Validation Report

Kansas, SPS-2
Task Order 15, CLIN 2
October 31 to November 1, 2006

List of Tables

List of Figures

1 Executive Summary

A visit was made to the Kansas 0200 on October 31 to November 1, 2006 for the purposes of conducting a validation of the WIM system located on I-70, 1 mile east of the Chapman exit. The SPS-2 is located in the righthand, westbound lane of a four-lane divided facility. The LTPP lane is the only lane that is instrumented at this site. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This site was installed as part of a relocation of the abandoned site located approximately 400 feet west of this site. This is the first validation visit to this location. The site was installed on June 6 through June 8, 2006 by IRD, and subsequently calibrated by the vendor on June 9, 2006.

This site meets all LTPP precision requirements except speed which is not considered sufficient to disqualify the site as having research quality data. The classification algorithm is not providing research quality classification information

The site is instrumented with bending plate and IRD/PAT Traffic iSINC electronics. It is installed in portland cement concrete, 400 feet long.

The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and an air suspension loaded to 77,290 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with standard rear tandem and an air suspension loaded to 64,850 lbs., the partial truck.

The validation speeds ranged from 49 to 70 miles per hour. The pavement temperatures ranged from 48 to 61 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 – 200200 – 01-Nov-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-4.8 ± 7.7%	Pass
Tandem axles	±15 percent	-1.1 ± 5.8%	Pass
GVW	±10 percent	-1.6 ± 4.6%	Pass
Speed	±1 mph [2 km/hr]	**0.0 ± 1.4 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The pavement condition appeared 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.

Profile data for this site was collected by the Regional Support Contract on June 5, 2006. As we have noted above, installation activities began on June 6, 2006, therefore the profile data collected was not utilized in the preparation of this report, as the scales were not installed at the time of its collection.

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

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

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

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

2 Corrective Actions Recommended

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

3 Post Calibration Analysis

This final analysis is based on test runs conducted November 1, 2006 during the early to late afternoon hours at test site 200200 on I-70. This SPS-2 site is at milepost 287 on the westbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for the calibration and for the subsequent validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and an air suspension loaded to 77,290 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with standard rear tandem and an air suspension loaded to 64,850 lbs., the partial truck.

Each truck made a total of *20* passes over the WIM scale at speeds ranging from approximately *49* to *70* miles per hour. The desired speed range *was* achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about *48* to *61* 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. The site did not pass the speed criteria, however this is not reason for failing the site as providing research quality loading data.

Table 3-1 Post-Validation Results – 200200 – 01-Nov-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-4.8 ± 7.7%	Pass
Tandem axles	±15 percent	-1.1 ± 5.8%	Pass
GVW	±10 percent	-1.6 ± 4.6%	Pass
Speed	±1 mph [2 km/hr]	**0.0 ± 1.4 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The test runs were conducted primarily during the early to mid-afternoon hours, resulting in a very 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 group. The distribution of runs by speed and temperature is illustrated in Figure 3-1. The figure indicates that the desired distribution of speed and temperature

combinations was not achieved for this set of validation runs due to the limited range of temperatures experienced during the test.

The three speed groups were divided as follows: Low speed – 49 to 55 mph, Medium speed – 56 to 64 mph and High speed – 65+ mph. The one temperature group, 48 to 61, degrees Fahrenheit is identified as Medium temperature.

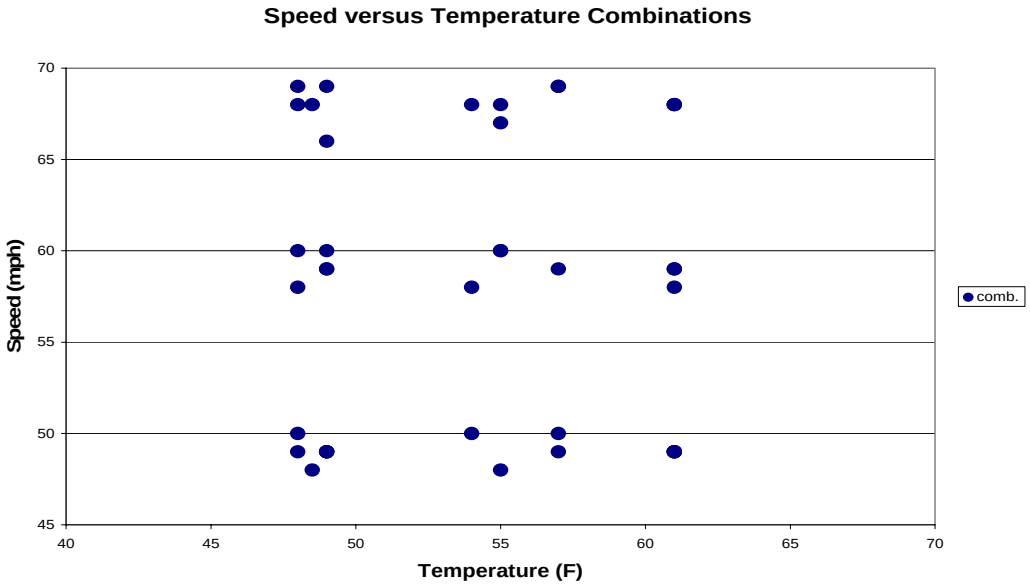

Figure 3-1 Post-Validation Speed-Temperature Distribution – 200200 – 01-Nov-2006

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

Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. From the figure, it appears that there is a tendency of the equipment to underestimate GVW in the medium and high speeds. Variability in error is somewhat greater in the high-speed range when compared with the low and medium speed ranges.

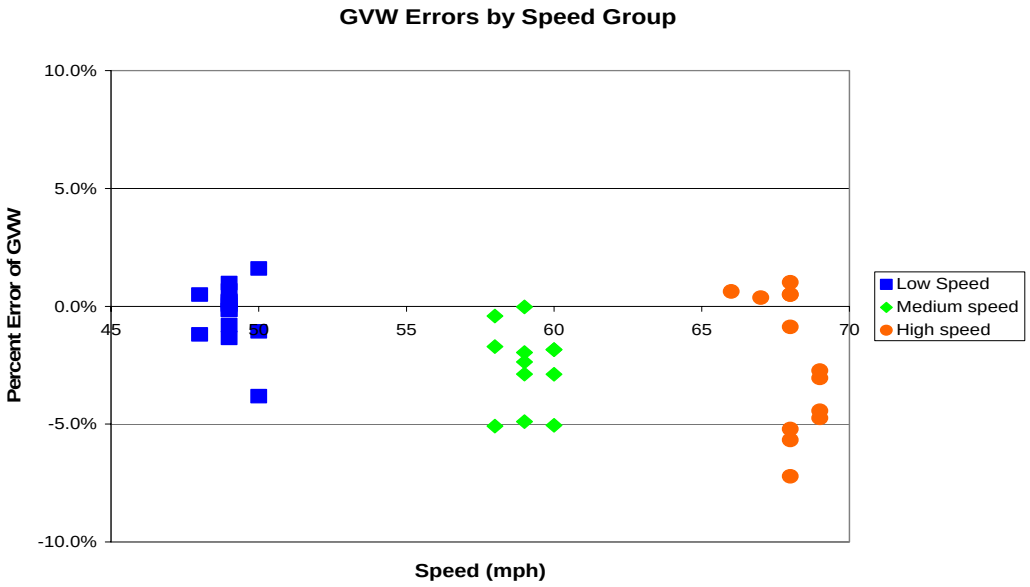

Figure 3-2 Post-validation GVW Percent Error vs. Speed – 200200 – 01-Nov-2006

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

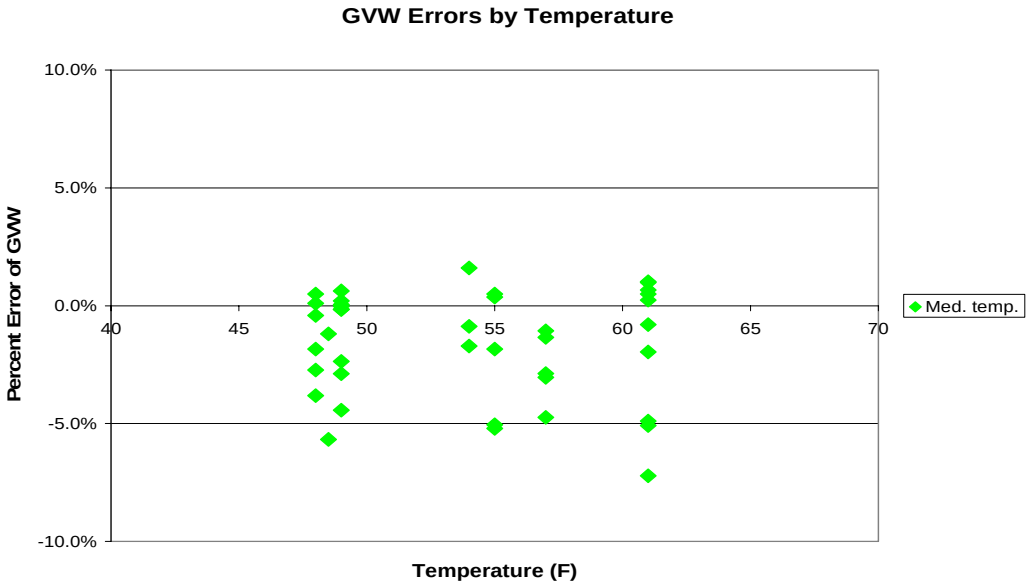

Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 200200 – 01-Nov-2006

Figure 3-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for

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

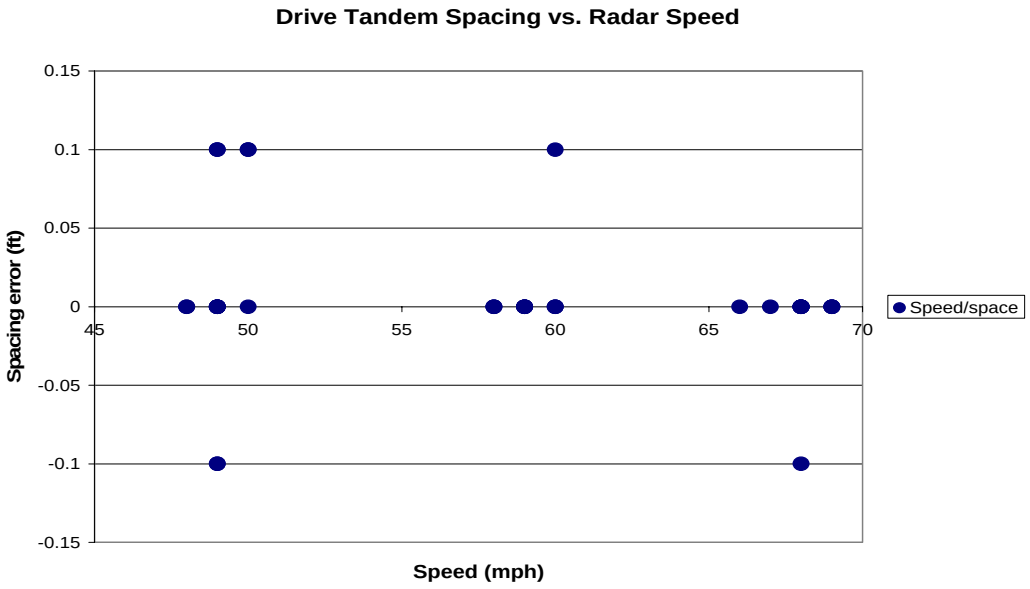

Figure 3-4 Post-Validation Spacing vs. Speed – 200200 – 01-Nov-2006

3.1 Temperature-based Analysis

The one temperature group was created by combining all of the runs between 48 and 61 degrees Fahrenheit as Medium temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 200200 – 01-Nov-2006

Element	**95% Limit**	**Medium Temperature 48-61 °F**
Steering axles	±20 %	-4.8 ± 7.7%
Tandem axles	±15 %	-1.1 ± 5.8%
GVW	±10 %	-1.6 ± 4.6%
Speed	±1 mph	**0.0 ± 1.4 mph**
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft

From Table 3-2, it appears that the equipment underestimates steering axle weights to a higher degree than tandem and GVW weights. The variability in steering axles also appears to be greater than that of tandem and GVW errors.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. From the figure, it appears that mean error is not particularly affected by temperature.

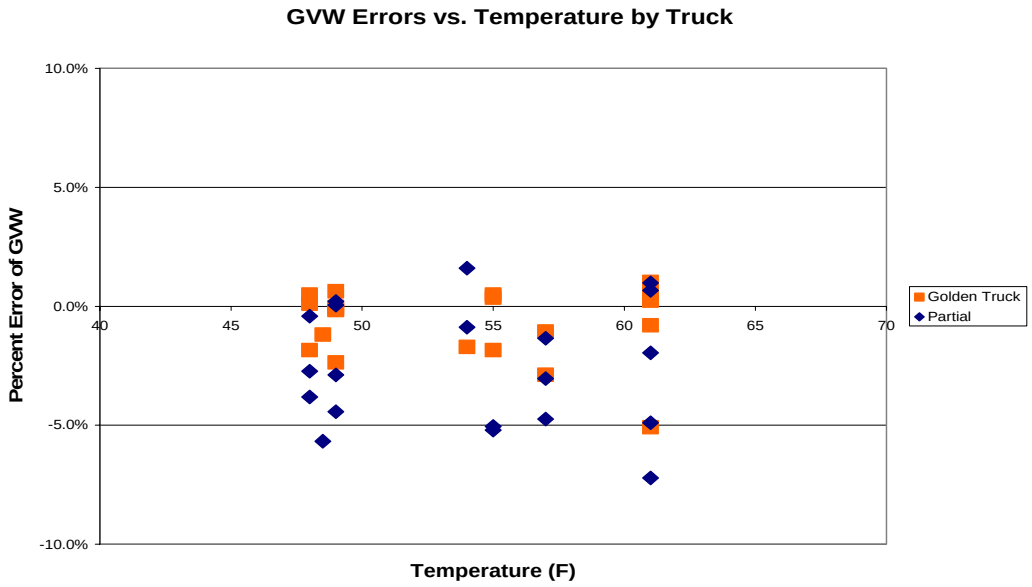

Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 200200 – 01-Nov-2006

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 equipment consistently underestimates steering axle weights through the temperature range. Variability in steering axle error appears to be consistent throughout the entire temperature range.

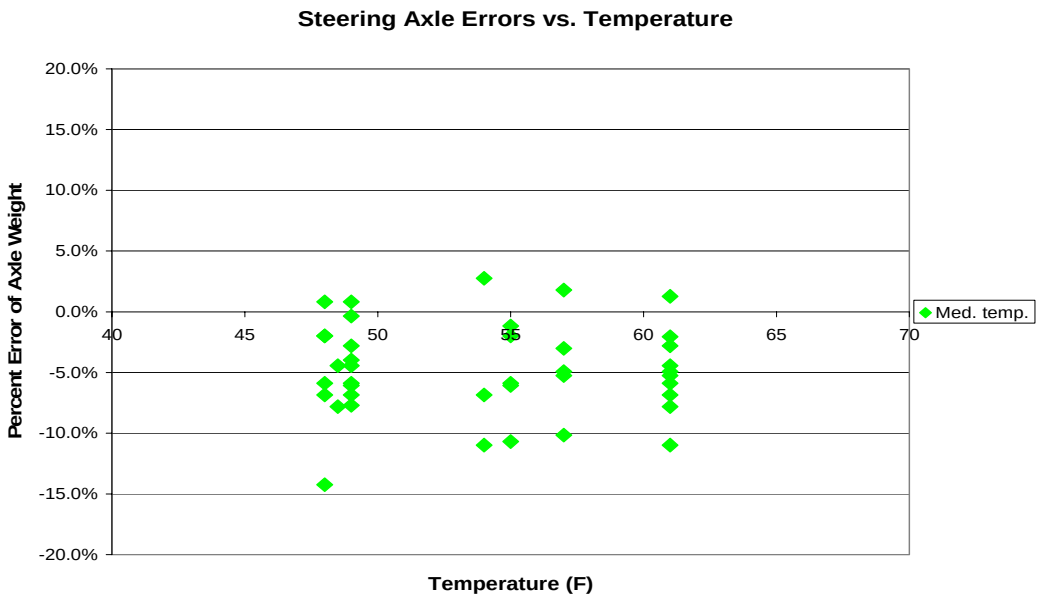

Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 200200 – 01-Nov-2006

3.2 Speed-based Analysis

The three speed groups were divided using 49 to 55 mph for Low speed, 56 to 64 mph for Medium speed and 65+ mph for High speed.

