Validation Report

Illinois, SPS-6

Task Order 11, CLIN 2
September 7 and 8, 2005

List of Tables

List of Figures

1 Executive Summary

A visit was made to the Illinois SPS-6 beginning on September 7 and continuing through September 8, 2005 for the purposes of conducting a validation of the WIM system located on Interstate 57 at milepost 225.6. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This site was installed as part of the SPS WIM Phase II contract on July 26th and July 27th, 2005. The site was subsequently calibrated August 8th to August 10th, 2005.

This site meets LTPP precision requirements. The classification data is also of research quality.

The site is instrumented with IRD/PAT Traffic bending plate WIM sensors and WIM controller.

The validation used the following trucks:

1) 3S2 with air suspension tandems loaded to 72,600 lbs.
2) 3S2 with air suspension tandems loaded to 65,400 lbs.

The validation speeds ranged from 47 to 61 miles per hour. The pavement temperatures ranged from 84 to 130 degrees Fahrenheit.

Table 1-1 Post-Validation results – 170600 – 08-Sep-2005

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-3.0 ±13.2%	Pass
Tandem axles	±15 percent	2.4 ±6.9%	Pass
Gross vehicle weights	±10 percent	1.5 ±5.8%	Pass
Speed	±1 mph [2 km/hr]	0.1 ±0.8 mph	Pass
Axle spacing	± 0.5 ft [150 mm]	0.0 ±0.1 ft	Pass

The pavement condition appeared to be satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area. Profile evaluation of the location cannot be completed until profile data is received.

This site meets the overall classification requirement of less than two percent unclassified. However, it does not meet the less than two percent trucks misclassified criteria.

The majority of vehicles that were misclassified were Class 3s, 4s and 5s that were being misidentified within the category of light single unit vehicles, i.e. 3s classified as 4s and 5s, 4s being classified as 5s, and 5s being classified as 3s and 4s.

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

2 Corrective Actions Recommended

The conduit trench for the power service has collapsed as much as 6 inches in many areas. Approximately 500 feet of the 777 foot trench needs to be refilled with soil and tamped to grade.

3 Post Calibration Analysis

This final analysis is based on test runs conducted on September 8, 2005 from mid-morning to early evening at test site 170600 on Interstate 57. This SPS-6 site is at milepost 225.6 on the northbound, right hand lane of a divided four-lane facility. No auto-calibration was used during test runs. The two trucks used for initial calibration and for the subsequent testing included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and air suspension loaded to 72,600 lbs.
2. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and air suspension loaded to 65,400 lbs.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 47 to 61 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 84 to 130 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

As shown in Table 3-1 this site meets all LTPP requirements for research quality data.

Table 3-1 Post-Validation Results - 170600 – 08-Sep-2005

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-3.0±13.2%	Pass
Tandem axles	±15 percent	2.4±6.9%	Pass
Gross vehicle weights	±10 percent	1.5±5.8%	Pass
Speed	±1 mph [2 km/hr]	0.1±0.8 mph	Pass
Axle spacing	± 0.5 ft [150 mm]	0.0±0.1 ft	Pass

The test runs were conducted primarily during the mid-morning to early evening hours on September 8th, resulting in a very 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 3 speed groups and 3 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 speed groups were divided as follows: Low speed – 47 to51 mph, Medium speed – 52 to 56 mph and High speed – 57 to 61 mph. The three temperature groups were created

by splitting the runs between those at 80 to 99 degrees Fahrenheit for low temperature, 100 to 115 degrees Fahrenheit for Medium temperature and 116 to 140 degrees Fahrenheit for High temperature.

