Validation Report

Lousiana, SPS-1
Task Order 16, CLIN 2
March 5, 2008

List of Tables

List of Figures

1 Executive Summary

A visit was made to the Lousiana 0100 on March 5, 2008 for the purposes of conducting a validation of the WIM system located on US 171, approximately 8 miles north of Lake Charles. The SPS-1 is located in the righthand, northbound lane of a four-lane divided facility. The posted speed limit at this location is 65 mph. The LTPP lane is the only lane that is instrumented at this site. This lane is designated Lane 1 in the controller. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This site is located approximately 0.5 miles north of the original site. The current site was installed under the Phase II contract. This is the first validation visit to this location. The site was installed Dec 11 to 13, 2007 by International Road Dynamics Inc..

This site demonstrates the ability to produce research quality loading data under the observed conditions. The classification algorithm does is currently not providing research quality classification information.

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

The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 69,590 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 3 tapered steel leaf suspension loaded to 55,120 lbs., the "partial" truck.

In our original request for quotation to our truck supplier we had requested the first truck (golden truck) to be loaded to between 74,000 and 78,000 pounds and the second truck to be loaded at approximately 65,000 pounds. Actual weights on the trucks did not meet those expectations.

The validation speeds ranged from 53 to 65 miles per hour. The pavement temperatures ranged from 76 to 98 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was not achieved.

Table 1-1 Post-Validation results – 220100 – 05-Mar-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-0.2 ± 4.2%	Pass
Tandem axles	±15 percent	0.8 ± 7.4%	Pass
GVW	±10 percent	0.6 ± 4.0%	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

Prepared: djw *Checked: bko*

The pavement condition was appeared to be satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area.

We are not aware of any profile data that has been collected at the site since the installation of the scales. When profile data becomes available WIMIndex values will be computed and an amended report submitted.

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%	98.8%	Pass
GVW	± 10%	100%	Pass

Prepared: djw *Checked: bko*

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

2 Corrective Actions Recommended

No corrective actions are required at this site at this time.

Investigation of the reporting for the capture file which is thought to be the source of the extra axles on the test vehicle should occur.

3 Post Calibration Analysis

This final analysis is based on test runs conducted March 5, 2008 during the afternoon hours at test site 220100 on US 171. This SPS-1 site is at milepost 8.4 on the northbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for the validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and air suspension loaded to 69,590 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 3 tapered steel leaf suspension loaded to 55,120 lbs., the "partial" truck.

Each truck made a total of 21 passes over the WIM scale at speeds ranging from approximately 53 to 65 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 76 to 98 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

As shown in Table 3-1, this site passed all of the performance criteria for weight and spacing.

Table 3-1 Post-Validation Results – 220100 – 05-Mar-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-0.2 ± 4.2%	Pass
Tandem axles	±15 percent	0.8 ± 7.4%	Pass
GVW	±10 percent	0.6 ± 4.0%	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

Prepared: djw *Checked: bko*

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

temperature combinations was not achieved for this set of validation runs as there is an uneven distribution of runs at the low and high end of the temperature range.

The three speed groups were divided as follows: Low speed – 53 to 57 mph, Medium speed – 58 to 61 mph and High speed – 62 + mph. The three temperature groups were created by splitting the runs between those at 76 to 82 degrees Fahrenheit for Low temperature, 83 to 89 degrees Fahrenheit for Medium temperature and 90 to 98 degrees Fahrenheit for High temperature.

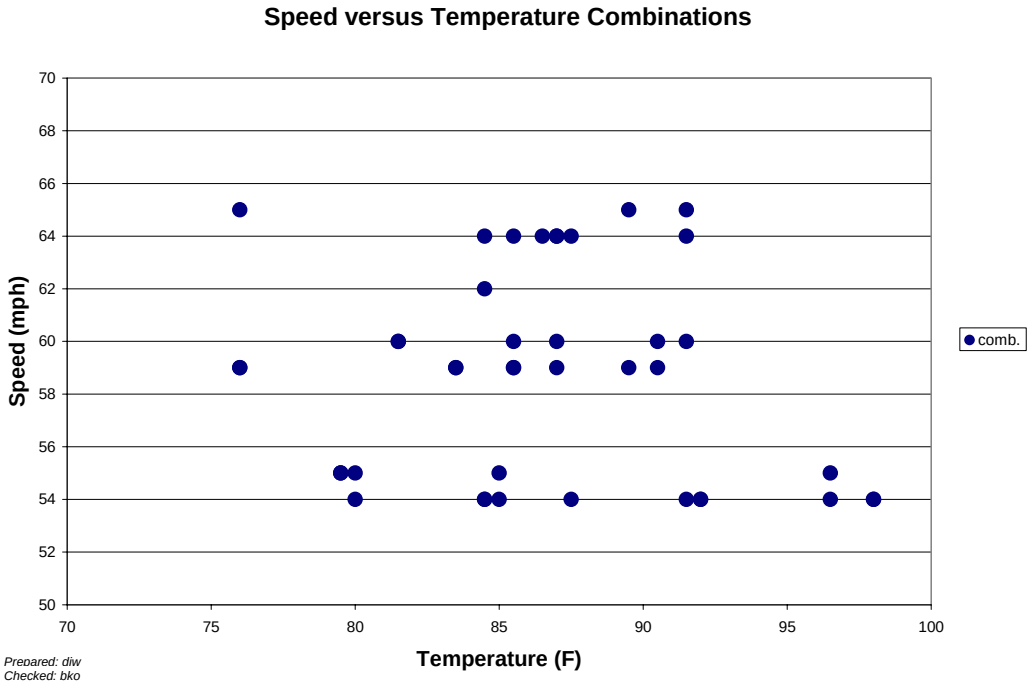

Figure 3-1 Post-Validation Speed-Temperature Distribution – 220100 – 05-Mar-2008

One test run was omitted from the 42 done after reviewing data using the capture file. The file indicated that the equipment had observed seven axles on a five axle vehicle.

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

Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. From the figure, it appears that the equipment estimates GVW accurately and consistently throughout the entire speed range. Variability in error appears to be lesser at medium speeds when compared with low and high speeds.

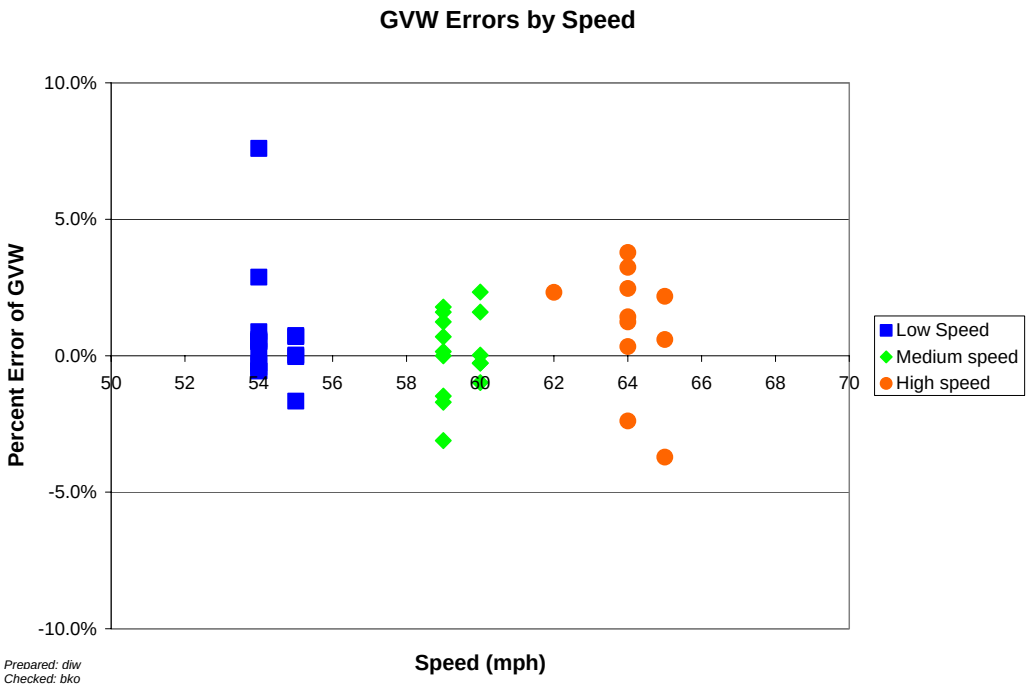

Figure 3-2 Post-validation GVW Percent Error vs. Speed – 220100 – 05-Mar-2008

Figure 3-3 shows the lack of relationship between temperature and GVW percentage error. The increasing scatter with temperature is attributed to speed rather than temperature effects.

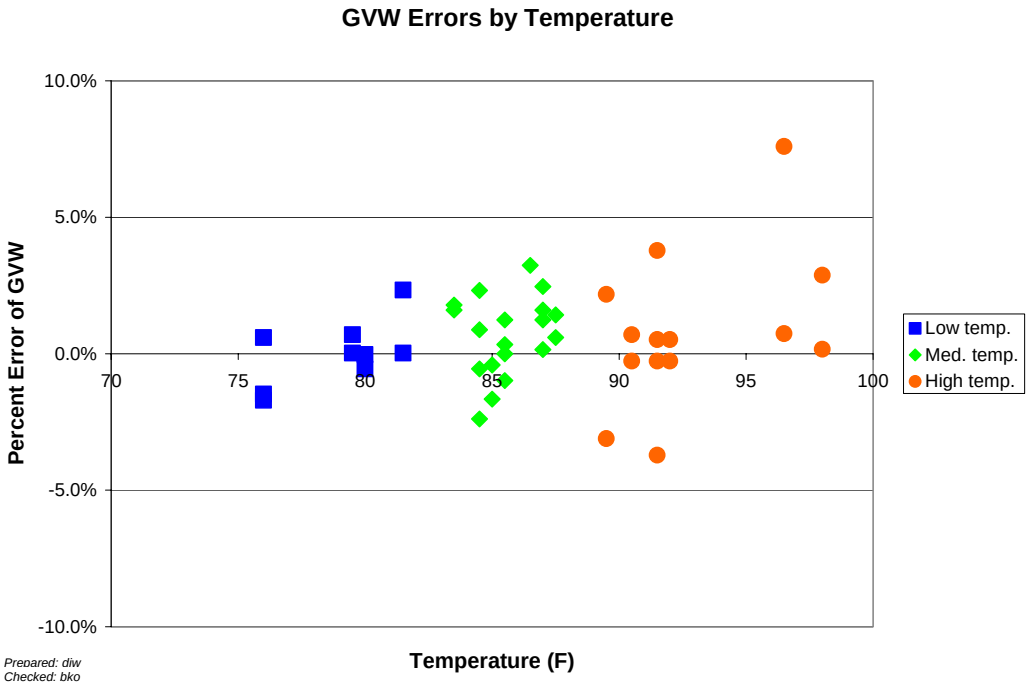

Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 220100 – 05-Mar-2008

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. The graph indicates that the errors in tandem spacings for the test trucks were not affected by changes in speed.

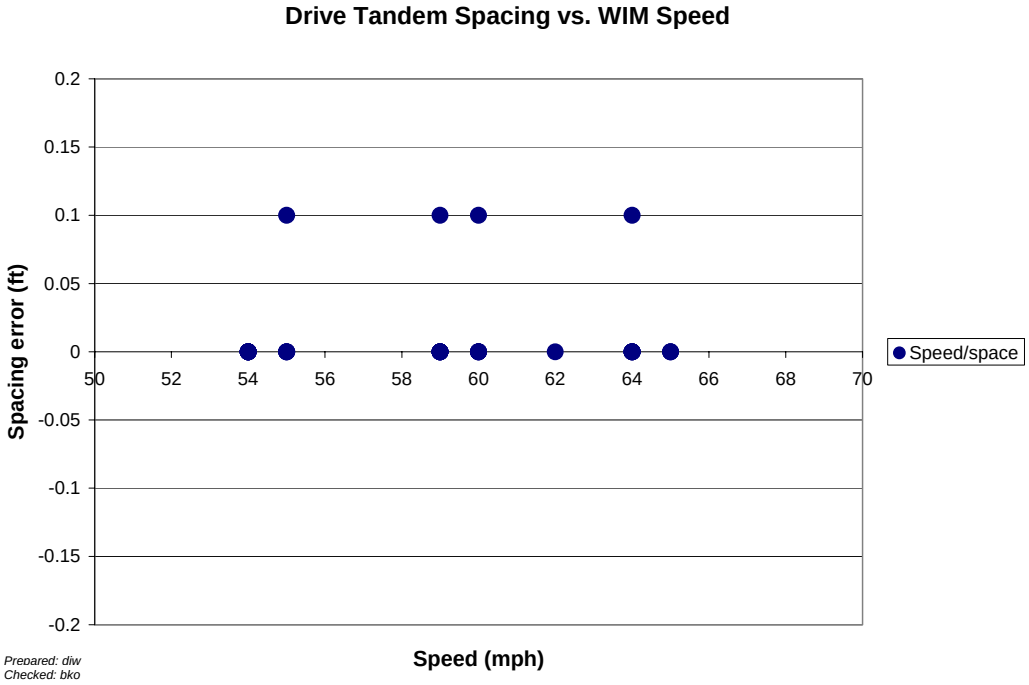

Figure 3-4 Post-Validation Spacing vs. Speed – 220100 – 05-Mar-2008

3.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 76 to 82 degrees Fahrenheit for Low temperature, 83 to 89 degrees Fahrenheit for Medium temperature and 90 to 98 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 220100 – 05-Mar-2008

Element	95% Limit	Low Temperature 76 to 82 °F	Medium Temperature 83 to 89 °F	High Temperature 90 to 98 °F
Steering axles	±20 %	-0.9 ± 3.3%	-0.3 ± 4.7%	0.4 ± 4.6%
Tandem axles	±15 %	0.2 ± 7.6%	1.0 ± 5.7%	0.9 ± 9.8%
GVW	±10 %	0.0 ± 2.8%	0.7 ± 3.1%	0.8 ± 0.6%
Axle spacing	± 0.5 ft	0.0 ± 0.0 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: djw *Checked: bko*

From Table 3-2, it appears that the equipment accurately estimates all weights and spacings at all temperatures. The variability in steering axle error is consistent throughout the temperature range. For GVW error, the variability in error is lower at the higher temperatures and variability in tandem axle error is greater at the higher temperatures.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. From the figure, it appears that mean error for the Golden truck (squares) was not particularly affected by temperature; however, GVW for the partial truck (diamonds)

appears to be overestimated at the highest temperatures in the range. Variability in error for both trucks appears to increase as temperature increases.

