Validation Report

Illinois, SPS-6
Task Order 18, CLIN 2
March 27 through March 29, 2007

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1 Executive Summary

A visit was made to the Illinois 0600 on March 27 through March 29, 2007 for the purposes of conducting a validation of the WIM system located on Interstate 57 located approximately 10 miles south of the I-57/I-72 interchange. The SPS-6 is located in the righthand, northbound 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 on July 26 to 27, 2005 and subsequently calibrated August 8th to August 10th, 2005 by IRD/PAT Traffic. This is the third validation visit to this location. The first visit was on September 7 and 8, 2005 and the second visit was September 19 through 21, 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 data is of research quality for Traffic Monitoring Guide Classes.

The site is instrumented with bending plate and 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 air suspension loaded to 73,690 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a steel leaf suspension loaded to 52,010 lbs., the "partial" truck.

The left weighpad was replaced on February 21, 2007. The decision to replace was made by the Phase 2 as a result of the discovery of improper system operation approximately 30 days prior. Data for January and February of 2007 will need to be carefully reviewed prior to inclusion in the database.

The validation speeds ranged from 45 to 65 miles per hour. The speed limit at the site is 65 mph. The pavement temperatures ranged from 56 to 103 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was also achieved.

Table 1-1 Post-Validation results – 170600 – 29-Mar-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-3.1 ± 11.3%	Pass
Tandem axles	±15 percent	1.0 ± 7.2%	Pass
GVW	±10 percent	0.2 ± 4.9%	Pass
Speed	±1 mph [2 km/hr]	**0.2 ± 1.3 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The pavement condition was 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 collected by the Regional Support Contractor on June 4, 2006 was also available and is discussed in Section 4.1 of this report.

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 four additional years of data to meet the goal of five years of research quality data.

2 Corrective Actions Recommended

No corrective actions to the equipment are required at this time.

There is a significant transverse crack located approximately 25 feet after the leading transition to the concrete section. Although it does not appear to influence truck movement as they cross the sensors, corrective actions should be evaluated as soon as feasible.

3 Post Calibration Analysis

This final analysis is based on test runs conducted March 29, 2007 during the morning and afternoon hours at test site 170600 on Interstate 57. This SPS-6 site is at milepost 225.7 on the northbound, 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 air suspension loaded to 73,690 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a steel leaf suspension loaded to 52,010 lbs., the "partial" truck.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 45 to 65 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 56 to 103 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was also 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, the site passed all of the performance criteria for weight and spacing.

Table 3-1 Post-Validation Results – 170600 – 29-Mar-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-3.1 ± 11.3%	Pass
Tandem axles	±15 percent	1.0 ± 7.2%	Pass
GVW	±10 percent	0.2 ± 4.9%	Pass
Speed	±1 mph [2 km/hr]	**0.2 ± 1.3 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

The test runs were conducted primarily during the morning and afternoon hours, resulting in a wide 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 three

temperature groups. The distribution of runs by speed and temperature is illustrated in Figure 3-1. The figure indicates that the desired distribution of speed and temperature combinations was achieved for this set of validation runs.

The three speed groups were divided as follows: Low speed – 45 to 50 mph, Medium speed – 51 to 60 mph and High speed – 61 + mph. The three temperature groups were created by splitting the runs between those at 56 to 69 degrees Fahrenheit for Low temperature, 70 to 87 degrees Fahrenheit for Medium temperature and 88 to 103 degrees Fahrenheit for High temperature.

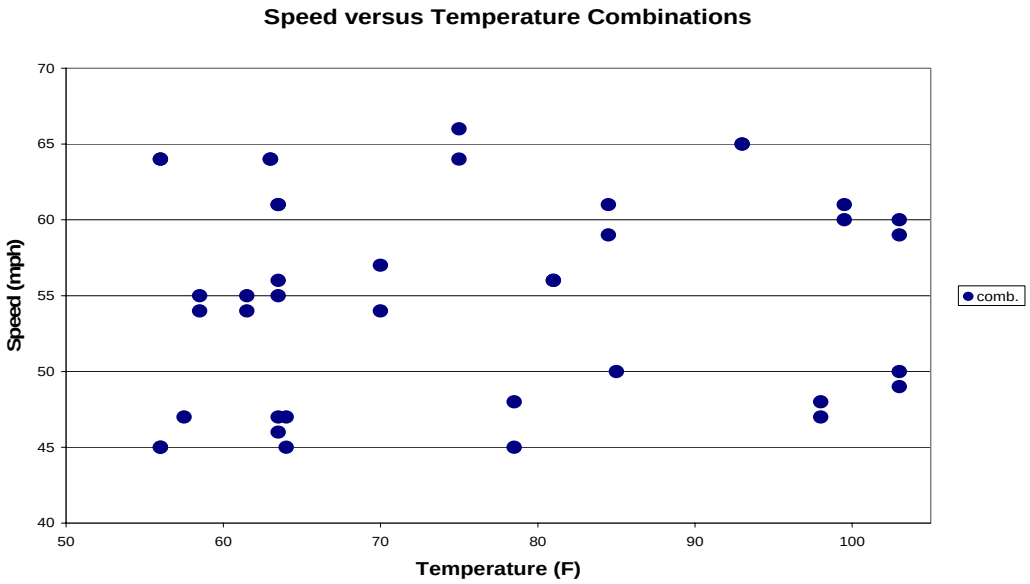

Figure 3-1 Post-Validation Speed-Temperature Distribution – 170600 – 29-Mar-2007

A series of graphs was developed to investigate visually any sign of a relationship between speed or temperature and the scale performance. Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole.

From the figure, it appears that the mean error in GVW errors is consistent throughout the entire speed range. The equipment estimates GVW reasonably well at all speeds. Variability in error is somewhat greater in the medium speed range.

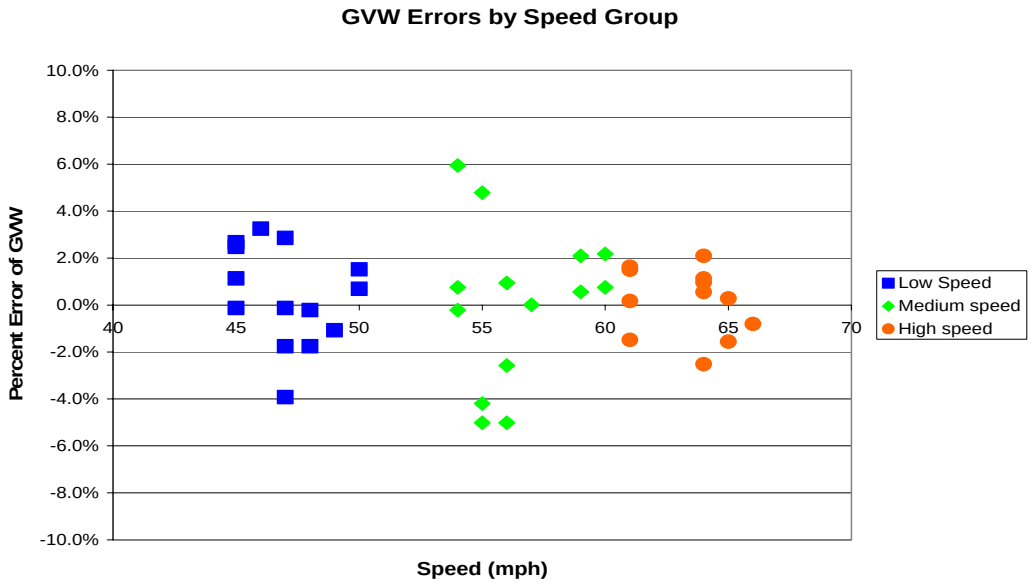

Figure 3-2 Post-validation GVW Percent Error vs. Speed – 170600 – 29-Mar-2007

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

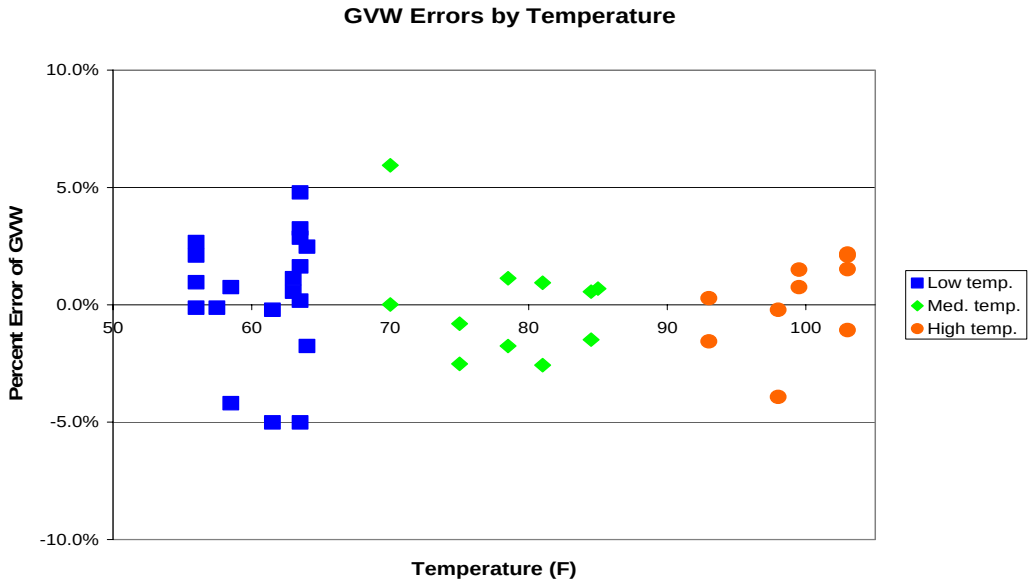

Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 170600 – 29-Mar-2007

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

drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. The graph indicates that the errors in tandem spacings for the test trucks were not affected by changes in speed.

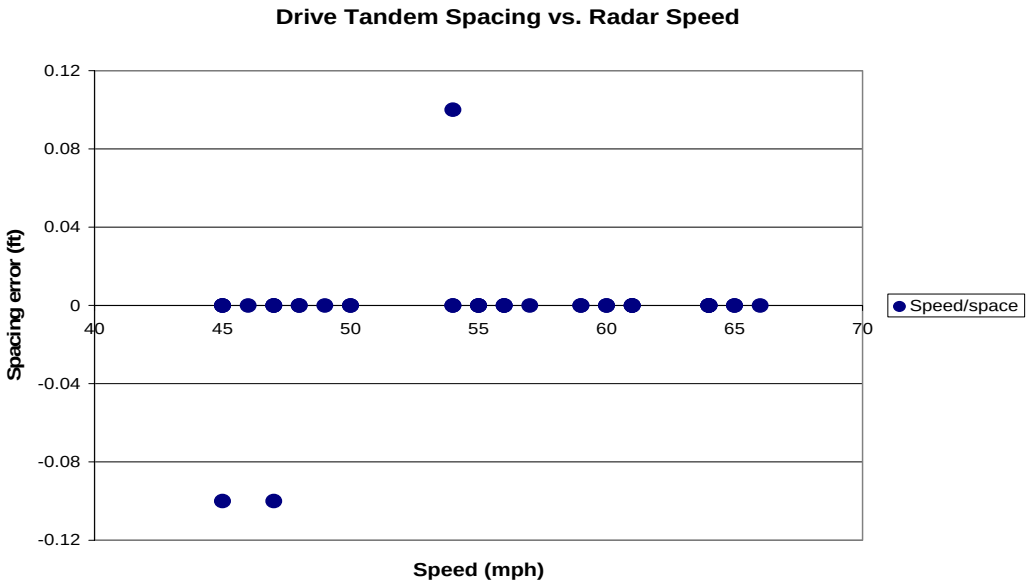

Figure 3-4 Post-Validation Spacing vs. Speed – 170600 – 29-Mar-2007

3.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 56 to 69 degrees Fahrenheit for Low temperature, 70 to 87 degrees Fahrenheit for Medium temperature and 88 to 103 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 170600 – 29-Mar-2007

Element	95% Limit	Low Temperature 56 - 69 °F	Medium Temperature 70 - 87 °F	High Temperature 88 - 103 °F
Steering axles	±20 %	-3.5 ± 12.3%	-2.5 ± 11.2%	-2.8 ± 13.7%
Tandem axles	±15 %	1.2 ± 7.3%	0.6 ± 8.6%	0.9 ± 6.6%
GVW	±10 %	0.4 ± 5.7%	0.0 ± 5.3%	0.2 ± 4.3%
Speed	±1 mph	0.5 ± 1.5 mph	-0.1 ± 1.2 mph	0.1 ± 1.3 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.0 ft	0.0 ± 0.0 ft

From Table 3-2, it appears that the underestimation and variability in steering axle weights is consistent throughout the entire temperature range. Mean error for tandem weights and GVW are also fairly consistent throughout the entire temperature range.

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 for the population as a whole. Separately, GVW for the Golden truck (squares) is overestimated at the lower temperatures while GVW for the Partial truck (diamonds) is

generally underestimated. This resulted in higher variability for the population at lower temperatures. The larger number of samples in this range may be a contributing factor.

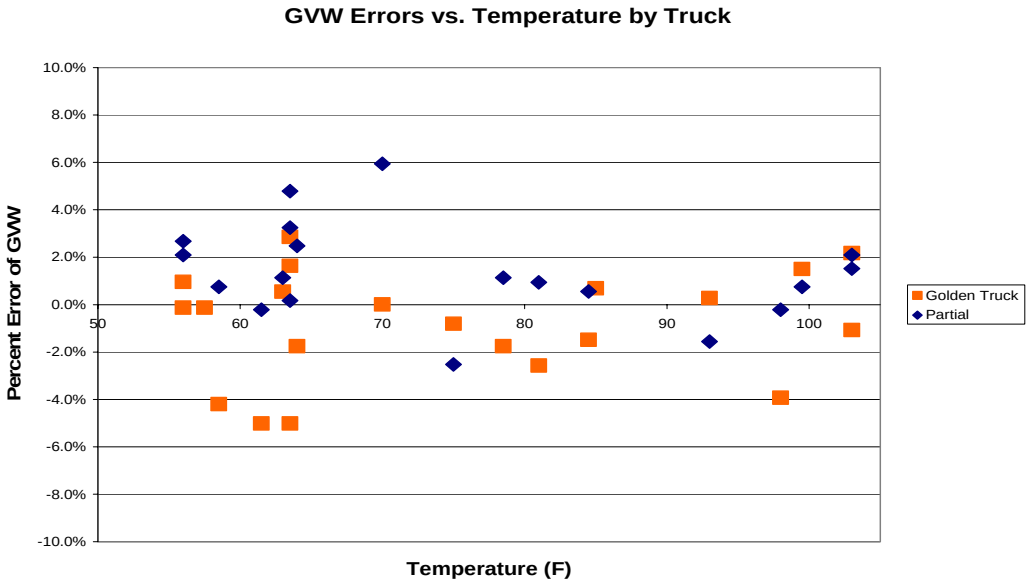

Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 170600 – 29-Mar-2007

Figure 3-6 shows the relation between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From the figure, it can be seen that the equipment has a tendency to underestimate steering axle weights at all temperatures. Variability in steering axle error appears to be greater at low and high temperatures when compared with medium temperatures.