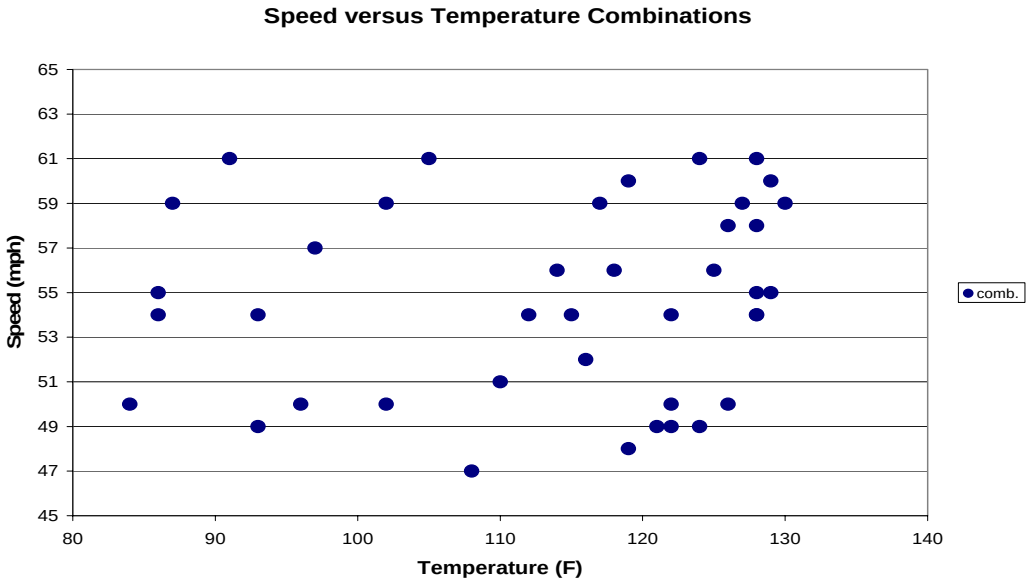

Figure 3-1 Post-Validation Speed-Temperature Distribution – 170600 – 08-Sep-2005

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 Figure 3-2 it can be seen that the GVW error estimate of the WIM equipment is greater at the high speeds when compared to the low and medium speeds. The scatter of the percent error appears to be consistent throughout the entire speed range.

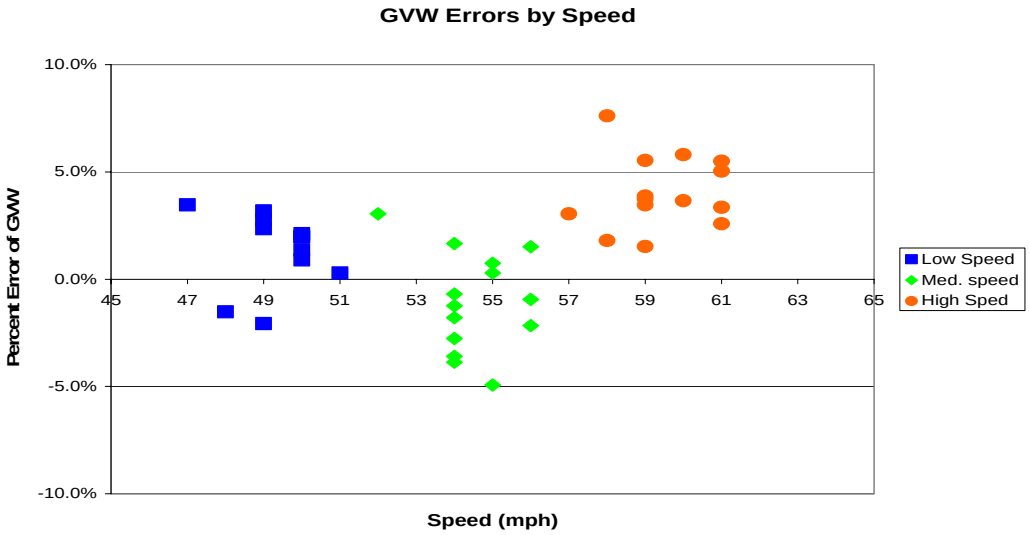

Figure 3-2 Post-Validation GVW Percent Error vs. Speed – 170600 – 08-Sep-2005

Figure 3-3 shows the relationship between temperature and GVW percentage error. The graph illustrates that there does not appear to be a relationship between GVW error and pavement temperature.