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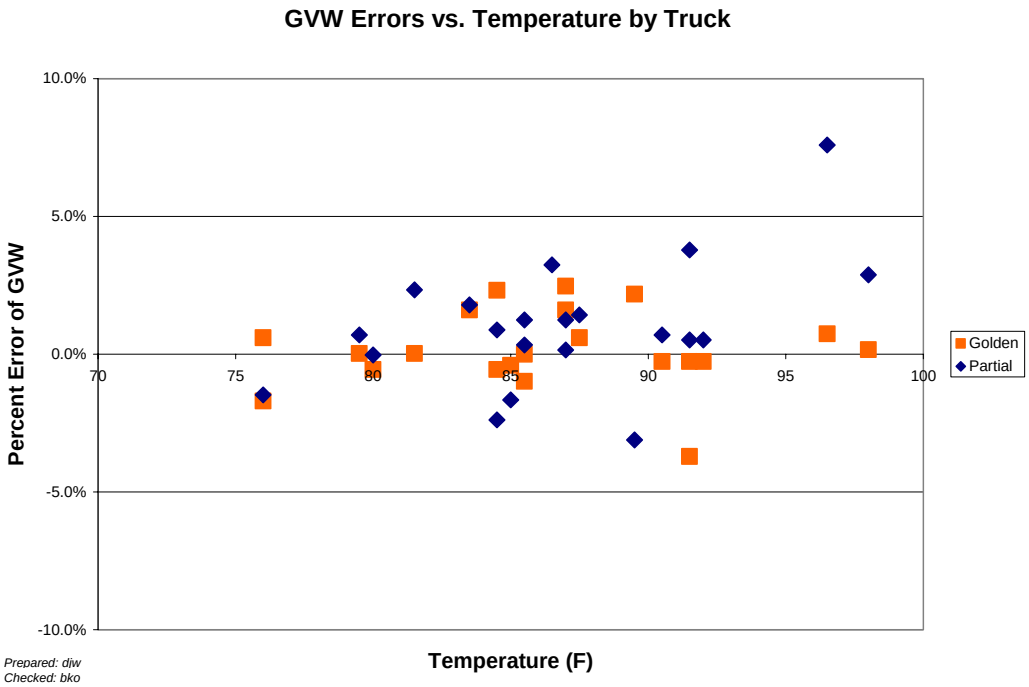

Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 220100 – 05-Mar-2008

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.

From the figure, it can be seen that the estimation of steering axle weights transitions from a slight underestimation at the lower end of the range to a slight overestimation at the higher end.

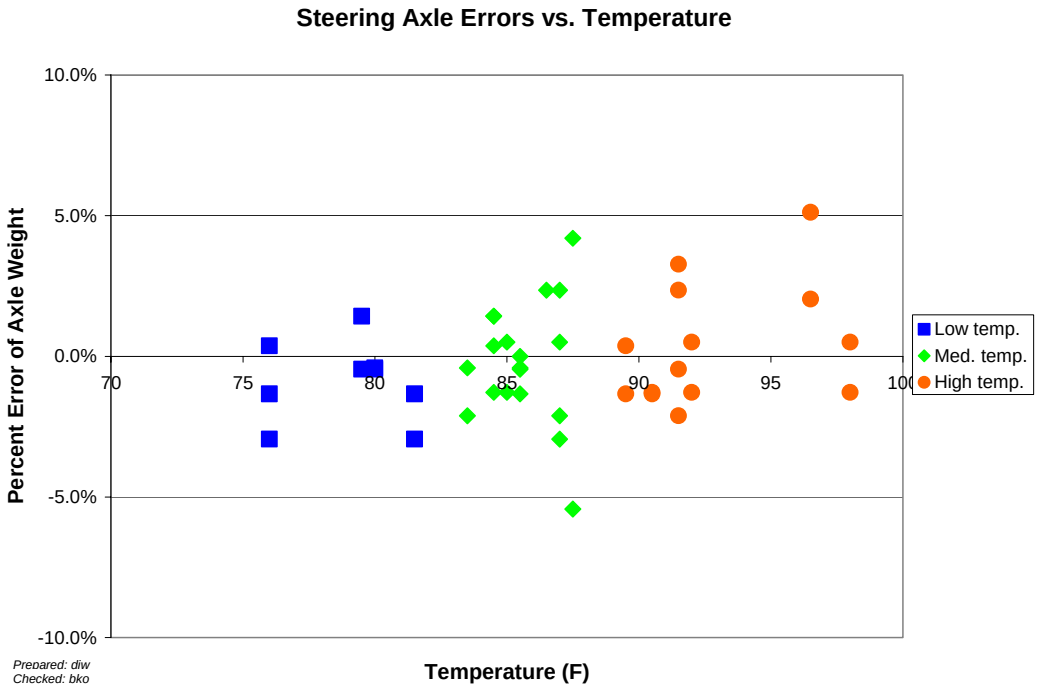

Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 220100 – 05-Mar-2008

3.2 Speed-based Analysis

The three speed groups were divided using 53 to 57 mph for Low speed, 58 to 61 mph for Medium speed and 62+ mph for High speed.

Table 3-3 Post-Validation Results by Speed Bin – 220100 – 05-Mar-2008

Element	95% Limit	Low Speed 53 to 57 mph	Medium Speed 58 to 61 mph	High Speed 62+ mph
Steering axles	±20 %	0.2 ± 4.8%	-1.5 ± 2.3%	0.8 ± 4.6%
Tandem axles	±15 %	0.8 ± 8.6%	0.5 ± 5.9%	1.2 ± 8.4%
GVW	±10 %	0.7 ± 4.4%	0.1 ± 3.4%	1.0 ± 5.1%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: djw *Checked: bko*

From Table 3-3 it can be seen that the equipment estimates all weights and spacings accurately throughout the entire speed range. Variability in steering axle weight appears to be consistent throughout the entire speed range, while the spread in error for GVW and tandem weights is lesser at the medium speeds when compared with the variability at the lower and higher speeds.

Figure 3-7 illustrates the ability of the system to estimate GVW accurately at all speeds for each of the test trucks and for the population as a whole. The variability of error for each truck and for the population as a whole appears to increase as speed increases.

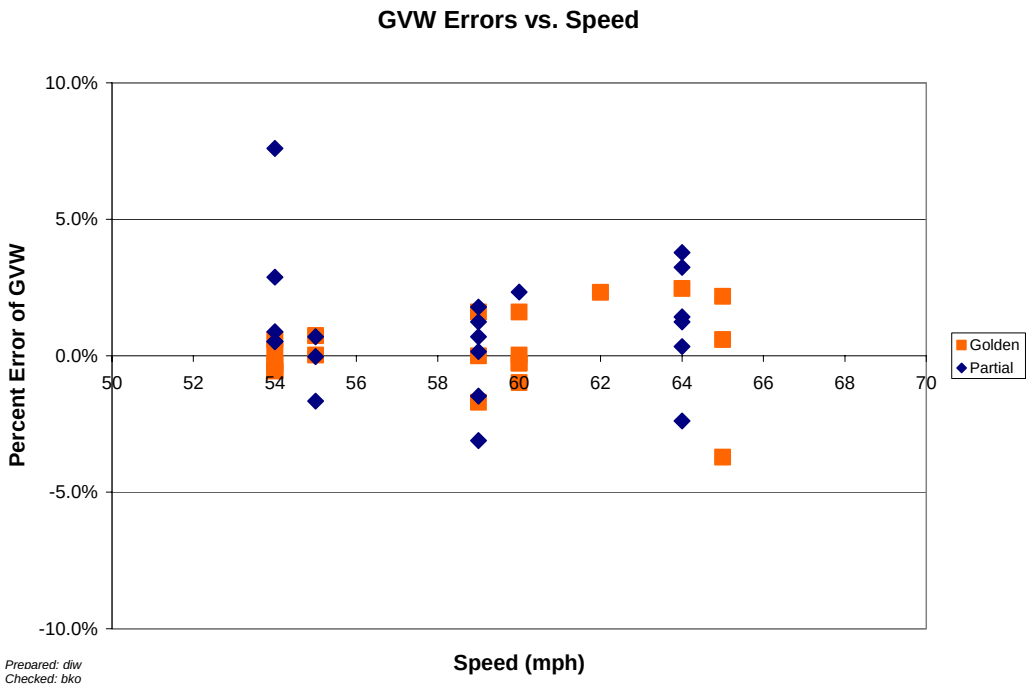

Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 220100 – 05-Mar-2008

Figure 3-8 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From the figure, it appears that the WIM equipment estimates steering axle weights with reasonable accuracy at the low and high speeds, and underestimate at the medium speeds. Variability in steering axle weight error appears to be less at the medium speeds when compared with low and high speeds.

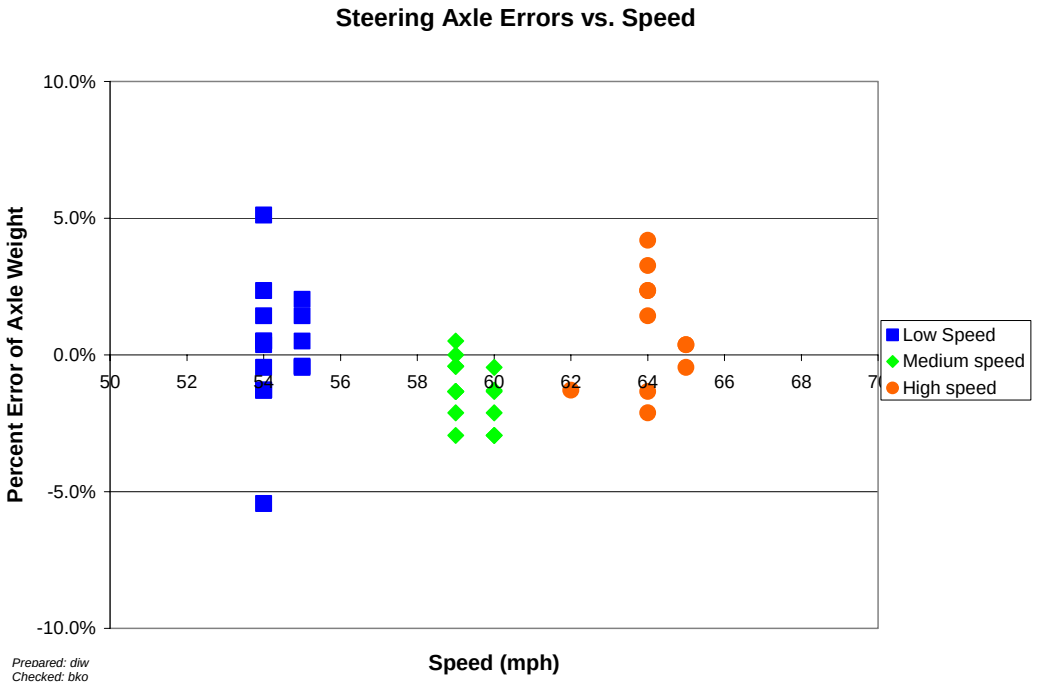

Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group – 220100 – 05-Mar-2008

3.3 Classification Validation

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

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of three hours (78 trucks) was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 percent unknown vehicles and 0 percent unclassified vehicles.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 3-4 has the classification error rates by class. The overall misclassification rate is 9.8 percent.

Table 3-4 Truck Misclassification Percentages for 220100 – 05-Mar-2008

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

Prepared: djw *Checked: bko*

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 220100 – 05-Mar-2008

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	-100	5	14	6	0
7	N/A				
8	0	9	0	10	0
11	N/A	12	N/A	13	N/A

Prepared: djw *Checked: bko*

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. The large mean error rates for Class 4s in Table 3-5 reflect the misclassification of all buses observed, due to shorter axle spacings than expected for this class. Lighter Class 5 vehicles were misclassified as Class 3s on a number of occasions. The other contributing factor to the high percentages and differences were the limited number of vehicles observed, particularly in the classes with identification errors.

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. Since the classification data met research quality standards for all vehicles with the exception of the Class 4 and 5 misclassifications mentioned above, the observed speed bias and variability are thought to be more strongly related to radar speed precision than errors in the WIM equipment.

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%	99%	Pass
GVW	± 10%	100%	Pass

Prepared: djw *Checked: bko*

4 Pavement Discussion

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

4.1 Profile Analysis

We are not aware of any profile data collected since the installation of the scale. When profile data becomes available WIMIndex values will be computed and an amended report submitted.

4.2 Distress Survey and Any Applicable Photos

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

4.3 Vehicle-pavement Interaction Discussion

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

5 Equipment Discussion

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

5.1 Pre-Evaluation Diagnostics

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

5.2 Calibration Process

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

The operating system weight compensation parameters that were in place during the validation and remained afterward are as follows:

	Left Sensors 1/3	Right Sensors 2/4
80 kph	2985	3094
88 kph	3048	3159
96 kph	3016	3127
104 kph	3024	3135
112 kph	3024	3135

5.3 Summary of Traffic Sheet 16s

This site has no validation information for the prior installation. There were no earlier validation visits to this site. Results from the current visit are shown in the tables below. Table 5-1 has the information to be entered in TRF_CALIBRATION_AVC for the current visit.

Table 5-1 Classification Validation History – 220100 – 05-Mar-2008

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
5-Mar-08	Manual	0	0			0.0%
4-Mar-08	Manual	0	-40			0.0%

Prepared: djw *Checked: bko*

Table 5-2 has the information to be entered in TRF_CALIBRATION_WIM for the current visit.

Table 5-2 Weight Validation History – 220100 – 05-Mar-2008

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
5-Mar-08	Test Trucks	0.6 (2.0)	-0.2 (2.1)	0.8 (3.7)
4-Mar-08	Test Trucks	0.4 (1.2)	0.9 (2.0)	0.2 (2.8)

Prepared: djw *Checked: bko*

When both sets of validation runs are made on the same day, the pre-validation runs are assigned to the previous day by convention so that both sets will be in the database.

5.4 Projected Maintenance/Replacement Requirements

This site is scheduled for semi-annual maintenance under the installation contract.

6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted March 5, 2008 during the morning hours at test site 220100 on US 171. This SPS-1 site is at milepost 8.4 on the northbound, 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 69,590 lbs.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 3 tapered steel leaf suspension loaded to 55,120 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 53 to 64 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 72 to 83degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 6-1.

As shown in Table 6-1, this site passed all of the performance criteria for weight and spacing. As a result, it was determined that a calibration of the system was not necessary.

Table 6-1 Pre-Validation Results – 220100 – 05-Mar-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	0.9 ± 4.1%	Pass
Tandem axles	±15 percent	0.2 ± 5.5%	Pass
GVW	±10 percent	0.4 ± 2.4%	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

Prepared: djw *Checked: bko*

The test runs were conducted primarily during the morning hours under sunny and mild temperature weather conditions, resulting in a narrow range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed groups and one temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs.

The three speed groups were divided into 53 to 57 mph for Low speed, 58 to 61 mph for Medium speed and 62+ mph for High speed. The one Medium temperature group was created by combining all runs between 72 to 83 degrees.

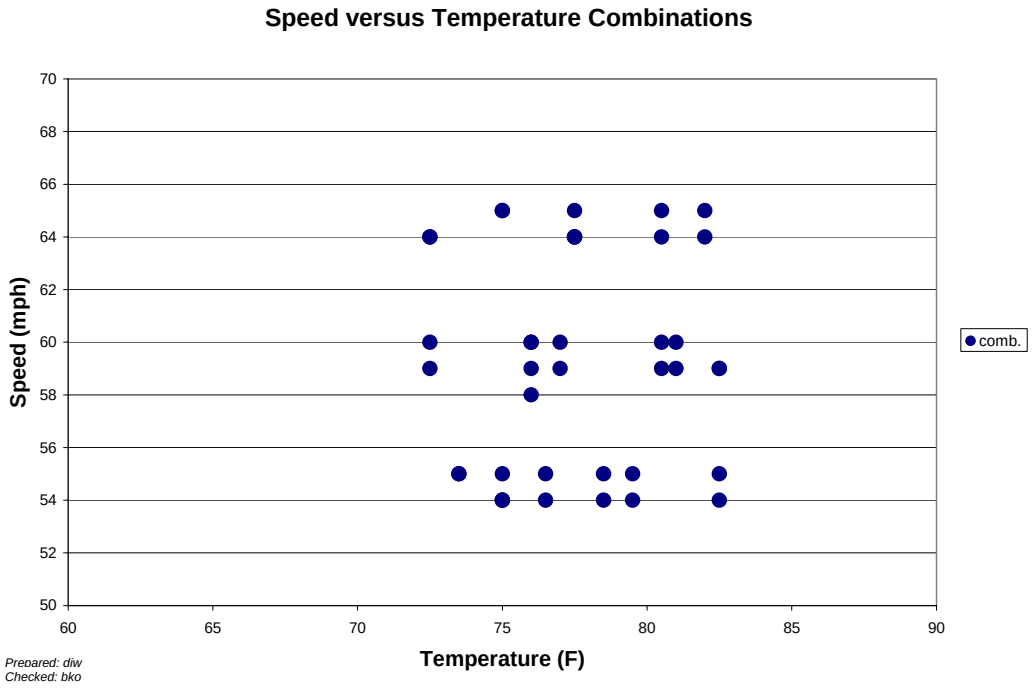

Figure 6-1 Pre-Validation Speed-Temperature Distribution – 220100 – 05-Mar-2008

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 figure illustrates the ability to estimate GVW accurately at all speeds. Variability appears to increase at the higher speeds.

