	29/63	61/74	71/68	62/70	70/76		69.3	17.4	4.3	31.1	4.0	
90	53	1	25 24	14:51	10020	54	57/55	71/74	75/70	59/104	62/104		72.5	19.3	4.5	32.5	4.1	
90	56	2	25	14:51	10025	56	67/70	64/70	73/66	58/69	65/75		67.5	17.5	4.3	31.1	4.0	
88.5	60	1	26 25	14:55	10113	59	58/52	78/82	80/78	65/111	67/110		78.1	19.3	4.5	32.5	4.0	
88.5	59	2	26	14:57	10143	61	69/68	59/72	75/63	57/66	75/72		67.0	17.4	4.3	31.0	4.0	

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64200 20022 SPSWIM_TO 22_12_2.111_0309 Sheet_21.doc

POST WIL

Calibration Worksheet Site: 120500

Calibration Iteration 1 Date 9/23/08

Beginning factors:

Speed Point (mph)	Name	Value
Overall	Sensitivity	810
Front Axle	front axle corr-factor	1000
1 – (30)	speed point 1	1020
2 – (45)	2	1030
3 – (60)	3	1030
4 – ( )	sens piezo 1	1065
5 – ( )	sens piezo 2	1000

Errors:

	Speed Point 1	Speed Point 2	Speed Point 3	Speed Point 4	Speed Point 5
F/A	-19.7	-14.6	-16.5		
Tandem	-25.8	-19.3	-24.1		
GVW	-24.8	-18.5	-27.7		

Adjustments:

	Raise	Lower	Percentage
Overall	☒	☐	28.8 %
Front Axle	☐	☒	-4.7 %
Speed Point 1	☒	☐	2.9 %
Speed Point 2	☐	☒	-3.4 %
Speed Point 3	☒	☐	0.8 %
Speed Point 4	☐	☐	
Speed Point 5	☐	☐	

End factors:

Speed Point (mph)	Name	Value
Overall	Sensitivity	1052
Front Axle	front axle corr-factor	953
1 – (30)	speed point 1	1049
2 – (45)	2	1043
3 – (60)	3	1038
4 – ( )	sens piezo 1	1065
5 – ( )	2	1000

Calibration Worksheet

Site: 120500

Calibration Iteration 2 Date 9/24/08

Beginning factors:

Speed Point (mph)	Name	Value
Overall		
Front Axle	NO CHANGE TO FACTORS	
1 – ( )		
2 – ( )	CHANGED TEST TRUCK RUN SPEEDS	
3 – ( )	FROM 30, 45, 60 TO 50, 55, 60	
4 – ( )		
5 – ( )		

Errors:

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

Adjustments:

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

End factors:

Speed Point (mph)	Name	Value
Overall		
Front Axle		
1 – ( )		
2 – ( )		
3 – ( )		
4 – ( )		
5 – ( )		

Calibration Worksheet

Site: 120500

Calibration Iteration 3 Date 9/24

Beginning factors:

Speed Point (mph)	Name	Value
Overall	sensitivity	1052
Front Axle	front axle corr-factor	958
1 – (50)	speed point 1	1049
2 – (55)	2	1043
3 – (60)	3	1038
4 – ( )		
5 – ( )		

Errors: 50 55 60

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

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☒	-3.4
Front Axle	☐	☐	
Speed Point 1	☐	☒	-0.8
Speed Point 2	☒	☐	0.7
Speed Point 3	☒	☐	0.1
Speed Point 4	☐	☐	
Speed Point 5	☐	☐	

End factors:

Speed Point (mph)	Name	Value
Overall	sensitivity	1018
Front Axle		
1 – (50)	speed point 1	1049
2 – (55)	2	1050
3 – (60)	3	1039
4 – ( )		
5 – ( )		