Table 3-3 Post-Validation Results by Speed Bin – 200200 – 01-Nov-2006

Element	95% Limit	Low Speed 49 to 55 mph	Medium Speed 56 to 64 mph	High Speed 65+ mph
Steering axles	±20 %	-2.9 ± 6%	-7.7 ± 8.3%	-4.4 ± 7.4%
Tandem axles	±15 %	0.2 ± 4.3%	-1.7 ± 5.8%	-2 ± 7.1%
GVW	±10 %	-0.3 ± 2.7%	-2.6 ± 3.7%	-2.4 ± 6.3%
Speed	±1 mph	0.1 ± 1.3 mph	-0.2 ± 1.6 mph	0.1 ± 1.7 mph
Axle spacing	± 0.5 ft	0.0 ± 0.2 ft	0.0 ± 0.1 ft	-0.1 ± 0.1 ft

From Table 3-3, it can be seen that the equipment tends to estimate tandem axle weights and GVW reasonably well at the lower speeds. For steering axles, the equipment tends to underestimate the weights at all speeds, and by a higher degree at medium and high speeds. Variability in tandem axle weight and GVW errors increases as speed increases. Steering axle variability is slightly greater at medium and high speeds when compared with low speeds.

Figure 3-7 illustrates the tendency for the system to estimate GVW for the Golden truck (squares) and the Partial truck (diamonds) reasonably well at the lower speeds. At the medium speeds, the system tends to underestimate GVW. At the higher speeds, the system tends estimate the Golden truck GVW reasonably well while underestimating

GVW for the Partial truck (diamonds). The inconsistency in the estimation of the two trucks' GVW at the higher speeds increases the variability in error in that speed range.

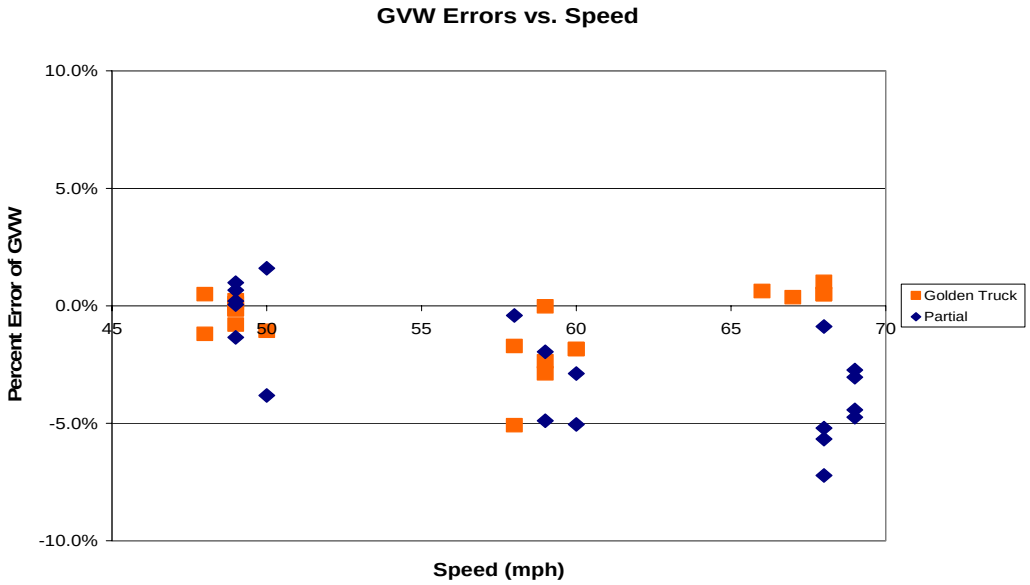

Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 200200 – 01-Nov-2006

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 underestimates steering axle weights at all speeds with the greatest underestimation at the medium speeds. The variability of error by truck seems to be consistent through the lower portion of the speed range.

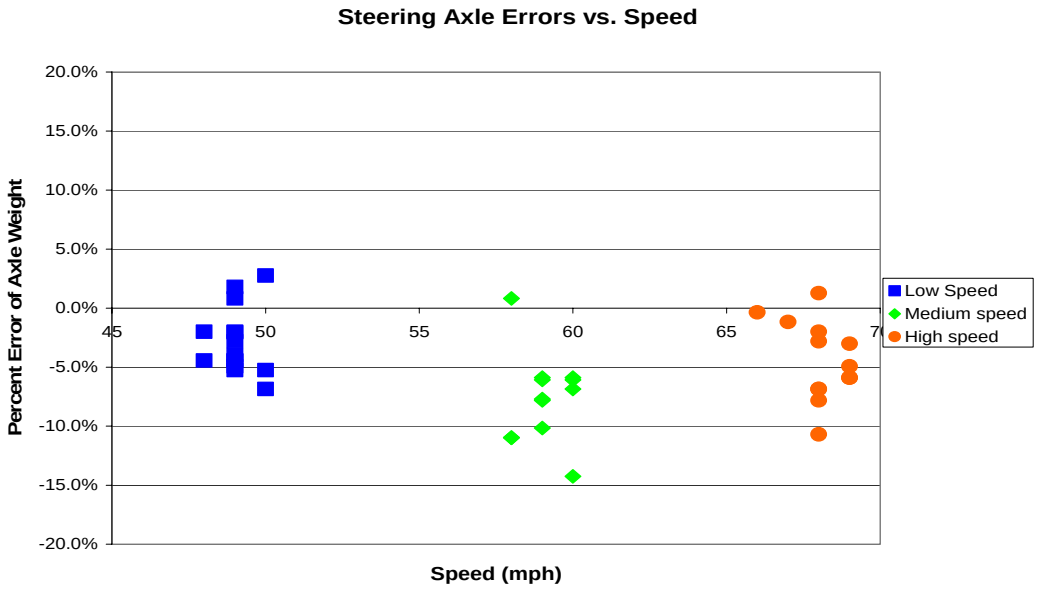

Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group – 200200 – 01-Nov-2006

3.3 Classification Validation

This LTPP installed site uses the FHWA 13-bin classification scheme and the LTPP classification algorithm. Classification 0 has been added to define unclassified vehicles.

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 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 4.9%. The large error rates for Classes 4 and 5 are a reflection of the very small sample size (one-Class 4 and four-Class 5s observed vs. one-Class 4 and three-Class 5s identified by the equipment). Of the three-Class 11s observed, one was identified as a Class 9 by the equipment due to irregular axle spacings.

Table 3-4 Truck Misclassification Percentages for 200200 – 01-Nov-2006

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	50	5	33	6	0
7	0				
8	0	9	1	10	0
11	33	12	0	13	N/A

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations with at least one Class 9 and only six of them 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. The large mean error rates for Class 4s and Class 11s in Table 3-5 reflect the small number of Class 4 vehicles and one misidentification of a Class 11 vehicle due to irregular axle spacings.

Table 3-5 Truck Classification Mean Differences for 200200 – 01-Nov-2006

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	100	5	0	6	0
7	0				
8	0	9	1	10	0
11	33	12	0	13	N/A

These error rates are normalized to represent how many vehicles of the class are expected to be over or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown are those identified by the equipment but no vehicles of the type were seen by the observer. There is no way to tell how many vehicles more than those identified by the equipment might actually present exist. N/A means no vehicles of the class were recorded by either the equipment or the observer. The classification errors are limited to Class 3, 4 and 5 vehicles, and a single Class 11 misidentification, which would not be considered significant enough to fail the site as providing research quality classification data if the criterion were limited to heavy trucks.

3.4 Evaluation by ASTM E-1318 Criteria

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

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

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

4 Pavement Discussion

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

4.1 Profile Analysis

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

4.2 Distress Survey and Any Applicable Photos

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

4.3 Vehicle-pavement Interaction Discussion

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

5 Equipment Discussion

The traffic monitoring equipment at this location includes bending plate and IRD/PAT Traffic iSINC. These sensors are installed in a staggered configuration in a portland cement concrete pavement about 400 ft in length.

All equipment and sensors were installed from June 6 to June 8, 2006 as part of the SPS WIM Phase II contract.

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. The trailing loop gave low resistive values between the loop wires and the cable shield; however, the loop appears to working properly.

Due to the presence of “ghost” axles during the pre-validation, sensor grounds were checked. These tests indicated lower resistive values that may indicate the presence of moisture at the sensor or in the cabling. Consultations with the manufacturer revealed that these readings are the result of water within the bending plate cable entry area, which creates an acceptable short between the bending plate and the frame. The manufacturer stated that the ghost axles were actually due to a signal threshold that was set too low. The manufacturer’s representative dialed into the site remotely and corrected the threshold setting.

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

5.2 Calibration Process

The equipment required one iteration of the calibration process between the initial 40 runs and the final 40 runs.

5.2.1 Calibration Iteration 1

For this equipment, there are 5 speed designated weight compensation factors that are adjusted to directly affect the weight reported by the WIM equipment. To reduce overestimation of weights these factors are reduced by the same percentage of the overestimation, and if the weights are underestimated, these factors are increased by the same percentage as the mean error.

For this equipment, the original compensation factors were:

- 55 mph – 3625
- 60 mph – 3625
- 65 mph – 3590
- 70 mph – 3665
- 75 mph – 3700

The results of the Pre-Validation from October 31, 2006 are illustrated in Figure 5-1. As shown, the equipment demonstrated a tendency to overestimate GVW at low speeds and underestimate GVW at medium and high speeds. Scatter appeared to be greater at the medium speeds. However, this appears to be a result of the problems associated with the axle detection function of the equipment for the heavy truck at medium speeds so the GVW error for the heavy truck was not used for the purposes of determining system calibration requirements at the medium speed range.

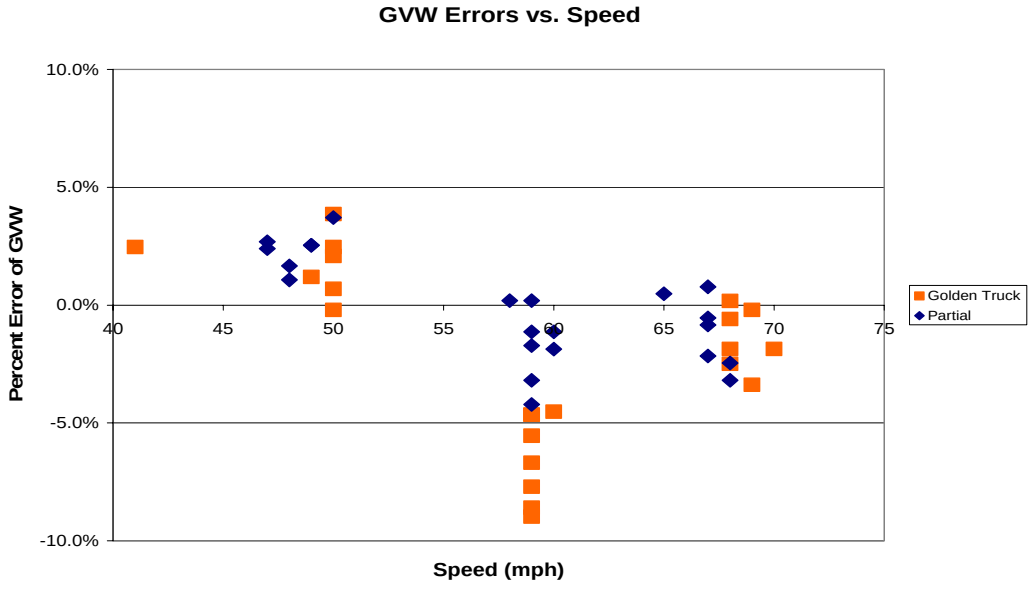

Figure 5-1 – Pre-Validation GVW Percent Error by Truck vs. Speed Group - 200200 – 31-Oct-2006

Based on the results from the Pre-Validation of October 31, 2006, which produced an error range of -4.0% to +4.0% (not considering the Golden truck errors at the medium speeds), the compensation factors were adjusted as follows:

- 55 mph – decreased 1.5% to 3570
- 60 mph – increased 1.5% to 3680
- 65 mph – increased 3.6% to 3720
- 70 mph – increased 2.5% to 3755
- 75 mph – not changed

Changes were made by the Phase II Contractor. Mr. James Cho was contacted by phone and subsequently dialed into the site to make the factor changes.

Results of the first iteration are shown in Table 5-1.

Table 5-1 Calibration Iteration 1 Results – 200200 – 01-Nov-2006 (12:13:00 PM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-4.9 ± 9.2%	Pass
Tandem axles	±15 percent	-1.0 ± 5.9%	Pass
GVW	±10 percent	-1.6 ± 4.4%	Pass
Speed	±1 mph	**0.4 ± 1.5 mph**	**Fail**
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	Pass

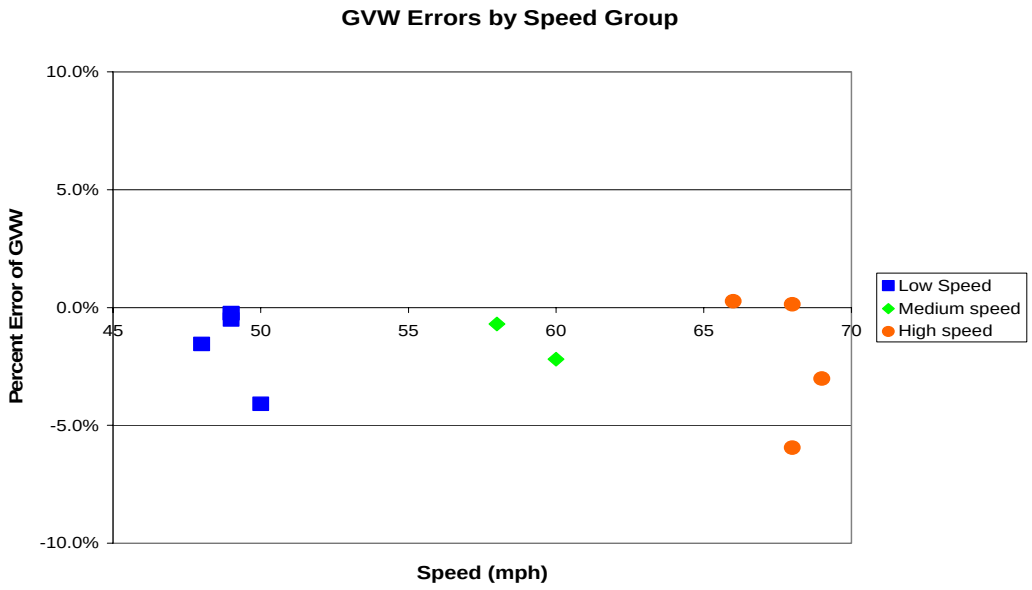

Figure 5-2 Calibration Iteration 1 GVW Percent Error vs. Speed Group – 200200 – 01-Nov-2006 (12:13:00 PM)

5.3 Summary of Traffic Sheet 16s

This site has validation information from the current visit in the tables below. Table 5-2 has the information that will be found in TRF_CALIBRATION_AVC for Sheet 16s submitted for the current visit. There are no prior validations of this installation.