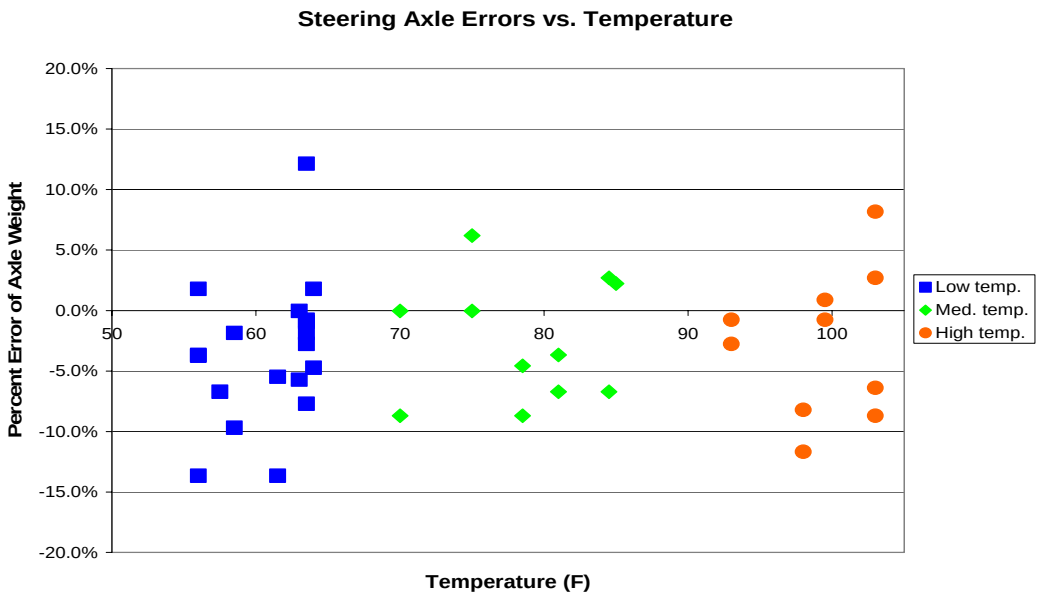

Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 170600 – 29-Mar-2007

3.2 Speed-based Analysis

The three speed groups were divided using 45 to 50 mph for Low speed, 51 to 60 mph for Medium speed and 61+ mph for High speed.

Table 3-3 Post-Validation Results by Speed Bin – 170600 – 29-Mar-2007

Element	95% Limit	Low Speed 45 to 50 mph	Medium Speed 51 to 60 mph	High Speed 61+ mph
Steering axles	±20 %	-4.5 ± 14.2%	-3.3 ± 12.7%	-1.2 ± 7.5%
Tandem axles	±15 %	1.5 ± 5.3%	0.7 ± 9.0%	0.6 ± 7.8%
GVW	±10 %	0.4 ± 4.5%	0.1 ± 7.2%	0.2 ± 3.2%
Speed	±1 mph	0.4 ± 1.4 mph	0.3 ± 1.6 mph	0.0 ± 1.3 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0 ft

From Table 3-3, it can be seen that for steering axle weights, underestimation and variability in error increases as speed decreases. GVW and tandem weights are estimated reasonably well at all speeds, although variability in error for these weights is higher at medium speeds when compared with low and high speeds.

Figure 3-7 illustrates the tendency for the system to estimate GVW accurately for the population as a whole over the entire speed range. For the partially loaded truck (diamonds), GVW is generally overestimated at low and medium speeds. For the golden truck (squares), the equipment appears to underestimate GVW at the low and medium speeds. Variability appears to greater at medium speeds, where the disparity between the estimation of GVW for the trucks is greatest.

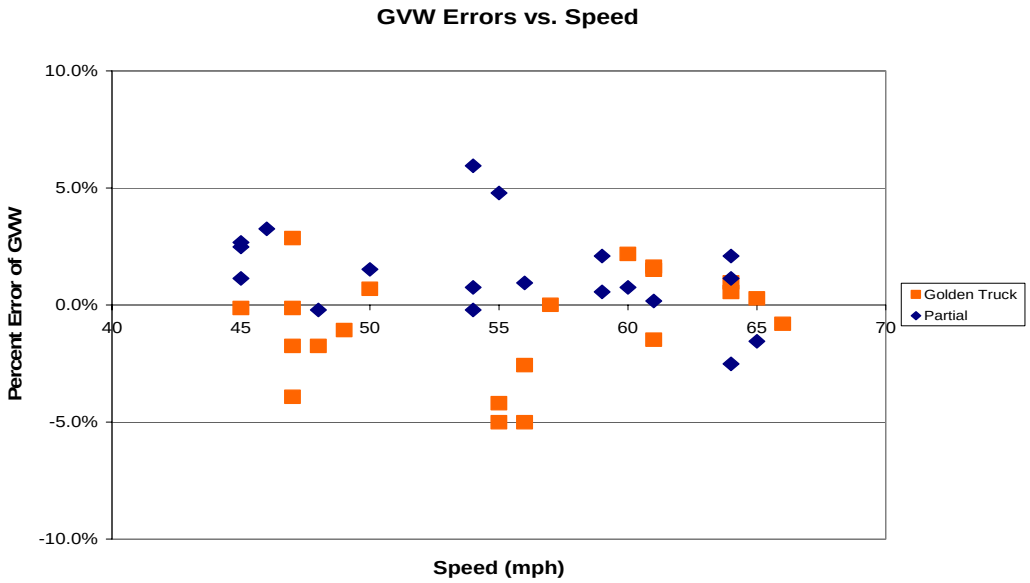

Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 170600 – 29-Mar-2007

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

From the figure, it appears that the WIM equipment increasingly underestimates steering axle weights as speed decreases. The variability of error also appears to increase as speeds decrease. The higher variability and underestimation at low speeds is not deemed significant, since it is below the 15th percentile for truck speeds at this site. The 15th percentile speed is approximately 55 mph.

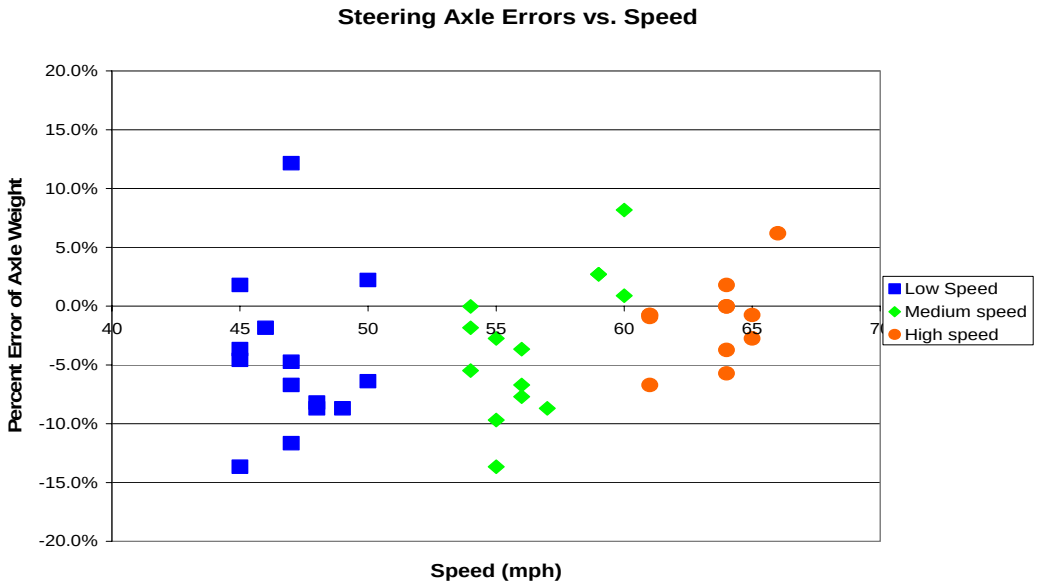

Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group – 170600 – 29-Mar-2007

3.3 Classification Validation

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

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 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 0.0 percent.

Table 3-4 Truck Misclassification Percentages for 170600 – 29-Mar-2007

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

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations with at least one Class 9 and only six of them are matches, the error rate is 25 percent.

The percent error and the mean differences reported below do not represent the same statistic. It is possible to have error rates greater than 0 with a mean difference of zero.

Table 3-5 Truck Classification Mean Differences for 170600 – 29-Mar-2007

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

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

3.4 Evaluation by ASTM E-1318 Criteria

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

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

Profile data collected at the SPS WIM location by Stantec Consultants on June 4, 2006 were processed through the LTPP SPS WIM Index software, version 1.1. This WIM scale is installed in a rigid pavement.

A total of 11 profiler passes were conducted over the WIM site. Since the issuance of the LTPP directive on collection of longitudinal profile data for SPS WIM sections, the requirements have been a minimum of 3 passes in the center of the lane and one shifted to each side. For this site the RSC has completed 5 passes at the center of the lane, 3 passes shifted to the left side of the lane, and 3 passes shifted to the right side of the lane. Shifts to the sides of the lanes were made such that data were collected as close to the lane edges as was safely possible. For each profiler pass, profiles were recorded under the left wheel path (LWP) and the right wheel path (RWP).

The SPS WIM Index software, version 1.1 includes four different indices: LRI, SRI, Peak LRI and Peak SRI. The LRI incorporates the pavement profile starting 25.8 m prior to the scale and ending 3.2 m after the scale in the direction of travel. The SRI incorporates a shorter section of pavement profile beginning 2.74 m prior to the WIM scale and ending 0.46 m after the scale. The LRI and SRI are the index values for the actual location of the WIM scale. Peak LRI is the highest value of LRI, within 30 m prior to the scale. Peak SRI indicates the highest value of SRI that is located between 2.45 m prior to the scale and 1.5 m after the scale. Also, a range for each of the indices was developed to provide the smoothness criteria. The ranges are shown in Table 4-1. When all of the values are below the lower thresholds, it is presumed unlikely that pavement smoothness will significantly influence sensor output. When one or more values exceed an upper threshold there is a reasonable expectation that the pavement smoothness will influence the outcome of the validation. When all values are below the upper threshold but not all below the lower threshold, the pavement smoothness may or may not influence the validation outcome.

Table 4-1 Thresholds for WIM Index Values

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

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

Table 4-2 WIM Index Values - 170600 –04-Jun-2006

Profiler Passes			Pass 1	Pass 2	Pass 3	Pass 4	Pass 5	Ave.
Center	LWP	LRI (m/km)	0.569	0.675	0.552	0.616	0.649	0.612
		SRI (m/km)	0.515	*0.401*	*0.447*	*0.452*	0.567	*0.476*
		Peak LRI (m/km)	0.676	0.700	0.648	0.662	0.658	0.669
		Peak SRI (m/km)	*0.534*	*0.524*	*0.479*	*0.606*	*0.584*	*0.545*
	RWP	LRI (m/km)	0.624	0.601	0.618	0.532	0.581	0.591
		SRI (m/km)	*0.498*	*0.320*	0.714	*0.344*	*0.487*	*0.473*
		Peak LRI (m/km)	0.658	0.706	0.672	0.657	0.673	0.673
		Peak SRI (m/km)	0.894	*0.569*	1.229	*0.615*	*0.680*	0.797
Left Shift	LWP	LRI (m/km)	*0.489*	0.578	*0.460*			0.509
		SRI (m/km)	*0.389*	*0.469*	*0.305*			*0.389*
		Peak LRI (m/km)	0.665	0.647	0.599			0.637
		Peak SRI (m/km)	*0.524*	*0.597*	*0.486*			*0.536*
	RWP	LRI (m/km)	0.603	0.664	0.870			0.712
		SRI (m/km)	1.070	0.975	1.734			1.260
		Peak LRI (m/km)	0.603	0.665	0.880			0.716
		Peak SRI (m/km)	1.392	1.313	2.310			1.672
Right Shift	LWP	LRI (m/km)	0.555	0.576	*0.447*			0.526
		SRI (m/km)	*0.479*	0.664	*0.318*			*0.487*
		Peak LRI (m/km)	0.642	0.641	0.608			0.630
		Peak SRI (m/km)	0.771	*0.709*	*0.429*			*0.636*
	RWP	LRI (m/km)	0.550	*0.469*	0.528			0.516
		SRI (m/km)	*0.475*	*0.379*	*0.365*			*0.406*
		Peak LRI (m/km)	0.642	0.603	0.627			0.624
		Peak SRI (m/km)	*0.652*	*0.549*	*0.557*			*0.586*

From Table 4-2 it can be seen that many of the SRI and peak SRI values fall below the lower threshold level. The LRI values predominantly fall between the two threshold levels. These values indicate that the pavement profile may or may not influence the WIM scale output. Since the scale could be validated as providing research quality data, no recommendation is made here for any remediation to the pavement at this site.

The profile data evaluated was collected after the last validation visit. There is no profile evaluation for conditions prior to that visit since the system was a new installation.

There is no profile data collected after the replacement of the weigh pad. Since the scale could be validated there is no apparent reason to collect additional profile information outside of the proposed profile visits.

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. A significant transverse crack (Figure 4-1) located approximately 25 feet following the leading transition to the concrete section

was discovered, but appears to be far enough in advance of the WIM scales so that it does not affect the movement of the trucks as they transverse the WIM scale area.

Figure 4-1 Transverse crack upstream of WIM section - 27-March-2007

The crack is approximately an inch wide and an inch or more deep. There is a little motion observed for the cracked slab.

4.3 Vehicle-pavement Interaction Discussion

A visual observation of the trucks as they approach, transverse 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 and any of the sensors for the equipment.

5 Equipment Discussion

The traffic monitoring equipment at this location includes bending plate and iSINC electronics. These sensors are installed in a staggered configuration in a portland cement concrete pavement approximately 400 feet in length. The roadway outside this short section is asphalt. The SPS-6 experiment is asphalt overlay of concrete but whether the WIM location is within the overlaid area has not been investigated.

All equipment and sensors were installed in July 2005 as part of the SPS WIM Phase II contract.

Since the last Validation visit on September 19, 2006, the trailing weigh-pad sensor was replaced due to failure. No subsequent calibration or validation was performed. The quality of the data based on field validation since its replacement and prior to this validation cannot be determined.

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.

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

As a result of the pre-validation, one-iteration of the calibration process was performed between the initial 40 runs and the final 40 runs to improve the performance of the equipment and diminish the discernable bias in weights provided by the equipment.

5.2.1 Calibration Iteration 1

For this equipment, there are 5 speed designated weight compensation factors for each sensor 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.

The final compensation factors for the September 19, 2006 validation were:

Speed point	sensor 1	sensor 2
80 kph (50 mph)	3710	3710
88 kph (55 mph)	3780	3780
96 kph (60 mph)	3815	3815
104 kph (65 mph)	3800	3800
112 kph (70 mph)	3720	3720

In February, 2007, the left weighpad was replaced. At that time, each compensation factor was changed to balance the weights being reported by the left and right weighpads. The results of the changes are shown in Table 5-1.

Table 5-1 - Results of Compensation Factor Changes – Exact Date(s) unknown

Speed point		50	55	60	65	70
Sensor 1	old factors	3710	3780	3815	3800	3720
	new factors	3445	3520	3553	3538	3464
	% change	-7.1%	-6.9%	-6.9%	-6.9%	-6.9%
Sensor 2	old factors	3710	3780	3815	3800	3720
	new factors	3807	3879	3914	3899	3817
	% change	2.6%	2.6%	2.6%	2.6%	2.6%
	combined change	**-2.3%**	**-2.1%**	**-2.1%**	**-2.1%**	**-2.1%**

As shown by the table, the change to the factors generally decreased all weight factorization by 2.1% over the entire speed range.

As a result of left/right wheel weight comparisons performed from the pre-validation test runs on March 28, 2007, adjustments were made to the sensor 1 and sensor 2 compensation factors to re-balance the weights reported by each WIM sensor. The new factors before weight bias adjustments were made are shown in Table 5-2.

Table 5-2 - Results of Right/Left Comparison Changes - 28-Mar-2007

Speed point		50	55	60	65	70
Sensor 1	old factors	3445	3520	3553	3538	3464
	new factors	3807	3879	3914	3899	3817
	% change	10.5%	10.2%	10.2%	10.2%	10.2%
Sensor 2	old factors	3807	3879	3914	3899	3817
	new factors	3445	3520	3553	3538	3464
	% change	-9.5%	-9.3%	-9.2%	-9.3%	-9.2%
	combined change	**+0.5%**	**+0.5%**	**+0.5%**	**+0.5%**	**+0.5%**

As shown in the table, after the right/left comparison was performed, total weights were increased by 0.5%.

Based on the results from the Pre-Validation, which produced a mean GVW error range of -7.9% to +4.2%, the compensation factors were adjusted to compensate for underestimations of all weights. The adjustments and their results are shown in Table 5-3.

Table 5-3 - Final Parameters - 29-Mar-2007

Speed point		50	55	60	65	70
Sensor 1	old factors	3807	3879	3914	3899	3817
	new factors	3884	4120	3994	3938	3817
	% change	2.0%	6.2%	2.0%	1.0%	0.0%
Sensor 2	old factors	3445	3520	3553	3538	3464
	new factors	3524	3740	3626	3574	3464
	% change	2.3%	6.3%	2.1%	1.0%	0.0%
	combined change	**+2.2%**	**+6.2%**	**+2.0%**	**+1.0%**	**0.0%**

Computations for the changes and equipment factor changes were made by the Validation Task Leader. There were no agency personnel on-site to review or execute the modifications.