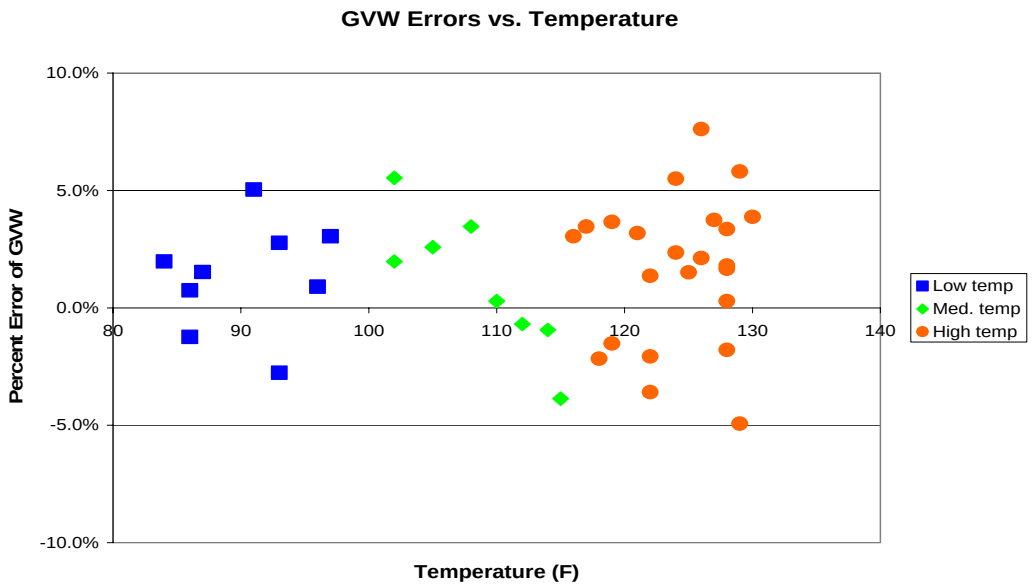

Figure 3-3 Post-Validation GVW Percent Error vs. Temperature– 170600 – 08-Sep-2005

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.

Axle spacing errors appear to be consistent throughout the test truck speed range and are limited to maximums of about 1.2 inches (0.1 feet). Vehicles speeds appear to have no effect on the error of measured axle spacing.