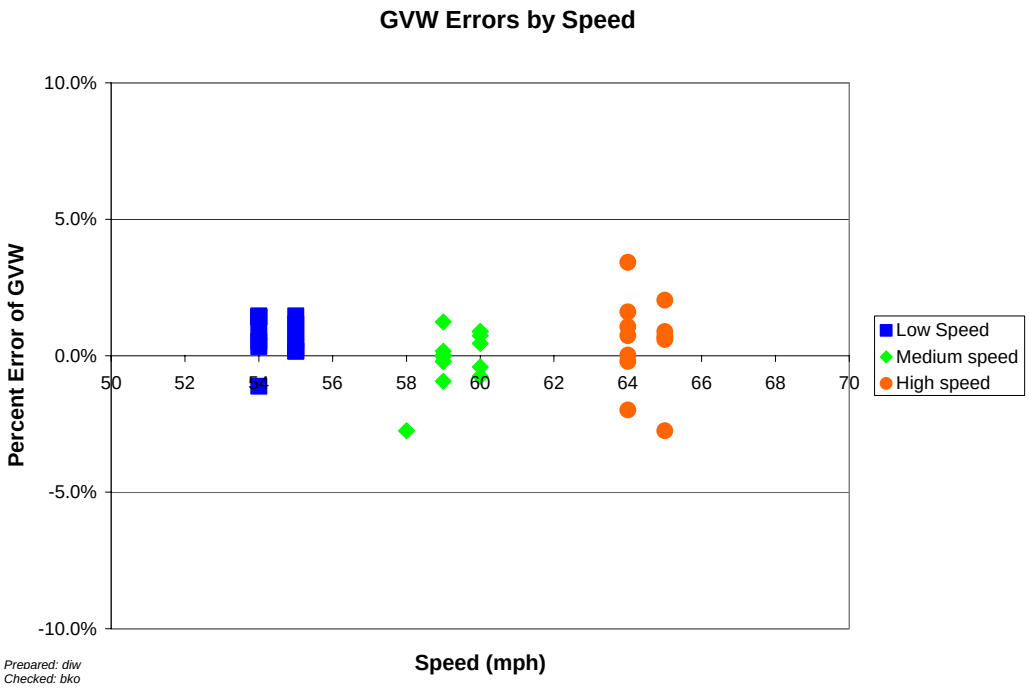

Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 220100 – 05-Mar-2008

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

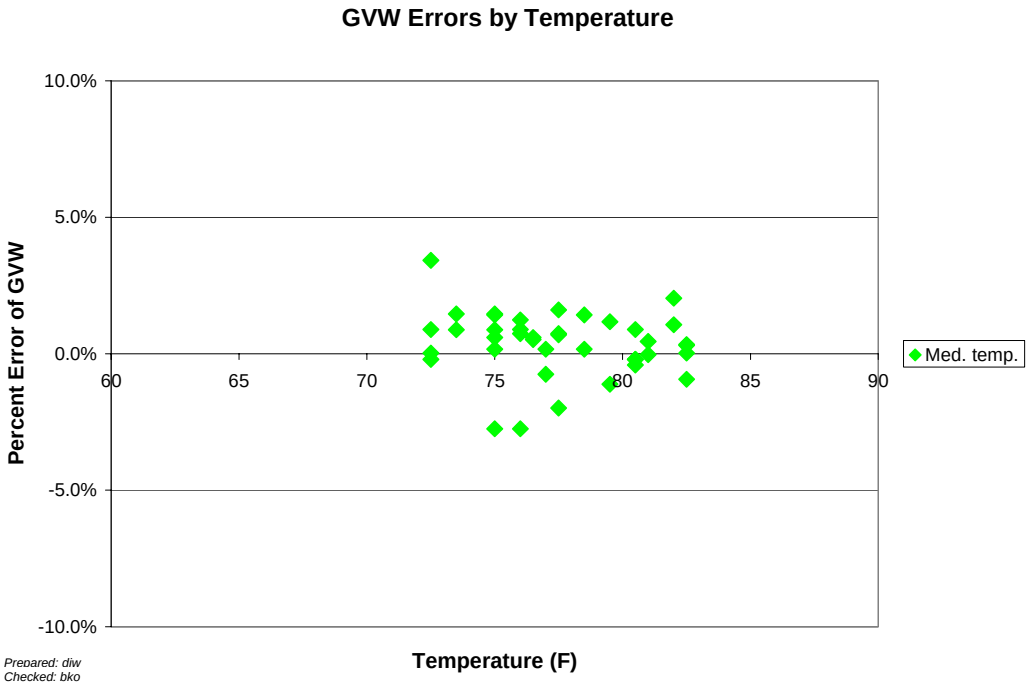

Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 220100 – 05-Mar-2008

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. The graph indicates that the errors in tandem spacings for the test trucks were not affected by changes in speed.

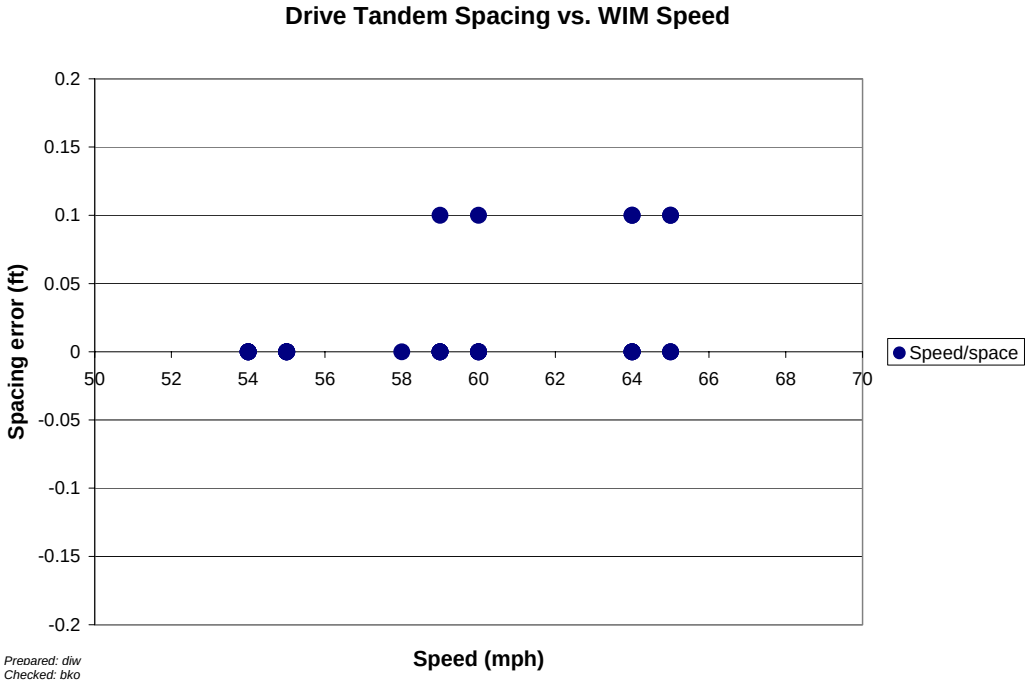

Figure 6-4 Pre-Validation Spacing vs. Speed - 220100 – 05-Mar-2008

6.1 Temperature-based Analysis

The three speed groups were divided into 53 to 57 mph for Low speed, 58 to 61 mph for Medium speed and 62+ mph for High speed. The one Medium temperature group was created by using all runs.

Table 6-2 Pre-Validation Results by Temperature Bin – 220100 – 05-Mar-2008

Element	**95% Limit**	**Medium Temperature 72 to 83 °F**
Steering axles	±20 %	0.9 ± 4.1%
Tandem axles	±15 %	0.2 ± 5.5%
GVW	±10 %	0.4 ± 2.4%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft

From Table 6-2, it appears that the equipment estimates all weights accurately.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck.
The equipment appears to estimate GVW accurately at all temperatures for each truck and for the population as a whole. The variability in error for each truck appears to be similar at all temperatures and appears to be consistent over the observed temperature range for the population as a whole.

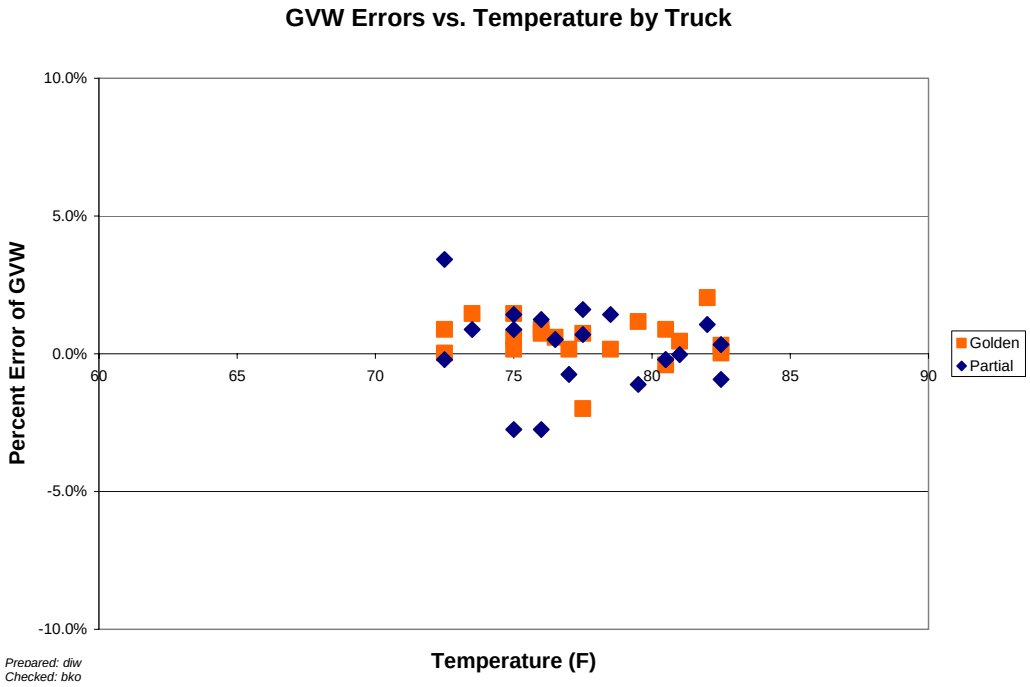

Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 220100 – 05-Mar-2008

Figure 6-6 shows the relationship between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. The figure shows that steering axle weights are consistently overestimated by the equipment over the temperature range.

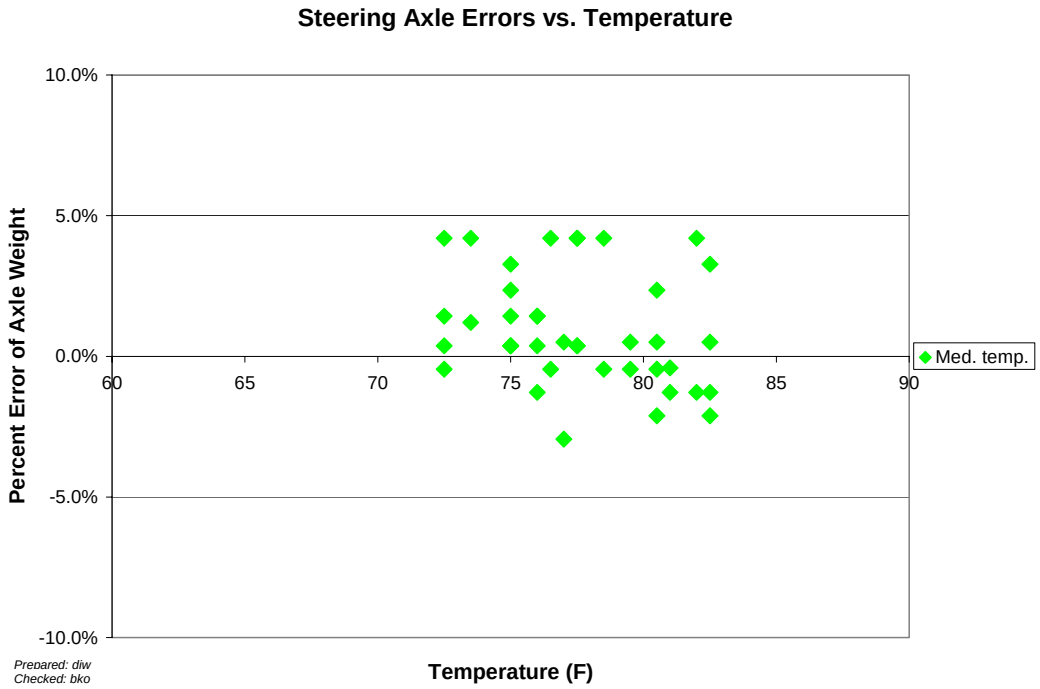

Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group – 220100 – 05-Mar-2008

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 53 to 57 mph, Medium speed – 58 to 61 mph and High speed – 62+ mph.

Table 6-3 Pre-Validation Results by Speed Bin – 220100 – 05-Mar-2008

Element	95% Limit	Low Speed 53 to 57 mph	Medium Speed 58 to 61 mph	High Speed 62+ mph
Steering axles	±20 %	1.5 ± 4.3%	-0.3 ± 3.1%	1.7 ± 4.5%
Tandem axles	±15 %	0.5 ± 5.7%	-0.1 ± 4.7%	0.2 ± 6.9%
GVW	±10 %	0.7 ± 1.5%	-0.1 ± 2.2%	0.5 ± 3.6%
Axle spacing	± 0.5 ft	0.0 ± 0.0 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: djw *Checked: bko*

From Table 6-3, it can be seen that the equipment estimates all weights and spacings accurately. Variability in Tandem and Steering axle error appears to be generally consistent, with slight decreases at the medium speeds, while the scatter in error for GVW tends to increase as speed increases.

Figure 6-7 illustrates the ability of the equipment to estimate GVW for both trucks with reasonable accuracy at all speeds. Variability in error appears to be greater for both trucks at the higher speeds.