Table 5-2 Classification Validation History – 200200 – 01-Nov-2006

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
11/01/06	Manual	1.2	0.0			0.0
10/31/06	Manual	3.0	22.2			0.0

Table 5-3 has the information found in TRF_CALIBRATION_WIM for Sheet 16s submitted prior to this validation as well as the information for the current visit.

Table 5-3 Weight Validation History – 200200 – 01-Nov-2006

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
11/01/06	Test Trucks	-1.6 (2.3)	-4.8 (3.8)	-1.1 (2.9)
10/31/06	Test Trucks	-1.2 (3.2)	-3.8 (4.7)	-1.8 (6.7)

5.4 Projected Maintenance/Replacement Requirements

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

Under a separate LTPP contract, this site is to be visited semi-annually for routine preventive equipment diagnostics and inspection. Annual validations are also anticipated.

6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted October 31, 2006 during the mid-morning to late afternoon hours at 200200 on I-70, 1 mile east of the Chapman exit. This SPS-2 site is at milepost 287 on the westbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for initial validation included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and an air suspension loaded to 78,660 lbs.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with standard rear tandem and an air suspension loaded to 68,070 lbs., the partial truck.

For the initial validation each truck made a total of 22 passes over the WIM scale at speeds ranging from approximately 41 to 70 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 33 to 38degrees 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.

Table 6-1 Pre-Validation Results – 200200 – 31-Oct-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	+20 percent	-3.8 ± 9.5%	Pass
Tandem axles	+15 percent	**-1.8 ± 13.3%**	**Fail**
GVW	+10 percent	-1.2 ± 6.5%	Pass
Speed	+1 mph [2 km/hr]	N/A	N/A
Axle spacing	+ 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The test runs were conducted primarily during the mid-morning to late afternoon hours, 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 used only one temperature group. 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 41 to 55 mph for Low speed, 56 to 64 mph for Medium speed and 65+ mph for High speed. The one temperature group was created by combining the runs from 33 to 38 degrees Fahrenheit as Medium temperature.

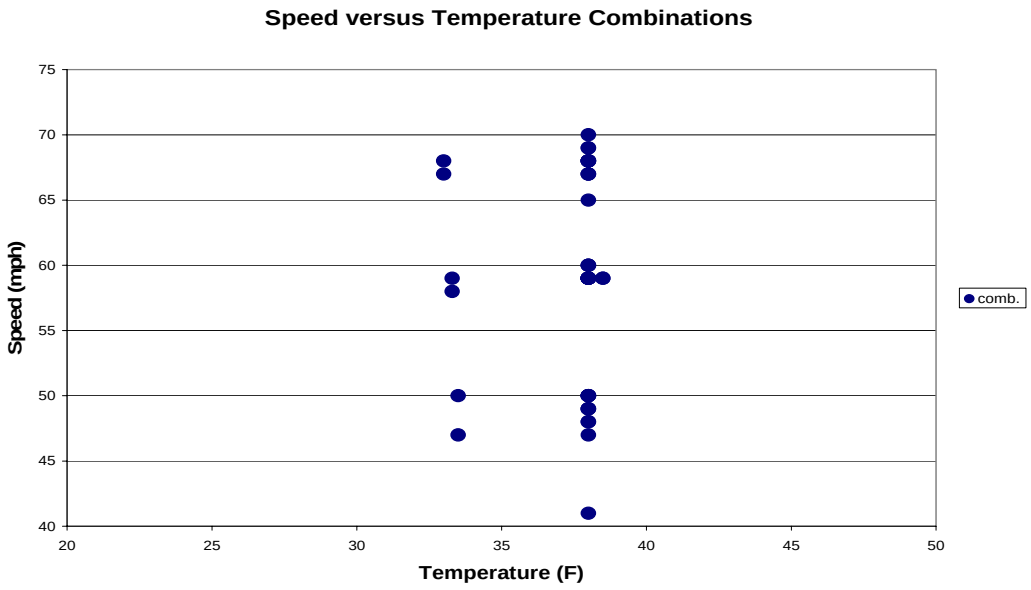

Figure 6-1 Pre-Validation Speed-Temperature Distribution – 200200 – 31-Oct-2006

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

Figure 6-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. The figure illustrates the tendency for the equipment to overestimate GVW at low speeds and underestimate GVW at medium and high speeds. Variability appears greater at the medium speeds.

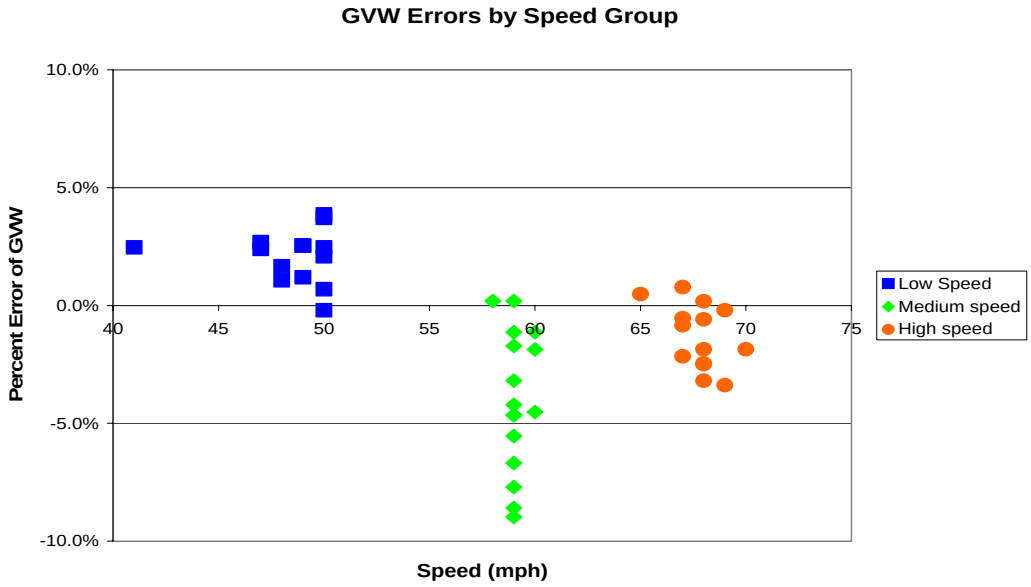

Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 200200 – 31-Oct-2006

Figure 6-3 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.

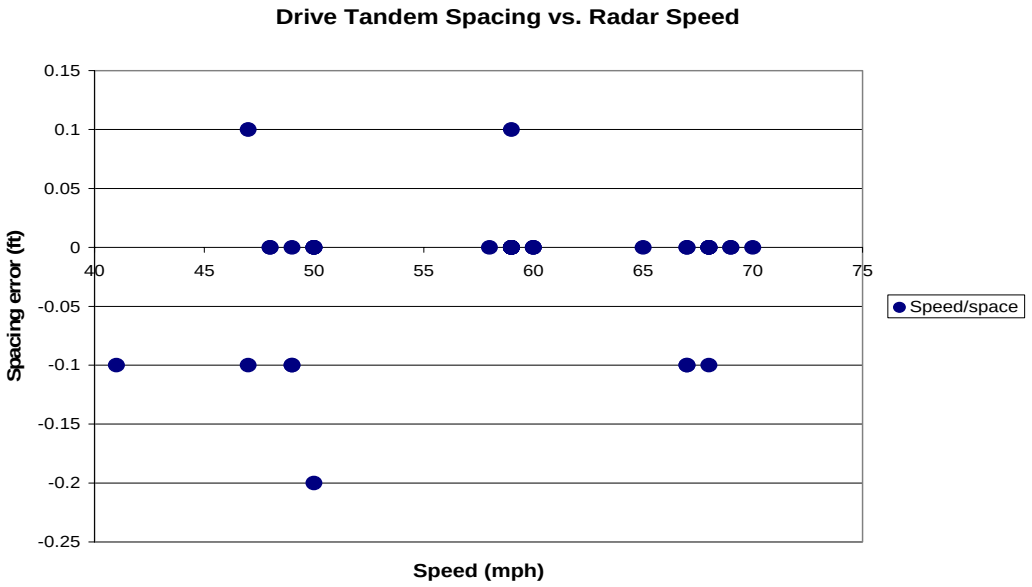

Figure 6-3 Pre-Validation Spacing vs. Speed - 200200 – 31-Oct-2006

6.1 Temperature-based Analysis

The one temperature group was created by combining all the runs from 33 to 38 degrees Fahrenheit as Medium temperature.

Table 6-2 Pre-Validation Results by Temperature Bin – 200200 – 31-Oct-2006

Element	**95% Limit**	**Medium Temperature 33-38 °F**
Steering axles	±20 %	-3.8 ± 9.5%
Tandem axles	±15 %	**-1.8 ± 13.3%**
GVW	±10 %	-1.2 ± 6.5%
Speed	±1 mph	N/A
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft

From Table 6-2, it can be seen that all weights are underestimated. Steering axles are underestimated by a greater degree. Variability in tandem axle weights exceeds research data quality requirements.

Figure 6-4 shows the distribution of GVW Errors versus Temperature by Truck. From the figure, it can be seen that the variability in GVW error is greater for the Golden truck (squares) than the Partial truck (diamonds).

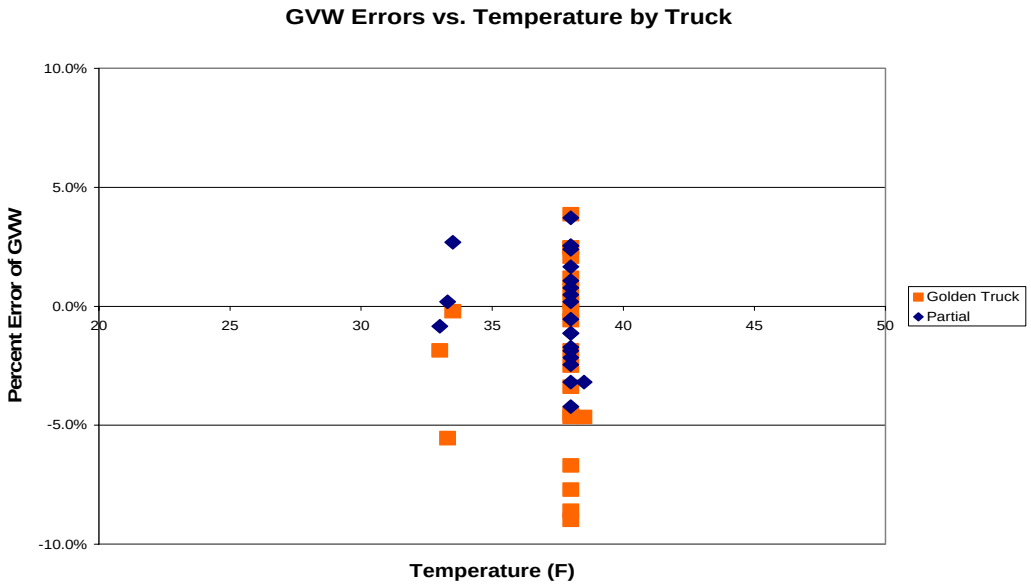

Figure 6-4 Pre-Validation GVW Percent Error vs. Temperature by Truck – 200200 – 31-Oct-2006

Figure 6-5 shows the relation between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

The figure shows that steering axle weights are consistently underestimated by the equipment over the temperature range.

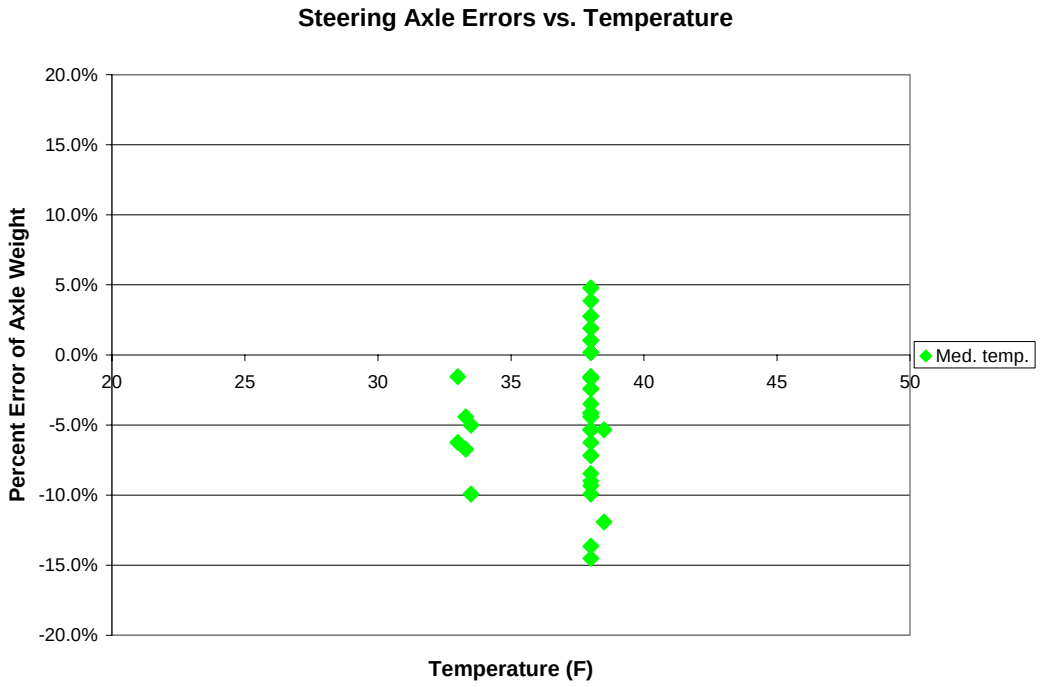

Figure 6-5 Pre-Validation Steering Axle Error vs. Temperature by Group – 200200 – 31-Oct-2006

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 41 to 55 mph, Medium speed – 56 to 64 mph and High speed – 65+ mph.

Table 6-3 Pre-Validation Results by Speed Bin – 200200 – 31-Oct-2006

Element	95% Limit	Low Speed 41 to 55 mph	Medium Speed 56 to 64 mph	High Speed 65+ mph
Steering axles	+20 %	-0.1 ± 9.6%	-7.1 ± 8%	-3.8 ± 6.9%
Tandem axles	+15 %	-0.5 ± 20.8%	-3.7 ± 10%	-0.9 ± 4.8%
GVW	+10 %	2.1 ± 2.4%	-4 ± 6.3%	-1.3 ± 2.9%
Speed	+1 mph	N/A	N/A	N/A
Axle spacing	+ 0.5 ft	0.0 ± 0.2 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

From Table 6-3, it can be seen that the underestimation of all weights is greatest at the medium speeds. At low speeds, Steering and Tandem weights are slightly underestimated while GVW is overestimated. At high speeds, all weights are underestimated, however steering axle weights by a higher degree. Variability in errors for all steering and tandem weights appear to decrease as speed increases while GVW variability appears to be greatest at medium speeds.

Figure 6-6 illustrates the tendency of the equipment to overestimate GVW for both trucks at low speeds and underestimate GVW for both trucks at high speeds. At medium speeds, the equipment appears to underestimate GVW for both trucks; however, the underestimation of the GVW for the Golden truck (squares) appears to be much greater than the underestimation for the Partial truck (diamonds). Variability in GVW error increases at medium speeds apparently due to different truck responses at this speed point.