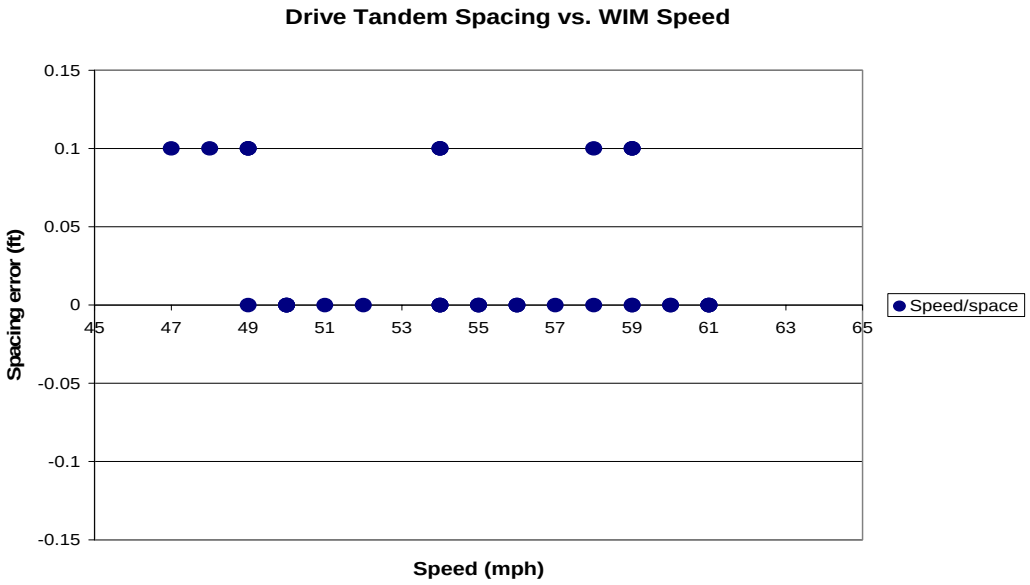

Figure 3-4 Post-Validation Spacing vs. Speed - 170600 – 08-Sep-2005

3.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 80 to 99 degrees Fahrenheit for low temperature, 100 to 115 degrees Fahrenheit for Medium temperature and 116 to 130 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 170600 – 08-Sep-2005

Element	95% Limit	Low Temp. 80-99 °F	Med. Temp. 100-115°F	High Temp. 116-130°F
Steering axles	±20 %	-2.0±14.4%	-2.0±21.7%	-3.7±11.9%
Tandem axles	±15 %	2.0±7.5%	2.0±6.0%	2.8±7.4%
GVW	±10 %	1.3±5.4%	1.0±7.0%	1.7±6.5%
Speed	±1 mph	0.0±0.0 mph	0.1±0.8 mph	0.1±1.1 mph
Axle spacing	± 0.5 ft	0.0±0.1 ft	0.0±0.1 ft	0.0±0.1 ft

From Table 3-2 it appears that changes in temperature do not significantly affect mean errors of weight estimates. The scatter of single axle errors, however, appears to increase at medium temperatures while tandem axle and GVW error scatter remains reasonably consistent.

Figure 3-5 shows the distribution of GVW errors versus temperature by truck. The GVW results for the fully loaded Truck A (squares) and the partially loaded Truck B (diamonds) indicate a lack of a relationship between the GVW mean error and the pavement temperature.

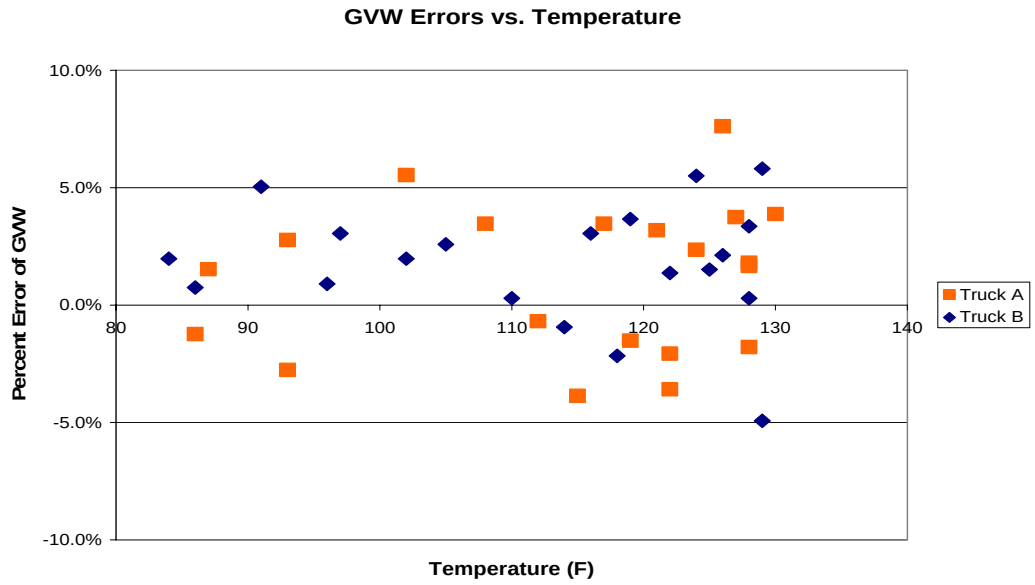

Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 170600 – 08-Sep-2005

Figure 3-6 shows the relationship between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. The figure illustrates a tendency to underestimate weights of steering axle weights by this WIM equipment at all temperatures.