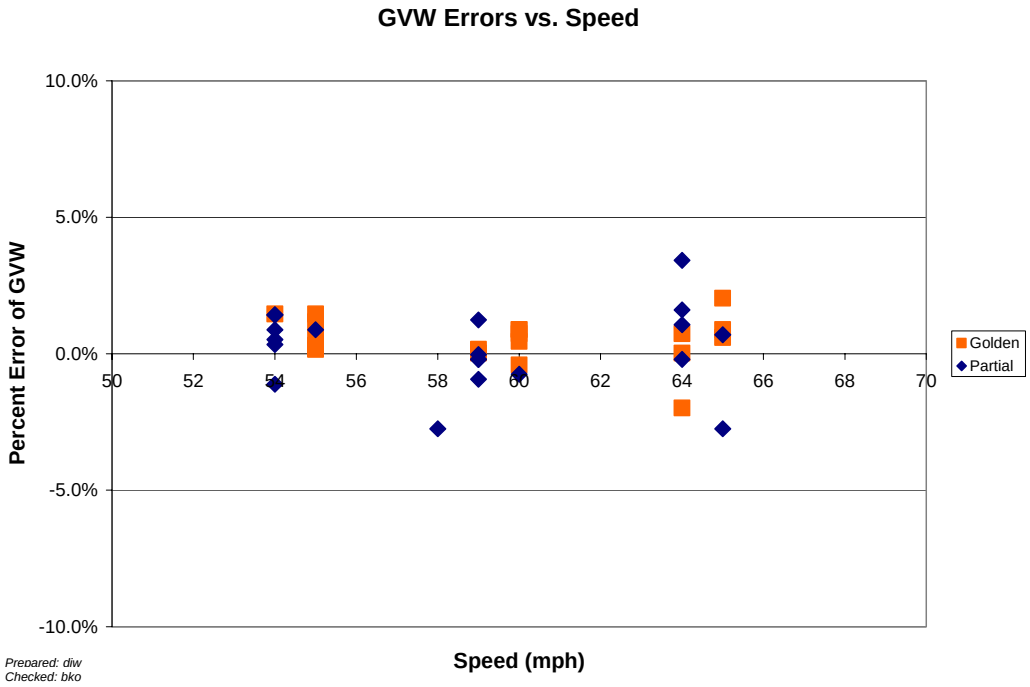

Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 220100 –05-Mar-2008

Figure 6-8 shows the relationship between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. From the figure, it appears that the equipment overestimates steering axle weights at low and high speeds, and underestimates steering axle weights at medium speeds. Variability in error appears to remain fairly constant over the entire speed range.

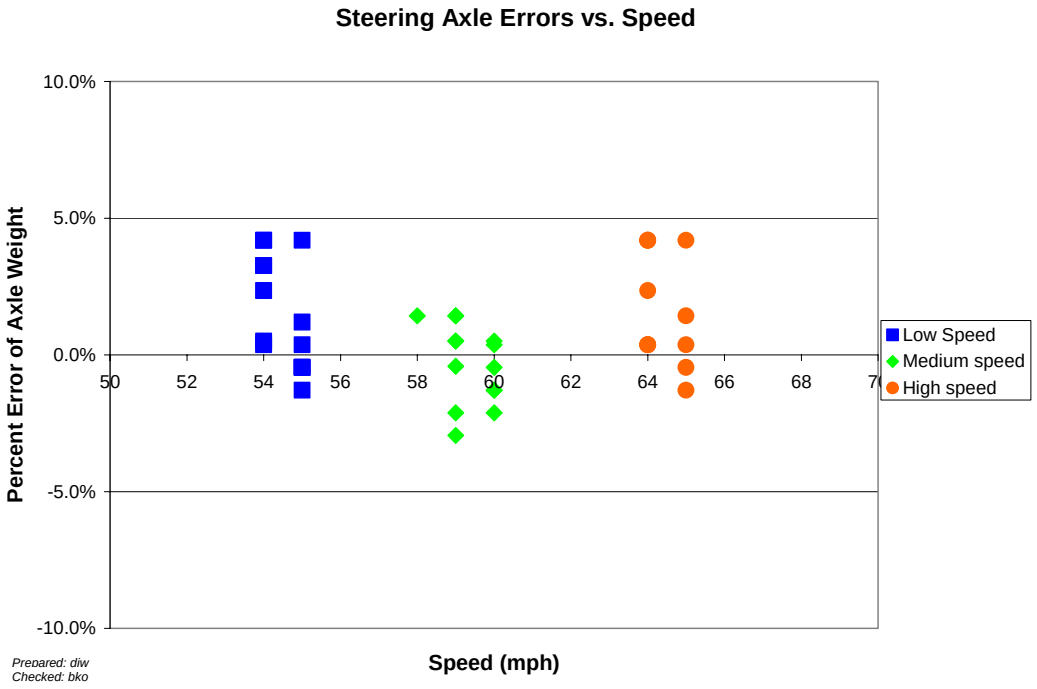

Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 220100 – 05-Mar-2008

6.3 Classification Validation

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

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of three hours (83 trucks) was collected at the site. The classification identification is to identify gross errors in classification, not validate the classification algorithm. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 percent unknown vehicles and 0 percent unclassified vehicles.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 6-4 has the classification error rates by class. The overall misclassification rate is 12.5 percent.

Table 6-4 Truck Misclassification Percentages for 220100 – 05-Mar-2008

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	100	5	29	6	0
7	N/A				
8	40	9	0	10	
11	N/A	12	N/A	13	N/A

Prepared: djw *Checked: bko*

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

Table 6-5 Truck Classification Mean Differences for 220100 – 05-Mar-2008

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	-100	5	25	6	0
7	N/A				
8	- 40	9	0	10	0
11	N/A	12	N/A	13	N/A

Prepared: djw *Checked: bko*

These error rates are normalized to represent how many vehicles of the class are expected to be over- or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown are those identified by the equipment but no vehicles of the type were seen the observer. There is no way to tell how many vehicles of that type might actually exist. N/A means no vehicles of the class were recorded by either the equipment or the observer. The large mean error rates for Class 4s in Table 6-5 reflect the misclassification of all buses due to shorter axle spacings than expected for that class vehicle. Lighter Class 5 vehicles were misclassified as Class 3s on a number of occasions. The high values for errors are attributed in part to small overall sample size and small sample sizes for the affected classes.

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. Since the classification data met research quality standards for all vehicles with the exception of the Class 4 and 5 misclassifications mentioned above, the observed speed bias and variability are thought to be more strongly related to radar speed precision than errors in the WIM equipment.

6.4 Evaluation by ASTM E-1318 Criteria

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

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

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

Prepared: djw *Checked: bko*

7 Data Availability and Quality

As of March 5, 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.

This site is a new installation. No data has been provided for the previous installation. Therefore, there is no historical data for this site and 5 years of data is needed to meet the goal of a minimum of 5 years of research quality data.

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

Class 9s and Class 5s constitute more than 10 percent of the truck population. Based on the data collected at this validation the following are the expected values for these populations. The precise values to be used in data review will need to be determined by the Regional Support Contractor on receipt of the first 14 days of data after the successful validation. For sites that do not meet LTPP precision requirements, this period may still be used as a starting point from which to track scale changes.

Table 7-1 is generated with a column for every vehicle class 4 or higher that represents 10 percent or more of the truck (class 4-20) population. In creating Table 7-1 the following definitions are used:

- Class 9 overweights are defined as the percentage of vehicles greater than 88,000 pounds

- Class 9 underweights are defined as the percentage of vehicles less than 20,000 pounds.
- Class 9 unloaded peak is the bin less than 44,000 pounds with the greatest percentage of trucks.
- Class 9 loaded peak is the bin 60,000 pounds or larger with the greatest percentage of trucks.
- For all other trucks the typical axle configuration is used to determine the maximum allowable weight based on 18,000 pounds for single axles and 34,000 pounds for tandem axles. A ten percent cushion above that maximum is used to set the overweight threshold.
- For all other trucks in the absence of site specific information the computation of under weights assumes the power unit weighs 10,000 pounds and each axle on a trailer 5,000 pounds. Ninety percent of the total for the unloaded configuration is the value below which a truck is considered under weight.
- For all trucks other than class 9s that have a bi-modal distribution the unloaded peak is defined to be in a bin less than or equal to half of the allowable maximum weight.
- For all trucks other than class 9s that have a bi-modal distribution the loaded peak is defined to be in a bin greater than or equal to half of the allowable maximum weight.

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

Table 7-1 GVW Characteristics of Major sub-groups of Trucks – 220100 – 05-Mar-2008

Characteristic	Class 9	Class 5
Percentage Overweights	1.5%	0.0%
Percentage Underweights	0.0%	0.5%
Unloaded Peak	32,000 lbs	
Loaded Peak	80,000 lbs	
Peak		8,000 lbs

Prepared: djw *Checked: bko*

The expected percentage of unclassified vehicles is 1.5%. This is based on the percentage of unclassified vehicles in the post-validation data download.

The graphical screening comparison figures are found in Figure 7-2 through Figure 7-4. These are based on data collected immediately after the validation and may not be wholly representative of the population at the site. They should however provide a sense of the statistics expected when SPS comparison data is computed for the post-validation Sheet 16.