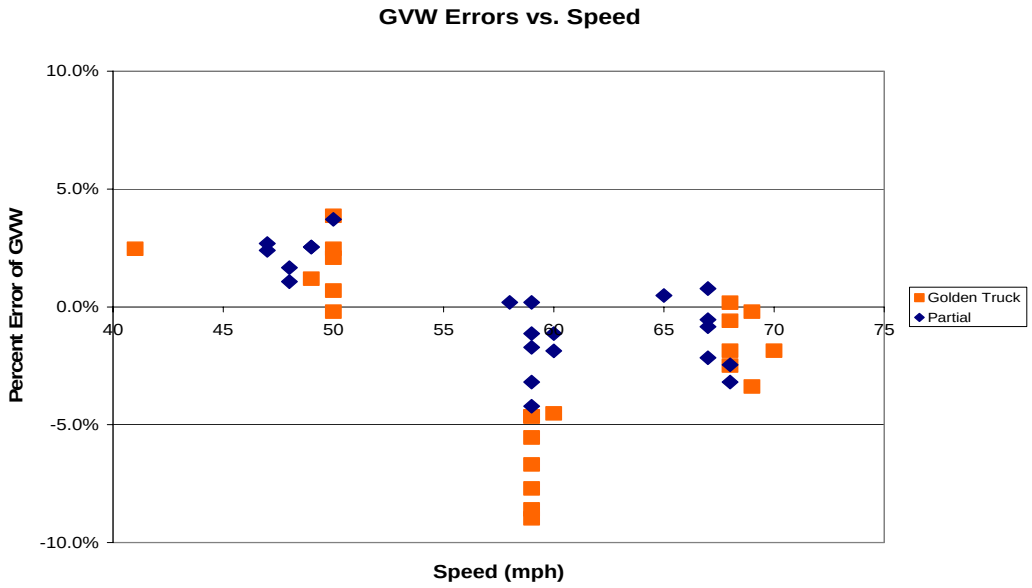

Figure 6-6 Pre-Validation GVW Percent Error vs. Speed Group - 200200 –31-Oct-2006

Figure 6-7 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From the figure, it appears that the equipment generally estimates steering axle weights reasonably well at lower speeds; however, the equipment underestimates steering axle weights at medium and high speeds. Variability in steering axle error appears to be reasonably consistent throughout the entire speed range.

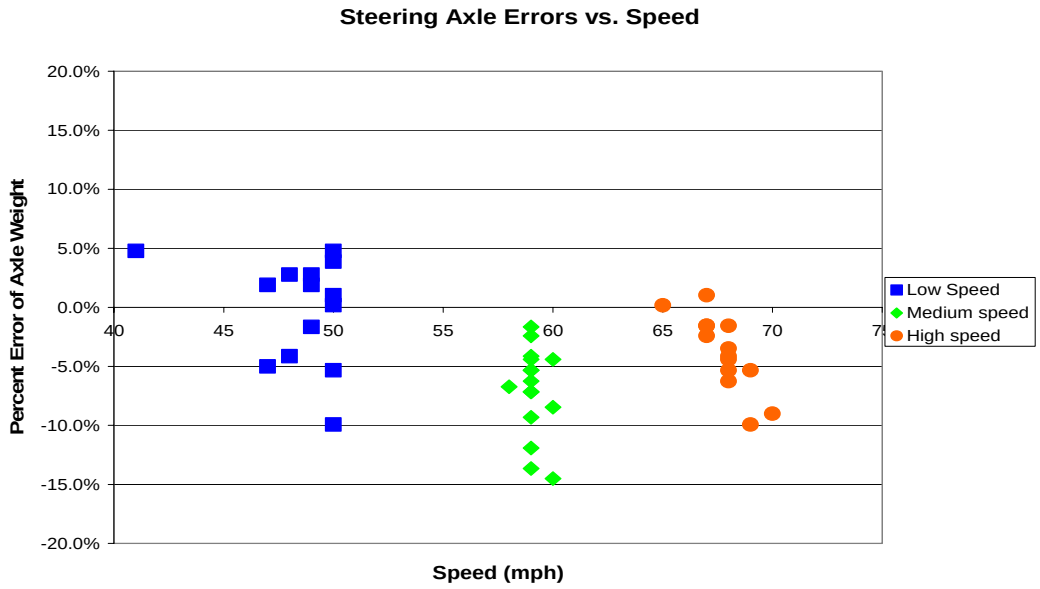

Figure 6-7 Pre-Validation Steering Axle Percent Error vs. Speed Group - 200200 – 31-Oct-2006

6.3 Classification Validation

This LTPP installed site uses the FHWA 13-bin classification scheme and the LTPP classification algorithm. Classification 0 has been added to define unclassified vehicles.

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 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 14. The large size of the errors reflects the small number of vehicles in Classes 3, 4 and 5 included in the sample. The misclassifications of the heavier trucks, classes 8 through 13, were due to an equipment malfunction where “ghost” axles were being detected as valid axles by the equipment. The malfunction was rectified prior to performing the post-validation classification study by the manufacturer remotely. They raised the threshold level of the system which prevented the system from identifying signal ringing as valid axle hits.

Table 6-4 Truck Misclassification Percentages for 200200 – 31-Oct-2006

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	75	5	50	6	0
7	N/A				
8	18	9	3	10	N/A
11	25	12	0	13	100

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

Table 6-5 Truck Classification Mean Differences for 200200 – 31-Oct-2006

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	-50	5	-75	6	0
7	N/A				
8	22	9	3	10	N/A
11	-25	12	0	13	-100

These error rates are normalized to represent how many vehicles of the class are expected to be over- or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown are those identified by the equipment but no vehicles of the type were seen by the observer. There is no way to tell how many vehicles of that type might actually exist. N/A means no vehicles of the class were recorded by either the equipment or the observer. The high error rates were the result of an equipment malfunction where "ghost" axles were being detected by the equipment and processed as valid axles, resulting in a high number of misidentifications by the 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%	98%	Pass
GWV	± 10%	100%	Pass

6.5 Prior Validations

There is no prior validation for this site.

7 Data Availability and Quality

As of October 31, 2006 this site does not have at least 5 years of research quality data. Research quality data is defined to be at least 210 days in a year of data of known calibration meeting LTPP's precision requirements.

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

The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. As can be seen from the table none of the years have a sufficient quantity to be considered complete years of data.

Table 7-1 Amount of Traffic Data Available 200200 – 31-Oct-2006

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1992	191	9	Full Week	79	4	Full Week
1993	70	5	Full Week	51	4	Full Week
1994	104	4	Full Week	4	1	Weekdays and weekend days

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 from the end of the last calibration iteration the following are the expected values for these populations. The precise values to be used in data review will need to be determined by the RSC on receipt of the first 14 days of data after the successful validation. For sites that do not meet LTPP precision requirements, this period may still be used as a starting point from which to track scale changes.

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

- Class 9 overweights are defined as the percentage of vehicles greater than 88,000 pounds
- Class 9 underweights are defined as the percentage of vehicles less than 20,000 pounds.
- Class 9 unloaded peak is the bin less than 44,000 pounds with the greatest percentage of trucks.
- Class 9 loaded peak is the bin 60,000 pounds or larger with the greatest percentage of trucks.
- 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 7-2 GVW Characteristics of Major sub-groups of Trucks – 200200 – 01-Nov-2006

Characteristic	Class 5	Class 9
Percentage Overweights	0.0	0.0
Percentage Underweights	2.9	0.0
Unloaded Peak		36,000 lbs
Loaded Peak		80,000 lbs
Peak	12,000 lbs	

The expected percentage of unclassified vehicles is 2.1%. 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.

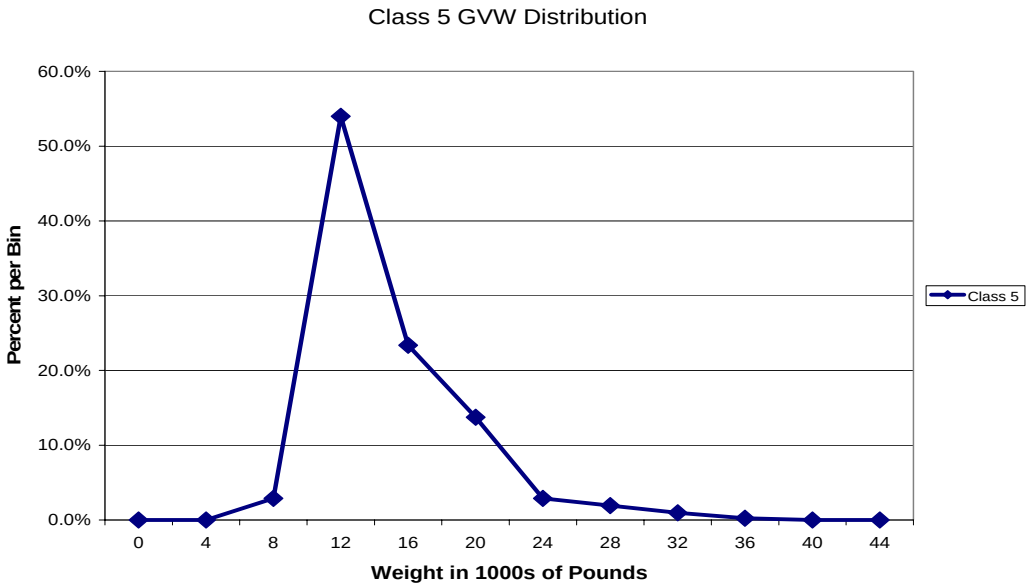

Figure 7-1 Expected GVW Distribution Class 5 – 200200 – 01-Nov-2006

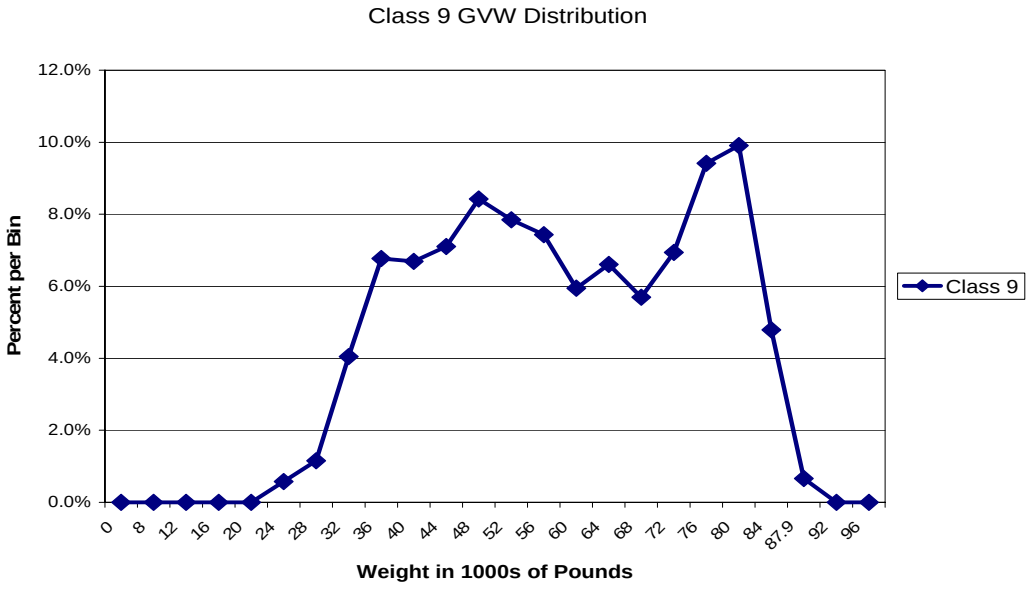

Figure 7-2 Expected GVW Distribution Class 9 – 200200 – 01-Nov-2006

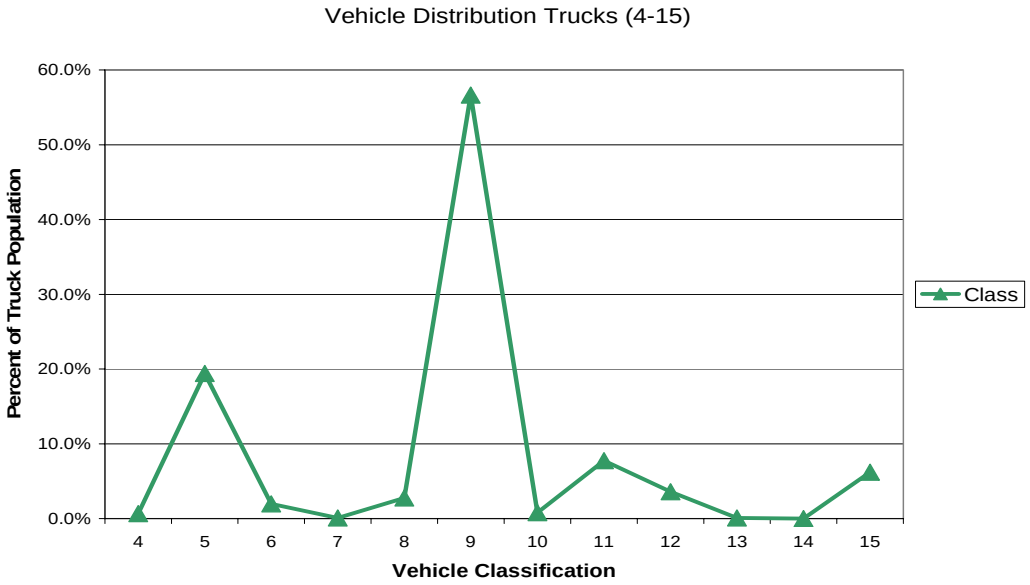

Figure 7-3 Expected Vehicle Distribution – 200200 – 01-Nov-2006

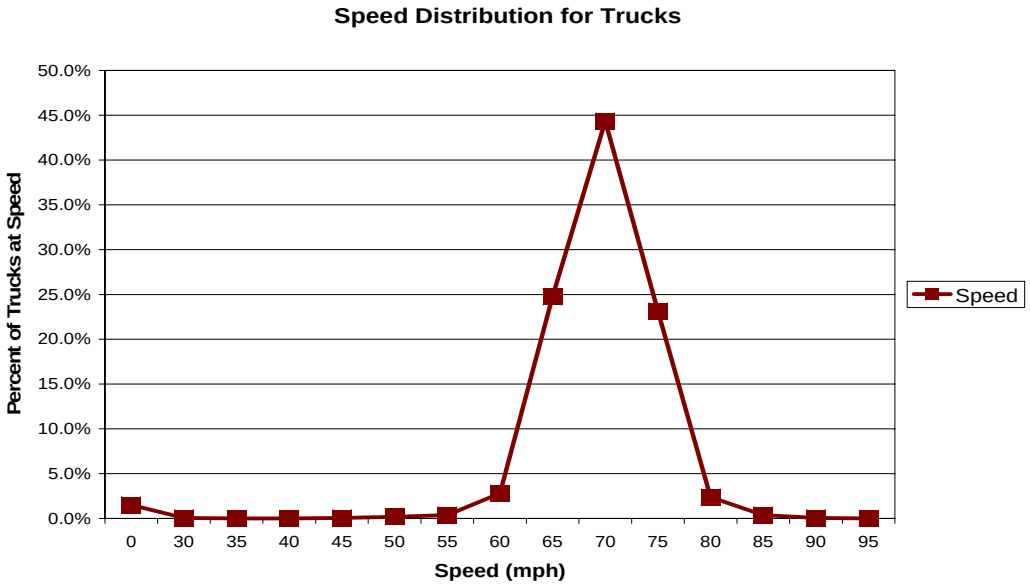

Figure 7-4 Expected Speed Distribution – 200200 – 01-Nov-2006

8 Data Sheets

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

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

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

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

Sheet 22 – Site Equipment Assessment (8 pages)

Calibration Iteration 1 Worksheets – (1 page)

Truck Photographs (6 pages)

9 Updated Handout Guide and Sheet 17

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

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: Kansas

SHRP ID: 0200

Figures

1. General Information

SITE ID: *200200*

LOCATION: *Interstate 70 West at M.P. 287.57*

VISIT DATE: *October 31 and November 1, 2006*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *Bill Hughes, 785-296-6863, bhughes@ksdot.org*

Bill Parcells, 785-291-3846, billp@ksdot.org

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

FHWA Division Office Liaison: *Kirk Fredrichs, 785-267-7299 x326, kirk.fredrichs@fhwa.dot.gov*