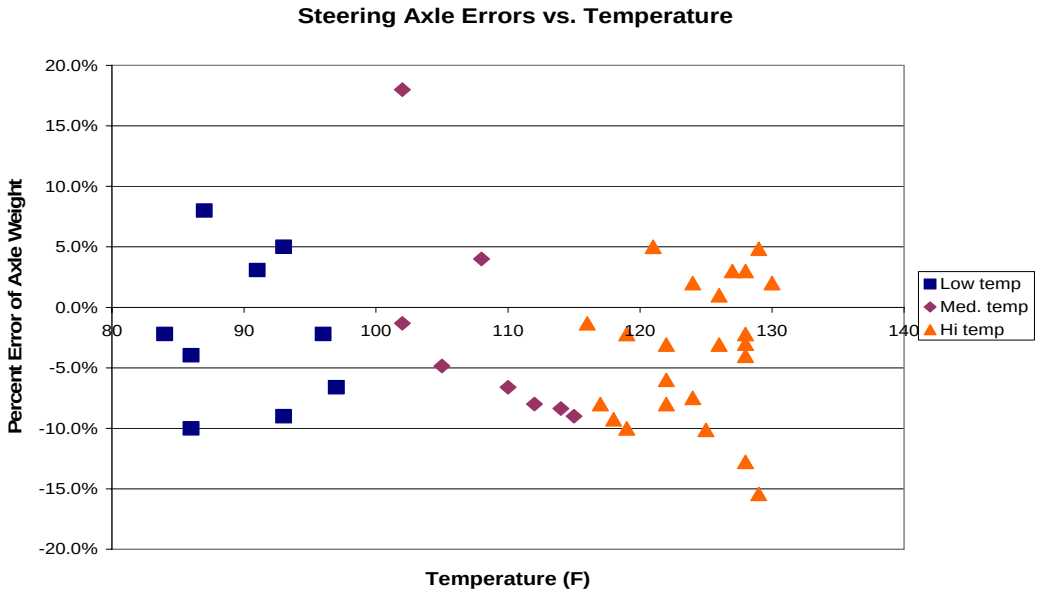

Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group - 170600 – 08-Sep-2005

3.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 47 to 51 mph, Medium speed – 52 to 56 mph and High speed – 57 to 61 mph.

Table 3-3 Post-Validation Results by Speed Bin – 170600 – 08-Sep-2005

Element	95% Limit	Low Speed 47-51 mph	Med. Speed 52-56 mph	High Speed 57-61 mph
Steering axles	±20 %	-1.7±11.0%	-7.9±8.4%	0.8±15.1%
Tandem axles	±15 %	2.1±5.7%	0.4±6.2%	4.8±6.1%
GVW	±10 %	1.4±3.8%	-1.1±5.0%	4.0±3.6%
Speed	±1 mph	0.0±0.0 mph	0.0±0.0 mph	0.0±0.0 mph
Axle spacing	± 0.5 ft	0.1±0.1 ft	0.0±0.1 ft	0.0±0.1 ft

From Table 3-3 it appears that the mean error and distribution of error for single axles decline at medium speeds. For tandem and GVW weights the system overestimates by approximately 4.4% at high speeds. Distribution of error is fairly stable at all speeds for tandem axles and GVW.

Figure 3-7 illustrates the tendency of the WIM equipment to report a greater mean error at the higher test speeds for both trucks. The variability in error for GVW remains consistent for both trucks throughout the speed range.