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

09/23/2008

STATE: Florida

SHRP ID: 0500

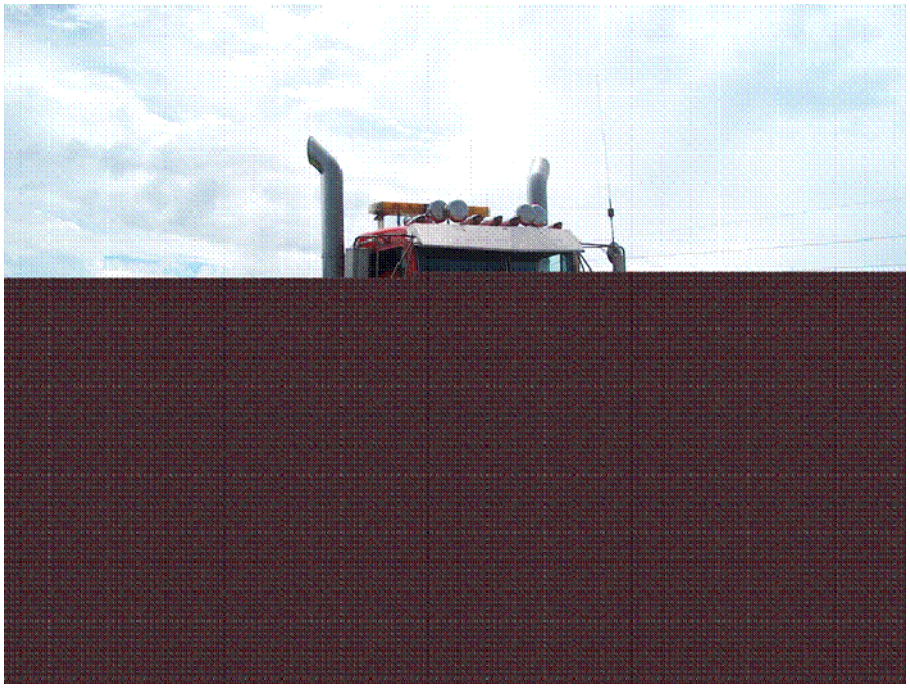

Photo 1 - 120500_Truck_1_Tractor_09_23_08.jpg

Photo 2 - 120500_Truck_1_Trailer_09_23_08.jpg

Photo 3 - 120500_Truck_1_Suspension_1_09_23_08.jpg

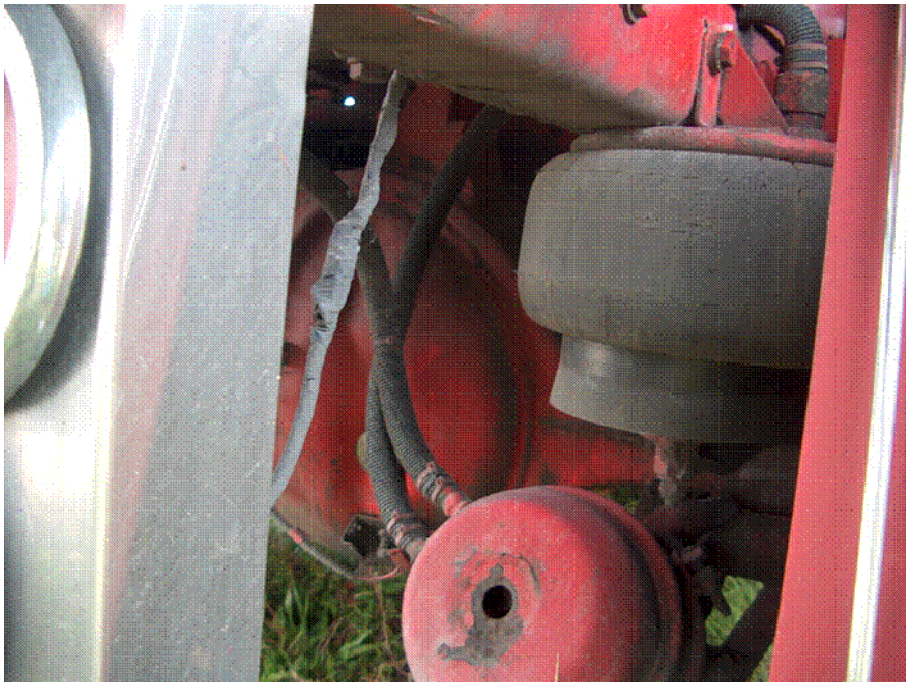

Photo 4 - 120500_Truck_1_Suspension_2_09_23_08.jpg

Photo 5 - 120500_Truck_1_Suspension_3_09_23_08.jpg

Photo 6 - 120500_Truck_2_Tractor_09_23_08.jpg

Photo 7 - 120500_Truck_2_Trailer_09_23_08.jpg

Photo 8 - 120500_Truck_2_Suspension_1_09_23_08.jpg

Photo 9 - 120500_Truck_2_Suspension_2_09_23_08.jpg

Photo 10 - 120500_Truck_2_Suspension_3_09_23_08.jpg

No. of axles: 2

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

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

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

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

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

No. of axles: 3

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

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

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

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

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

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

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

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

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

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

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

No. of axles: 5

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

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

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

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

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

No. of axles: 6

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

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

No. of axles: 7

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

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

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

No. of axles: 8

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

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

No. of axles: 9

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

System Operating Parameters

Florida SPS-5 (Lane 4)

Validation Visit	24 September 2008	23 September 2008	23 May 2007
Calibration factors for Lane 4			
Overall Sensitivity	1018	830	900
Front Axle Correction Factor	953	1000	1000
Sensitivity Piezo 1	1065	1065	1065
Sensitivity Piezo 2	1000	1000	1000
Speed Correction Factor 1	1041	1020	1040
Speed Correction Factor 2	1050	1080	1080
Speed Correction Factor 3	1039	1030	1030