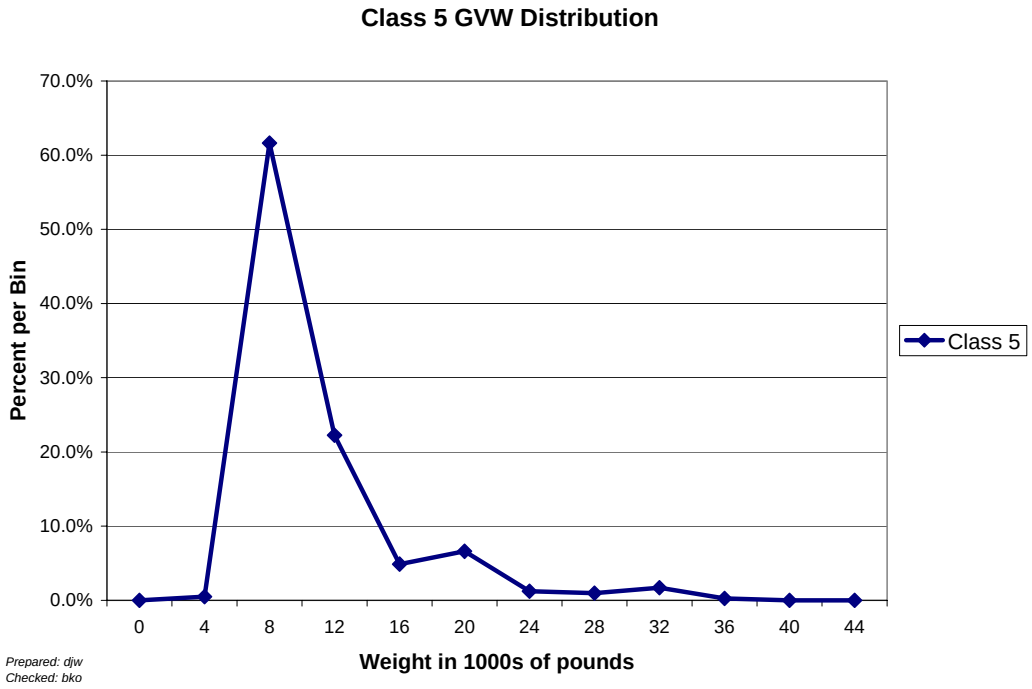

Figure 7-1 Expected GVW Distribution Class 5 – 220100 – 05-Mar-2008

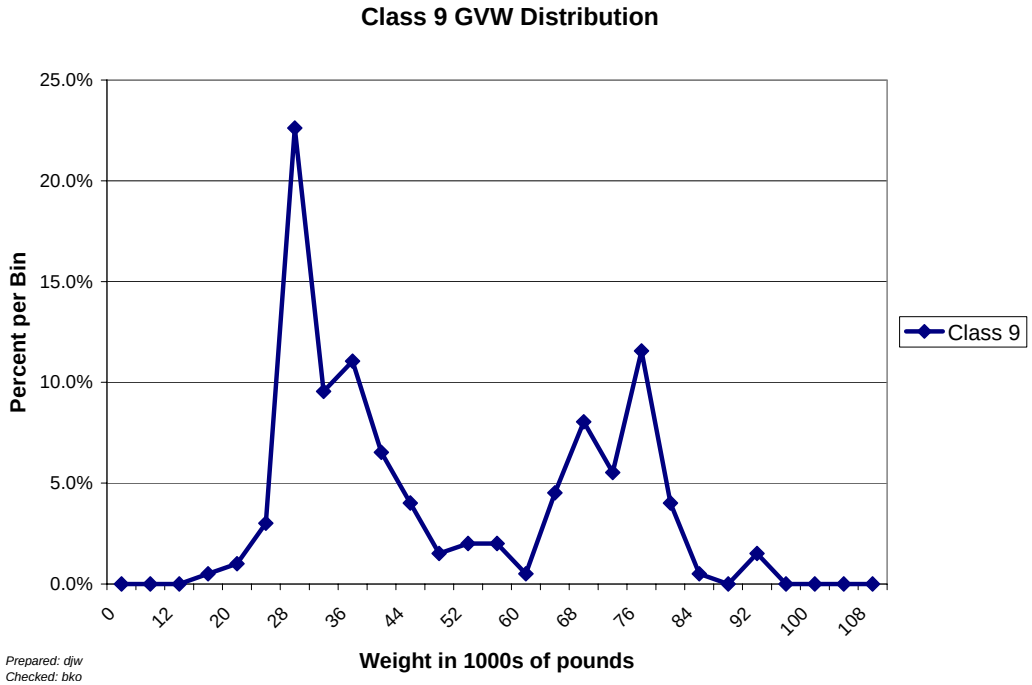

Figure 7-2 Expected GVW Distribution Class 9 – 220100 – 05-Mar-2008

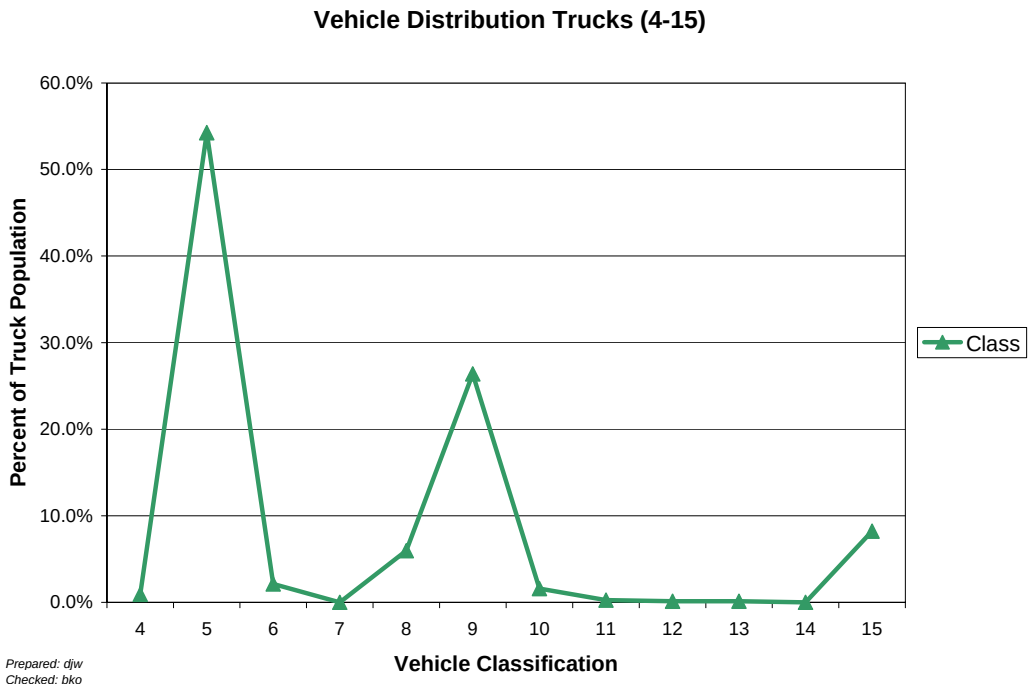

Figure 7-3 Expected Vehicle Distribution – 220100 – 05-Mar-2008

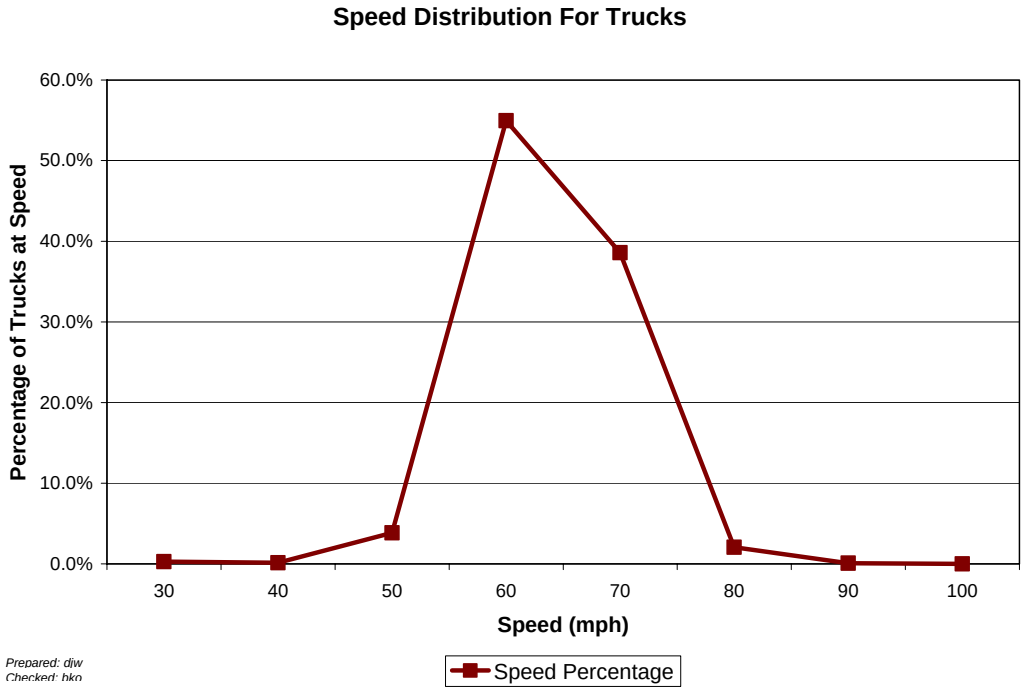

Figure 7-4 Expected Speed Distribution – 220100 – 05-Mar-2008

8 Data Sheets

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

Sheet 19 – Truck 1 – 3S2 loaded air suspension (2 pages)
Sheet 19 – Truck 2 – 3S2 loaded air suspension tractor, spring suspension trailer (2 pages)

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

Sheet 21 – Pre-Validation (3 pages)
Sheet 21 – Post-Validation (4 pages)

Test Truck Photographs (6 pages)

LTPP Mod 3 Classification Scheme (1 page)

Final System Parameters (1 page)

9 Updated Handout Guide and Sheet 17

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

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 FIELD VALIDATION

STATE: Louisiana

SHRP ID: 220100

Figures

Photos

1. General Information

SITE ID: *220100*

LOCATION: *US-171, milepost 8.4, approximately 8 miles north of Lake Charles.*

VISIT DATE: *March 4, 2008*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

Validation Team Leader:

Dean J. Wolf, 301-210-5105, djwolf@mactec.com

Highway Agency:

Kevin J. Gaspard, 225-767-9104, kgaspard@dotd.la.gov

Doc Zhang, 225-767-9162, doczhang@dotd.la.gov

FHWA COTR:

Debbie Walker, 202-493-3068, deborah.walker@fhwa.dot.gov

FHWA Division Office Liaison:

Philip Arena, 225-757-7612, Philip.arena@fhwa.dot.gov

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

3. Agenda

BRIEFING DATE: *No briefing requested for this visit.*

ON SITE PERIOD: *March 4 and 5, 2008*

TRUCK ROUTE CHECK: *Completed during calibration January 23, 2008.*

4. Site Location/ Directions

NEAREST AIRPORT: *Baton Rouge Metropolitan Airport, Baton Rouge, LA*

DIRECTIONS TO THE SITE: *US-171, approximately 8 miles north of Lake Charles.*

MEETING LOCATION: *On site at 9:00 a.m., March 4, 2008.*

WIM SITE LOCATION: *US-171, milepost 8.4; GPS = N 30.34960°, W -93.19862°.*

WIM SITE LOCATION MAP: *See Figure 4.1*

Figure 4-1 – Site 220100 in Louisiana

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

CERTIFIED SCALE LOCATION: *CAT Scales located at Love's Country Store, I-10, exit 43, Iowa, LA; GPS = 30.253010° N, -93.013580° W*

TRUCK ROUTE: *See Figure 5.1*

NB on US-171 1.6 miles to Gillis Road.

SB on US-171 1.4 miles to Debra Lane.

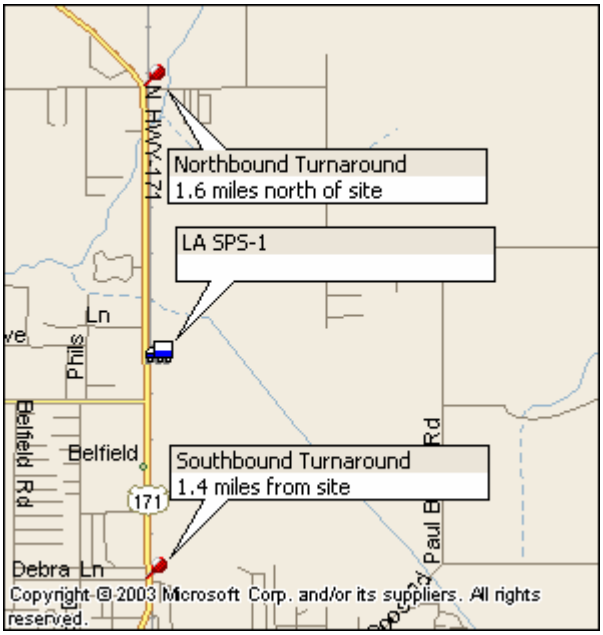

Figure 5-1 – Truck Route at 220100 in Louisiana

SB distance = 1.4 miles
NB distance = 1.6 miles

Total distance = 6 miles (10 minutes)

6. Sheet 17 – Louisiana (220100)

1.* ROUTE ____US-171____ MILEPOST __8.4__ LTPP DIRECTION - **N** S E W

2.* WIM SITE DESCRIPTION - Grade ___< 1_____ % Sag vertical Y / **N**
Nearest SPS section upstream of the site _____
Distance from sensor to nearest upstream SPS Section ___ ___ ___ ___ 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 __11__ ft

4.* PAVEMENT TYPE _____asphalt_____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date 03/04/08 __ Photo Filename: 22_0100_Upstream_03_04_08.jpg_____
Date 03/04/08__ Photo Filename: 22_0100_Downstream_03_04_2008.jpg _____
Date _____ Photo Filename: _____

6. * SENSOR SEQUENCE ____loop – quartz piezo – quartz piezo – loop_____

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

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

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

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

10. * CABINET LOCATION

Same side of road as LTPP lane **Y** / N Median Y/ **N** Behind barrier **Y** / N
Distance from edge of traveled lane _18 _ _ ft
Distance from system __24__ __ ft
TYPE _____3R_____

CABINET ACCESS controlled by **LTPP** / STATE / JOINT ?
Contact - name and phone number ___Roy Czinku 306-653-6627_____
Alternate - name and phone number _____

11. * POWER

Distance to cabinet from drop __122_____ ft Overhead / **underground** / solar / AC in cabinet?
Service provider _____ Phone number _____

12. * TELEPHONE

Distance to cabinet from drop __145____ ft Overhead / **underground** / cell?
Service provider _____ Phone Number _____

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

14. * TEST TRUCK TURNAROUND time __4 minutes__ Distance _3__ mi.

15. PHOTOS FILENAME

Power source 22_0100_Power_Box_03_04_2008.jpg
Phone source 22_0100_Telephone_Pedestal_03_04_2008.jpg
22_0100_Telephone_Service_Sign_03_04_2008.jpg
Cabinet exterior 22_0100_Cabinet_Exterior_03_04_2008.jpg
Cabinet interior 22_0100_Cabinet_Interior_Front_03_04_2008.jpg
22_0100_Cabinet_Interior_Back_03_04_2008.jpg
Weight sensors 22_0100_Leading_WIM_Sensor_03_04_2008.jpg
22_0100_Trailing_WIM_Sensor_03_04_2008.jpg
Classification sensors __N/A
Other sensors 22_0100_Leading_Loop_03_04_2008.jpg
22_0100_Trailing_Loop_Sensor_03_04_2008.jpg

Description ___Loops_____
Downstream direction at sensors on LTPP lane
____22_0100_Downstream_03_04_2008.jpg _____
Upstream direction at sensors on LTPP lane
____22_0100_Upstream_03_04_08.jpg_ _____