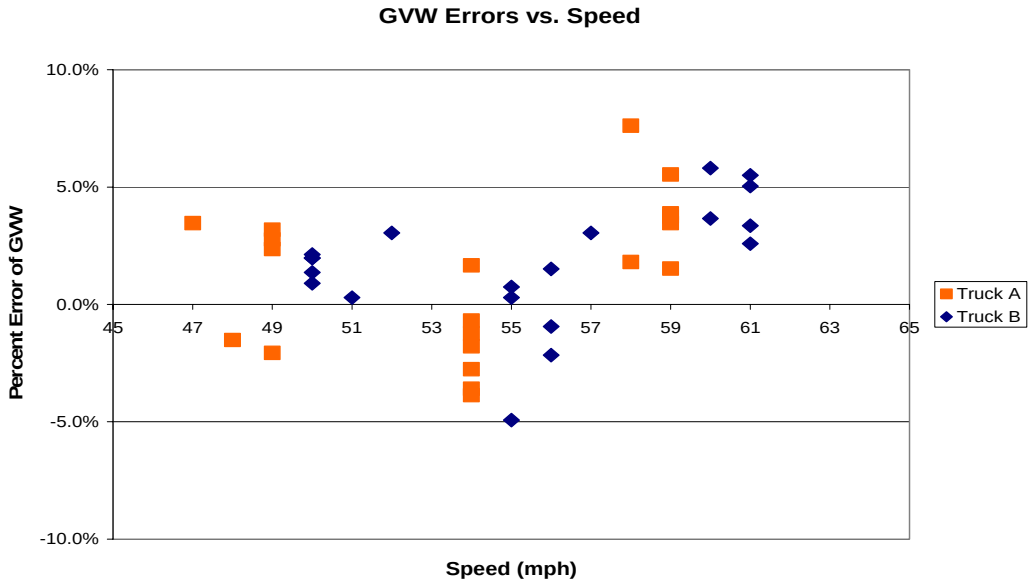

Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 170600 – 08-Sep-2005

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

calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. Figure 3-8 shows how the WIM equipment generally underestimates the steering axle weights. The underestimate increases at medium speeds. Variability of the error is generally constant throughout the entire speed range, with only a slight increase at higher speeds.

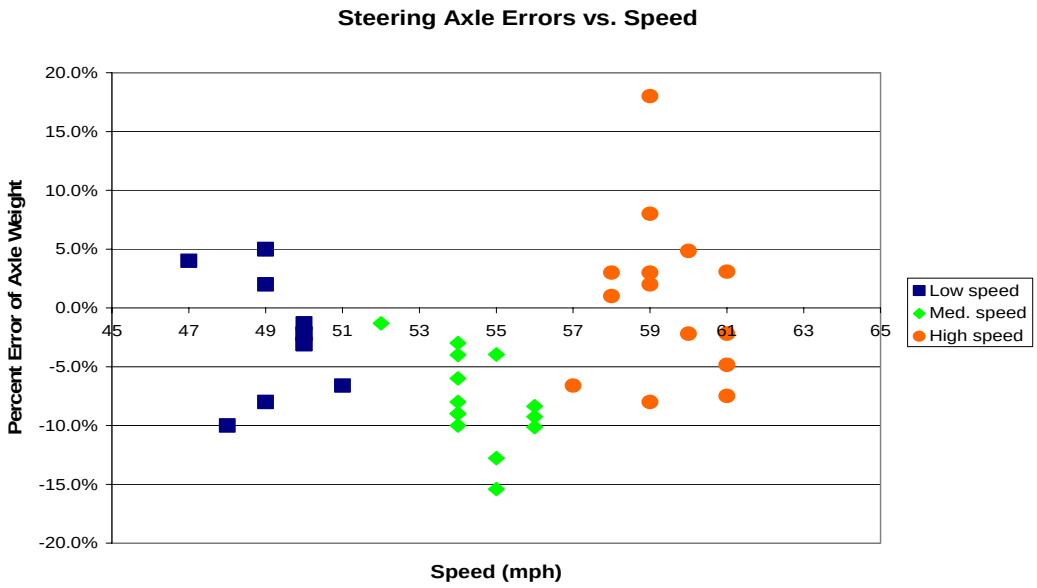

Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group - 170600 – 08-Sep-2005

3.3 Classification Validation

The agency uses the FHWA 13-bin classification scheme. Classification 0 has been added to define unclassified vehicles.

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 5 percent and is driven primarily by class 3, 4, 5 misclassifications, along with a single class 6 misclassification.