The results of the first iteration are shown in Table 5-4 and Figure 5-1.

Table 5-4 Calibration Iteration 1 Results – 170600 – 29-Mar-2007 (7:53:00 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-4.6 ± 10.5%	Pass
Tandem axles	±15 percent	0.1 ± 6.4%	Pass
GVW	±10 percent	-0.7 ± 5.3%	Pass
Speed	±1 mph	**0.6 ± 1.5 mph**	**Fail**
Axle spacing	± 0.5 ft	0 ± 0.1 ft	Pass

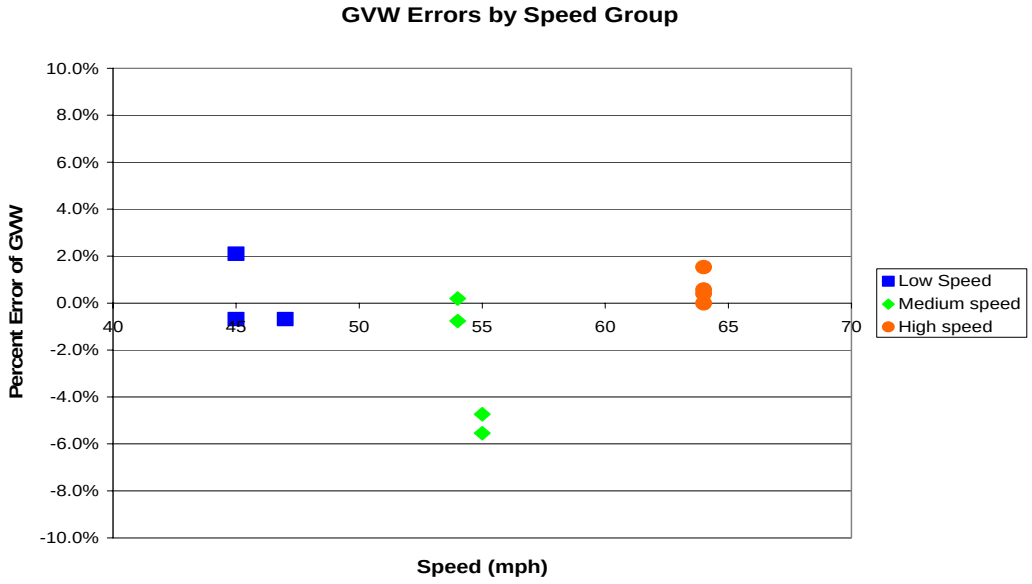

Figure 5-1 Calibration Iteration 1 GVW Percent Error vs. Speed Group – 170600 – 29-Mar-2007 (7:53:00 AM)

Mean errors for all weights were deemed acceptable for research quality data. Thirty more runs were performed to complete the required 40 post-validation runs.

5.3 Summary of Traffic Sheet 16s

This site has validation information from previous visits as well as the current one in the tables below.

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

Table 5-5 Classification Validation History – 170600 – 29-Mar-2007

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
03/29/2007	Manual	0	0			0
03/28/2007	Manual	0	0			0
09/21/2006	Manual	0	0			0
09/19/2006	Manual	0	0			0
09/08/2005	Manual	0	0			0
09/07/2005	Manual	0	0			0

Table 5-6 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 5-6 Weight Validation History – 170600 – 29-Mar-2007

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
03/29/2007	Test Trucks	0.2 (2.4)	-3.1 (5.6)	1.0 (3.6)
03/28/2007	Test Trucks	1.6 (2.8)	-6.6 (6.3)	-0.3 (3.9)
09/21/2006	Test Trucks	-0.7 (2.5)	-4.8 (5.1)	0.0 (3.5)
09/20/2006	Test Trucks	-0.4 (2.5)	-3.4 (4.4)	0.1 (3.7)
09/08/2005	Test Trucks	1.5 (2.9)	-3.0 (6.5)	2.4 (3.5)
09/07/2005	Test Trucks	1.6 (2.6)	-3.5 (5.2)	2.6 (3.6)

From the table, it appears that standard deviation in error for all weights has remained consistent over time. For the last two validation visits, 1 to 4 percent increases to compensation factors have been made in order to reduce the bias of the data.

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 March 28, 2007 from late morning until early evening at 170600 on approximately 10 miles south of the I-57/I-72 interchange. This SPS-6 site is at milepost 225.7 on Interstate 57 in the northbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for initial validation included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and an air suspension loaded to 74,100 lbs.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a steel leaf suspension loaded to 52,040 lbs. , the partial truck.

For the initial validation each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 40 to 62 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 62 to 84 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 6-1.

As seen in Table 6-1, the site passed all of the performance criteria for research quality data except speed. As a result of the Pre-Validation test truck runs, a bias was observed for both test trucks at the low and medium speeds. It was determined that additional adjustment could further improve the overall quality of the data.

Table 6-1 Pre-Validation Results – 170600 – 28-Mar-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-6.6 ± 12.7%	Pass
Tandem axles	±15 percent	-0.3 ± 7.7%	Pass
GVW	±10 percent	-1.6 ± 5.7%	Pass
Speed	±1 mph [2 km/hr]	**0.3 ± 1.7 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0 ± 0 ft	Pass

The test runs were conducted primarily during the evening and early morning hours. Predominately overcast skies resulted 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 two temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs.

The three speed groups were divided into 41 to 50 mph for Low speed, 51 to 59 mph for Medium speed and 60+ mph for High speed. The two temperature groups were created by splitting the runs between those at 62 to 73 degrees Fahrenheit for Low temperature and 74 to 84 degrees Fahrenheit for High temperature.

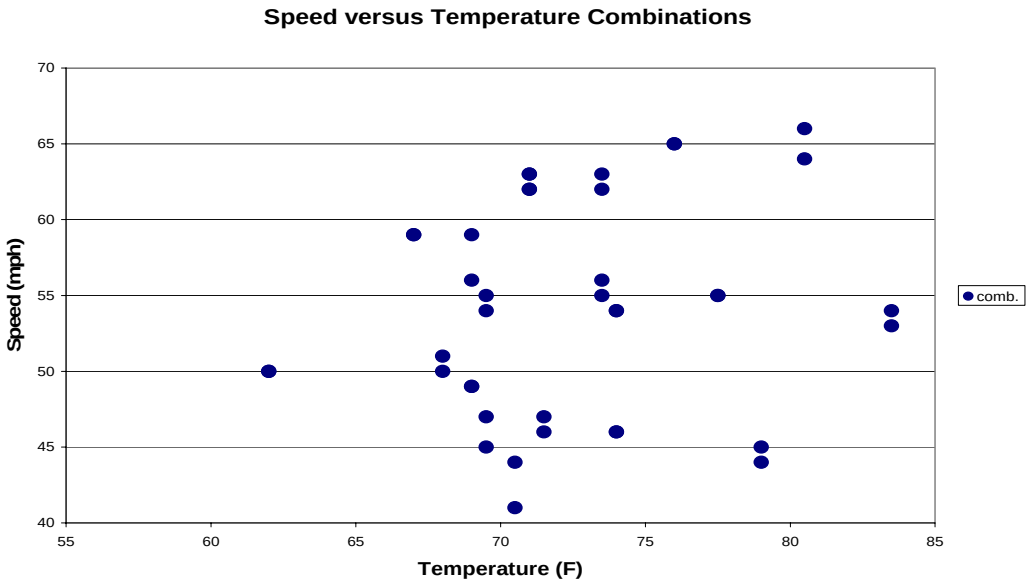

Figure 6-1 Pre-Validation Speed-Temperature Distribution – 170600 – 28-Mar-2007

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

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

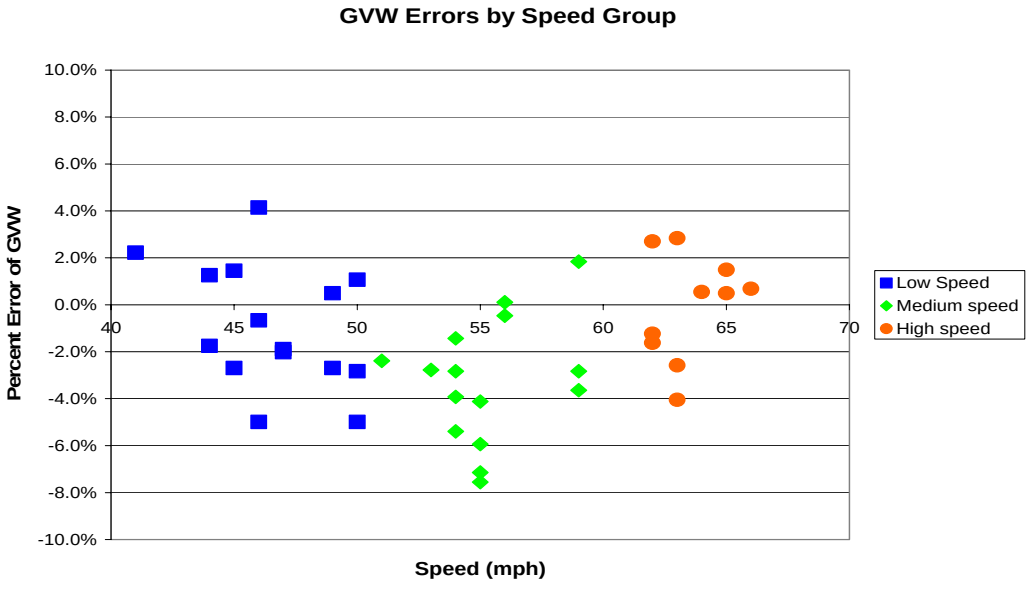

Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 170600 – 28-Mar-2007

Figure 6-3 shows the relationship between temperature and GVW percentage error. From the figure, it appears that the GVW is measured reasonably accurately over the entire temperature range. Variability in error is fairly consistent over the entire temperature range.

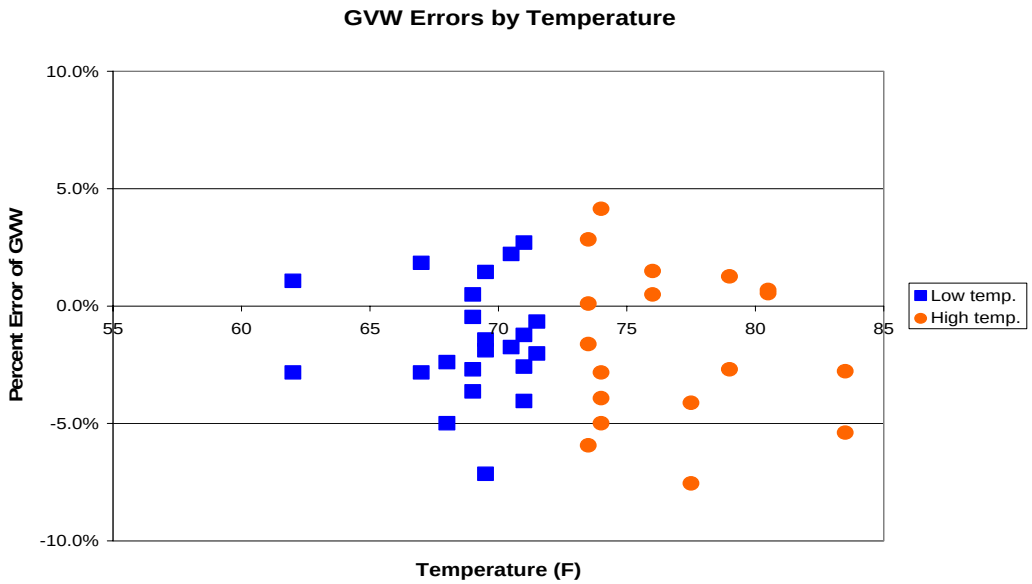

Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 170600 – 28-Mar-2007

Figure 6-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. The graph indicates that the errors in tandem spacings for the test trucks were not affected by changes in speed.

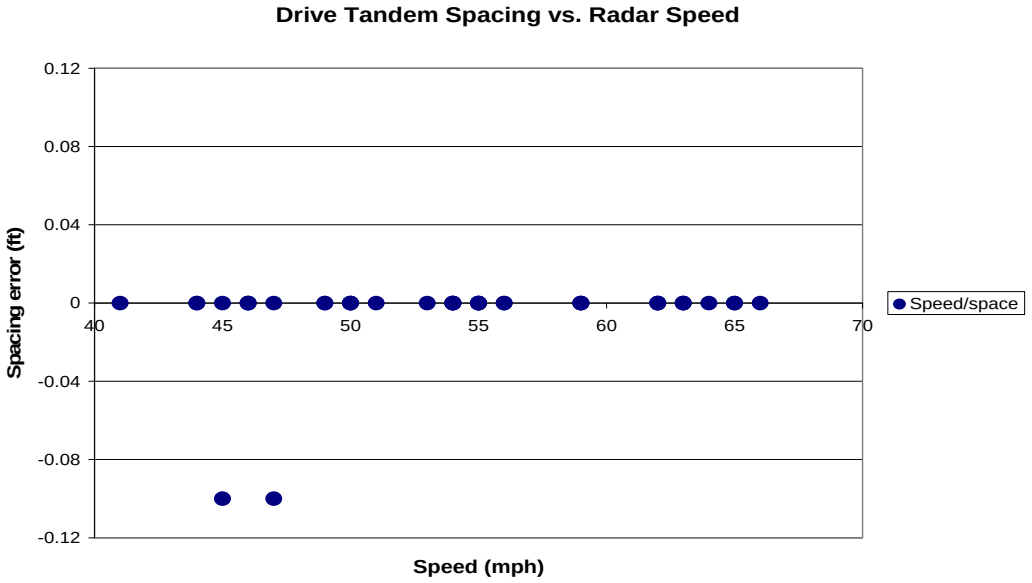

Figure 6-4 Pre-Validation Spacing vs. Speed - 170600 – 28-Mar-2007

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 62 to 73 degrees Fahrenheit for Low temperature and 74 to 84 degrees Fahrenheit for High temperature.

Table 6-2 Pre-Validation Results by Temperature Bin – 170600 – 28-Mar-2007

Element	95% Limit	Low Temperature 62 to 73 °F	High Temperature 74 to 84 °F
Steering axles	±20 %	-7.2 ± 13.2%	-5.9 ± 13.2%
Tandem axles	±15 %	-0.1 ± 7.3%	-0.5 ± 8.5%
GVW	±10 %	-1.5 ± 5.1%	-1.7 ± 6.9%
Speed	±1 mph	0.5 ± 1.4 mph	0.1 ± 2.1 mph
Axle spacing	± 0.5 ft	0.0 ± 0.0 ft	0.0 ± 0.0 ft

From Table 6-2, it can be seen that GVW and tandem weights are estimated consistently throughout the entire temperature range, while steering axle weights are underestimated. Variability also appears to be reasonably consistent throughout the temperature range.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. The equipment appears to produce a generally accurate estimation of the partial truck (diamonds) GVW over the observed temperature range. For the golden truck (squares), the equipment appears to underestimate evenly over the temperature range. The variability in error for the golden truck appears to be greater over the temperature range when compared with the partial truck error variability.