COMMENTS _____

COMPLETED BY ____Dean J. Wolf_____

PHONE __301-210-5105____ DATE COMPLETED _03 _ /_05 _/ _2008_

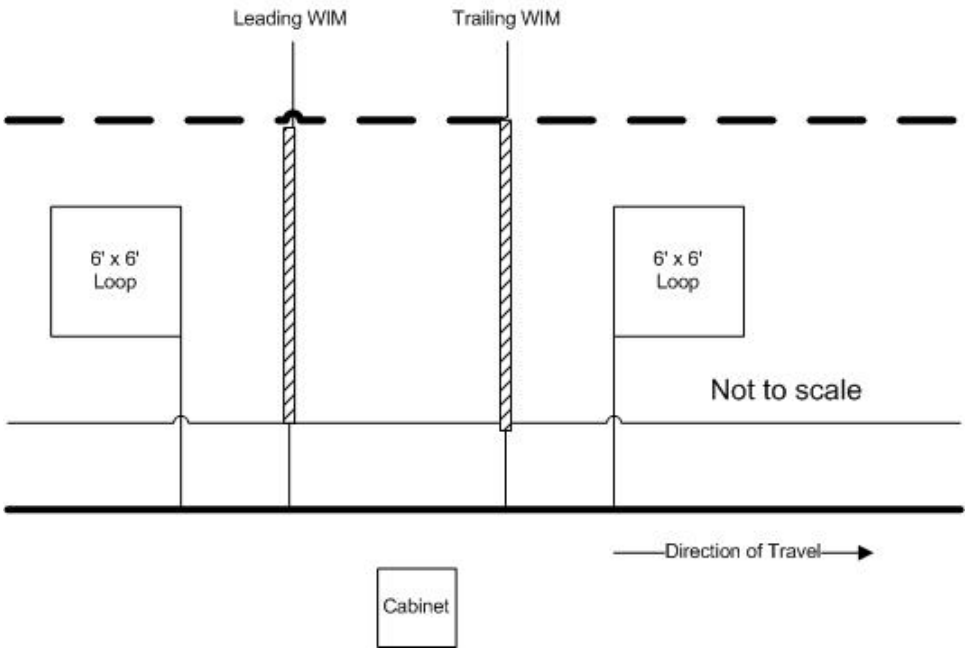

Figure 6-1 Equipment Layout 220100

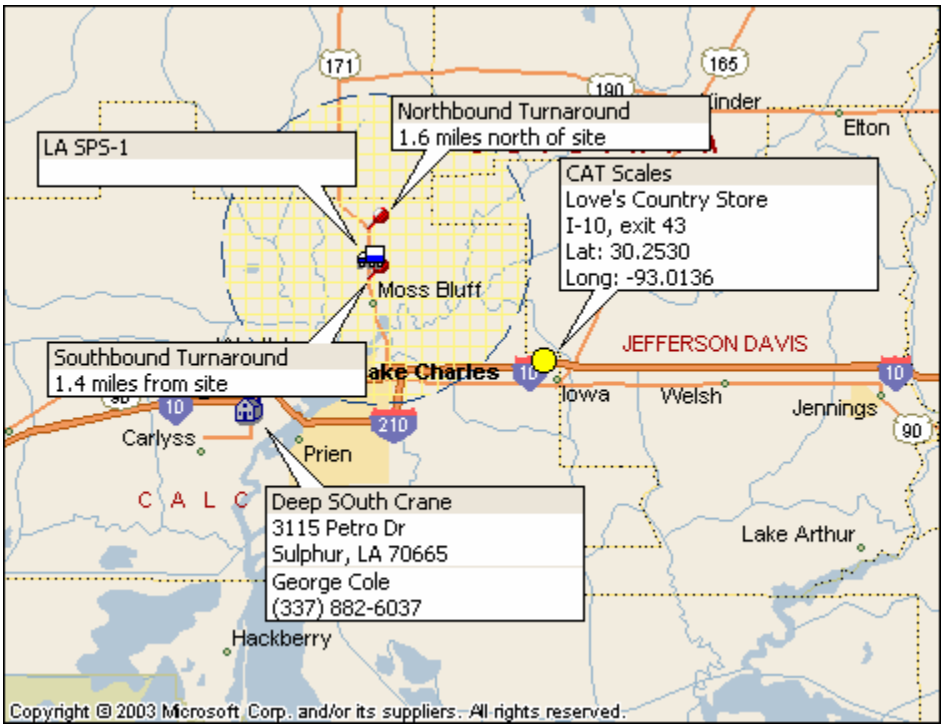

Figure 6-2 – Site Map of 220100 in Louisiana

Photo 6-1 22_0100_Upstream_03_04_2008.jpg

Photo 6-2 22_0100_Downstream_03_04_2008.jpg

Photo 6-3 22_0100_Power_Box_03_04_2008.jpg

Photo 6-4 22_0100_Telephone_Pedestal_03_04_2008.jpg

Photo 6-5 22_0100_Telephone_Service_Sign_03_04_2008.jpg

Photo 6-6 22_0100_Cabinet_Exterior_03_04_2008.jpg

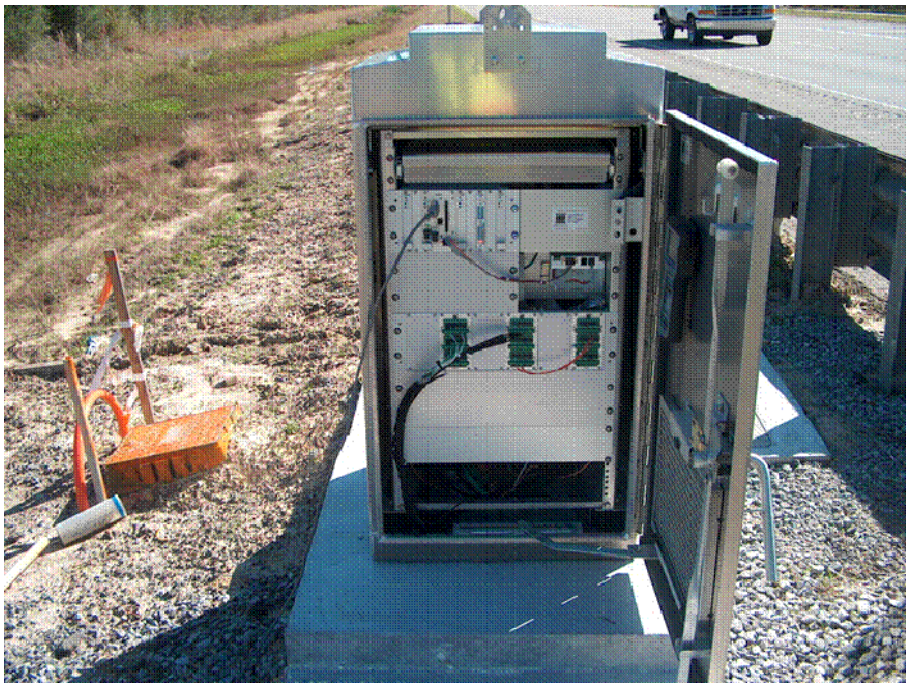

Photo 6-7 22_0100_Cabinet_Interior_Front_03_04_2008.jpg

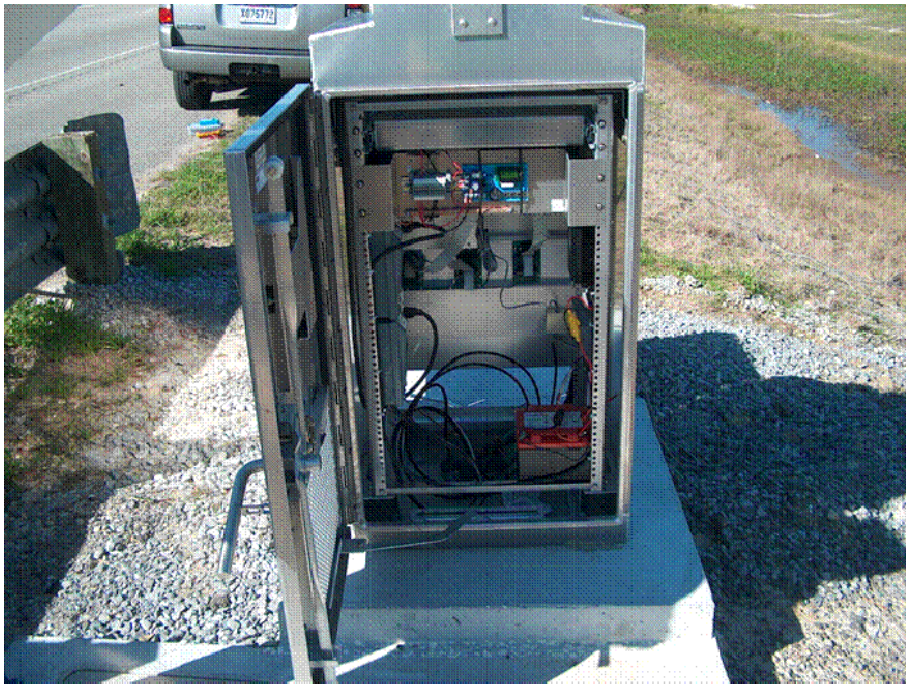

Photo 6-8 22_0100_Cabinet_Interior_Back_03_04_2008.jpg

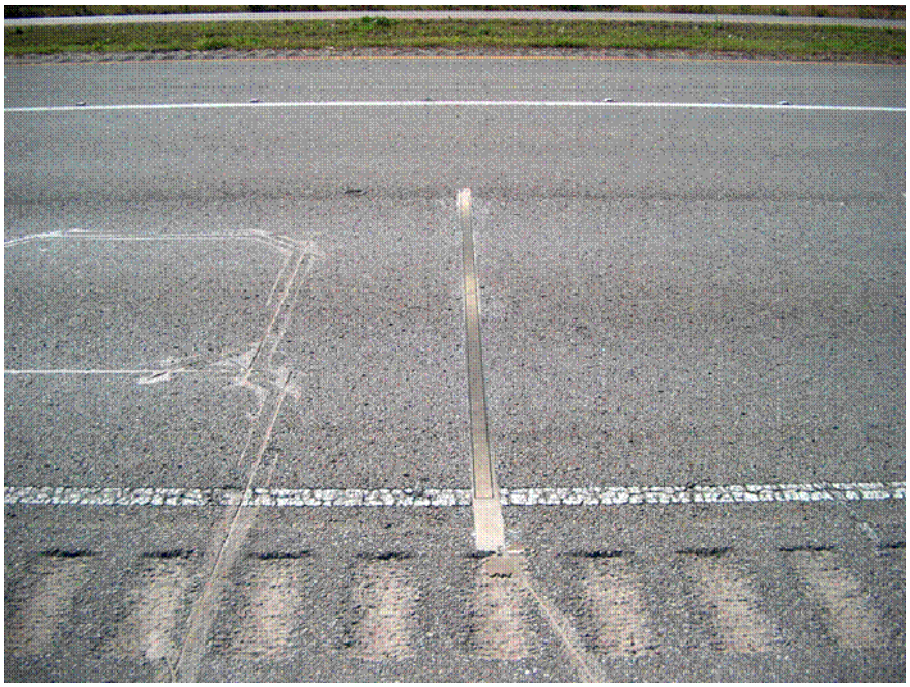

Photo 6-9 22_0100_Leading_WIM_Sensor_03_04_2008.jpg

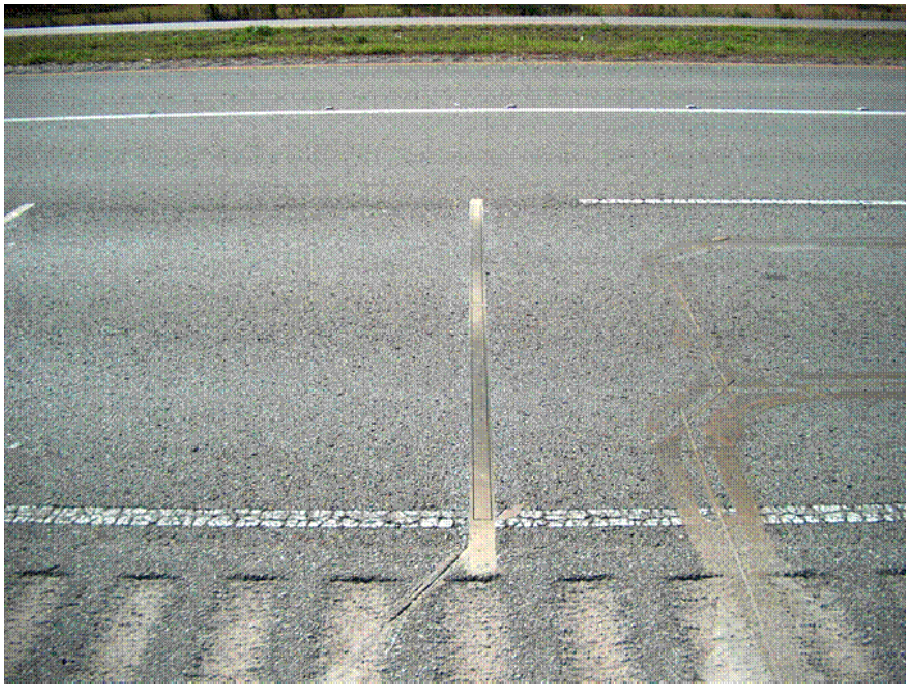

Photo 6-10 22_0100_Trailing_WIM_Sensor_03_04_2008.jpg

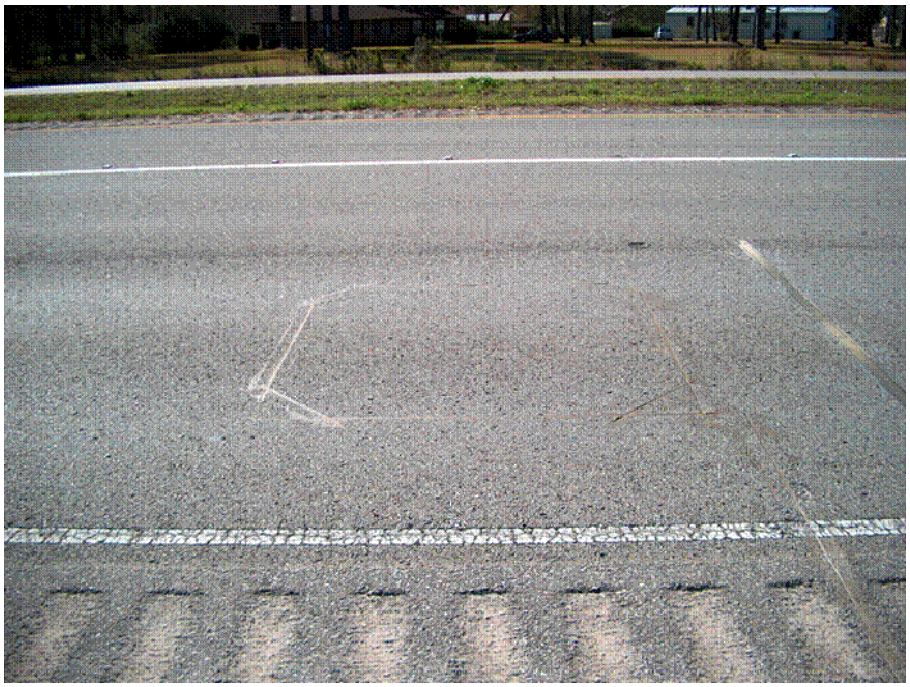

Photo 6-11 22_0100_Leading_Loop_03_04_2008.jpg

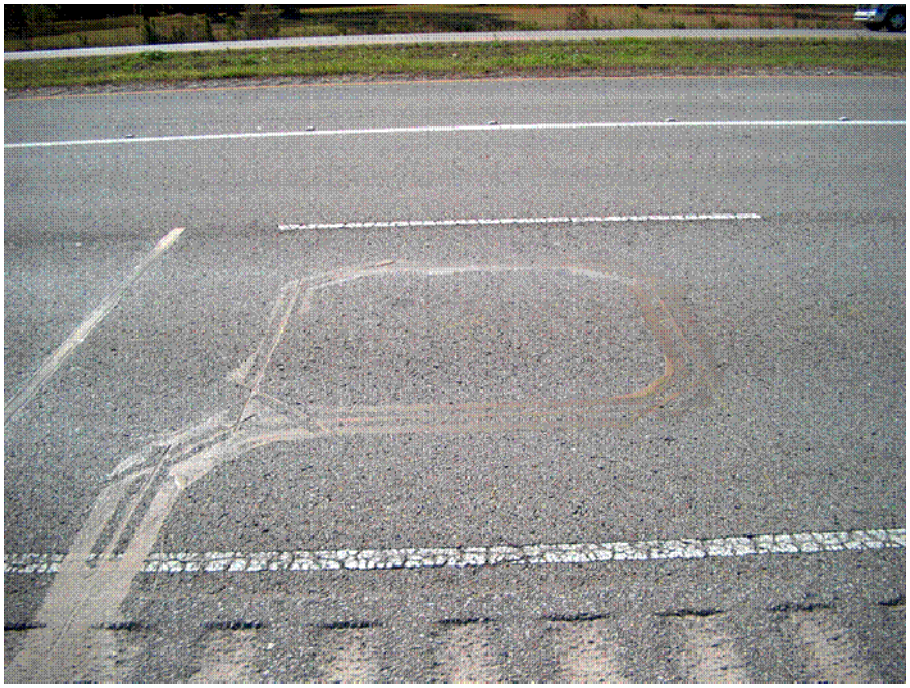

Photo 6-12 22_0100_Trailing_Loop_Sensor_03_04_2008.jpg

SHEET 18	STATE CODE [22]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0100]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 3/4/2008

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 _5 years from installation_
      - ☐ Separate contract LTPP – Expiration Date _____
      - ☐ Separate contract State – Expiration Date _____
      - ☐ State personnel

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

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

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

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

g. Communication –

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

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

3. PAVEMENT –

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

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

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

4. ON SITE ACTIVITIES –

a. WIM Validation Check - advance notice required _2__ ☐ days ☒ weeks

b. Notice for straightedge and grinding check - __2_ ☐ days ☒ weeks

i. On site lead –
- ☐ State
- ☒ LTPP

ii. Accept grinding –
- ☐ State
- ☒ LTPP

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

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

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

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

   _____

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

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

i. Traffic Control Required – ☐Yes ☒No

j. Enforcement Coordination Required – ☐Yes ☒No

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

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

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

      Agency: IRD

b. Maintenance (equipment) –

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

Agency: IRD

c. Data Processing and Pre-Visit Data –

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

Agency: IRD

d. Construction schedule and verification –

Name: _____ Phone:_____

Agency: _____

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

Name: George Cole Phone:337-882-6037

Agency: Deep South Crange

f. Traffic Control –

Name: _____ Phone:_____

Agency: _____

g. Enforcement Coordination –

Name: _____ Phone:_____

Agency: _____

h. Nearest Static Scale

Name: Love's Country STore Location:I-10, exit 43

Phone: 337-582-4528

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [22] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [3/4/2008]

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_____	___2_____
3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   - DYNAMIC AND STATIC GVW ___0.4 STANDARD DEVIATION ___1.2
   - DYNAMIC AND STATIC SINGLE AXLES ___0.9 STANDARD DEVIATION ___2.0
   - DYNAMIC AND STATIC DOUBLE AXLES ___0.2 STANDARD DEVIATION ___2.8

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ _55_ __60__ __65_ __ __ __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___3024 / 3135___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   - *** FHWA CLASS 9 ____ 0.0
   - *** FHWA CLASS 8 ____ -40.0
   - FHWA CLASS _5_ ____ ____ 25
   - 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 [22] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [3/5/2008]

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

__ 21__ PASSES PER TRUCK

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

TRUCK	TYPE	SUSPENSION
1	___9_____	___1_____
2	___9_____	___2_____
3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   - DYNAMIC AND STATIC GVW ___0.6 STANDARD DEVIATION ___2.0
   - DYNAMIC AND STATIC SINGLE AXLES ___-0.2 STANDARD DEVIATION ___2.1
   - DYNAMIC AND STATIC DOUBLE AXLES ___0.8 STANDARD DEVIATION ___3.7

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ _55_ __60__ __65_ __ __ __ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___3024 / 3135___

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 ____ 0.0
   - *** FHWA CLASS 8 ____ 0.0
   - FHWA CLASS _5_ ____ ____ 14
   - 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

APPENDIX A

Sheet 19	* STATE CODE	2 2
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0
*CALIBRATION TEST TRUCK # 1	* DATE	3/5/2008

Rev. 08/31/01

T-130

PART I.

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

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: _____

10.* Trailer Load Distribution Description:

COUNTERWEIGHT MID 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 14.4 B to C 4.5 C to D 30.6

D to E 4.1 E to F _____

Wheelbase (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) (+1.7)

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R 24.5	3 FULL LEAF
B	11R 24.5	AIR
C	11R 24.5	AIR
D	R15 TR	AIR
E	R15 TR	AIR
F		

Sheet 19	* STATE_CODE	2 2
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0
*CALIBRATION TEST TRUCK # 1	* DATE	3/5/2008

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 69740
*c) Post Test Loaded Weight 69430
*d) Difference Post Test – Pre-test ~~410~~ 310

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	12160	15050	15850	13740	13740		69740
2	12140	15060	15060	13740	13740		69740
3							
Average	12150	15055	15055	13740	13740		69740

Table 6. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	12000	14970	14970	13750	13750		69440
2	11920	15020	15020	13730	13730		69420
3							
Average	11960	14995	14995	13740	13740		69430

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

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

Measured By DEAN Verified By MARK Weight date 3/6/08

Sheet 19	* STATE CODE	2 2
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0
*CALIBRATION TEST TRUCK # 2	* DATE	3/5/2008

Rev. 08/31/01

T-126

PART I.