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

3. Agenda

BRIEFING DATE: *Briefing canceled by Bill Parcells.*

ON SITE PERIOD: *October 31, 2006 and November 1, 2006, beginning at 9:00 a.m.*

TRUCK ROUTE CHECK: *Completed. See truck route.*

4. Site Location/ Directions

NEAREST AIRPORT: *Kansas City International Airport, Kansas City, Kansas.*

DIRECTIONS TO THE SITE: *1 mile West of Chapman Interchange, East of Abilene, Kansas*

MEETING LOCATION: *On Site, October 31, 2006 beginning at 9:00 a.m.*

WIM SITE LOCATION: *Interstate 70 West at M.P. 287.48* (*Latitude: 38.9902^0 and Longitude: 97.9992^0*)

WIM SITE LOCATION MAP:*See Figure 4.1*

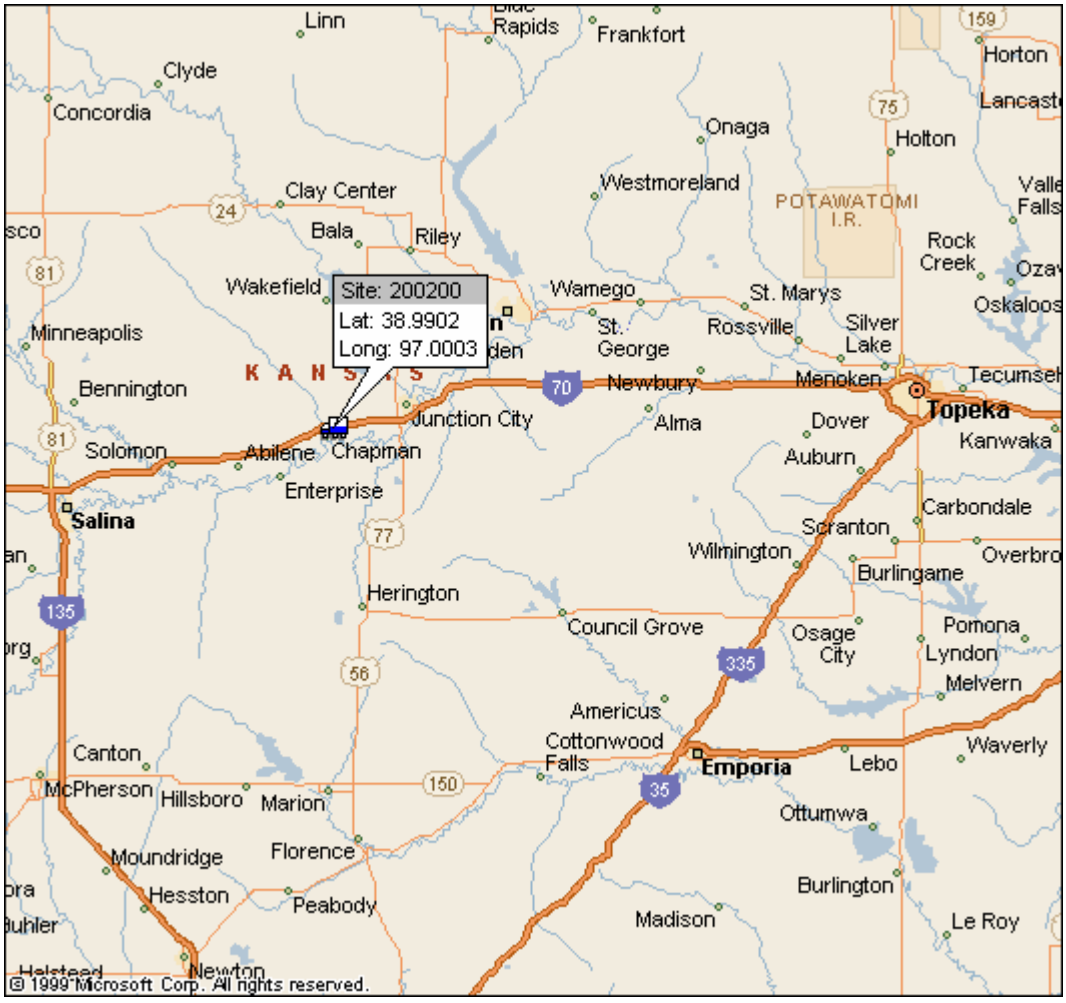

Figure 4-1 – Site 200200 Location in Kansas

5. Truck Route Information

ROUTE RESTRICTIONS: *None.*

SCALE LOCATION: *De Bruce Grain, 513 W. First St., Abilene, Kansas. Manager – Brent Martin, phone: (785) 263-7275. Open from 7:30 a.m. to 5:00 p.m. (14.1 miles from site)*

TRUCK ROUTE:

East – 2.7 miles to exit 290 on I-70 (Milford Lake Road)
West – 1.1 miles to exit 286 on I-70 (Chapman)
Length of truck turnaround is 3.8 miles

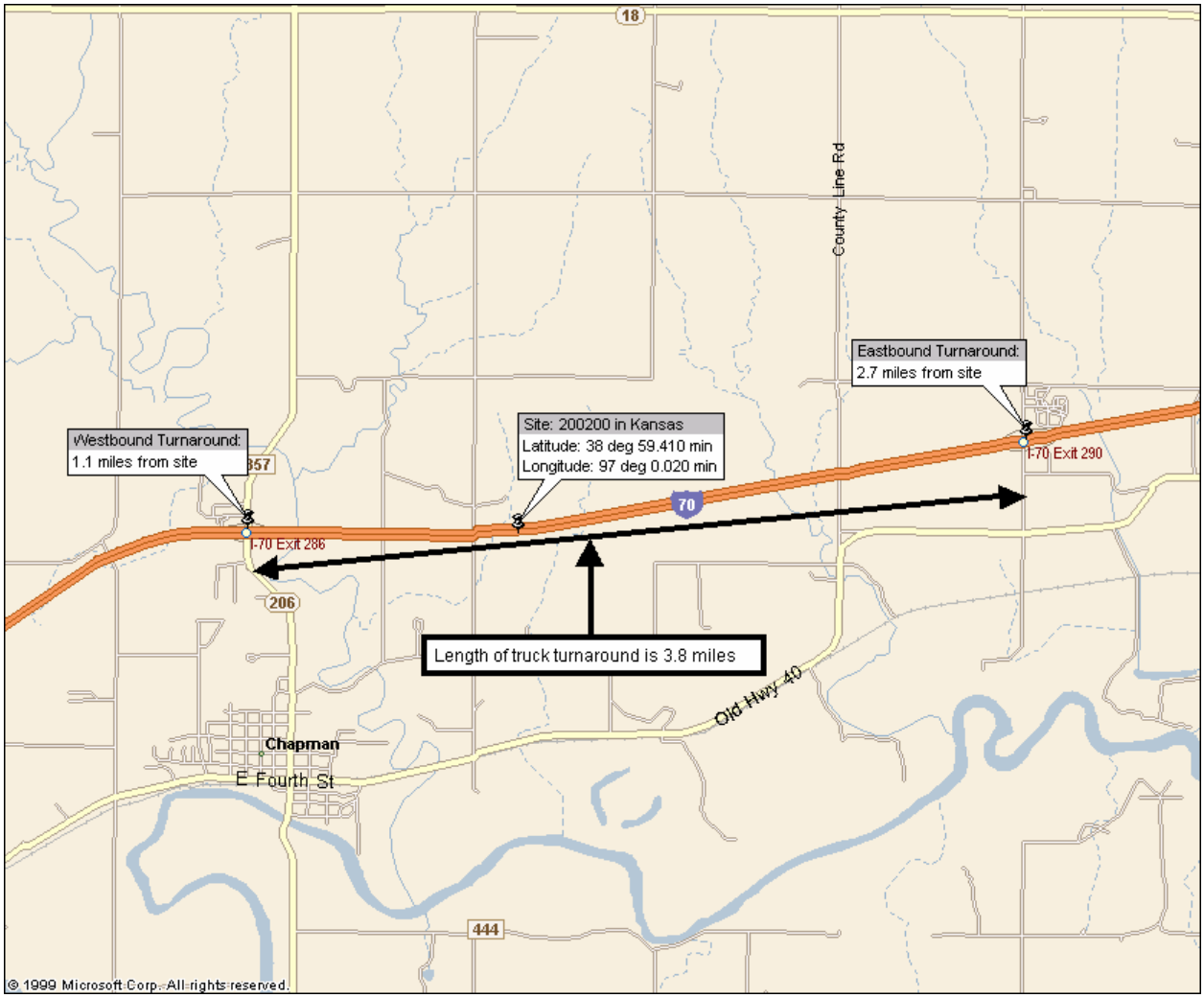

Figure 5-1 – Truck Route of 200200 in Kansas

6. Sheet 17 – Kansas (200200)

1.* ROUTE ___I-70_____ MILEPOST __287.57_ LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade __~ 1___ % Sag vertical Y / N
Nearest SPS section upstream of the site _2_0_0_2_1_2_
Distance from sensor to nearest upstream SPS Section ___7_8_2___ ft

3.* LANE CONFIGURATION
Lanes in LTPP direction __2__ Lane width _1_2_ ft

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

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

Shoulder width __1_0__ ft

4.* PAVEMENT TYPE __Portland concrete cement_____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date:_10/31/06_ Filename: Upstream_TO_15_20_2.72_0200_10_31_06.jpg _____
Date _10/31/06_ Filename: Downstream_TO_15_20_2.72_0200_10_31_06.jpg ___
Date _____ Filename: _____

6. * SENSOR SEQUENCE _____ loop-weighpad-weighpad-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 ___ __4 . 0__ 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 _7_2__ ft
Distance from system _7_8_ __ ft
TYPE _____3R_____

CABINET ACCESS controlled by LTPP / STATE / JOINT ?
Contact - name and phone number _Bill Hughes (785) 296-6863_____
Alternate - name and phone number _ Bill Parcells - (785) 291-3846____

11. * POWER

Distance to cabinet from drop _4_3_8_ ft Overhead/underground/solar/AC in cabinet?
Service provider _____ Phone number _____

12. * TELEPHONE

Distance to cabinet from drop ___ __1___ ft Overhead / under ground / cell?
Service provider _____ Site Phone Number _(785) 922-6231____

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

14. * TEST TRUCK TURNAROUND time __12___ minutes DISTANCE __7 . 6__ mi.

15. PHOTOS FILENAME

Power source _ Power_Box_TO_15_20_2.72_0200_10_31_06.jpg _____
Phone source _ Telephone_Box_TO_15_20_2.72_0200_10_31_06.jpg _____
Cabinet exterior _ Cabinet_Exterior_TO_15_20_2.72_0200_10_31_06.jpg _____
Cabinet interior _ Cabinet_Interior_Front_TO_15_20_2.72_0200_10_31_06.jpg ___
_ Cabinet_Interior_Back_TO_15_20_2.72_0200_10_31_06.jpg ___
Weight sensors _ Leading_WIM_Sensor_TO_15_20_2.72_0200_10_31_06.jpg ___
_ Trailing_WIM_Sensor_TO_15_20_2.72_0200_10_31_06.jpg ___
Classification sensors _____
Other sensors _ Loop Sensors_____
Description _ Leading_Loop_Sensor_TO_15_20_2.72_0200_10_31_06.jpg ___
_ Trailing_Loop_Sensor_TO_15_20_2.72_0200_10_31_06.jpg ___
Downstream direction at sensors on LTPP lane
_ Downstream_TO_15_20_2.72_0200_10_31_06.jpg ___
Upstream direction at sensors on LTPP lane
_ Upstream_TO_15_20_2.72_0200_10_31_06.jpg _____

COMMENTS _ _____
_____GPS Coordinates: Latitude: 38.9902^0 and Longitude: -97.9992^0_____
_____
_____
__Amenities:_____
_____West: exit 275 on I-70, Abilene – 12.1 miles from site_____
_____BP Gas, Holiday Inn Express, Super 8, various restaurants_____
_____
_____East: exit 295 on I-70 – 6.9 miles from site_____
_____Motel 6, Phillips 66 Gas, Conoco Gas_____
_____
_____exit 296 on I-70 – 8.5 miles from site_____
_____Comfort Inn, Ramada Ltd, Days Inn, various gas stations & restaurants_____
_____
_____exit 298 on I-70 – 9.9 miles from site_____
_____Holiday Inn Express, various gas stations & restaurants, Wal-Mart _____
_____
_____Speed Limit – 70 mph_____
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____ Expected Test Truck Speeds: 50, 60 and 70 mph_____
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COMPLETED BY __Dean J. Wolf_____

PHONE _____301-210-5105_____ DATE COMPLETED _1_0_ /_3_1_ / _2_0_0_6__

Sketch of equipment layout

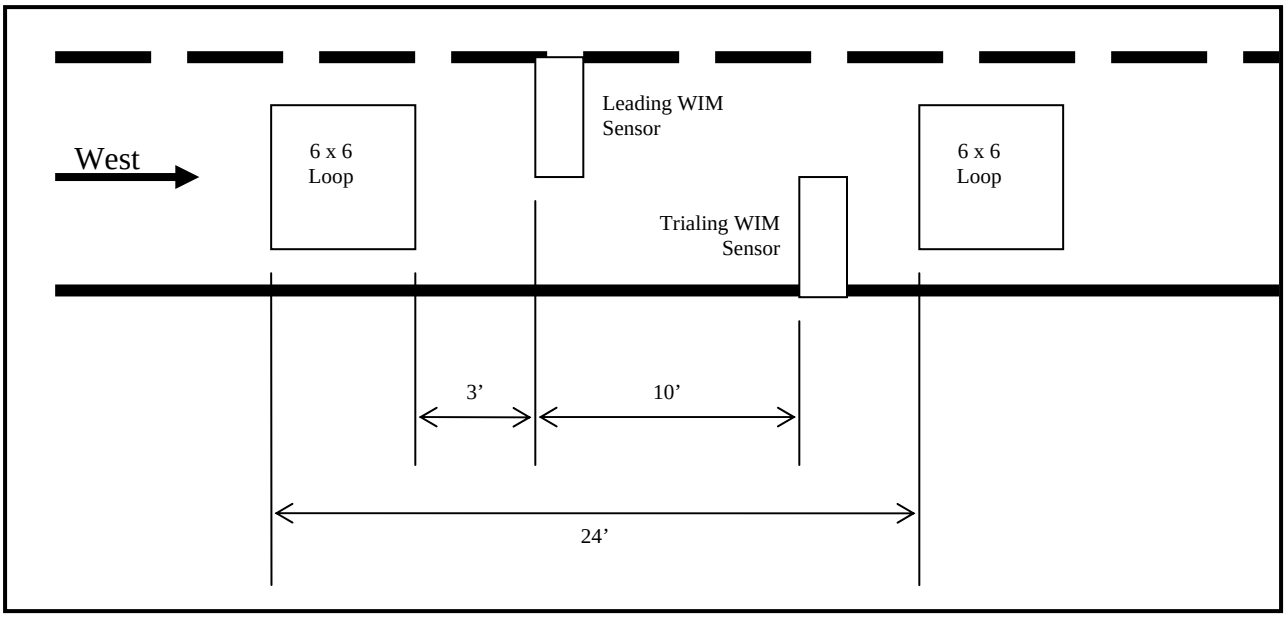

Figure 6-1 – Equipment Layout of Site 200200 in Kansas

Site Map

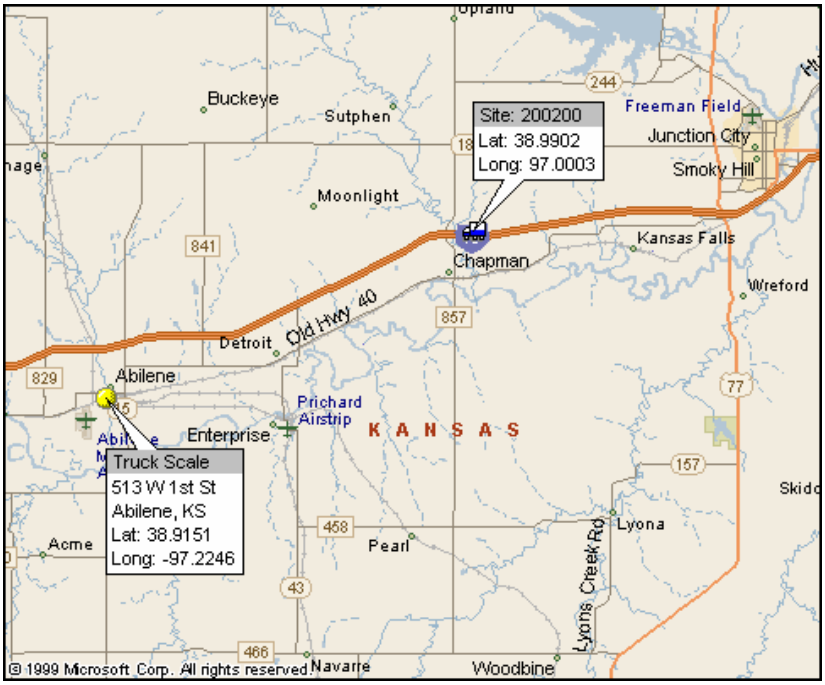

Figure 6-2 - Site map of 200200 in Kansas

Figure 6-3 – Downstream_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-4 – Upstream_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-5 – Cabinet_Interior_Front_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-6 – Cabinet_Interior_Back_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-7 – Leading_Loop_Sensor_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-8 – Leading_WIM_Sensor_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-9 – Trailing_WIM_Sensor_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-10 – Trailing_Loop_Sensor_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-11 – Power_Box_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6-12 – Telephone_Box_TO_15_20_2.72_0200_10_31_06.jpg