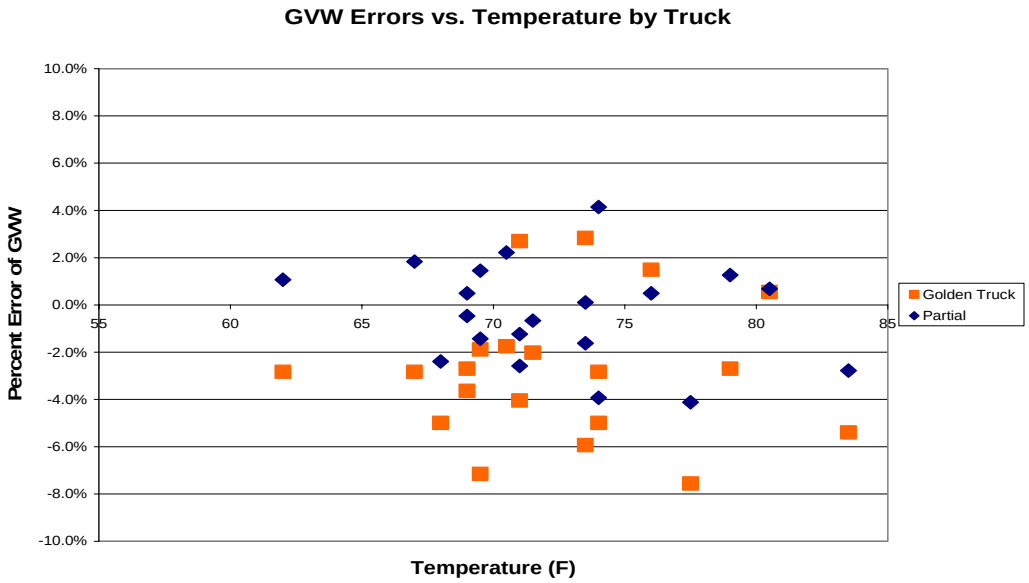

Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 170600 – 28-Mar-2007

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

The figure shows that steering axle weights are consistently underestimated by the equipment over the temperature range, with a slightly less underestimation at higher temperatures when compared with lower temperatures. Variability in error appears to be higher at the low end of the temperature range when compared to high end.

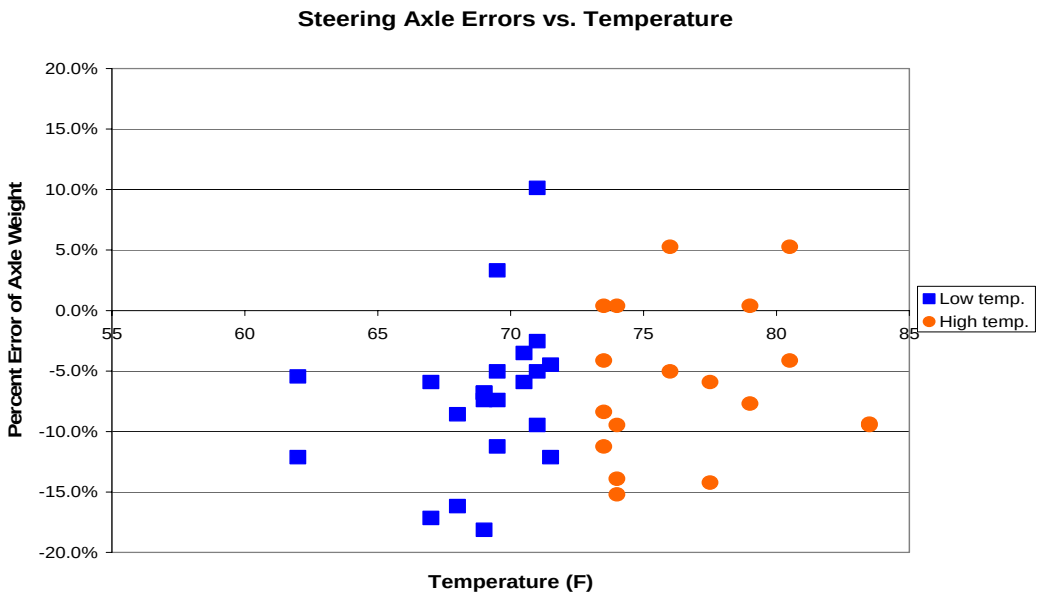

Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group – 170600 – 28-Mar-2007

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 41 to 50 mph, Medium speed – 51 to 59 mph and High speed – 60+ mph.

Table 6-3 Pre-Validation Results by Speed Bin – 170600 – 28-Mar-2007

Element	95% Limit	Low Speed 41 to 50 mph	Medium Speed 51 to 59 mph	High Speed 60+ mph
Steering axles	±20 %	-7.2 ± 11.4%	-9.8 ± 10.2%	-0.9 ± 13.7%
Tandem axles	±15 %	0.6 ± 7.8%	-1.7 ± 8.1%	0.4 ± 7%
GVW	±10 %	-0.9 ± 5.7%	-3.2 ± 5.6%	-0.1 ± 5.1%
Speed	±1 mph	0.5 ± 1.4 mph	0.3 ± 1.9 mph	0.0 ± 2.4 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.0 ft	0.0 ± 0.0 ft

From Table 6-3, it can be seen that mean errors for GVW are underestimated over the observed speed range, with greater underestimation at the medium speeds. For steering axle weights, the equipment produced a greater underestimation at the low and medium speeds when compared with high speeds. Tandem weights appear to be measured accurately over the entire speed range, with only a slight underestimation at medium speeds. Variability in all errors appears to be consistent over the entire speed range.

Figure 6-7 illustrates the tendency of the equipment to generally underestimate GVW for the truck population at low and medium speeds, with the greatest underestimation at the 55 mph speed point. Separately, the GVW for the Golden truck (squares) is underestimated at low and medium speeds and GVW for the partial truck (diamonds) is overestimated at low and medium speeds. Variability in GVW error appears to remain

consistent throughout the speed range for each truck and for the truck population as a whole.

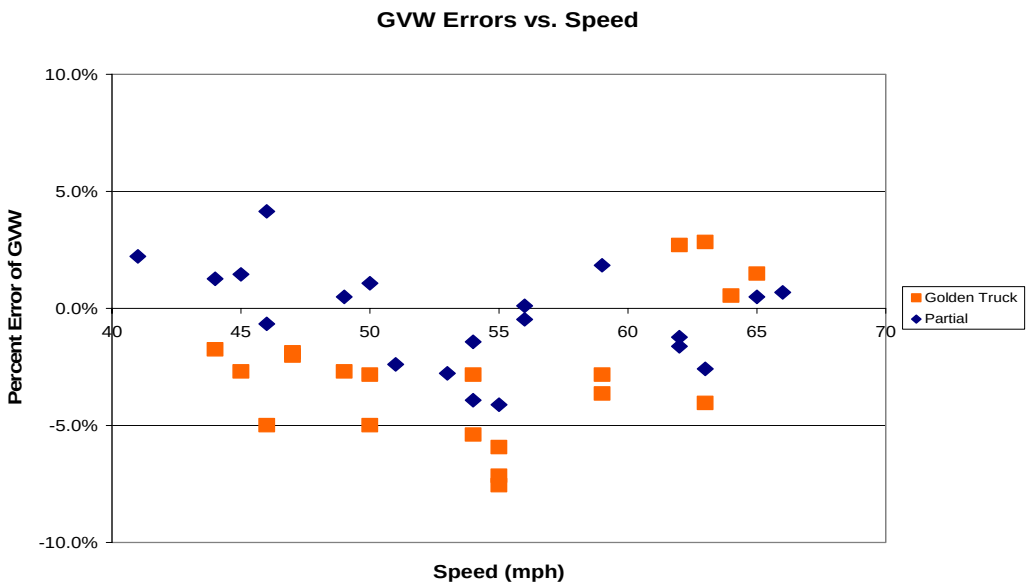

Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 170600 –28-Mar-2007

Figure 6-8 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

From the figure, it appears that the equipment generally underestimates steering axle weights at low and medium speeds, with variability in error remaining reasonably consistent throughout the entire speed range.

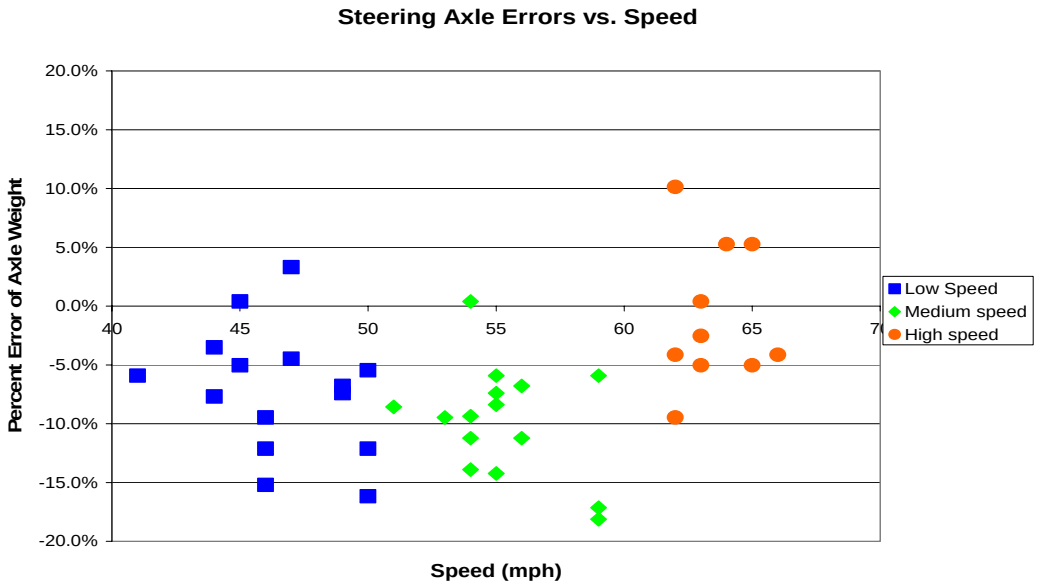

Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 170600 – 28-Mar-2007

6.3 Classification Validation

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

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. The classification identification is to identify gross errors in classification, not validate the classification algorithm. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0.0 percent unknown vehicles and 0.0 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 0.0 percent.

Table 6-4 Truck Misclassification Percentages for 170600 – 28-Mar-2007

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

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations

with at least one Class 9 and only six of them are matches, the error rate is 25 percent. The percent error and the mean differences reported below do not represent the same statistic. It is possible to have error rates greater than 0 with a mean difference of zero.

Table 6-5 Truck Classification Mean Differences for 170600 – 28-Mar-2007

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

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

6.4 Evaluation by ASTM E-1318 Criteria

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

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

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

6.5 Prior Validations

The last validation for this site was done September 19 to 21, 2006. It was the second validation of the site. The site was producing research quality data. Figure 6-9 shows the GVW Percent Error vs. Speed for the post validation runs. The site was validated with two trucks. The "Golden" truck was loaded to 75840 lbs. The "partial" truck which had an air suspension tractor tandem and a leaf spring trailer tandem was loaded to 60880 lbs.

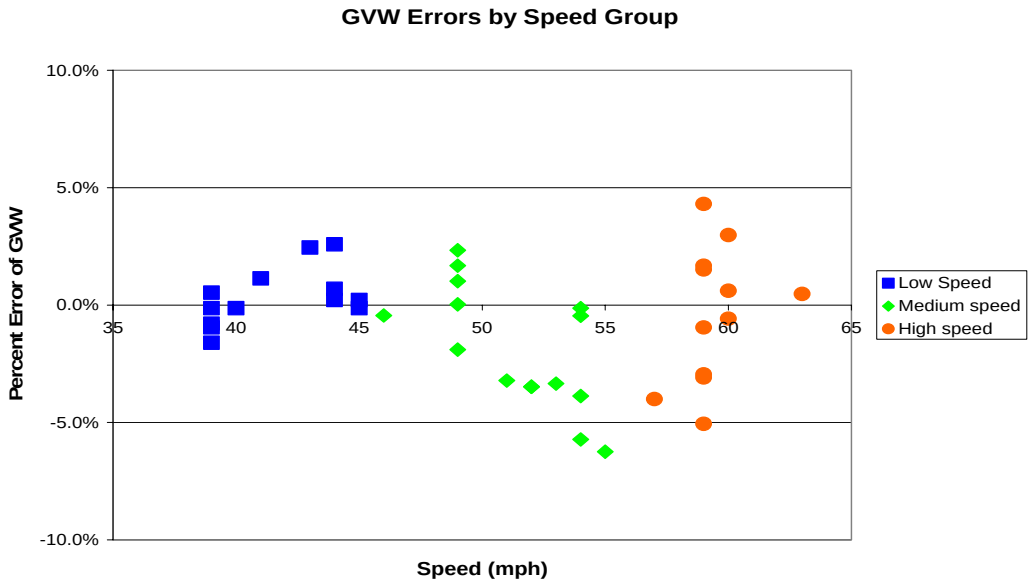

Figure 6-9 Last Validation GVW Percent Error vs. Speed – 170600 – 19-Sep-2006

Table 6-7 shows the overall results from the last validation.

Table 6-7 Last Validation Final Results – 170600 – 19-Sep-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-4.8 ± 10.4%	Pass
Tandem axles	±15 percent	0.0 ± 6.9%	Pass
Gross vehicle weights	±10 percent	-0.7 ± 5.0%	Pass
Speed	±1 mph [2 km/hr]	N/A	
Axle spacing	± 0.5 ft [150 mm]	0.0 ± 0.1 ft	Pass

Table 6-8 has the results at the end of the last validation by temperature. Clear skies provided for a wide temperature range. Through this validation the equipment has been observed at temperatures from 48 to 103 degrees Fahrenheit.

Table 6-8 Last Validation Results by Temperature Bin – 170600 – 19-Sep-2006

Element	95% Limit	Low Temperature 48 to 59°F	Medium Temperature 60 to 77°F	High Temperature 77 to 86°F
Steering axles	±20 %	-1.2 ± 13.2%	-6.1 ± 9.8%	-6.0 ± 9.0%
Tandem axles	±15 %	0.4 ± 6.7%	-0.6 ± 6.9%	0.3 ± 7.8%
GVW	±10 %	0.1 ± 5.2%	-1.4 ± 4.2%	-0.6 ± 6.4%
Speed	±1 mph	N/A	N/A	N/A
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Table 6-9 has the results of the prior post validation by speed groups. As shown in the table, the equipment underestimated steering axle weights, while reporting GVW and

tandem weights with reasonable accuracy. Variability in all weight errors appears to have generally increased with speed, with the exception of steering axle errors at medium speeds where there was a slight decrease.

Table 6-9 Last Validation Results by Speed Bin – 170600 – 19-Sep-2006

Element	95% Limit	Low Speed mph	Medium Speed mph	High Speed mph
Steering axles	±20 %	-5.0 ± 8.4%	-7.0 ± 7.2%	-2.0 ± 15.1%
Tandem axles	±15 %	1.2 ± 5.6%	-0.9 ± 7.0%	-0.1 ± 8.4%
GVW	±10 %	0.3 ± 2.6%	-1.8 ± 5.6%	-0.4 ± 6.4%
Speed	±1 mph	N/A	N/A	N/A
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

7 Data Availability and Quality

As of March 28, 2007 this site does not have at least 5 years of research quality data. Research quality data is defined to be at least 210 days in a year of data of known calibration meeting LTPP's precision requirements.

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

The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. As can be seen from the table, only 1997,1998 and 2006 have a sufficient quantity to be considered complete years of data. In the absence of validation information prior to 2005, together with the calibration information gathered in 2006, it can be seen that at least 4 additional years of research quality data are needed to meet the goal of a minimum of 5 years of research weight data.

Table 7-1 Amount of Traffic Data Available 170600 – 28-Mar-2007

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1991	0	0	None	17	2	Full Week
1992	0	0	None	110	7	Full Week
1993	44	2	Full Week	48	3	Full Week
1994	96	7	Full Week	126	7	Full Week
1995	60	5	Full Week	0	0	None
1996	23	6	Full Week	0	0	None
1997	224	11	Full Week	282	11	Full Week
1998	218	10	Full Week	225	11	Full Week
1999	52	3	Full Week	51	3	Full Week
2002	4	1	Weekday(s) and Weekend day(s)	0	0	None
2005	135	5	Full Week	137	5	Full Week
2006	231	9	Full Week	235	9	Full Week

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

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

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

- Class 9 overweights are defined as the percentage of vehicles greater than 88,000 pounds
- Class 9 underweights are defined as the percentage of vehicles less than 20,000 pounds.
- Class 9 unloaded peak is the bin less than 44,000 pounds with the greatest percentage of trucks.
- Class 9 loaded peak is the bin 60,000 pounds or larger with the greatest percentage of trucks.

There may be more than one bin identified for the unloaded or loaded peak due to the small sample size collected after validation. Where only one peak exists, the peak rather

than a loaded or unloaded peak is identified. This may happen with single unit trucks. It is not expected to occur with combination vehicles.

Table 7-2 GVW Characteristics of Major sub-groups of Trucks – 170600 – 29-Mar-2007

Characteristic	Class 9
Percentage Overweights	0.0%
Percentage Underweights	0.1%
Unloaded Peak	36,000 lbs
Loaded Peak	76,000 lbs

The expected percentage of unclassified vehicles is 0.0%. This is based on the percentage of unclassified vehicles in the post-validation data download.