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

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: T-800

10.* Trailer Load Distribution Description:

2 COUNTERWEIGHTS LOADED OVER TANDEMS

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 14.5 B to C 4.5 C to D 32.8

D to E 4.1 E to F _____

Wheelbase (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) _____ (+2.1)

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R 24.5	3 FULL LEAF
B	11R 24.5	AIR
C	11R 24.5	AIR
D	275R 24.5	3 TAPERED LEAF
E	275R 24.5	3 TAPERED LEAF
F		

Sheet 19	* STATE_CODE	2 2
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0
*CALIBRATION TEST TRUCK # 2	* DATE	3/5/2008

Rev. 08/31/01

Day 2 1

7.2 *b) Average Pre-Test Loaded weight 54960 55320
*c) Post Test Loaded Weight 54910
*d) Difference Post Test – Pre-test -410

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11040	11500	11500	10670	10670		55380
2	10880	11540	11540	10650	10450		55260
3							
Average	10960	11520	11520	10660	10660		55320

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10720	11430	11430	10660	10660		54900
2	10740	11430	11430	10660	10660		54920
3							
Average	10730	11430	11430	10660	10660		54910

Measured By DEAN Verified By [illegible] Weight date 3/6/08

Sheet 20	* STATE_CODE 22
LTPP Traffic Data	* SPS PROJECT ID 0100
Speed and Classification Checks * 1 of* 2	* DATE 3/4/08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
54	85	50748	53	8	54	5	50913	54	4
54	9	50754	56	9	64	9	50915	64	9
58	5	50761	57	5	58	9	50920	57	9
64	9	50762	62	9	59	9	50930	59	9
65	5	50766	65	5	60	9	50933	60	9
55	6	50767	54	6	60	5	50936	59	4
55	9	50768	54	9	58	9	50940	59	9
64	9	50790	65	9	61	5	50950	61	5
62	5	50792	59	5	57	9	50968	58	9
67	5	50798	66	5	57	5	50987	57	5
59	8	50806	57	8	59	6	50988	58	6
60	9	50812	60	9	61	5	50999	61	5
65	5	50813	64	5	61	9	51001	59	9
59	9	50816	59	9	62	5	51008	61	5
64	9	50829	64	9	59	8	51017	58	8
68	10	50835	66	10	61	5	51022	61	5
60	5	50836	59	5	57	5	51025	53	5
70	9	50842	68	9	56	9	51033	55	9
60	9	50845	60	9	63	9	51041	61	9
66	5	50849	65	8	62	9	51042	62	9
54	5	50853	54	5	59	9	51048	58	9
64	9	50856	63	9	64	6	51049	65	6
65	9	50861	63	9	59	9	51053	59	9
56	9	50865	55	9	59	9	51062	59	9
45	5	50905	44	5	59	9	51063	58	9

Recorded by MARK Direction NJ Lane 1 Time from 9:10 to 10:45

1:35

Sheet 20	* STATE_CODE	22
LTPP Traffic Data	* SPS PROJECT ID	0100
Speed and Classification Checks * 2 of* 2	* DATE	3 / 4 / 08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
67	9	51073	64	9	57	9	51804	57	9
64	9	51074	62	9	64	5	51816	65	5
59	9	51075	56	9	62	9	51818	60	9
64	6	51079	63	6	59	9	51825	59	9
49	6	51555	50	6	56	9	51838	51	9
56	9	51557	57	9	59	6	51848	59	6
57	6	51560	56	6	60	9	51859	60	9
63	6	51567	62	6	62	9	51866	62	5
57	6	51568	57	6					
58	9	51570	58	9					
57	9	51580	55	9					
68	9	51592	68	9					
56	3	51593	55	5					
62	10	51604	62	10					
60	9	51619	59	9					
56	9	51666	57	9					
56	9	51676	54	9					
57	10	51677	56	10					
52	9	51687	53	9					
59	8	51719	60	8					
62	9	51731	62	9					
59	9	51738	59	9					
62	9	51758	63	9					
62	6	51759	62	6					
57	5	51705	56	4					

Recorded by MARK Direction N Lane 1 Time from 1047 to 1057
1246 2:01

10
1:15
1:25

Sheet 20	* STATE_CODE 22
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 1 of*	* DATE 3/5/08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
64	9	536	63	9	53	9	819	54	9
62	6	540	62	6	54	6	821	54	6
71	5	552	71	5	52	5	833	52	5
55	5	588	56	5	60	10	841	60	10
70	9	634	69	9	64	9	847	63	9
55	9	644	55	9	55	9	866	55	9
67	9	660	67	9	59	9	879	59	9
55	5	665	55	5	57	5	947	56	5
61	9	675	61	9	55	9	955	55	9
68	9	698	68	9	59	5	1002	60	4
55	9	702	55	9	61	5	1004	62	5
54	9	707	54	9	58	5	1013	59	5
53	5	708	53	5	59	5	1022	59	5
62	9	714	62	9	57	9	1114	58	9
54	5	720	54	5	60	6	1132	60	6
64	9	725	64	9	52	8	1143	53	8
64	9	726	63	9	57	5	1145	57	5
59	5	731	57	5	57	5	1159	57	5
61	6	735	60	6	57	6	1160	57	6
54	9	743	55	9	48	5	1175	58	5
56	13	748	55	13	60	6	1184	59	6
60	6	760	60	6	60	5	1189	59	5
58	5	762	58	5	60	5	1192	62	5
56	5	796	56	5	60	5	1193	61	5
47	6	816	47	6	60	5	1196	61	5

Recorded by MARK Direction N Lane 1 Time from 1250pm to 310pm

Sheet 20	* STATE_CODE	22
LTPP Traffic Data	*SPS PROJECT_ID	0100
Speed and Classification Checks * 2 of*	* DATE	3/5/08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
52	5	1200	52	5	66	5	1608	66	5
57	5	1257	57	5	55	9	1610	54	9
59	9	1263	59	9	61	9	1626	61	9
59	9	1294	59	9					
57	6	1305	57	6					
51	5	1307	51	4					
59	5	1324	59	5					
65	5	1339	67	5					
62	5	1369	63	5					
63	5	1370	63	4					
65	9	1379	66	9					
55	5	1402	56	4					
57	9	1405	59	9					
68	6	1425	69	6					
50	13	1435	50	13					
37	5	1482	38	5					
65	9	1505	66	9					
52	6	1506	52	6					
60	9	1522	63	9					
64	9	1545	65	9					
66	9	1556	66	9					
64	5	1559	64	5					
51	5	1566	51	5					
58	6	1586	58	6					
52	9	1599	53	9					

Recorded by MARK Direction N Lane 1 Time from 3:10PM to 4:25PM

Sheet 21	* STATE_CODE	27
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 1 of 3	* DATE	3 / 5 / 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
73.5	54	1	1	10:28	20	55	61/61	81/78	78/76	68/74	68/61		70.6	14.5	4.5	31.3	4.1	
73.5	55	2	1	10:28	22	55	58/55	65/54	58/53	54/58	53/50		55.6	14.7	4.5	32.8	4.1	
72.5	60	1	2	10:33	40	60	60/60	75/76	75/77	68/72	72/67		70.2	14.6	4.6	31.5	4.1	
72.5	59	2	2	10:33	41	59	56/54	62/58	55/51	58/58	53/45		55	14.6	4.5	32.8	4.1	
72.5	64	1	3	10:36	53	64	62/59	73/73	81/83	68/65	70/63		69.6	14.6	4.5	31.4	4.1	
72.5	64	2	3	10:37	55	64	57/56	65/60	59/54	59/55	54/53		57	14.6	4.5	32.9	4.1	
75	55	1	4	10:41	70	54	61/60	78/82	74/80	68/72	69/63		70.6	14.6	4.5	31.4	4.1	
75	54	2	4	10:41	72	54	59/52	61/58	57/54	55/40	59/56		55.9	14.6	4.5	32.8	4.0	
76	59	1	5	10:46	91	60	60/61	74/81	74/78	68/74	65/65		70.2	14.6	4.5	31.3	4.1	
76	58	2	5	10:46	92	58	56/54	61/56	56/51	55/41	57/50		53.6	14.5	4.5	32.7	4.1	
75	64	1	6	10:50	106	65	69/61	83/80	75/75	66/65	79/65		70	14.6	4.6	31.5	4.1	
75	64	2	6	10:51	108	65	55/55	58/59	54/54	49/59	40/54		53.6	14.6	4.5	33.0	4.1	
75	54	1	7	10:54	121	55	61/60	75/74	75/75	66/70	72/69		69.7	14.5	4.5	31.4	4.1	
75	54	2	7	10:55	122	54	58/54	60/54	58/52	59/50	57/53		55.6	14.7	4.5	32.8	4.0	
76	60	1	8	10:59	136	60	60/59	77/75	80/79	65/71	68/67		70.1	14.6	4.5	31.3	4.1	
76	59	2	8	10:59	138	59	53/55	56/57	54/56	52/59	52/54		55.8	14.6	4.5	33.0	4.1	

Recorded by MARK Checked by _____

pre-validation

Sheet 21	* STATE_CODE 22
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 2 of 3	* DATE 3 / 5 / 08

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
77.5	64	1	9	11:02	149	64	62/59	80/76	74/72	66/67	65/62		68.2	14.5	4.5	31.2	4.1	
77.5	63	2	9	11:04	157	65	56/57	62/58	54/48	55/58	53/53		55.5	14.6	4.5	32.9	4.1	
76.5	54	1	10	11:07	164	55	61/59	78/76	74/80	71/68	67/66		70	14.6	4.5	31.2	4.1	
76.5	54	2	10	11:07	167	54	59/54	62/55	56/50	60/49	55/54		55.4	14.6	4.5	32.8	4.1	
77	60	1	11	11:10	177	59	62/55	83/71	78/72	73/72	68/63		69.7	14.4	4.5	31.3	4.1	
77	59	2	11	11:11	178	60	55/54	60/59	54/51	57/57	59/49		54.7	14.7	4.5	32.9	4.1	
77.5	64	1	12	11:14	189	64	62/59	82/79	75/71	68/74	68/63		70.1	14.6	4.6	31.4	4.1	
77.5	64	2	12	11:15	191	64	57/56	57/56	56/53	59/58	52/55		56.0	14.6	4.5	32.8	4.1	

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pre-visit-daftar

Sheet 21	* STATE_CODE 22
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 3 of 3	* DATE 3/5/08

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
78.5	55	1	13	11:19	201	55	61/59	79/75	77/73	66/74	72/67		69.7	14.6	4.5	31.3	4.1	
78.5	53	2	13	11:19	202	54	58/55	64/55	55/50	57/60	54/52		55.9	14.6	4.5	32.9	4.1	
80.5	60	1	14	11:24	225	60	60/58	79/77	78/73	68/64	72/65		69.3	14.6	4.5	31.3	4.1	
80.5	58	2	14	11:24	226	59	57/52	62/55	59/53	55/50	57/50		55	14.6	4.5	32.8	4.1	
80.5	64	1	15	11:28	240	65	60/60	81/81	71/78	68/75	65/67		70.2	14.6	4.6	31.4	4.1	
80.5	64	2	15	11:28	241	64	52/55	56/57	54/53	63/54	50/53		55	14.6	4.5	32.7	4.1	
79.5	55	1	16	11:33	260	55	61/59	78/77	73/74	66/72	75/68		70.4	14.5	4.5	31.3	4.1	
79.5	53	2	16	11:33	261	54	56/53	59/55	55/51	53/53	58/53		54.5	14.5	4.5	32.6	4.1	
81	60	1	17	11:43	288	60	59/60	76/78	75/78	68/66	72/66		69.9	14.6	4.5	31.4	4.1	
81	59	2	17	11:43	289	59	56/52	60/58	55/50	55/60	57/49		55.1	14.6	4.6	32.8	4.1	
82	64	1	18	11:47	310	65	61/58	77/73	81/85	66/73	70/76		71.0	14.6	4.5	31.3	4.1	
82	63	2	18	11:47	311	64	55/58	58/59	54/55	49/63	54/52		55.7	14.7	4.6	33.1	4.1	
82.5	54	1	19	11:51	324	55	60/59	79/76	73/75	64/74	70/60		69.8	14.6	4.5	31.4	4.1	
82.5	53	2	19	11:51	325	54	57/55	57/55	55/47	60/58	58/49		55.3	14.6	4.5	32.7	4.1	
82.5	59	1	20	11:55	342	59	60/58	75/76	77/77	79/80	67/65		69.6	14.6	4.5	31.4	4.1	
82.5	60	2	20	11:55	343	59	55/54	60/59	53/51	59/46	53/56		54.6	14.6	4.5	32.7	4.0	

6420060018_SPSWIM_TO_16_22_2.79_0100_Sheet_21.doc

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re-validation

Sheet 21	* STATE_CODE	22
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records	1 of 4	* DATE 3 / 5 / 08

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
84.5	54	1	1	13:11	599	54	62/59	79/73	78/69	68/71	67/66		69.2	14.5	4.5	31.3	4.1	
84.5	53	2	1	13:12	601	54	56/54	62/57	58/54	55/61	47/52		55.6	14.7	4.5	32.8	4.1	
83.5	60	1	2	13:16	622	59	61/57	85/73	79/70	72/75	68/68		70.7	14.5	4.5	31.2	4.1	
83.5	59	2	2	13:16	623	59	55/53	63/58	59/55	57/58	55/49		56.1	14.6	4.5	32.8	4.1	
84.5	61	1	3	13:20	641	62	61/58	81/78	84/76	72/70	66/66		71.2	14.6	4.5	31.3	4.1	
84.5	64	2	3	13:20	642	64	57/53	61/53	57/49	54/53	55/46		53.8	14.6	4.5	32.6	4.0	
98	54	1	4	13:43	741	54	60/59	84/78	73/70	66/76	68/63		69.7	14.5	4.5	31.2	4.1	
98	54	2	4	13:43	743	54	55/54	61/56	57/50	61/60	60/53		56.7	14.6	4.5	32.8	4.1	

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post-validation

Sheet 21	* STATE_CODE	22
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 2 of 4	* DATE	3 / 5 / 08

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
91.5	60	1	5	13:45	756	60	59/59	77/76	79/79	66/67	66/66		69.4	14.6	4.5	31.3	4.1	
91.5	54	2	5	13:47	764	54	58/53	61/54	57/47	65/50	57/54		55.4	14.6	4.5	32.6	4.0	
89.5	63	1	6	13:50	777	65	60/61	69/70	81/81	68/73	71/67		71.1	14.7	4.5	31.5	4.1	
89.5	58	2	6	13:51	781	59	55/52	59/56	56/50	54/60	42/49		53.4	14.6	4.5	33.0	4.1	
86.5	63	2	7	13:54	796	64	57/54	65/59	58/52	61/57	57/49		56.9	14.6	4.5	32.6	4.1	
86.5	55	1	7	14:12	883	55	61/62	74/76	78/81	67/69	72/60		70.1	14.6	4.5	31.3	4.1	
86.5	55	2	8	14:13	886	54	61/53	62/58	55/54	65/68	59/57		59.3	14.6	4.5	32.7	4.1	
90.5	59	1	8	14:16	912	60	61/58	80/79	74/69	66/75	65/66		69.4	14.6	4.6	31.4	4.1	