SHEET 18	STATE CODE	[_2_0_]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID	[_0_2_0_0_]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy)	_1_0_ / _3_1_ / _2_0_0_6_

Rev. 05/25/04

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 _____
      - ■ 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 __1___ □ days ■ weeks

b. Notice for straightedge and grinding check - ___1___ □ 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 _____	□ 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:

_____Hammell Scale_____

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/PAT Traffic_____

b. Maintenance (equipment) –

Name: ___Bill Hughes _____ Phone:(785) 296-6863

Agency: _____

c. Data Processing and Pre-Visit Data –

Name: ____Bill Hughes _____ Phone:(785) 296-6863__

Agency: _____

d. Construction schedule and verification –

Name: ____Bill Hughes _____ Phone: (785) 296-6863

Agency: _____

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

Name: __DeBruce Grain _____ Phone: __785-263-7275____

Agency: __Brent Martin _____

f. Traffic Control –

Name: _____ Phone: _____

Agency: _____

g. Enforcement Coordination –

Name: _____ Phone: _____

Agency: _____

h. Nearest Static Scale

Name: De Bruce Grain Location: 513 W. First St., Abilene, Kansas

Phone: Manager – Brent Martin, phone: (785) 263-7275

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [_2_0_] *SHRP SECTION ID [_0_2_0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_1_0_ / _3_1_ / _2_0_0_6_]

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 __x_ NEW EQUIPMENT INSTALLATION
   __x_ OTHER (SPECIFY) ___LTPP Validation_____

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

5. EQUIPMENT MANUFACTURER ____IRD/PAT Traffic_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

   __ __ __ NUMBER OF TRUCKS COMPARED __ _2__ NUMBER OF TEST TRUCKS USED

   __ __ __ PASSES PER TRUCK

TYPE PER FHWA 13 BIN SYSTEM SUSPENSION: 1 - AIR; 2 - LEAF SPRING 3 - OTHER (DESCRIBE)	TRUCK	TYPE	SUSPENSION
	1	___9____	__1_____
	2	___9____	__1_____
	3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW ___ ___ _- 1 . 2_ STANDARD DEVIATION __ _ 3 . 2 _
   DYNAMIC AND STATIC SINGLE AXLES ___ ___ _- 3 . 8_ STANDARD DEVIATION __ _ 4 . 7 _
   DYNAMIC AND STATIC DOUBLE AXLES ___ ___ _- 1 . 8_ STANDARD DEVIATION __ _ 6 . 7 _

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ __50, 60, 70 _____ _____ _____ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___ _3_6_6_5 ___ ___

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 ____ __ 3 . 0 ___	FHWA CLASS ____	____ ____ ____ ____
*** FHWA CLASS 8 ____ _2 2 . 2 ___	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____

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

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, MACTEC E&C_____
CONTACT INFORMATION: ___301-210-5105_____ rev. November 9, 1999

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [_2_0_] *SHRP SECTION ID [_0_2_0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_1_1_ / _0_1_ / _2_0_0_6_]

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 __x_ NEW EQUIPMENT INSTALLATION
   __x_ OTHER (SPECIFY) ___LTPP Validation_____

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

5. EQUIPMENT MANUFACTURER ____IRD/PAT Traffic_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

   __ __ __ NUMBER OF TRUCKS COMPARED __ _2__ NUMBER OF TEST TRUCKS USED

   __ __ __ PASSES PER TRUCK

TYPE PER FHWA 13 BIN SYSTEM SUSPENSION: 1 - AIR; 2 - LEAF SPRING 3 - OTHER (DESCRIBE)	TRUCK	TYPE	SUSPENSION
	1	___9____	__1_____
	2	___9____	__1_____
	3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW ___ ___ _- 1 . 6_ STANDARD DEVIATION __ _ 2 . 3 _
   DYNAMIC AND STATIC SINGLE AXLES ___ ___ _- 4 . 8_ STANDARD DEVIATION __ _ 3 . 8 _
   DYNAMIC AND STATIC DOUBLE AXLES ___ ___ _- 1 . 1_ STANDARD DEVIATION __ _ 2 . 9 _

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ __50, 60, 70 _____ _____ _____ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___3_7_2_0___ ___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:

*** FHWA CLASS 9 ____ __ 1 . 2 ___	FHWA CLASS ____	____ ____ ____ ____
*** FHWA CLASS 8 ____ __ 0 . 0 ___	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____

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

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, MACTEC E&C_____
CONTACT INFORMATION: ___301-210-5105_____ rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE	20
LTPP Traffic Data	* SPS PROJECT ID	SPS-2
*CALIBRATION TEST TRUCK # 1	* DATE	10/31/00

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

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

GVW (same units as axles)

7. a) Empty GVW _____ *b) Average Pre-Test Loaded weight _____
*c) Post Test Loaded Weight _____
*d) Difference Post Test – Pre-test _____

GEOMETRY

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

9. a) * Make: KENWORTH b) * Model: W900L

10.* Trailer Load Distribution Description:

grain in bulks

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE_CODE	20
LTPP Traffic Data	* SPS PROJECT ID	SPS-2
*CALIBRATION TEST TRUCK # 1	* DATE	10/31/06

Rev. 08/31/01

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

A to B 20.0 B to C 4.4 C to D 31.0

D to E 4.1 E to F

Wheelbased (measured A to last) Computed

13. *Kingpin Offset From Axle B (units) +3.1 ( )
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R24.5	4 full springs
B	11R24.5	air
C	11R24.5	air
D	11R24.5	air
E	11R24.5	air
F		

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

Sheet 19	* STATE_CODE	20
LTPP Traffic Data	* SPS PROJECT ID	SD-2
*CALIBRATION TEST TRUCK # 1	* DATE	10/31/00

Rev. 08/31/01

PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

Sheet 19	* STATE CODE	20
LTPP Traffic Data	* SPS PROJECT ID	SS-2
*CALIBRATION TEST TRUCK # 1	* DATE	10/3/06

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10900	17220	17220	16750	16750		78940
2	11120	17080	17050	16800	16820		78880
3	10980	17130	17130	16810	16810		78860
Average	11000	17140	17140	16790	16790		78860
post -	10760	17050	17050	16800	16800		78460

Table 6. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10760	17050	17050	16800	16800		78460
2							
3							
Average		17050	17050	16800	16800		78460

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10600	13900	13900	13200	13200		64800
2	10280	14040	14040	13270	13270		64900
3	10460	13930	13930	13270	13270		64860
Average	10450	13960	13960	13250	13250		64860
post -	10380	13760	13760	13290	13290		64460 (-400)

Measured By DW Verified By Abe

Sheet 19	* STATE_CODE	20
LTPP Traffic Data	* SPS PROJECT ID	55-2
*CALIBRATION TEST TRUCK # 2	* DATE	10/31/02

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

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

GVW (same units as axles)

7. a) Empty GVW _____ *b) Average Pre-Test Loaded weight _____
*c) Post Test Loaded Weight _____
*d) Difference Post Test – Pre-test _____

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:

grain in buffels

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE CODE	20
LTPP Traffic Data	* SPS PROJECT ID	SPS-2
*CALIBRATION TEST TRUCK # 2	* DATE	10/31/02

Rev. 08/31/01

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

A to B 14.5 B to C 4.4 C to D 20.7

D to E 4.1 E to F _____

Wheelbased (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) +3.7 (_____)
(+ 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 springs
B	11R24.5	air
C	11R24.5	air
D	11R24.5	air
E	11R24.5	air
F		

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

Sheet 19	* STATE_CODE	20
LTPP Traffic Data	* SPS PROJECT ID	505-2
*CALIBRATION TEST TRUCK # 2	* DATE	10/31/00

Rev. 08/31/01

PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

Sheet 19	* STATE CODE	20
LTPP Traffic Data	* SPS PROJECT ID	SPS-2
*CALIBRATION TEST TRUCK # 2	* DATE	10/31/00

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11780	14540	14540	13690	13690		68240
2	11640	14590	14590	13710	13710		68240
3	11800	14550	14550	13640	13640		68180
Average	11740	14560	14560	13680	13680		68220
post	11420	14460	14460	13790	13790		67920

Table 6. Raw data – Axle scales – day 2 pm

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	12340	16570	16570	15890	15890		77260
2	12100	16680	16680	15930	15930		77320
3	12360	16570	16570	15900	15900		77300
Average	12270	16610	16610	15910	15910		77300
post	12200						76740 (-560)

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 DW Verified By

717 796-8422 ext 162 Bob

Sheet 20	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0200
Speed and Classification Checks * 1 of* 3	* DATE 10/31/2006

Rev. 08/31/2001....

PRE-VALIDATION

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
63	9		63	9	73	9		72	9
72	5		72	4	50	9		50	9
65	9		65	9	72	9		72	9
63	9		62	9	63	5		64	4
66	9		68	9	64	5		64	5
68	9		69	9	63	9		64	9
67	8		67	8	74	9		74	9
72	9		70	9	72	9		72	9
60	9		60	9	73	8		71	8
68	9		67	9	70	9		72	9
64	9		66	9	75	9		74	9
69	5		69	3	76	8		73	8
70	9		70	9	68	9		68	9
67	9		68	9	73	9		73	9
70	9		72	9	68	9		69	9
65	9		65	9	75	9		75	9
64	9		64	9	70	9		70	9
70	9		70	9	67	9		66	9
49	9		48	9	65	9		66	9
73	8		73	8	63	8		64	8
64	9		65	9	75	9		73	9
74	9		72	9	75	9		76	9
72	6		71	6	75	8		73	8
69	9		70	9	73	8	57770	72	11
72	5		71	5	71	8		71	8

20.5

Recorded by _____ Direction W Lane 1 Time from _____ to _____

Sheet 20	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0202
Speed and Classification Checks * 2 of* 3	* DATE 10 / 31 / 06

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		68	9	70	9		71	9	
67	12		67	12	67	11		67	11	
67	9		67	9	63	6		62	6	
69	9		68	9	68	9		69	9	
59	9		59	9	68	8		69	8	
69	9		71	9	68	9		68	9	
70	9		70	9	71	5		71	5	
59	5		60	5	66	9		65	9	
74	8		74	8	74	9		73	9	PICK UP RV.
68	9		68	9	70	9		70	11	2-3 2-17
78	12		77	12	68	5		67	4	22-6
72	11		72	11	68	9		69	9	
70	11		69	11	70	9		70	9	
74	9		74	9	72	9		71	9	
67	9		67	9	67	9		67	9	
67	9		68	9	67	11		67	9	
67	9		68	9	66	9		66	9	
65	9		66	9	65	9		65	9	
70	12		70	12	68	4		67	4	
70	9		70	9	65	9		65	9	
69	11		70	11	62	9		61	9	
75	4		74	11	68	9		68	9	
72	3		70	5	70	9		70	9	78 GVW
65	9		65	9	72	5		70	5	
70	9		69	9	74	8		72	8	

Recorded by _____ Direction W Lane 1 Time from _____ to _____

Sheet 20	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0200
Speed and Classification Checks * 3 of* 3	* DATE 10/31/2006

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
69	9	57818	69	13					

Recorded by _____ Direction W Lane 1 Time from _____ to _____

Sheet 20	* STATE_CODE	20
LTPP Traffic Data	*SPS PROJECT_ID	0200
Speed and Classification Checks * 1 of* 3	* DATE	11/01/2006

Rev. 08/31/2001....

POST VALIDATION

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
~~71~~		63100	~~63100~~ 71	~~70~~	75	3	63289	73	3	
70	9	63100	71	9	73	5	63293	73	3	GVW 7.5
67	2	63107	70	2	68	9	63295	67	9	
69	9	63110	69	9	72	2	63297	73	2	
72	9	63121	70	9	72	3	63299	70	3	
67	9	63152	67	9	49	9	63306	49	9	
78	2	63155	79	2	58	8	63318	58	8	
73	2	63157	74	2	49	9	63336	~~48~~ 50	9	
64	9	63160	64	9	73	2	63358	71	2	
67	2	63163	68	2	70	8	63366	70	8	
~~74~~	2	63165	74	2	66	4	63368	66	5	~~GVW~~ 20.7
70	2	63168	72	2	49	9	63374	49	9	
68	2	63169	70	2	73	2	63382	74	2	
69	9	63197	69	9	67	9	63385	67	9	
62	11	63226	63	11	73	9	63386	71	9	
72	9	63230	72	9	73	2	63387	73	2	
74	2	63231	74	2	66	9	63390	66	9	
63	9	63234	63	9	67	9	63392	67	9	
73	9	63236	73	9	~~74~~ 73	3	63394	73	3	
67	9	63240	67	9	73	2	63395	72	2	
59	9	63244	59	9	59	9	63403	59	9	
64	9	63260	62	9	72	9	63436	71	9	
69	9	63266	70	9	70	9	63441	70	9	
70	9	63268	69	9	68	9	63446	68	9	
70	2	63284	70	2	62	9	63456	62	11	

Recorded by Abee Direction ↑ Lane ___ Time from 1:27 to 2:28

16.5
21.5
8.8
22.0

Sheet 20	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0200
Speed and Classification Checks * 2 of* 3	* DATE 11/01/2006

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
75	9	63470	75	9	68	5	63714	68	5
64	9	63476	64	9	66	9	63731	66	9
68	9	63480	69	9	70	9	63735	69	9
63	9	63486	66	9	62	8	63739	62	8
64	5	63496	66	5	69	9	63744	69	9
68	9	63499	67	9	71	9	63756	71	9
68	9	63506	68	9	65	9	63760	66	9
59	9	63529	60	9	66	12	63766	64	12
49	9	63531	49	9	68	9	63769	66	9
72	9	63544	71	9	63	9	63773	62	9
57	8	63550	58	8	67	6	63778	66	6
68	9	63558	67	9	49	9	63786	50	9
73	9	63562	73	9	68	9	63809	69	9
72	9	63563	70	9	68	9	63875	68	9
70	9	63569	70	9	67	9	63881	66	9
65	9	63581	65	9	71	9	63891	71	9
49	9	63591	49	9	62	5	63898	62	5
65	9	63659	66	9	60	5	63899	61	5
61	9	636663	63	9	68	9	63903	66	9
68	4	63685	69	4	60	11	63912	61	11
72	9	63691	72	9	67	9	63914	65	9
72	9	63699	71	9	62	9	63924	62	9
68	8	63708	67	9	49	9	63925	49	9
65	9	63709	63	9	62	8	63936	61	8
67	9	63710	66	9	69	9	63977	68	9