The graphical screening comparison figures are found in Figure 7-1 through Figure 7-3. These are based on data collected immediately after the validation and may not be wholly representative of the population at the site. They should however provide a sense of the statistics expected when SPS comparison data is computed for the post-validation Sheet 16.

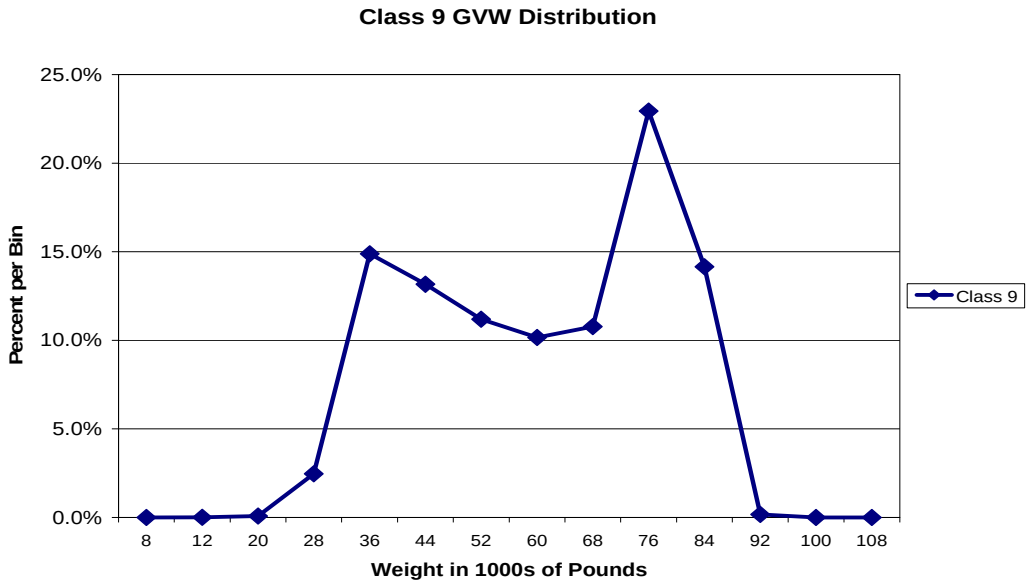

Figure 7-1 Expected GVW Distribution Class 9 – 170600 – 29-Mar-2007

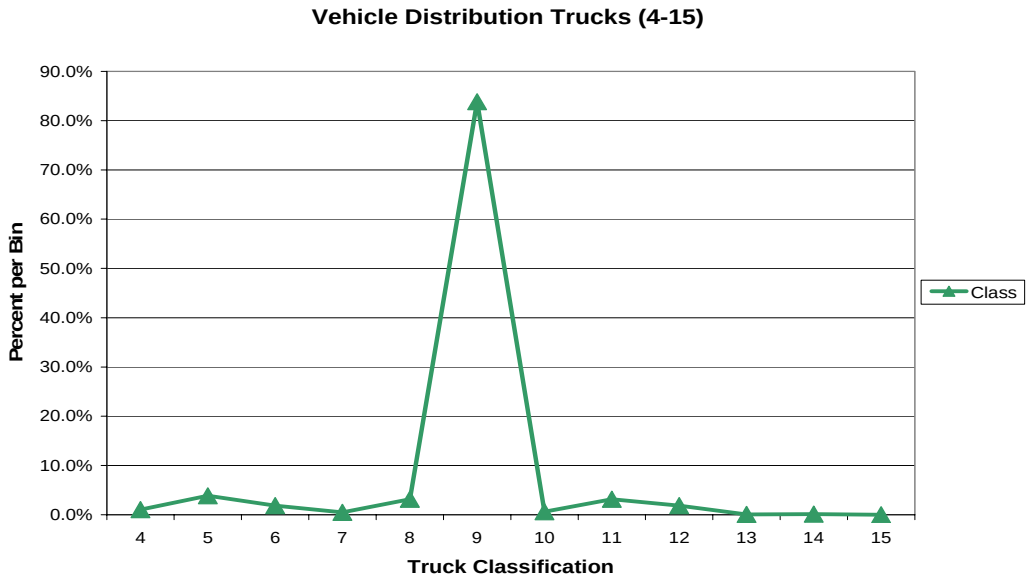

Figure 7-2 Expected Vehicle Distribution – 170600 – 29-Mar-2007

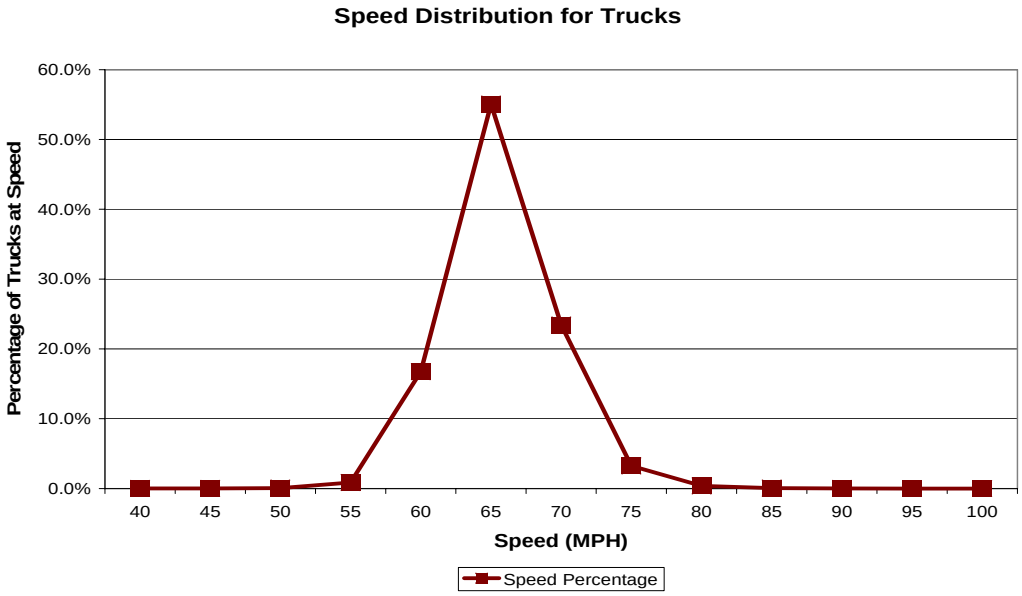

Figure 7-3 Expected Speed Distribution – 170600 – 29-Mar-2007

8 Data Sheets

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

Sheet 19 – Truck 1 – 3S2 loaded air suspension (4 pages)
Sheet 19 – Truck 2 – 3S2 partial air tractor suspension and leaf spring trailer suspension (4 pages)

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

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

Calibration Iteration 1 Worksheets – (1 page)

Test Truck Photographs (7 pages)

LTPP Mod 3 Classification Scheme 9 (1 page)

Final System Parameters (1 page)

9 Updated Handout Guide and Sheet 17

A copy of the handout has been included following this page. It includes a current Sheet 17 with all applicable maps and photographs. There are no significant changes in the information provided.

10 Updated Sheet 18

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

11 Traffic Sheet 16(s)

Sheet 16s for the Pre-Validation and Post-Validation conditions are attached following the current Sheet 18 information at the very end of the report.

POST-VISIT HANDOUT GUIDE FOR SPS WIM VALIDATION

STATE: Illinois

SHRP ID: 0600

Figures

1. General Information

SITE ID: *170600*

LOCATION: *I-57 North, milepost 255.6, approximately 10.0 miles south of the I-57/ I-72 interchange in Champaign.*

VISIT DATE: Beginning Tuesday, March 27, *2007*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *David Lippert, lippertdl@nt.dot.state.il.us*

Rob Robinson, 217-785-2353, robinsonre@nt.dot.state.il.us

Mark Gawedzinski, 217-782-2799, mark.gawedzinski@illinois.gov

Amy Schutzbach, 217-785-4888, amy.schutzbach@illinois.gov

Susan Stitt, 217-782-8080, stittb@nt.dot.state.il.us

Ray Taylor, 217-782-2065, taylorrl@nt.dot.state.il.us

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

FHWA Division Office Liaison: *Douglas Blades*, 217-492-4629, *douglas.blades@fhwa.dot.gov*

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

3. Agenda

BRIEFING DATE: *None Requested*

ON SITE PERIOD: *Beginning Tuesday, March 27, 2007at 8:00 am*

TRUCK ROUTE CHECK: *Completed at previous Validation*

4. Site Location/ Directions

NEAREST AIRPORT: *University of Illinois' Willard Airport, Champaign, IL*

DIRECTIONS TO THE SITE: *Approximately 10 miles south of the I-57/I-72 interchange in Champaign.*

MEETING LOCATION: On-site, Tuesday March 27, *2007at 8:00 am*

WIM SITE LOCATION: *Located in the northbound driving lane of Interstate 57, milepost 225.6, just north of the rest areas near the town of Pesotum.*

WIM SITE LOCATION MAP:

Figure 4-1 - WIM Site Location - 170600 - Illinois

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *Road Ranger, I-57 & HWY 36, EXIT 212, Tuscola, IL; Operator – Carol Logan, Phone 217-253-5474; Latitude: 39.79258 Longitude: -88.26667; Open 24 hours; $8.50 per weigh; located 13.3 miles from WIM site.*

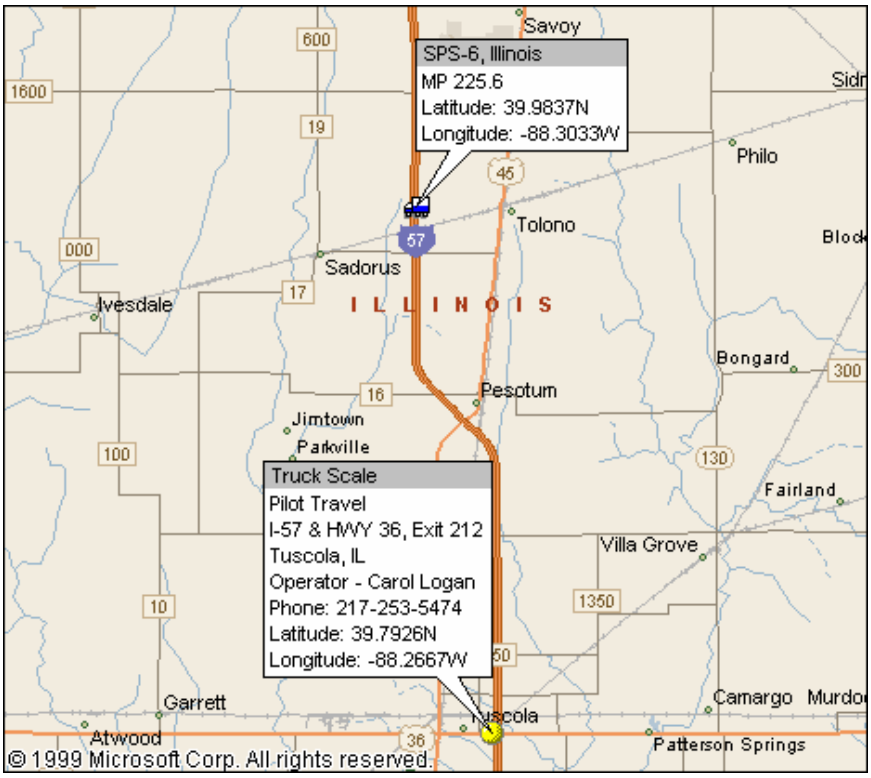

Figure 5-1 – Truck Scale Location – 170600 - Illinois

TRUCK ROUTE:

Northbound – Exit 229 / CR18 Monticello Savoy *Distance from WIM - 3.3 Miles*

Southbound – Exit 220 / US45 Pesotum *Distance from WIM - 5.7 Miles*

Circuit travel distance – 18.0 Miles *Estimated lap time - 20 Minutes*

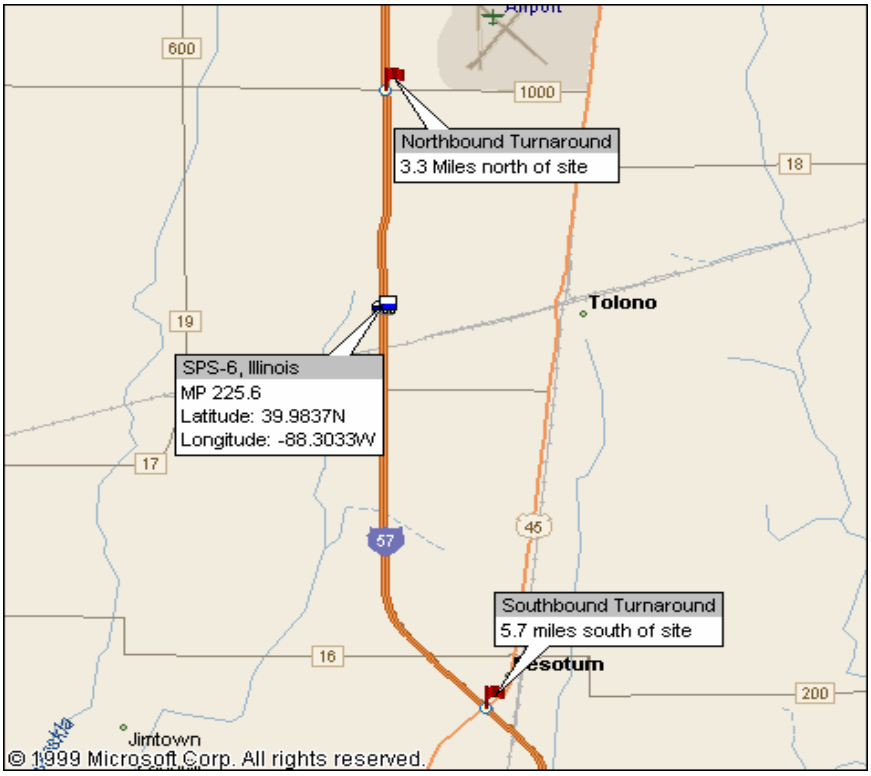

Figure 5-2 - Truck Route - 170600 - Illinois

6. Sheet 17 – Illinois (170600)

1.* ROUTE ___I-57_____ MILEPOST __225.7___LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade ___<1%_____ % Sag vertical Y / N
Nearest SPS section upstream of the site _0__ _6__ _6__ _4__
Distance from sensor to nearest upstream SPS Section _8__0__ 2__0__ 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: _3/28/07_ Filename: _TO_18_17_2.85_0600_03_28_07_downstream.jpg _____
Date: _3/28/07_ Filename: _TO_18_17_2.85_0600_03_28_07_upstream.jpg_____
Date _____ Filename: _____

6. * SENSOR SEQUENCE
_____Loop – Bending Plate-Bending Plate-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 ___ __6_ . _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 __6_2__ ft
Distance from system __6__8__ ft
TYPE _____336S_____

CABINET ACCESS controlled by LTPP / STATE / JOINT?
Contact - name and phone number __Basel Abukhater, Stantec, Inc._____
Alternate - name and phone number __Ray Taylor, IL DOT_____

11. * POWER

Distance to cabinet from drop __7_7_7_ ___ ft Overhead / underground / solar / AC in cabinet?
Service provider _____ Phone number _____

12. * TELEPHONE

Distance to cabinet from drop ___1_2__ ___ ft Overhead / underground / cell?
Service provider _____Phone Number _____

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

14. * TEST TRUCK TURNAROUND time _20____ minutes DISTANCE _18.0_ mi.