6420060018_SPSWIM_TO_16_22_2.79_0100_Sheet_21.doc

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Sheet 21	* STATE_CODE 22
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 3 of 4	* DATE 3/5/08

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
90.5	59	2	9	14:17	914	59	57/50	65/56	56/48	62/56	55/50		55.5	14.5	4.5	32.7	4.1	
91.5	65	1	9	14:20	929	65	69/60	75/74	71/72	63/66	66/63		67.0	14.6	4.5	31.4	4.1	
91.5	64	2	10	14:20	930	64	59/53	66/60	56/55	60/57	56/52		57.2	14.5	4.5	32.7	4.1	
80	54	1	10	14:43	1061	54	61/59	83/73	74/71	70/71	69/62		69.2	14.5	4.5	31.2	4.1	
80	54	2	11	14:43	1062	55	55/53	62/56	56/53	61/50	53/52		55.1	14.6	4.5	32.8	4.0	
81.5	60	1	11	14:46	1085	60	60/57	81/75	77/75	68/71	71/62		69.6	14.5	4.5	31.4	4.1	
81.5	59	2	12	14:47	1086	60	54/53	64/60	58/53	61/61	49/51		56.4	14.6	4.5	32.6	4.1	
87	65	1	12	14:52	1117	64	60/58	78/71	81/82	67/71	76/70		71.3	14.5	4.5	31.1	4.0	
87	64	2	13	14:52	1120	64	55/56	63/60	54/50	56/60	56/49		55.8	14.6	4.6	32.8	4.1	
85	55	1	13	15:13	1222	54	60/59	79/73	76/77	66/70	66/67		69.3	14.5	4.5	31.3	4.1	
85	54	2	14	15:13	1223	55	53/56	60/59	53/54	53/50	49/55		54.2	14.6	4.6	32.9	4.1	
85	59	1	14	15:16	1239	60	69/60	77/82	70/73	66/73	68/65		68.9	14.6	4.5	31.3	4.1	
85	58	2	15	15:17	1240	59	55/53	60/57	53/52	61/57	59/52		55.8	14.6	4.6	33.0	4.1	
87.5	53	1	15	15:21	1269	54	58/56	81/79	77/80	68/67	68/67		70.0	14.6	4.5	31.5	4.1	
87.5	63	2	16	15:21	1270	64	56/57	61/56	55/52	58/60	54/51		55.9	14.7	4.5	33.0	4.1	
92	55	1	16	15:44	1409	54	61/58	73/70	83/75	66/67	71/69		69.4	14.5	4.5	31.3	4.1	

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post-validation

Sheet 21	* STATE_CODE 2 2
LTPP Traffic Data	*SPS PROJECT_ID 0 1 0 0
WIM System Test Truck Records 4 of 4	* DATE 3 / 5 / 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
92	54	2	17	15:45	1411	54	55/54	62/59	57/50	55/58	61/46		55.4	14.6	4.5	32.8	4.1	
87	60	1	17	15:48	1434	60	60/57	79/77	74/70	68/72	73/69		72.7	14.6	4.5	31.5	4.1	
87	54	2	18	15:49	1443	59	55/54	64/58	52/55	55/59	49/50		55.2	14.7	4.5	33	4.1	AXLES 6&7 in cap ~~out~~ ~~why 12?~~ out
85.5	59	1	18	15:52	~~1455~~	60	59/55	78/71	80/79	63/75	71/66		69.8	14.5	4.5	31.3	4.1	
85.5	63	2	19	15:54	1467	64	55/52	63/57	59/56	60/55	53/45		55.3	14.6	4.5	32.7	4.1	
79.5	55	1	19	16:16	1615	55	60/60	75/76	74/79	62/75	66/67		69.6	14.6	4.5	31.4	4.1	
79.5	54	2	20	16:16	1616	55	58/52	62/52	56/49	62/61	54/48		55.5	14.6	4.5	32.8	4.1	
76	~~59~~	1	20	16:20	1639	59	50/58	73/74	73/79	65/77	63/63		68.4	14.4	4.5	31.3	4.1	
76	55	2	21	16:20	1642	59	57/50	~~60~~/~~60~~	~~80~~/~~79~~	~~80~~/~~84~~	~~82~~/~~68~~		54.3	14.6	4.5	32.7	4.1	
								61/52	57/53	59/54	54/47 !							
76	64	1	21	16:24	1665	65	61/60	90/87	79/75	64/63	66/63		70	14.6	4.5	31.4	4.1	

Recorded by MARK

Checked by

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

Visit Date: March 5, 2008

STATE: Louisiana

SHRP ID: 220100

Photo 1 - Truck_1_Tractor_ 22_0100_03_05_08.JPG

Photo 2 - Truck_1_Trailer_Load_1_22_0100_03_05_08.JPG

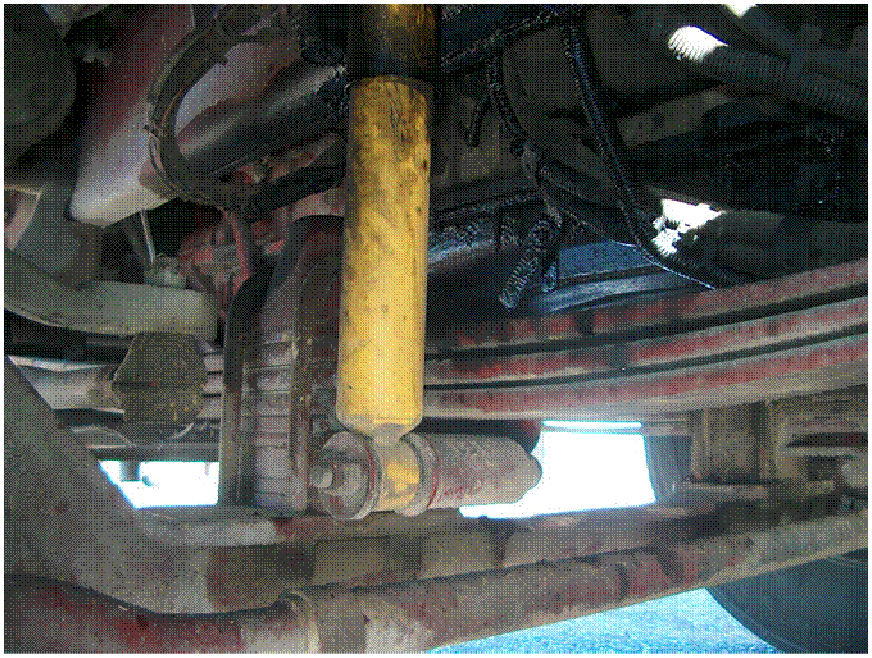

Photo 3 - Truck_1_Suspension_1_22_0100_03_05_08.JPG

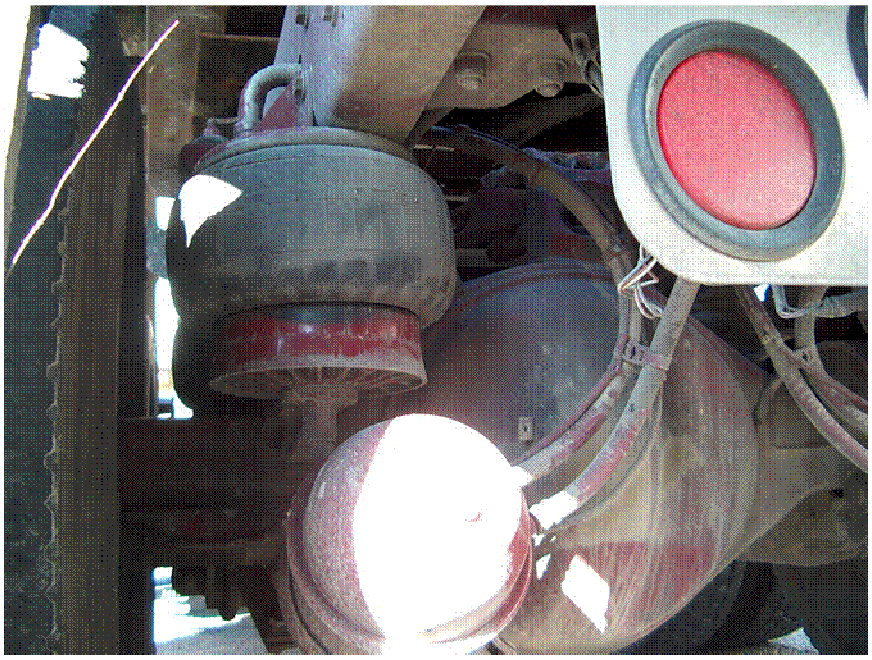

Photo 4 - Truck_1_Suspension_2_22_0100_03_05_08.JPG

Photo 5 - Truck_1_Suspension_3_22_0100_03_05_08.JPG

Photo 6 - Truck_2_Tractor_22_0100_03_05_08.JPG

Photo 7 - Truck_2_Trailer_22_0100_03_05_08.JPG

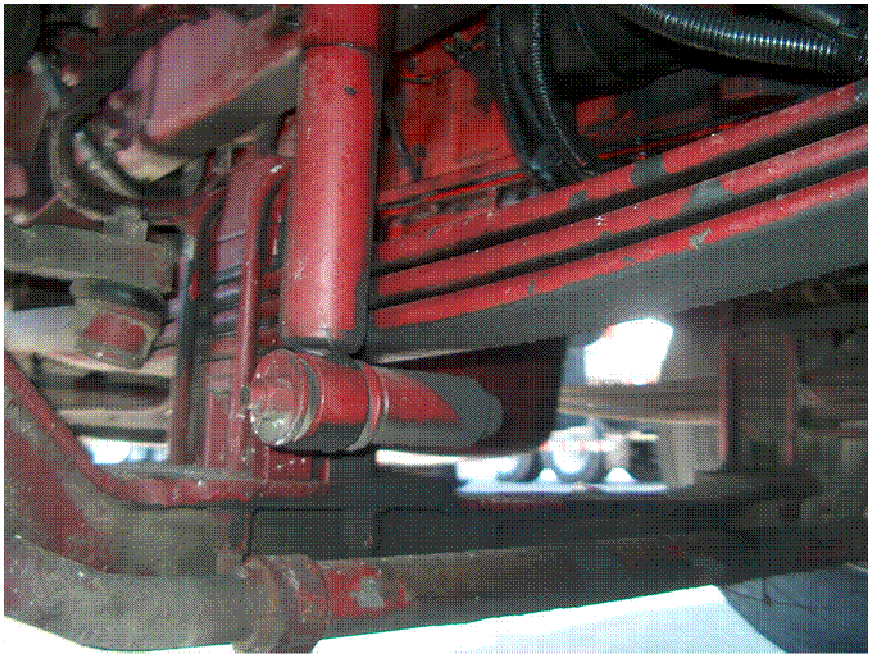

Photo 8 - Truck_2_Suspension_1_22_0100_03_05_08.JPG

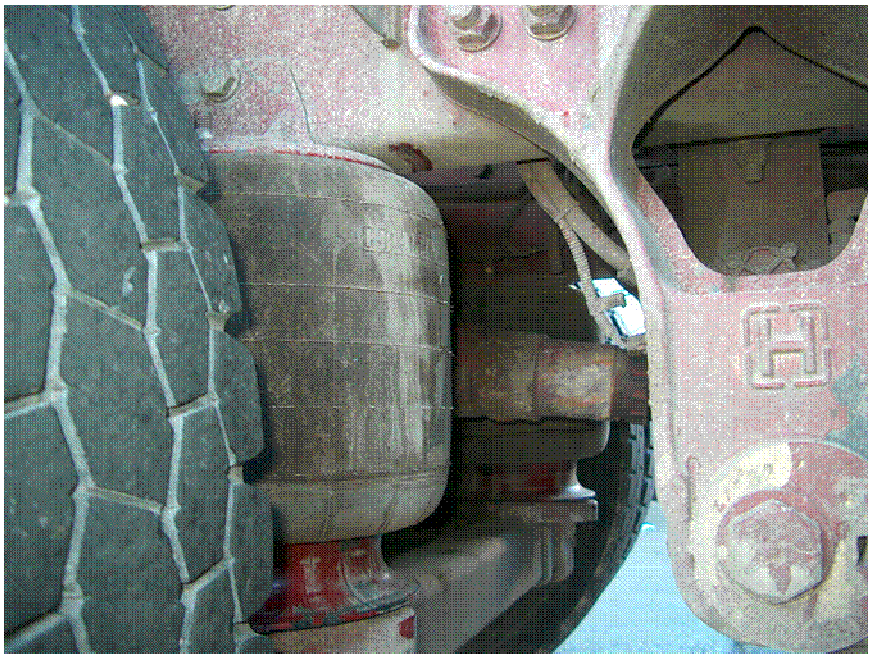

Photo 9- Truck_2_Suspension_2_22_0100_03_05_08.JPG

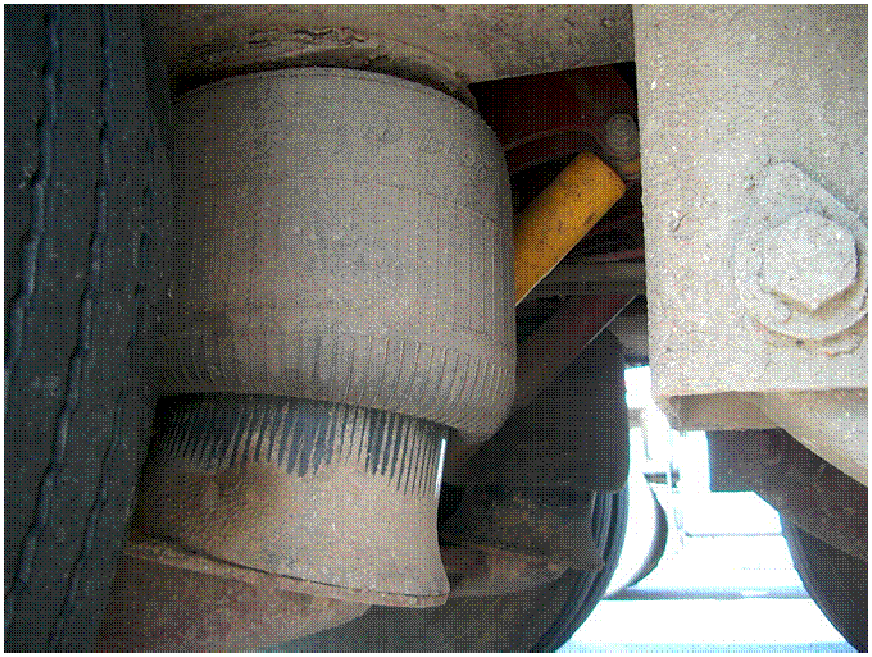

Photo 10 - Truck_2_Suspension_3_22_0100_03_05_08.JPG

ETG LTPP CLASS SCHEME, MOD 3

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

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

System Operating Parameters

Louisiana SPS-1 (Lane 1)

Calibration Factors for Sensor #1

Validation Visit	March 5, 2008
80 kph (50 mph)	2985
88 kph	3048
96 kph	3016
104 kph	3024
112 kph (70 mph)	3024

Calibration Factors for Sensor #2

Validation Visit	March 5, 2008
80 kph (50 mph)	3094
88 kph	3159
96 kph	3127
104 kph	3135
112 kph (70 mph)	3135