Recorded by Ambie Direction W Lane 1 Time from 2:29p to _____

Sheet 20	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0200
Speed and Classification Checks * 3 of* 3	* DATE 11/01/2006

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	63982	66	9					
65	9	63990	63	9					
71	~~9~~	64000	72	~~9~~					
62	9	64013	62	9					
63	9	64097	63	9					
68	9	64107	68	9					
70	9	64111	70	9					
68	9	64115	68	9					
67	9	64119	68	9					
64	9	64122	65	9					
67	9	64128	65	9					
64	9	64134	62	9					
72	9	64138	72	9					
68	9	64141	68	9					
49	9	64146	48	9					
64	9	64157	64	9					
63	9	64163	63	9					
70	10	64182	70	10					
67	9	64193	68	9					

Recorded by Ambio Direction W Lane 1 Time from _____ to 4:10

Sheet 21	* STATE_CODE	20
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 1 of 3	* DATE	10/31/2006

Rev. 08/31/2001

(PRE-VALIDATION)

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
33.5		1	1	10:42:58	55796	50	4.4/5.4	7.9/8.6	8.9/8.1	8.1/9.2	8.1/9.2	0.4/0.4	78.5	19.9	4.0	30.4	4.0	3.0
33.5		2	1	10:47:19	55986	47	5.1/5.9	7.8/7.5	7.4/7.4	6.8/7.2	7.3/7.5		69.9	19.1	4.4	30.3	4.0	
33.3		1	2	10:55:02	56025	59	5.9/6.5	8.1/7.0	8.4/7.1	7.7/8.1	8.7/8.0		74.3	19.6	4.2	30.4	3.9	
33.3		2	2	10:59:54	56046	58	5.5/5.3	8.1/6.9	7.6/6.6	7.4/6.8	7.4/6.7		68.2	19.2	4.3	30.3	4.0	
? 52.2		1	3	11:07:20	56083	68	5.0/5.2	8.0/6.5	8.0/8.0	7.6/8.9	7.4/8.7		77.2	19.6	4.2	30.4	4.0	
? 52.2		2	3	11:10:44	56098	67	5.8/5.6	7.3/7.0	7.1/6.8	6.8/6.7	7.0/7.4		67.5	19.2	4.2	30.2	4.0	
? 64.0		1	4	11:19:28	56133	41	5.4/6.0	7.8/8.4	9.2/8.2	0.4/8.7	8.5/9.0	8.7/8.4	80.6	19.9	4.1	10.5	8.5	2.7
? 64.0		2	4	11:22:32	56150	48	6.3/5.6	7.6/7.5	7.7/7.3	7.0/7.0	5.4/7.4		68.8	19.3	4.3	30.3	4.0	
38.5		1	5	11:32:28	56186	59	5.7/4.6	8.0/7.5	8.1/7.3	7.7/8.4	8.2/8.3	0.6/0.6	75.0	19.6	4.2	30.4	3.9	3.0
38.5		2	5	11:34:28	56199	59	5.3/4.9	7.4/7.2	7.1/6.9	6.4/7.1	6.3/7.3		65.9	19.2	4.3	30.3	4.0	
~~[illegible]~~		~~1~~	~~6~~	~~11:41:48~~	~~56229~~	~~70~~	6.0/5.7	8.2/8.1	8.3/7.6	7.8/8.3	7.5/7.6		75.2	18.5	4.2	30.5	4.0	
67.5		1	6	11:44:28	56258	69	5.2/5.1	8.3/8.8	8.4/8.8	7.8/8.4	8.6/9.2		78.5	19.6	4.2	30.4	3.9	
67.5		2	6	11:46:22	56265	67	6.9/5.7	7.6/6.7	7.2/6.8	7.1/7.3	7.3/7.0		68.6	19.1	4.2	30.2	4.0	
68.2		1	7	11:56:32	56317	50	5.5/5.8	8.9/8.5	8.9/8.3	0.5/0.5	8.3/8.8	8.7/9.1	81.7	19.6	4.2	2.0	28.4	4.0
68.2		2	7	11:58:14	56326	48	5.4/5.7	7.7/7.9	7.5/7.3	6.3/7.0	7.2/7.3		69.2	19.3	4.2	30.7	3.9	
75.0		1	8	12:08:40	56384	60	6.9/6.4	8.3/8.0	9.4/7.5	7.8/7.7	8.5/7.5		79.1	19.5	4.2	30.4	3.9	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE	20
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 2 of 3	* DATE	10 / 31 / 06

Rev. 08/31/2001

Pvmt temp °F	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
75.0		2	8	12:16:3	56400	59	5.3/5.2	7.8/7.0	7.5/6.8	7.5/7.2	7.0/7.0		68.2	19.2	4.3	30.3	4.0	
Ambient Temp 41°F 80.5		1	9	12:20:31	56451	69	4.8/5.0	7.9/8.1	8.1/8.1	6.6/8.5	8.5/8.6		76.0	19.7	4.2	30.5	3.9	
41°F 80.5		2	9	12:23:38	56463	67	5.5/5.9	7.3/7.4	6.9/7.3	6.1/7.5	6.5/7.3		67.7	19.2	4.3	30.3	4.0	
78.6		1	10	12:32:46	56506	50	4.8/5.5	9.0/8.7	8.6/8.1	8.6/8.9	8.9/8.9	0.4/0.4	80.6	19.6	4.2	30.4	4.0	2.0
78.6		2	10	12:35:26	56520	47	6.9/5.8	7.6/7.6	7.3/7.3	6.7/6.9	7.3/7.2		69.7	19.1	4.2	30.1	4.0	
94		1	11	12:45:10	56563	59	5.2/4.9	7.9/8.1	8.7/9.6	7.3/8.1	7.5/8.7	0.6/0.6	75.0	19.6	4.3	30.4	4.0	3.0
94		2	11	12:47:30	56572	59	5.1/4.9	7.8/8.8	7.3/6.8	7.6/6.9	7.9/6.7		66.9	19.1	4.3	30.2	4.0	
66.2		1	12	14:49:57	57253	68	4.9/5.5	8.2/8.7	8.1/8.5	7.8/8.8	8.8/9.3		78.8	19.6	4.2	30.4	3.9	
66.2		2	12	14:54:43	57280	65	6.1/5.5	7.9/6.9	7.4/6.7	7.2/6.5	7.5/6.5		68.4	19.3	4.3	30.4	4.0	
95		1	13	15:02:24	57319	49	5.2/5.5	8.7/8.4	9.0/8.2	8.2/9.0	8.3/9.3		79.6	19.6	4.2	30.5	4.0	
95		2	13	15:06:18	57349	49	5.9/5.9	7.3/7.5	7.4/7.5	7.0/7.0	7.3/7.1		69.8	19.2	4.2	30.3	4.0	
98.3		1	14	15:14:06	57392	59	5.5/4.6	7.6/7.4	7.8/7.5	7.4/7.3	8.5/8.4	0.7/0.7	73.4	19.7	4.2	30.4	4.0	3.0
98.3		2	14	15:17:18	57415	60	4.6/5.3	7.9/10.7	7.3/6.6	7.5/7.0	7.1/6.7		66.8	19.2	4.3	30.3	4.0	
Ambient 49 81.1		1	15	15:25:22	57465	68	5.4/5.1	8.7/8.3	8.1/8.3	7.8/8.4	7.6/8.5		76.7	19.6	4.2	30.4	4.0	
81.1		2	15	15:29:00	57488	68	5.8/5.6	7.3/6.9	6.7/6.8	6.8/6.9	6.3/7.2		66.4	19.2	4.2	30.3	4.0	
78.5		1	16	15:38:18	57537	50	5.6/5.3	8.8/8.3	8.8/8.0	8.4/8.7	8.4/9.0		79.2	19.6	4.2	30.5	4.0	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE	20
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 3 of 3	* DATE	10/31/2006

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
78.5		2	16	15:46:41	57553	49	6.3/5.9	7.4/7.6	7.3/7.5	6.9/6.8	7.3/7.1		69.8	19.2	4.2	30.3	4.0	
86		1	17	15:50:34	57612	59	5.8/4.9	8.1/7.1	7.7/7.0	7.6/7.1	8.4/7.9	0.6/0.6	72.6	19.6	4.2	30.5	3.9	2.9
86		2	17	15:52:26	57623	59	6.2/4.9	6.6/7.1	7.0/6.4	6.5/7.1	6.7/6.7		65.2	19.2	4.3	30.3	4.0	
96.0		1	18	16:05:20	57703	68	5.5/4.8	8.4/8.2	8.8/8.1	8.2/8.3	8.9/9.0		78.2	19.6	4.2	30.4	3.9	
96.0		2	18	16:06:23	57711	67	5.3/6.0	7.2/7.3	6.7/6.8	6.8/7.4	6.1/7.1		66.6	19.2	4.3	30.3	4.0	
87.1		1	19	16:17:12	57799	50	5.8/5.6	8.9/8.6	8.9/8.4	8.3/8.9	8.2/8.7		80.3	19.7	4.2	30.5	4.0	
87.1		2	19	16:18:51	57810	50	6.1/5.6	7.5/7.7	7.5/7.6	7.6/7.1	6.8/7.1		70.6	19.3	4.3	30.3	4.0	
87.1		1	20	16:29:32	57894	59	5.7/4.6	8.1/7.3	7.9/7.0	7.4/7.6	8.1/8.1		71.9	19.6	4.2	30.4	3.9	
87.1		2	20	16:30:28	57898	60	5.1/5.5	7.6/6.7	7.3/6.5	7.5/7.0	7.1/6.7		67.3	19.2	4.3	30.3	3.9	
90.3		1	21	16:41:34	57976	59	5.6/4.6	8.1/7.2	7.7/7.3	7.3/7.5	8.2/8.1		71.6	19.6	4.2	30.5	3.9	
~~90.3~~		~~2~~	~~21~~	~~16:43~~	~~57986~~		~~5.6/5.7~~	~~8.0/8.9~~	~~7.3/8.6~~	~~7.8/7.5~~	~~8.6/9.~~							
90.3		2	21	16:43:32	57986	59	5.6/5.7	7.5/6.9	6.8/6.6	6.9/7.1	6.9/7.3		67.3	19.2	4.3	30.2	4.0	
90.5		1	22	16:53:09	58069	70	5.2/4.7	8.2/8.3	8.6/8.3	8.0/8.0	8.6/9.3		77.2	19.7	4.2	30.5	3.9	
90.5		2	22	16:55:39	58084	68	5.3/5.8	7.1/7.2	6.4/6.9	8.0/7.4	6.3/7.3		65.9	19.2	4.3	30.3	4.0	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 1 of 1	* DATE 11 / 01 / 96

Rev. 08/31/2001 CALIBRATION 1

	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
48	37.0	69	2	14	16:07:04	63744	69	4.8/5.1	5.9/7.5	5.9/6.9	4.7/6.7	7.3/7.9		62.7	19.6	4.2	30.4	3.9	
47	57.0	50	1	15	16:12:47	63786	49	5.8/5.8	8.4/8.1	7.5/8.0	7.8/8.1	8.0/8.6		76.2	19.1	4.4	30.3	4.0	
47	57.0	69	2	15	16:19:15	63826	68	4.6/5.5	5.5/7.7	5.3/7.5	4.7/7.7	5.3/7.7		61.6	19.6	4.2	30.5	4.0	
47	74.5	59	1	16	16:23:42	63857	59	5.7/5.3	8.3/7.7	8.2/7.6	7.9/8.2	7.6/8.3		74.8	19.2	4.3	30.3	4.0	
47	74.5	49	2	16	16:32:19	63925	49	5.3/5.3	6.9/6.8	5.9/6.5	6.6/7.0	6.4/7.0		63.8	19.7	4.3	30.5	3.9	
47	75.0	67	1	17	16:34:35	63943	67	6.2/5.9	8.4/8.2	8.3/8.2	8.0/8.4	7.6/8.4		77.3	19.2	4.3	30.3	4.0	
47	75.0	60	2	17	16:45:18	64020	59	5.2/4.6	6.6/7.0	6.3/6.6	5.5/7.1	5.7/6.8		61.4	19.7	4.3	30.7	4.0	
47	55.0	60	1	18	16:47:39	64047	59	6.3/5.2	7.4/8.3	8.1/8.2	7.1/8.6	8.0/8.5		77.0	19.6	4.3	30.2	3.9	
47	55.0	68	2	18	16:58:09	64141	68	4.5/4.8	5.9/7.3	6.1/7.0	5.1/7.3	5.6/7.8		61.3	19.7	4.2	30.5	4.0	
45	66.5	48	1	19	16:59:22	64146	49	5.9/6.1	8.2/8.4	8.3/8.4	7.5/8.0	8.0/8.5		77.4	19.2	4.3	30.4	4.0	
45	66.5	50	2	19	17:18:32	64323	49	5.4/5.3	6.9/7.0	6.9/6.9	6.6/7.1	6.7/7.0		65.7	19.7	4.2	30.4	4.0	
45	54.0	58	1	20	17:22:42	64359	58	5.3/5.6	8.7/7.7	8.5/7.6	8.5/7.3	8.2/8.2		75.7	19.2	4.3	30.3	4.0	
45	54.0	68	2	20	17:42:34	64537	68	5.2/4.5	6.7/7.2	7.0/6.3	5.9/7.2	6.7/7.3		64.1	19.6	4.2	30.4	3.9	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 1 of 2	* DATE 11 / 01 / 06

Rev. 08/31/2001

POST VALIDATION

Ambient temp	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
47	84.5	49	2	6	14:27:44	63127	49	4.8/5.7	6.8/7.0	7.0/6.7	6.3/7.0	6.5/7.0		64.8	19.7	4.2	30.4	4.0	
47	94.5	59	1	7	14:36:32	63170	59	6.3/5.2	7.6/8.1	8.3/7.5	7.5/8.6	7.6/8.4		75.2	19.1	4.3	30.3	4.0	
47	94.5	60	2	7	14:40:10	63200	59	5.2/4.5	6.6/7.2	7.0/6.3	6.9/7.2	5.9/6.8		62.8	19.7	4.2	30.6	4.0	
47	90.0	59	1	8	14:48:[illegible]	63244	59	5.6/5.7	9.0/7.8	8.6/7.4	8.4/8.2	8.2/8.1		77.0	19.1	4.3	30.3	4.0	
47	90.0	69	2	8	14:52:16	63268	70	5.9/4.8	6.9/6.9	6.3/6.9	5.1/7.1	5.9/7.8		61.8	19.6	4.2	30.5	4.0	
47	91.5	49	1	9	14:59:12	63306	49	6.0/5.9	8.3/8.3	8.1/8.0	7.7/8.2	8.2/8.3		76.9	19.1	4.2	30.2	4.0	
47	91.5	49	2	9	15:04:53	63336	50	4.9/5.3	7.0/7.2	7.0/6.9	6.1/7.5	6.3/7.3		65.3	19.7	4.2	30.5	4.0	
47	89.5	49	1	10	15:10:51	63374	49	5.8/5.8	8.1/8.5	8.3/8.2	6.8/8.3	7.8/8.6		76.4	19.2	4.3	30.6	3.9	
47	89.5	59	2	10	15:17:03	63403	59	5.1/4.7	6.4/7.4	6.5/6.5	5.5/7.1	5.5/6.6		61.5	19.7	4.2	30.6	4.0	
47	83.5	68	1	11	15:22:08	63446	68	6.2/6.2	8.4/8.4	8.0/8.1	7.4/8.7	7.7/8.8		77.8	19.2	4.2	30.3	4.0	
47	83.5	68	2	11	15:29:57	63506	68	4.5/5.2	5.9/7.4	5.3/7.3	4.6/7.1	5.4/7.5		60.0	19.7	4.2	30.5	4.0	
48	85.0	49	1	12	15:33:11	63531	49	5.8/5.9	8.6/8.4	7.7/8.2	7.6/8.4	7.8/8.7		77.2	19.1	4.4	30.4	4.0	
48	85.0	49	2	12	15:42:24	63591	49	4.8/5.1	7.1/6.8	7.3/6.6	6.5/7.2	6.4/7.2		65.1	19.6	4.2	30.3	4.0	
48	61.0	58	1	13	15:43:31	63598	59	5.6/5.3	7.9/7.6	8.3/7.9	7.4/7.7	7.2/8.2		73.1	19.2	4.3	30.3	4.0	
48	61.0	59	2	13	15:54:48	63669	58	5.3/4.4	6.7/7.0	7.2/6.6	6.0/6.9	6.0/7.2		63.4	19.7	4.2	30.5	4.0	
48	37.0	68	1	14	16:04:52	63670	67	5.8/6.1	8.3/8.4	7.9/8.4	8.0/8.5	7.4/8.5		77.4	19.2	4.3	30.2	4.0	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE 20
LTPP Traffic Data	*SPS PROJECT_ID 0280
WIM System Test Truck Records 2 of 3	* DATE 11 / 01 / 06