15. PHOTOS

	FILENAME
Power source	_TO_18_17_2.85_0600_03_28_07_Power_Meter.jpg
Phone source	_TO_18_17_2.85_0600_03_28_07_Telephone_Pedestal.jpg
Cabinet exterior	_TO_18_17_2.85_0600_03_28_07_Cabinet_Exterior.jpg
Cabinet interior	_TO_18_17_2.85_0600_03_28_07_Cabinet_Interior_Front.jpg
	_TO_18_17_2.85_0600_03_28_07_Cabinet_Interior_Back.jpg
Weight sensors	_TO_18_17_2.85_0600_03_28_07_Leading_WIM_Sensor.jpg
	_TO_18_17_2.85_0600_03_28_07_Trailing_WIM_Sensor.jpg
Other sensors	_TO_18_17_2.85_0600_03_28_07_Leading_Loop.jpg
	_TO_18_17_2.85_0600_03_28_07_Trailing_Loop.jpg

Description __Loop Sensors_____
Downstream direction at sensors on LTPP lane
_TO_18_17_2.85_0600_03_28_07_Downstream.jpg
Upstream direction at sensors on LTPP lane
_TO_18_17_2.85_0600_03_28_07_Upstream.jpg

COMMENTS Power trench has sunk up to 6" in some areas and over 95% of the 777' length of the trench

GPS – 39 degrees, 59.027 min north; -88 deg, 18.201 min West

Power Trench repaired as of site visit on 09/18/06

COMPLETED BY Dean J. Wolf

PHONE 301-210-5105 DATE COMPLETED _0_3_ /_2_7_ / _2_0_0_7_

Sketch of equipment layout

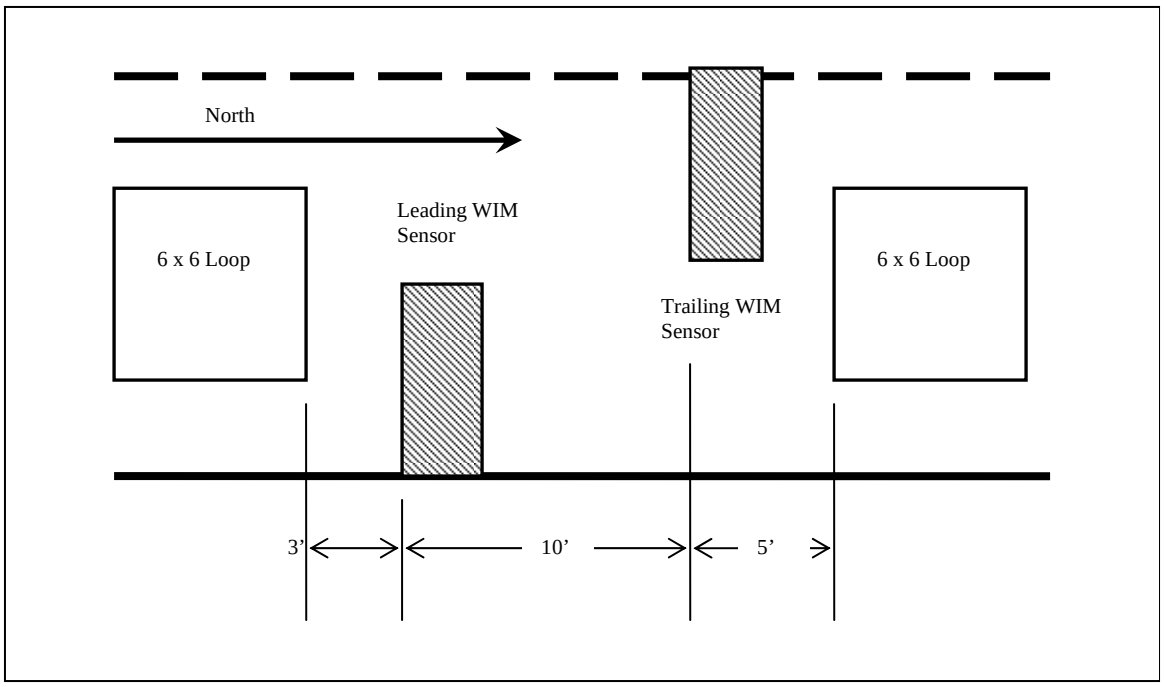

Figure 6-1 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Cabinet_Exterior_03_28_07.jpg

Figure 6-2 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Cabinet_Interior_Back_03_28_07.jpg

Figure 6-3 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Cabinet_Interior_Front_03_28_07.jpg

Figure 6-4 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Power_Meter_03_28_07.jpg

Figure 6-5 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Service_Mast_03_28_07.jpg

Figure 6-6 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Telephone_Pedestal_03_28_07.jpg

Figure 6-7 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Leading_Loop_03_28_07.jpg

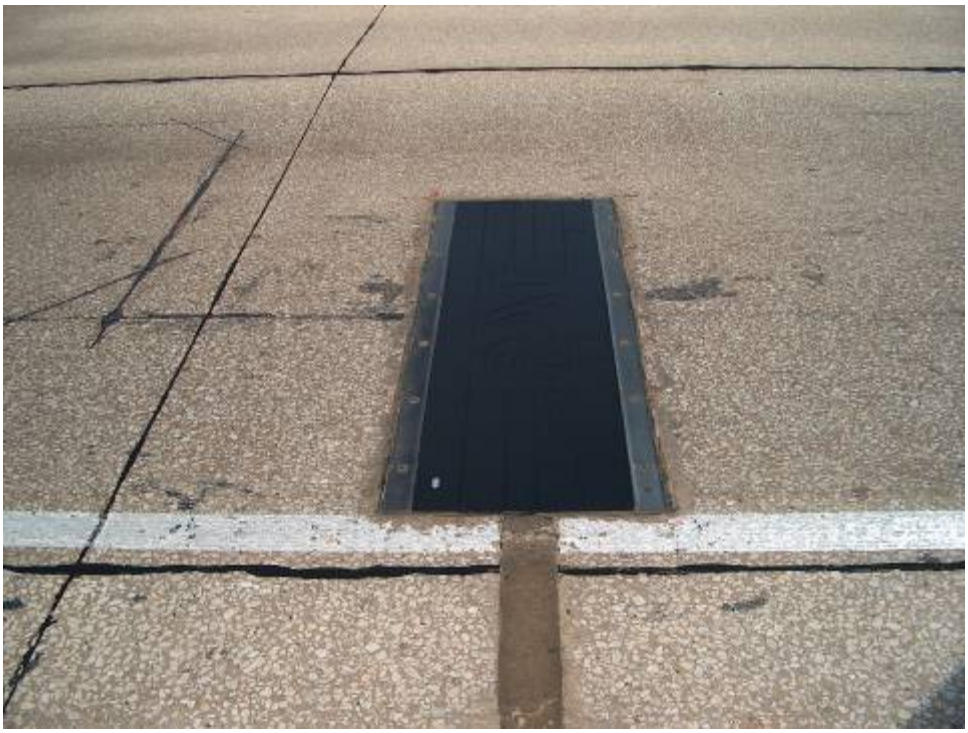

Figure 6-8 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Leading_WIM_Sensor_03_28_07.jpg

Figure 6-9 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Trailing_WIM_Sensor_03_28_07.jpg

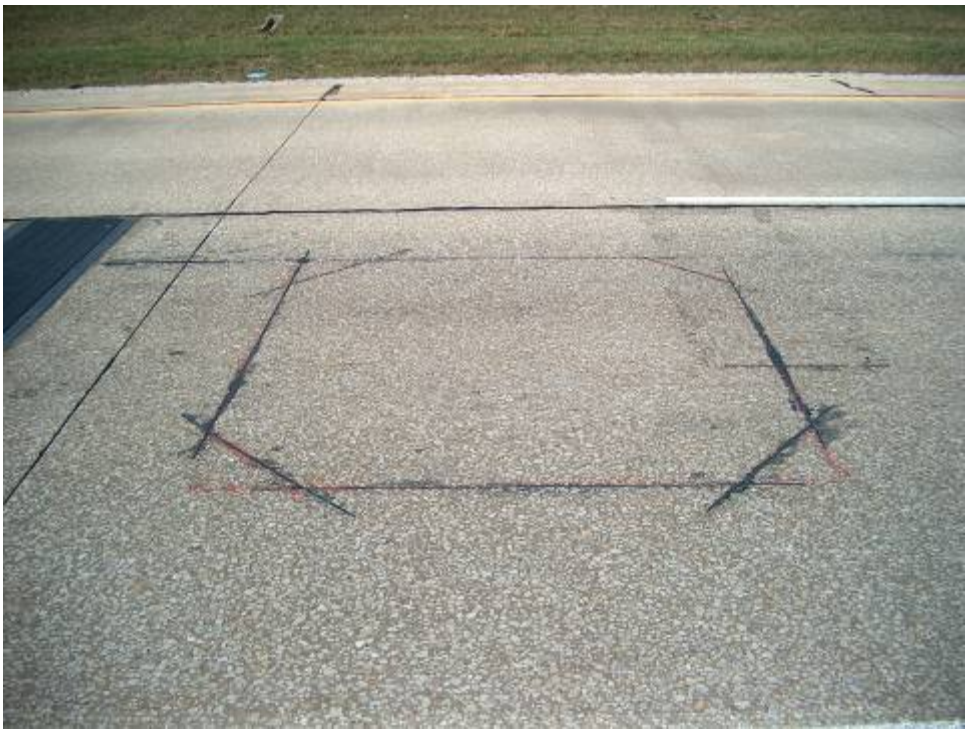

Figure 6-10 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Trailing_Loop_03_28_07.jpg

Figure 6-11 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Downstream_28_07.jpg

Figure 6-12 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Upstream_03_28_07.jpg

Figure 6-13 – 6420060018_SPSWIM_TO_18_17_2.85_0600_Transverse_Crack_03_28_07.jpg

SHEET 18	STATE CODE	[_1_7_]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID	[_0_6_0_0_]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy)	[_0_3_ / _2_8_ / _2_0_0_7_]

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 ___2___ □ days ■ weeks

b. Notice for straightedge and grinding check - __2____ □ days ■ weeks

i. On site lead –

□ State
■ LTPP

ii. Accept grinding –

□ State
■ LTPP

c. Authorization to calibrate site –

■ State
■ 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 – Air suspension 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:

_____IRD_____

g. Access to cabinet

i. Personnel Access –

□ State only
■ Joint
□ LTPP

ii. Physical Access –

■ Key
□ Combination

h. State personnel required on site – □Yes ■No (Validations Only)

i. Traffic Control Required – □Yes ■No (Sensor Maintenance Only)

j. Enforcement Coordination Required – □Yes ■No

5. SITE SPECIFIC CONDITIONS –

a. Funds and accountability – ____LTPP_____

b. Reports – _____

c. Other – _____

d. Special Conditions – _____

6. CONTACTS –

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

Name: ___Ray Taylor_____ Phone:__217-782-2065_____

Agency: _____IL DOT_____

b. Maintenance (equipment) –

Name: ___Ray Taylor_____ Phone:__217-782-2065____

Agency: ____IL DOT_____

c. Data Processing and Pre-Visit Data –

Name: ___Basel Abukhater_____ Phone:_716-632-0804____

Agency: ___Stantec, Inc._____

d. Construction schedule and verification –

Name: _____ Phone: _____

Agency: _____IL DOT District 5, Region 3_____

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

Name: __Bryan Patterson_____ Phone: _317-271-8545_____

Agency: ___B.A. Patterson Trucking, Inc._____

f. Traffic Control –

Name: _____ Phone: _____

Agency: _____

g. Enforcement Coordination –

Name: _____ Phone: _____

Agency: _____

h. Nearest Static Scale

Name:__Road Ranger_____ Location: ___I-57, Exit 121_____

Phone: _____

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [_1_7_] *SHRP SECTION ID [_0_6_0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_3_ / _2_8_ / _2_0_0_7_]

2. * TYPE OF EQUIPMENT CALIBRATED __ WIM __ CLASSIFIER _x_ BOTH

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
   ____ BARE ROUND PIEZO CERAMIC ____ BARE FLAT PIEZO __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

   __2_0__ PASSES PER TRUCK

	TRUCK	TYPE	SUSPENSION
TYPE PER FHWA 13 BIN SYSTEM	1	___9____	__1_____
SUSPENSION: 1 - AIR; 2 - LEAF SPRING	2	___9____	__2_____
3 - OTHER (DESCRIBE)	3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW ___ ___ _- 1 . 6_ STANDARD DEVIATION __ _2 . 8_
   DYNAMIC AND STATIC SINGLE AXLES ___ ___ _- 6 . 6_ STANDARD DEVIATION __ _6 . 3_
   DYNAMIC AND STATIC DOUBLE AXLES ___ ___ _- 0 . 3_ STANDARD DEVIATION __ _3 . 9_

8. ___ 5___ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____ _45, 50, 55, 60, 65____ _____ _____ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___ ___3553/ 3914___ ___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:

*** FHWA CLASS 9 ____ __0_ ____	FHWA CLASS ____	____ ____ ____ ____
*** FHWA CLASS 8 ____ __0_ ____	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____

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

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

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [_1_7_] *SHRP SECTION ID [_0_6_0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_3_ / _2_9_ / _2_0_0_7_]

2. * TYPE OF EQUIPMENT CALIBRATED __ WIM __ CLASSIFIER _x_ BOTH

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
   ____ BARE ROUND PIEZO CERAMIC ____ BARE FLAT PIEZO __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

   __2_0__ PASSES PER TRUCK

	TRUCK	TYPE	SUSPENSION
TYPE PER FHWA 13 BIN SYSTEM	1	___9____	__1_____
SUSPENSION: 1 - AIR; 2 - LEAF SPRING	2	___9____	__2_____
3 - OTHER (DESCRIBE)	3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW ___ ___ __ 0 . 2_ STANDARD DEVIATION __ _2 . 4_
   DYNAMIC AND STATIC SINGLE AXLES ___ ___ _ - 3 . 1_ STANDARD DEVIATION __ _5 . 6_
   DYNAMIC AND STATIC DOUBLE AXLES ___ ___ __ 1 . 0_ STANDARD DEVIATION __ _3 . 6_

8. ___ 5___ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____ _45, 50, 55, 60, 65____ _____ _____ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___ ___3994/ 3626___ ___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:

*** FHWA CLASS 9 ____ __0_ ____	FHWA CLASS ____	____ ____ ____ ____
*** FHWA CLASS 8 ____ __0_ ____	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____

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

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

APPENDIX A

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 1	* DATE	03/28/07

Rev. 08/31/01

PART I.

TRUCK 33

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: PETERBILT b) * Model: UNK

10.* Trailer Load Distribution Description:

CONCRETE BLOCKS LOADED EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 1	* DATE	03-28-07

Rev. 08/31/01

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

A to B 20.4 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) +1.1 ( )

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R22.5	FOUR TAPERED LEAVES
B	11R22.5	AIR
C	11R22.5	AIR
D	75R22.5	AIR
E	75R22.5	AIR
F		

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

642006D018

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 1	* DATE	03-28-07

Rev. 08/31/01

PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

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LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 1	* DATE	3-28-07

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

Table 5. Raw data – Axle scales – pre-test (day 1 - pre-val)

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10040	15350	15350	16790	16790		74320
2	10080	15330	15330	16790	16790		74320
3	10060	15320	15320	16800	16800		74300
Average	10060	15330	15330	16790	16790		74320
day 1 post (pre-val)	10460	14940	14940	16770	16770		73800

Table 6. Raw data – Axle scales –

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

Table 7. Raw data – Axle scales – post-test (day 2 - col 1 and post-val)

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9920	15320	15320	16780	16780		74120
2	9920	15300	15300	16790	16790		74100
3	9900	15310	15310	16790	16790		74100
Average	9910	15310	15310	16790	16790		74110
2 post (post-val)	10240	14760	14760	16760	16760		73280

Measured By DJW Verified By Amjad

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Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 2	* DATE	3-28-07

Rev. 08/31/01

PART I.

1.* FHWA Class 9 2.* Number of Axles 5 TRUCK 52

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: FREIGHTLINER b) * Model: CENTURY CLASS

10.* Trailer Load Distribution Description:

CONCRETE BARRIER LOADED EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): _____

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

A to B 17.5 B to C 4.3 C to D 29.5

D to E 4.1 E to F _____

Wheelbased (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) +1.3 (_____)
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	75R22.5	2 TAPERED LEAVES
B	80R22.5	AIR
C	75R22.5	AIR
D	75R22.5	SINGLE LEAF SPRING
E	75R22.5	SINGLE LEAF SPRING
F		

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

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LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK #2	* DATE	3.28.07

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PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

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Sheet 19	* STATE CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0600
*CALIBRATION TEST TRUCK # 2	* DATE	3.28.07

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Table 4 . Axle and GVW computations -

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

Table 5. Raw data – Axle scales – pre-test (day 1 - pre-val)

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11480	8990	8990	11420	11420		52300
2	11480	8970	8970	11430	11430		52280
3	11460	8980	8980	11430	11430		52280
Average	11470	8970	8970	11430	11430		52290
day 1 post	11060	8950	8950	11420	11420		51800

Table 6. Raw data – Axle scales –

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

Table 7. Raw data – Axle scales – post-test (day 2 - post-val + col 1)

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10940	9270	9270	11410	11410		~~11410~~ 52300
2	10960	9240	9240	11420	11420		~~11420~~ 52280
3	10940	9270	9270	11420	11420		~~11420~~ 52320
Average	10957	9260	9260	11420	11420		~~11420~~ 52300
day 2 post	11060	8930	8930	11400	11400		51720

Measured By DAW Verified By

64200600018

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Sheet 20	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0600
Speed and Classification Checks * 1 of* 2	* DATE	03/27/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
60	9	42349	60	9	63	9	42496	63	9
62	9	42351	61	9	60	9	42498	59	9
60	9	42358	60	9	62	9	42505	62	9
57	9	42361	58	9	61	9	42506	60	9
60	9	42366	59	9	65	12	42523	65	12
54	9	42368	54	9	72	9	42528	71	9
53	9	42369	53	9	64	9	42538	65	9
62	9	42374	62	9	57	9	42551	56	9
65	9	42375	64	9	64	9	42558	63	9
57	9	42379	57	9	59	9	42564	60	9
67	9	42381	67	9	66	9	42565	66	9
60	11	42386	61	11	63	9	42570	64	9
59	9	42391	61	9	64	5	42579	63	5
57	9	42400	56	9	64	9	42582	65	9
61	9	42410	61	9	61	9	42589	60	9
54	9	42412	54	9	62	9	42591	61	9
54	11	42418	54	11	60	9	42597	60	9
68	8	42433	67	8	58	9	42602	58	9
58	9	42438	57	9	64	9	42610	64	9
60	9	42445	60	9	64	9	42628	64	9
63	9	42450	63	9	67	9	42635	66	9
58	9	42456	59	9	59	9	42639	60	9
62	9	42461	61	9	62	9	42650	63	9
64	9	42467	63	9	62	9	42651	64	9
62	9	42473	61	9	59	9	42659	60	9

Recorded by _____ Direction South Lane 1 Time from 9:56 to 10:42

Sheet 20	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0600
Speed and Classification Checks * 2 of* 2	* DATE	03/27/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
66	9	42674	66	9	62	9	42944	63	9
60	12	42680	60	12	67	(9) 42975 →		67	9
60	9	42681	60	9	62	11	42979	62	11
60	9	42687	60	9	62	9	42985	62	9
63	6	42697	63	6	62	9	42986	63	9
62	10	42706	62	10	62	9	43006	62	9
66	9	42730	65	9	64	9	43008	63	9
62	12	42735	62	12	55	9	43009	55	9
60	9	42741	61	9	64	6	43016	63	6
61	9	42837	61	9	63	9	43024	63	9
57	9	42840	57	9	59	9	43029	60	9
61	9	42845	60	9	66	5	43031	66	5
62	9	42848	62	9	62	9	43036	61	9
65	9	42857	64	9	60	6	43037	59	6
63	9	42861	63	9	65	9	43044	65	9
62	9	42863	62	9	63	5	43048	63	5
60	9	42877	60	9	62	9	43060	62	9
59	9	42880	60	9	64	9	43068	61	9
66	9	42884	65	9	60	9	43078	61	9
64	9	42898	64	9	60	9	43088	60	9
61	9	42910	61	9	64	9	43105	64	9
62	9	42911	62	9	65	9	43111	64	9
64	9	42918	65	9	61	9	43120	61	9
65	9	42930	64	9	64	5	43121	63	5
60	6	42931	60	6	70	9	43134	69	9

Recorded by Amber Direction South Lane 1 Time from 10:45 to 11:50

642006 0018

Sheet 20	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0600
Speed and Classification Checks * 1 of* 2	* DATE	03/29/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
61	9	58436	61	9	64	6	58188	64	6
60	9	58448	60	9	64	9	58189	64	9
61	9	58470	60	9	60	9	58194	60	9
67	6	58474	66	6	58	9	58196	59	9
60	9	58493	59	9	57	9	58800	57	9
68	9	58497	67	9	60	9	58805	61	9
47	9	58503	46	9	57	9	58809	57	9
47	9	58508	47	9	64	9	58810	64	9
64	9	58558	63	9	61	9	58816	61	9
57	9	58568	56	9	60	5	58929	60	5
58	9	58573	58	9	62	9	58933	61	9
66	9	58593	65	9	64	9	58938	66	9
65	9	58614	64	9	57	9	58940	57	9
64	9	58618	63	9	68	5	58943	68	5
62	9	58623	62	9	59	9	58945	58	9
62	9	58634	62	9	64	9	58948	64	9
65	9	58654	65	9	62	9	58958	61	9
63	9	58657	63	9	63	9	58963	63	9
68	9	58660	67	9	61	9	58966	60	9
59	5	58741	59	5	61	9	58971	61	9
59	9	58746	59	9	64	9	58972	63	9
60	9	58761	60	9	64	9	59010	64	9
60	9	58769	60	9	64	9	59011	64	9
60	9	58773	60	9	68	9	59015	68	9
58	9	58780	58	9	67	9	59027	67	9

Recorded by [signature] Direction N Lane 4 Time from 9:54 to 11:08

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Sheet 20	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0600
Speed and Classification Checks * 2 of* 2	* DATE	03/29/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
62	9	59118	62	9	62	9	59974	62	9
59	9	59131	59	9	60	9	59980	60	9
55	9	59134	55	9	63	9	59986	63	9
54	9	59138	54	9	64	9	59987	64	9
57	9	59139	56	9	62	9	59990	62	9
65	9	59646	65	9	65	9	59994	64	9
62	5	59655	62	5	58	5	60004	60	5
62	9	59660	63	9	64	9	60013	63	9
67	9	59666	66	9	67	9	60016	66	9
62	9	59670	62	9	66	9	60017	66	9
61	9	59674	61	9	61	9	60019	61	9
67	9	59681	67	9	64	9	60029	64	9
68	9	59752	69	9	65	9	60032	64	9
60	9	59763	61	9	61	9	60033	61	9
59	9	59768	59	9	60	9	60036	60	9
64	9	59777	64	9	59	9	60039	60	9
70	9	59788	69	9	62	9	60044	61	9
64	9	59793	63	9	60	9	60050	60	9
74	9	59825	74	9	57	9	60057	56	9
74	5	59831	74	5	56	9	60058	56	9
65	9	59835	65	9	65	9	60089	65	9
59	9	59839	60	9	60	9	60090	60	9
60	9	59847	60	9	64	9	60096	64	9
61	9	59854	61	9	58	5	60101	58	5
65	9	59863	64	9	62	9	60110	62	9

Recorded by Arlene Direction N Lane 1 Time from 11:19 to 1:20

64200600 18

Sheet 21	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0600
WIM System Test Truck Records 1 of 3	* DATE 03/28/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
70.5	44	1	1	10:49:59	50621	44	4.8/5.1	8.3/8.4	5.1/7.8	8.7/8.4	7.0/9.2		72.8	20.4	4.4	30.9	4.1	
70.5	41	2	1	10:50:00	50622	42	5.9/5.6	3.9/5.3	4.9/5.4	4.9/7.6	4.2/7.1		53.2	17.4	4.3	29.3	4.1	
73.5	55	1	2	11:11:01	50763	54	4.2/5.2	7.3/7.8	5.7/7.9	7.8/8.1	7.2/8.5		69.7	20.4	4.4	31.0	4.0	
73.5	56	2	2	11:11:04	50764	55	4.6/5.4	4.1/5.4	3.9/5.2	4.7/7.1	4.6/6.9		52.1	17.5	4.3	29.5	4.1	
73.5	63	1	3	11:30:50	50932	62	5.3/5.0	9.0/8.0	6.2/8.0	8.8/9.0	7.8/9.1		76.2	20.4	4.4	30.9	4.1	
73.5	62	2	3	11:31:54	50933	62	5.2/5.6	3.7/5.6	3.7/4.9	4.3/6.6	3.9/7.6		51.2	17.5	4.3	29.4	4.1	
74.0	46	1	4	11:52:37	51110	46	3.6/5.1	7.4/7.4	6.0/8.0	8.3/8.3	7.6/8.3		70.4	20.4	4.4	31.0	4.0	
74.0	46	2	4	11:52:45	51112	47	4.8/5.4	4.2/5.3	4.2/5.7	5.3/7.3	5.0/7.0		54.2	17.4	4.3	29.7	4.1	
74.0	54	1	5	12:13:12	51278	54	5.1/5.2	7.0/7.6	6.2/8.6	7.5/9.0	7.3/8.5		72.0	20.5	4.4	31.1	4.1	
74.0	54	2	5	12:13:18	51279	55	4.7/5.0	3.9/5.2	4.0/4.9	4.8/6.4	4.1/7.1		50.0	17.5	4.3	29.6	4.1	
76.0	65	1	6	12:33:45	51453	64	5.7/5.1	8.0/7.2	6.5/8.2	8.2/8.9	7.8/9.6		75.2	20.4	4.4	31.0	4.1	
76.0	65	2	6	12:33:49	51454	65	5.2/5.5	3.6/5.1	4.0/6.3	5.0/6.3	4.0/7.3		52.3	17.5	4.3	29.4	4.1	
79.0	45	1	7	12:55:14	51626	45	4.9/6.3	6.7/7.4	6.4/8.4	8.6/8.4	7.5/8.4		72.1	20.5	4.3	30.9	4.1	
79.0	44	2	7	12:55:18	51627	45	4.4/5.8	4.0/5.3	4.2/5.2	5.3/7.1	4.6/6.9		52.7	17.5	4.3	29.4	4.1	
83.5	54	1	8	13:16:05	51792	55	4.4/4.9	6.9/7.2	6.3/8.5	7.4/8.6	7.7/8.2		70.1	20.4	4.4	31.1	4.1	
83.5	53	2	8	13:16:09	51793	54	5.1/5.1	3.9/5.3	3.8/5.2	4.7/6.4	4.1/7.1		50.6	17.5	4.3	29.4	4.2	

Recorded by _____ Checked by _____

6420060018

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Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0600
WIM System Test Truck Records 2 of 3	* DATE	03/28/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
71.0	63	1	9	13:37:25	51963	64	4.8/5.2	7.8/7.1	6.2/6.3	8.1/8.6	9.2/9.5		71.1	20.5	4.4	31.0	4.1	
71.0	63	2	9	13:37:29	51964	64	5.0/5.7	4.1/5.2	3.8/5.0	4.9/6.1	4.0/6.9		50.7	17.5	4.3	29.4	4.2	
69.5	47	1	10	13:59:18	52133	47	4.5/6.1	7.2/7.5	6.3/8.4	8.3/8.3	7.4/8.8		72.7	20.4	4.4	31.0	4.1	
69.5	45	2	10	13:59:24	52134	45	5.5/5.2	4.2/5.4	4.9/4.9	4.9/7.3	4.5/7.0		52.8	17.4	4.3	29.2	4.1	
77.5	55	1	11	14:36:35	52444	55	4.0/4.8	6.8/6.7	6.1/8.3	7.4/8.9	7.8/8.4		68.5	20.4	4.4	31.1	4.1	
77.5	55	2	11	14:36:39	52445	57	5.1/5.5	3.9/5.3	3.9/5.0	3.6/6.5	4.1/7.2		49.9	17.5	4.3	29.5	4.2	
80.5	64	1	12	14:57:43	52609	64	5.4/5.4	7.9/7.2	6.6/8.1	8.1/8.8	7.5/9.8		74.5	20.5	4.4	31.1	4.1	
80.5	66	2	12	14:57:47	52610	64	5.3/5.5	3.6/5.5	3.9/6.1	4.9/7.1	3.8/7.4		52.4	17.5	4.3	29.5	4.1	
71.5	47	1	13	15:18:19	52795	48	4.1/5.7	7.1/7.2	6.3/8.9	8.2/8.3	7.8/9.0		72.6	20.4	4.3	31.0	4.1	
71.5	46	2	13	15:18:29	52796	46	4.8/5.1	4.2/5.1	4.1/5.1	5.8/6.4	4.6/7.2		51.7	17.4	4.3	29.3	4.1	
69.5	55	1	14	15:39:57	52969	56	4.7/4.8	6.4/6.8	5.7/8.0	7.2/7.9	8.3/8.7		68.8	20.4	4.4	31.0	4.1	
69.5	54	2	14	15:40:03	52970	54	4.9/5.2	4.0/5.2	3.9/5.1	4.8/6.8	4.4/6.9		51.3	17.5	4.3	29.5	4.1	
71.0	62	1	15	16:01:32	53153	63	6.0/5.3	8.0/7.4	6.8/8.1	8.0/8.9	7.2/9.9		76.1	20.4	4.4	30.9	4.1	
71.0	62	2	15	16:01:36	53154	63	5.0/5.2	3.7/5.3	3.8/5.2	5.2/6.6	4.6/6.9		51.4	17.5	4.3	29.5	4.1	
69.0	49	1	16	16:23:02	53319	50	4.7/4.8	7.0/7.5	6.0/8.1	7.9/8.8	7.6/9.1		72.1	20.3	4.4	31.0	4.1	
69.0	49	2	16	16:23:14	53320	49	5.1/5.4	4.1/5.2	4.1/5.5	4.8/6.4	4.7/6.9		52.3	17.5	4.3	29.5	4.1	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0600
WIM System Test Truck Records 3 of 3	* DATE	03/28/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
69	59	1	17	16:44:25	53495	59	3.4 / 5.0	7.6 / 7.4	6.3 / 7.6	8.4 / 8.3	8.5 / 8.8		71.4	20.4	4.4	31.0	4.1	
69	56	2	17	16:44:38	53497	57	5.2 / 5.5	3.8 / 5.4	3.8 / 5.2	5.2 / 6.8	4.3 / 6.8		51.8	17.5	4.3	29.4	4.1	
68.0	51	1	18	17:05:14	53680	52	4.2 / 4.4	6.8 / 7.1	6.1 / 8.1	7.8 / 8.3	7.7 / 9.3		70.4	20.5	4.4	31.2	4.1	
68.0	50	2	18	17:04:59	53678	50	4.9 / 5.4	3.6 / 5.3	4.2 / 5.5	4.3 / 6.3	4.0 / 7.2		50.8	17.5	4.3	29.5	4.1	
67.0	59	2	19	17:24:30	53843	60	5.3 / 5.3	4.0 / 5.5	4.0 / 5.1	4.4 / 7.2	4.9 / 7.3		53.0	17.4	4.3	29.4	4.1	
67.0	59	1	19	17:25:14	53849	59	3.9 / 4.6	7.2 / 7.4	6.4 / 7.1	8.3 / 9.2	7.9 / 9.0		72.0	20.4	4.4	31.0	4.1	
62	50	1	20	17:46:04	54024	50	4.6 / 5.1	6.9 / 7.2	6.4 / 8.4	8.0 / 8.6	7.2 / 9.0		72.0	20.4	4.4	31.1	4.1	
62	50	2	20	17:46:46	54044	50	4.8 / 5.1	3.9 / 5.4	3.9 / 5.7	4.5 / 7.3	4.2 / 7.3		52.6	17.4	4.3	29.3	4.1	