Amber Temp

Rev. 08/31/2001

Pvmt temp °F	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
		1	1	11:58:55	62272	59	5.6 / 5.5	9.1 / 7.4	8.8 / 7.2	8.7 / 7.4	9.0 / 7.5		75.5	19.3	4.3	30.4	4.0	
13	71.5	69	2	1	12:13:01	62365	69	5.2 / 4.8	5.9 / 7.2	6.3 / 6.9	5.4 / 7.5	6.7 / 7.5		62.9	19.7	4.2	30.5	4.3
3	71.5	49	1	1	12:20:42	62402	49	6.1 / 5.9	8.2 / 8.3	8.5 / 8.2	7.5 / 8.1	8.0 / 8.3		77.1	19.2	4.3	30.3	4.0
43	94.0	50	2	2	12:24:44	62433	50	4.3 / 5.4	7.0 / 6.9	6.1 / 6.8	6.3 / 7.0	5.1 / 7.3		62.2	19.9	4.3	30.6	4.1
43	94.0	60	1	2	12:32:31	62475	60	5.2 / 5.3	9.2 / 7.4	8.5 / 7.4	8.2 / 7.9	8.7 / 7.9		75.6	19.3	4.3	30.5	4.0
44	88.3	58	2	3	12:36:59	62502	59	5.0 / 5.5	6.7 / 7.5	7.1 / 6.9	5.7 / 6.9	6.3 / 6.8		64.4	19.7	4.2	30.6	4.0
44	83.3	68	1	3	12:48:43	62538	68	5.8 / 6.2	8.1 / 9.0	7.1 / 8.8	7.8 / 8.5	7.3 / 8.7		77.4	19.3	4.3	30.4	4.0
44	48.5	68	2	4	12:48:43	62560	68	4.9 / 4.7	6.0 / 7.9	5.5 / 7.4	4.6 / 6.7	5.5 / 7.7		61.0	19.6	4.2	30.5	4.0
44	48.5	48	1	4	12:55:12	62597	49	6.0 / 5.7	8.2 / 8.4	8.3 / 8.3	6.8 / 8.1	7.7 / 8.3		76.1	19.3	4.3	30.8	3.9
45	77.5	49	2	5	13:00:46	62621	49	4.7 / 5.3	7.1 / 6.7	7.0 / 6.5	6.5 / 7.1	6.5 / 7.2		64.7	19.7	4.2	30.4	3.9
45	77.5	66	1	5	13:06:27	62673	68	6.2 / 6.3	8.6 / 8.2	8.3 / 8.0	7.6 / 8.3	7.6 / 8.7		77.5	19.2	4.3	30.3	4.0
47	84.5	49	1	6	14:25:11	63111	49	5.8 / 5.9	8.4 / 8.2	8.5 / 8.3	7.7 / 8.1	7.9 / 8.4		76.9	19.1	4.2	30.1	4.3

Recorded by Amber

Checked by

SHEET 22 LTPP MONITORED TRAFFIC DATA	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

SITE EQUIPMENT INFORMATION

TYPE OF EQUIPMENT ___ WIM ___ VC _x_ BOTH

LANE NUMBER ON-SITE ____1_____ DIRECTION ON-SITE ____West_____

VENDOR _IRD/PAT Traffic____ MODEL _iSINC_____ SERIAL NO. __unk_____

WEIGHING SENSOR TYPE _bending plate____

SYSTEM SOFTWARE VERSIONS:

CPU _____

LOOP _____

PIEZO _____

WEIGHPAD/ LOAD CELL _____

COMMUNICATION _____

CLASSIFICATION VIDEO:

TIME FROM: _____ TO: _____

SITE CONDITIONS

PAVEMENT:

INDICATE ANY DEFICIENCIES THAT MAY AFFECT THE PERFORMANCE OF THE WIM SYSTEM. LIST ALL PHOTOS THAT SUPPORT THE EVALUATION.

None

SHEET 22 LTPP MONITORED TRAFFIC DATA	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

IN-ROAD SENSORS:

DESCRIBE ANY DEFICIENCIES REGARDING THE SENSOR INSTALLATION. INDICATE SENSORS THAT SHOW ANY SIGN OF BEING BROKEN, SEVERELY WORN, MISSING, REMOVED OR LOOSE. LIST PHOTOS FOR EACH OCCURANCE.

None

TRUCK OBSERVATIONS

INDICATE ANY IRREGULAR TRUCK BEHAVIORS SUCH AS BOUNCING, SWERVING, OR BRAKING NEAR THE WEIGHING AREA (WITHIN 40 METERS). NOTE THE DISTANCE FROM THE WEIGHING SENSORS.

None

MINIMUM 15 MINUTE OR 35 TRUCK SAMPLE VIDEO FOR PAVEMENT INTERACTION – TAPE: _____

FILE NAME: _____ TIME FROM: _____ TO: _____

SHEET 22 LTPP MONITORED TRAFFIC DATA	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

CLASSIFICATION VERIFICATION VIDEO:

TAPE 1- NAME: _____

Interval 1 - FILE: _____ TIME FROM: _____ TO: _____

Interval 2 - FILE: _____ TIME FROM: _____ TO: _____

Interval 3 - FILE: _____ TIME FROM: _____ TO: _____

Interval 4 - FILE: _____ TIME FROM: _____ TO: _____

Interval 5 - FILE: _____ TIME FROM: _____ TO: _____

Interval 6 - FILE: _____ TIME FROM: _____ TO: _____

Interval 7 - FILE: _____ TIME FROM: _____ TO: _____

TAPE 2- NAME: _____

Interval 1 - FILE: _____ TIME FROM: _____ TO: _____

Interval 2 - FILE: _____ TIME FROM: _____ TO: _____

Interval 3 - FILE: _____ TIME FROM: _____ TO: _____

Interval 4 - FILE: _____ TIME FROM: _____ TO: _____

Interval 5 - FILE: _____ TIME FROM: _____ TO: _____

Interval 6 - FILE: _____ TIME FROM: _____ TO: _____

Interval 7 - FILE: _____ TIME FROM: _____ TO: _____

TAPE 3- NAME: _____

Interval 1 - FILE: _____ TIME FROM: _____ TO: _____

Interval 2 - FILE: _____ TIME FROM: _____ TO: _____

Interval 3 - FILE: _____ TIME FROM: _____ TO: _____

Interval 4 - FILE: _____ TIME FROM: _____ TO: _____

Interval 5 - FILE: _____ TIME FROM: _____ TO: _____

Interval 6 - FILE: _____ TIME FROM: _____ TO: _____

Interval 7 - FILE: _____ TIME FROM: _____ TO: _____

SHEET 22 **LTPP MONITORED TRAFFIC DATA**	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

SYSTEM ACCURACY TESTS

CONDUCT THE FOLLOWING SYSTEM ACCURACY TESTS EITHER ON-SITE OR IN OFFICE.

SPEED AND CLASSIFICATION – COMPLETE SHEET 20 AND ATTACH

AVERAGE DISTANCE BETWEEN AXLES OF DRIVE TANDEM _____ FT/ m

% ERROR FROM ___ (from system record average) FEET _____ % ERROR

SPEED ACCURACY mean difference _____ SD of mean _____

****VALIDATION – see results in report****

WEIGHT – COMPLETE SHEET 21 AND ATTACH

AVERAGE FRONT AXLE WEIGHT FOR CLASS 9 VEHICLES _____ LBS/kg

% ERROR FROM 10,300/ _____ (known site value) LBS _____ %

****VALIDATION – see results in report****

SUPPORT EQUIPMENT/STRUCTURES

INDICATE ANY DEFICIENCIES WITH ANY SITE EQUIPMENT OTHER THAN THE IN-ROAD SENSORS. LIST PHOTOS OF EACH OCCURANCE.

CABINET/FOUNDATION NONE _x___

PULL-BOXES NONE _x___

MAST NONE _x___

SHEET 22 LTPP MONITORED TRAFFIC DATA	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

SOLAR PANELS NONE _____

TELEPHONE D-MARK BOX NONE _x___

POWER SERVICE BOX NONE _x___

GROUNDING NONE _x___

CONDUIT NONE _x___

SHEET 22 LTPP MONITORED TRAFFIC DATA	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

STATIC EQUIPMENT VALUES (SYSTEM OFF)

POWER

SOLAR PANEL	_____ WATTS _____ VDC
AC	_ 122.3 _ VAC
BATTERY 1	_ 13.5 __ VDC
BATTERY 2	_____ VDC
REGULATED	_____ VDC
POWER SUPPLY	_____ VDC
SYSTEM INPUT	_ 122.3 _ VDC
MODEM POWER	_ 122.3 _ VAC _____ VDC
TELEPHONE	_ 49.7__ VDC

LOOP SENSORS

L1 (LEAD)	RES ___ .6 __ Ω; IND __ 130 __ Uh; SHLD __ inf __ MΩ
L2 (TRAIL)	RES ___ .7 __ Ω; IND __ 133 __ Uh; SHLD __ 3.0 __ MΩ

WEIGHPAD SENSORS

WP1 (LEAD)	INPUT __ 981 __ Ω; OUTPUT __ 846 __ Ω; SHLD _ inf ___ MΩ
WP2 (TRAIL)	INPUT __ 981 __ Ω; OUTPUT __ 846 __ Ω; SHLD _ inf ___ MΩ

PIEZO SENSORS

PZ1 (LEAD)	RES _____ Ω; CAP _____ Nf
PZ2	RES _____ Ω; CAP _____ Nf
PZ3	RES _____ Ω; CAP _____ Nf
PZ4 (TRAIL)	RES _____ Ω; CAP _____ Nf

LOAD CELL SENSORS

LC1 (LEAD)	INPUT _____ Ω; OUTPUT _____ Ω; SHLD _____ MΩ
LC2 (TRAIL)	INPUT _____ Ω; OUTPUT _____ Ω; SHLD _____ MΩ

SHEET 22 LTPP MONITORED TRAFFIC DATA	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

KISTLER SENSORS

K1 (LEAD L) RES _____ Ω; CAP _____ nF

K2 (LEAD ML) RES _____ Ω; CAP _____ nF

K3 (LEAD MR) RES _____ Ω; CAP _____ nF

K4 (LEAD R) RES _____ Ω; CAP _____ nF

K5 (TRAIL L) RES _____ Ω; CAP _____ nF

K6 (TRAIL ML) RES _____ Ω; CAP _____ nF

K7 (TRAIL MR) RES _____ Ω; CAP _____ nF

K8 (TRAIL R) RES _____ Ω; CAP _____ nF

DYNAMIC EQUIPMENT VALUES (SYSTEM ON)

LOOP SENSORS

L1 (LEAD) FREQ __ 22.4 __ KHz;

L2 (TRAIL) FREQ __ 22.5 __ KHz

WEIGHPAD SENSORS

WP1 (LEAD) ZERO POINT ___ 0.1 __ mV

WP2 (TRAIL) ZERO POINT ___ 0.0 __ mV

PIEZO SENSORS

PZ1 (LEAD) AMPLITUDE (CLASS 9) _____ mV

PZ2 AMPLITUDE (CLASS 9) _____ mV

PZ3 AMPLITUDE (CLASS 9) _____ mV

PZ4 (TRAIL) AMPLITUDE (CLASS 9) _____ mV

LOAD CELL SENSORS

LC1 (LEAD) ZERO POINT _____ mV

LC2 (TRAIL) ZERO POINT _____ mV

SHEET 22 **LTPP MONITORED TRAFFIC DATA**	* STATE CODE [_2_0_] * SPS PROJECT ID [_0_2_0_0_]
SITE EQUIPMENT ASSESSMENT	* STATE ASSIGNED ID [_ _ _ _]
LTPP LANE ONLY	* DATE: (mm/dd/yyyy) _1_0_ / _3_1_ / _2_0_0_6__

ADDITIONAL COMMENTS

Sensor ground checks:

Weighpad 1 shield to cabinet ground = 3.1 MOhm

Weighpad 2 shield to cabinet ground = 254 KOhm

3.11.2. Iteration 1 Worksheet

Date 11/1/06

Beginning factors:

Speed Point (mph)	Name	Value
Overall		
Front Axle		
1 – (55)	bin 1	3625
2 – (60)	bin 2	3625
3 – (65)	bin 3	3590
4 – (70)	bin 4	3665
5 – (75)	bin 5	3700

Errors (Pre-Validation):

	Speed Point 1 (55)	Speed Point 2 (60)	Speed Point 3 (65)	Speed Point 4 (70)	Speed Point 5 (75)
F/A	-5.0	-7.0	-6.0	-4.0	-3.0
Tandem	+0.5	-2.0	-1.0	0.0	+1.0
GVW	-1.5	-2.5	-1.5	-1.5	-1.0

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☐	
Front Axle	☐	☐	
Speed Point 1	☐	☑	1.5 %
Speed Point 2	☐	☑	1.5 %
Speed Point 3	☑	☐	2.5 %
Speed Point 4	☑	☐	1.5 %
Speed Point 5	☑	☐	1.5 %

End factors:

Speed Point (mph)	Name	Value
Overall		
Front Axle		
1 – (55)	bin 1	3570
2 – (60)	bin 2	3570
3 – (65)	bin 3	3680
4 – (70)	bin 4	3720
5 – (75)	bin 5	3755

Task Leader Initials: QJS

TEST TRUCK PHOTOS FOR SPS WIM FIELD VALIDATION

STATE: Kansas

SHRP ID: 0200

Figures

Figure 1 – Truck_1_Tractor_TO_15_20_2.72_0200_10_31_06.jpg

Figure 2 – Truck_1_Trailer_TO_15_20_2.72_0200_10_31_06.jpg

Figure 3 – Truck_1_Suspension_1_TO_15_20_2.72_0200_10_31_06.jpg

Figure 4 – Truck_1_Suspension_2_TO_15_20_2.72_0200_10_31_06.jpg

Figure 5 – Truck_1_Suspension_3_TO_15_20_2.72_0200_10_31_06.jpg

Figure 6 – Truck_2_Tractor_TO_15_20_2.72_0200_10_31_06.jpg

Figure 7 – Truck_2_Trailer_TO_15_20_2.72_0200_10_31_06.jpg

Figure 8 – Truck_2_Suspension_1_TO_15_20_2.72_0200_10_31_06.jpg

Figure 9 – Truck_2_Suspension_2_TO_15_20_2.72_0200_10_31_06.jpg

Figure 10 – Truck_2_Suspension_3_TO_15_20_2.72_0200_10_31_06.jpg