Recorded by _____ Checked by _____

64200600018

Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	06000
WIM System Test Truck Records 1 of 1	* DATE	03/29/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
56.0	45	2	1	07:53:05	57501	45	5.3 / 5.8	4.4 / 5.0	4.6 / 5.2	5.3 / 6.2	5.3 / 6.9		53.4	17.4	4.3	29.3	4.1	
56.0	45	1	1	07:53:32	57505	46	4.2 / 4.5	9.6 / 8.4	5.6 / 7.4	9.3 / 8.3	8.0 / 8.4		73.6 ~~80.2~~	20.2 ~~4.4~~	4.4	30.9	4.1	
61.5	54	2	2	8:13:36	57654	54	5.3 / 4.9	4.0 / 5.1	4.1 / 5.2	4.6 / 6.7	4.7 / 7.0		51.9	17.5	4.3	29.7	4.1	
61.5	55	1	2	8:14:09	57658	56	4.3 / 4.4	8.1 / 7.2	6.3 / 7.0	8.7 / 7.7	8.4 / 7.9		70.0	20.4	4.4	31.0	4.1	
58.0	64	2	3	8:33:52	57813	64	5.8 / 5.4	4.0 / 5.0	4.8 / 5.7	4.5 / 6.7	4.5 / 6.7		53.1	17.5	4.3	29.7	4.1	
58.0	64	1	3	8:34:10	57817	65	5.1 / 4.6	9.9 / 7.6	6.6 / 7.0	9.4 / 8.3	7.6 / 8.4		74.4	20.4	4.4	31.0	4.1	
~~57.5~~		~~2~~	~~4~~															
57.5	47	1	4	8:54:29	57965	48	4.8 / 4.6	8.5 / 7.2	6.9 / 7.9	9.3 / 7.9	8.5 / 8.0		73.6	20.4	4.4	31.1	4.0	
58.5	54	2	4	9:15:16	58135	54	5.8 / 5.0	4.5 / 5.3	4.4 / 4.9	5.3 / 5.8	5.2 / 6.3		52.4	17.5	4.3	29.3	4.1	
58.5	55	1	5	9:15:24	58136	57	4.6 / 4.5	8.0 / 6.3	7.0 / 7.1	8.8 / 8.4	8.2 / 7.7		70.6	20.4	4.4	31.1	4.1	
	64	2	5	9:40:57	58320	64	6.0 / 5.0	3.9 / 5.0	4.1 / 5.4	5.2 / 6.7	4.8 / 6.6		52.6	17.5	4.3	29.5	4.1	
	64	1	6	9:41:30	58323	65	5.0 / 4.5	8.5 / 7.3	6.9 / 7.4	9.2 / 8.3	8.0 / 8.9		74.1	20.5	4.4	31.0	4.1	

Recorded by _____ Checked by _____

642006 0018

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Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0600
WIM System Test Truck Records 1 of 1	* DATE	03/29/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
56.0	45	2	1	07:53:05	57501	45	5.3 / 5.8	4.4 / 5.0	4.6 / 5.2	5.3 / 6.2	5.3 / 6.9		53.4	17.4	4.3	29.3	4.1	
56.0	45	1	1	07:53:32	57505	46	4.2 / 4.5	9.6 / 8.4	5.6 / 7.4	9.3 / 8.3	8.0 / 8.4		73.6 / 20.2	20.2 / 4.4	4.4	30.9	4.1	
61.5	54	2	2	8:13:36	57654	54	5.5 / 4.9	4.9 / 5.1	4.1 / 5.2	4.6 / 6.7	4.7 / 7.0		51.9	17.5	4.3	29.7	4.1	
61.5	55	1	2	8:14:09	57658	56	4.3 / 4.4	8.1 / 7.2	6.3 / 7.0	8.7 / 7.7	8.4 / 7.9		70.0	20.4	4.4	31.0	4.1	
58.0	64	2	3	8:33:52	57813	64	5.8 / 5.4	4.0 / 5.0	4.8 / 5.7	4.5 / 6.7	4.5 / 6.7		53.1	17.5	4.3	29.7	4.1	
58.0	64	1	3	8:34:10	57817	65	5.1 / 4.6	9.9 / 7.6	6.6 / 7.0	9.4 / 8.3	7.6 / 8.4		74.4	20.4	4.4	31.0	4.1	
~~57.5~~		2	4															
57.5	47	1	4	8:54:29	57965	48	4.8 / 4.6	8.5 / 7.2	6.9 / 7.9	9.3 / 7.9	8.5 / 8.0		73.6	20.4	4.4	31.1	4.0	
58.5	54	2	4	9:15:14	58135	54	5.8 / 5.0	4.5 / 5.3	4.4 / 4.9	5.3 / 5.8	5.2 / 6.3		52.4	17.5	4.3	29.3	4.1	
58.5	55	1	5	9:15:24	58136	57	4.6 / 4.5	8.0 / 6.3	7.0 / 7.1	8.8 / 8.4	8.2 / 7.7		70.6	20.4	4.4	31.1	4.1	
	64	2	5	9:40:57	58324	64	6.0 / 5.0	3.9 / 5.0	4.1 / 5.4	5.2 / 6.7	4.8 / 6.6		52.6	17.5	4.3	29.5	4.1	
	64	1	6	9:41:30	58323	65	5.0 / 4.5	8.5 / 7.3	6.9 / 7.4	9.2 / 8.0	8.9 / 8.9		74.1	20.5	4.4	31.0	4.1	

Recorded by _____ Checked by _____

6420060018

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Sheet 21	* STATE_CODE	17
LTPP Traffic Data 1 2	*SPS PROJECT_ID	0680
WIM System Test Truck Records 2 of 3	* DATE	03/29/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
63.5	46	2	6	10:01:54	58503	47	5.9 / 4.9	4.4 / 4.9	4.4 / 4.7	6.3 / 6.1	5.4 / 6.8		53.7	17.5	4.3	29.5	4.1	
63.5	47	1	7	10:02:30	58508	47	5.7 / 5.6	8.3 / 7.1	7.1 / 7.6	9.4 / 8.1	8.6 / 8.2		75.8	20.5	4.4	31.1	4.1	
63.5	55	2	7	10:22:06	58664	55	5.3 / 4.8	4.4 / 5.2	4.3 / 5.2	5.2 / 7.0	5.6 / 6.8		54.5	17.5	4.3	29.5	4.2	
63.5	56	1	8	10:22:42	58667	57	4.2 / 4.6	7.1 / 6.3	6.6 / 7.6	8.8 / 7.7	9.0 / 7.5		70.0	20.4	4.4	30.9	4.1	
63.5	61	2	8	10:41:46	58816	61	5.7 / 5.2	4.2 / 5.2	4.2 / 5.4	4.8 / 6.2	4.7 / 6.7		52.1	17.5	4.3	29.7	4.1	
63.5	61	1	9	10:42:36	58825	61	5.1 / 4.9	8.5 / 6.8	7.4 / 6.9	9.3 / 8.5	9.5 / 8.6		74.9	20.4	4.4	31.1	4.1	
64.0	45	2	9	11:01:58	58977	46	6.2 / 5.1	4.6 / 4.9	4.3 / 4.8	5.7 / 6.5	5.2 / 6.3		53.3	17.4	4.3	29.3	4.1	
64.0	47	1	10	11:02:30	58980	46	4.6 / 5.0	7.1 / 6.9	6.9 / 7.9	9.2 / 8.1	8.6 / 8.1		72.4	20.6	4.3	30.9	4.0	
67.0	54	2	10	11:22:24	59138	54	6.0 / 5.0	4.4 / 5.1	4.7 / 5.3	5.7 / 6.7	5.4 / 6.7		55.1	17.5	4.3	29.6	4.1	
67.0	57	1	11	11:22:31	59139	56	4.8 / 4.4	7.4 / 6.4	7.3 / 7.4	10.5 / 8.1	9.2 / 8.2		73.7	20.4	4.4	31.0	4.1	
75.0	64	2	11	12:28:30	59688	64	5.9 / 5.1	4.3 / 4.8	4.4 / 5.5	4.2 / 6.2	4.0 / 6.3		50.7	17.5	4.3	29.5	4.1	
75.0	66	1	12	12:28:35	59689	66	6.0 / 4.7	8.4 / 6.8	7.5 / 7.6	9.1 / 7.1	7.6 / 8.4		73.1	20.4	4.4	31.0	4.1	
78.5	45	2	12	12:48:31	59867	45	5.4 / 5.1	4.5 / 4.6	4.5 / 5.1	5.5 / 6.4	5.3 / 5.9		52.4	17.4	4.3	29.4	4.1	
78.5	48	1	13	12:48:35	59868	48	4.7 / 4.5	8.2 / 6.8	6.7 / 7.9	9.3 / 8.0	8.0 / 8.3		72.4	20.4	4.4	30.9	4.1	
81.0	56	2	13	13:08:09	60057	57	5.3 / 5.0	4.4 / 5.0	4.3 / 4.8	5.1 / 6.3	5.2 / 6.8		52.5	17.4	4.3	29.4	4.1	
81.0	56	1	14	13:08:09	60058	56	5.3 / 4.1	8.9 / 6.3	6.9 / 7.6	8.5 / 8.2	8.3 / 7.7		71.8	20.4	4.4	31.0	4.1	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE	17
LTPP Traffic Data 2 2	*SPS PROJECT_ID	0600
WIM System Test Truck Records 2 of 2	* DATE	03/29/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
93	65	2	14	13:31:35	60265	65	5.8 / 4.9	4.1 / 4.6	4.2 / 5.6	4.4 / 6.2	4.3 / 6.8		51.2	17.5	4.3	29.5	4.1	
93	65	1	15	13:31:49	60266	65	5.6 / 4.4	9.1 / 6.5	7.7 / 7.4	9.2 / 7.9	7.7 / 8.7		73.9	20.5	4.4	31.0	4.1	
98	48	2	15	13:51:34	60449	49	5.5 / 4.6	4.4 / 4.7	4.6 / 4.9	5.8 / 6.5	5.1 / 6.8		51.9	17.4	4.3	29.3	4.1	
98	47	1	16	13:51:39	60445	47	4.2 / 4.7	7.4 / 6.8	6.9 / 7.8	9.2 / 7.4	8.4 / 7.9		70.8	20.3	4.4	30.9	4.0	
99.5	60	2	16	14:11:18	60625	60	6.1 / 5.0	4.6 / 4.9	4.7 / 4.9	4.9 / 6.2	4.6 / 6.5		52.4	17.5	4.3	29.4	4.1	
99.5	61	1	17	14:11:22	60626	60	5.2 / 4.8	9.0 / 6.6	7.0 / 6.8	9.4 / 8.5	9.0 / 8.4		74.8	20.4	4.4	31.0	4.1	
103.0	50	2	17	14:31:22	60816	51	5.5 / 4.8	4.6 / 4.8	4.6 / 4.9	5.5 / 6.0	5.3 / 6.9		52.8	17.6	4.3	29.5	4.1	
103.0	49	1	18	14:31:27	60817	49	4.3 / 4.9	8.1 / 6.8	7.0 / 7.6	9.2 / 8.2	9.1 / 7.9		72.9	20.4	4.4	30.9	4.1	
103.0	59	2	18	14:51:26	61011	59	6.1 / 5.2	4.4 / 5.1	4.3 / 5.2	5.6 / 6.0	4.5 / 6.7		53.1	17.5	4.3	29.5	4.2	
103.0	60	1	19	14:51:30	61012	60	6.0 / 4.9	8.7 / 6.7	7.5 / 6.4	9.2 / 8.0	9.2 / 8.6		75.3	20.4	4.4	31.0	4.1	
85.0	52	2	19	15:16:18	61240	52	4.4 / 5.1	3.6 / 4.9	3.4 / 5.1	3.2 / 6.1	2.6 / 6.9		95.9	17.6	4.3	29.5	4.2	
85.0	50	1	20	15:16:18	61241	50	5.1 / 5.2	8.5 / 6.6	7.4 / 7.7	9.2 / 7.6	9.0 / 8.1		74.2	20.4	4.4	30.9	4.1	
84.5	59	2	20	15:35:29	61442	59	6.2 / 5.1	4.4 / 4.9	4.2 / 4.8	4.9 / 6.5	4.5 / 6.8		52.3	17.5	4.3	29.5	4.2	
84.5	61	1	21	15:35:32	61443	60	5.1 / 4.3	8.3 / 6.7	7.0 / 6.9	8.8 / 8.0	8.8 / 8.8		72.6	20.4	4.4	31.1	4.1	

Recorded by _____ Checked by _____

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3.11.2. Iteration 1 Worksheet

Date 3/28/07

Beginning factors:

Speed Point (mph)	Name	Value
Overall		1 / 2
Front Axle		
1 – (80 kph)	speed bin 1	3455/3807
2 – (88 kph)	speed bin 2	3520/3889
3 – (96 kph)	speed bin 3	3553/3864
4 – (104 kph)	speed bin 4	3538/3899
5 – (112 kph)	speed bin 5	3464/3817

Errors (Pre-Validation):

	Speed Point 1 (50)	Speed Point 2 (55)	Speed Point 3 (60)	Speed Point 4 (65)	Speed Point 5 (70)
F/A	-8.0 %	-9.0 %	-7.0 %	0.0 %	0.0 %
Tandem	0.0 %	-4.0 %	0.0 %	0.0 %	0.0 %
GVW	-2.0 %	-4.0 %	-1.0 %	0.0 %	0.0 %

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☐	
Front Axle	☐	☐	
Speed Point 1	☑	☐	2.0 %
Speed Point 2	☑	☐	6.25 %
Speed Point 3	☑	☐	2.0 %
Speed Point 4	☑	☐	1.0 %
Speed Point 5	☐	☐	

* reversed sensor 1/2 values first!

End factors:

Speed Point (mph)	Name	Value
Overall		1 | 2
Front Axle		
1 – (80 k)	speed bin 1	3884 / 3524
2 – (88 k)	2	4120 / 3740
3 – (96 k)	3	3994 / 3626
4 – (104 k)	4	3938 / 3574
5 – (112 k)	5	3817 / 3464

Task Leader Initials: DJW

- ☑ Open WIM Controller Log File – filename _____
- ☐ 10 runs (equal distribution)
  - ✓ Varying speeds
  - ✓ Separate Sheet 21s (pages = 1)
  - ✓ Recorded on Spreadsheet
- ☑ Errors from 1st Iteration –

	Mean	1SD	2SD	P/F
✓ GVW	-0.7 %	2.4 %	5.3 %	P
✓ Tandem	0.1 %	3.1 %	6.4 %	P
✓ Axle	-4.6 %	4.7 %	10.5 %	P
✓ Spacing	0.0 ft		0.1 ft	P

- ☑ Data meets performance requirements?
  - ○ No – go to 3.11.3.
  - ✓ Yes – go to 3.12

Task Leader Initials: RCA

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

March 28 and 29, 2007

STATE: Illinois

SHRP ID: 0600

Photo 1 - Truck_1_Tractor_6420060018_SPSWIM_TO_18_17_2.85_0600_ 03_28_07.JPG

Photo 2 - Truck_1_Trailer_Load_6420060018_SPSWIM_TO_18_17_2.85_0600_ 03_28_07.JPG

Photo 3 - Truck_1_6420060018_SPSWIM_TO_18_17_2.85_0600_ 03_28_07.JPG

Photo 4 - Truck_1_Suspension_1_6420060018_SPSWIM_TO_18_17_2.85_0600_ 03_28_07.JPG

Photo 5 - Truck_1_Suspension_2_6420060018_SPSWIM_TO_18_17_2.85_0600_03_28_07.JPG

Photo 6 - Truck_1_Suspension_3_6420060018_SPSWIM_TO_18_17_2.85_0600_03_28_07.JPG

Photo 7 - Truck_2_Tractor_6420060018_SPSWIM_TO_18_17_2.85_0600_03_28_07.JPG

Photo 8 - Truck_2_Trailer_6420060018_SPSWIM_TO_18_17_2.85_0600_03_28_07.JPG

Photo 9 - Truck_2_6420060018_SPSWIM_TO_18_17_2.85_0600_ 03_28_07.JPG

Photo 10 - Truck_2_Suspension_1_6420060018_SPSWIM_TO_18_17_2.85_0600_ 03_28_07.JPG

Photo 11 - Truck_2_Suspension_2_6420060018_SPSWIM_TO_18_17_2.85_0600_03_28_07.JPG

Photo 12 - Truck_2_Suspension_3_6420060018_SPSWIM_TO_18_17_2.85_0600_03_28_07.JPG

ETG LTPP CLASS SCHEME, MOD 3

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

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

System Operating Parameters

Illinois SPS-6 (Lane 1)

Validation Visit – 28 March, 2007

Calibration factor for sensor #1:

80 kph:	3884
88 kph:	4120
96 kph:	3994
104 kph:	3928
112 kph:	3817

Calibration factor for sensor #2:

80 kph:	3524
88 kph:	3740
96 kph:	3626
104 kph:	3574
112 kph:	3464