Table 3-4 Truck Misclassification Percentages for 170600 – 08-Sep-2005

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	66.7%	5	25%	6	25%
7	N/A				
8	0%	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 – 08-Sep-2005

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	200.0	5	-25.0	6	-25.0
7	N/A				
8	0.0	9	0.0	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 the observer. There is no way to tell how many more than those that might actually present exist. N/A means no vehicles of the class recorded by either the equipment or the observer. The class 3, 4, 5 misclassification problem is not significant enough to either fail the site as providing research quality data or warrant any changes to equipment or algorithms.

3.4 Evaluation by ASTM E-1318 Criteria

The ASTM E-1318 standard 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, and our validation did not include verification of that information.

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 smoothness was not assessed prior to the validation since the profile data has yet to be provided.

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

4.1 Profile analysis (Pending)

An assessment of the smoothness will be completed on receipt of the profile data and included in an amended report.

4.2 Distress survey and any applicable photos

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

4.3 Vehicle-pavement interaction discussion

A visual observation of the trucks as they approach, 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 IRD/PAT Traffic bending plate WIM sensors and WIM controller. These sensors are installed in a staggered configuration in a Portland concrete cement pavement about 500 ft in length. The roadway outside this short section is asphalt.

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

5.1 Pre-Evaluation Diagnostics

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

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

5.2 Calibration Process

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

Due to the mean values of the pre-validation test results, it was decided that a calibration of the equipment would not significantly improve the accuracies of the WIM system and so a calibration of the equipment was deemed unnecessary.

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 5-1 has the information found in TRF_CALIBRATION_AVC for site visits and Sheet 16s submitted prior to this validation as well as the information for the current visit

Table 5-1 Classification Validation History - 170600 – 08-Sep-2005

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
09/07/2005	Test Trucks	0.0	0.0			0.0
09/08/2005	Test Trucks	0.0	0.0			0.0

Table 5-2 has the information found in TRF_CALIBRATION_WIM for site visits and Sheet 16s submitted prior to this validation as well as the information for the current visit.

Table 5-2 Weight Validation History - 170600 – 08-Sep-2005

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
09/07/2005	Test Trucks	1.6 (2.6)	-3.5 (5.2)	2.6 (3.6)
09/08/2005	Test Trucks	1.5 (2.9)	-3.0 (6.5)	2.4 (3.5)

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 September 7, 2005 from the late morning to early evening hours at test site 170600 on Interstate 57. This SPS-6 site is at milepost 225.6 on the northbound, right hand lane of a divided four-lane facility. No auto-calibration was used during test runs. The *two* trucks used for initial calibration and for the subsequent testing included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and air suspension loaded to 73,200 lbs.
2. 5-axle tractor semi-trailer combination with a tractor having air suspension and trailer with standard rear tandem and air suspension loaded to 65,900 lbs.

For the initial validation each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 47 to 61 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 86 to 128 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are within Table 6-1.

As shown in Table 6-1, this site met all precision requirements for research quality data during the initial validation runs.

Table 6-1 Pre-Validation Results - 170600 – 07-Sep-2005

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-3.5±10.6%	Pass
Tandem axles	±15 percent	2.6±7.1%	Pass
Gross vehicle weights	±10 percent	1.6±5.2%	Pass
Vehicle speed	±1 mph [2 km/hr]	0.1±0.8 mph	Pass
Axle spacing length	± 0.5 ft [150 mm]	0.0±0.1 ft	Pass

The test runs were conducted during the evening and early morning hours, resulting in a very 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 3 speed groups and 3 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 achieved for this set of validation runs.

The speed groups were divided as follows: Low speed – 47 to 51 mph, Medium speed – 52 to 56 mph and High speed – 57 to 61 mph. The three temperature groups were created by splitting the runs between those at 86 to 99 degrees Fahrenheit for low temperature, 100 to 113 degrees Fahrenheit for Medium temperature and 114 to 128 degrees Fahrenheit for High temperature.

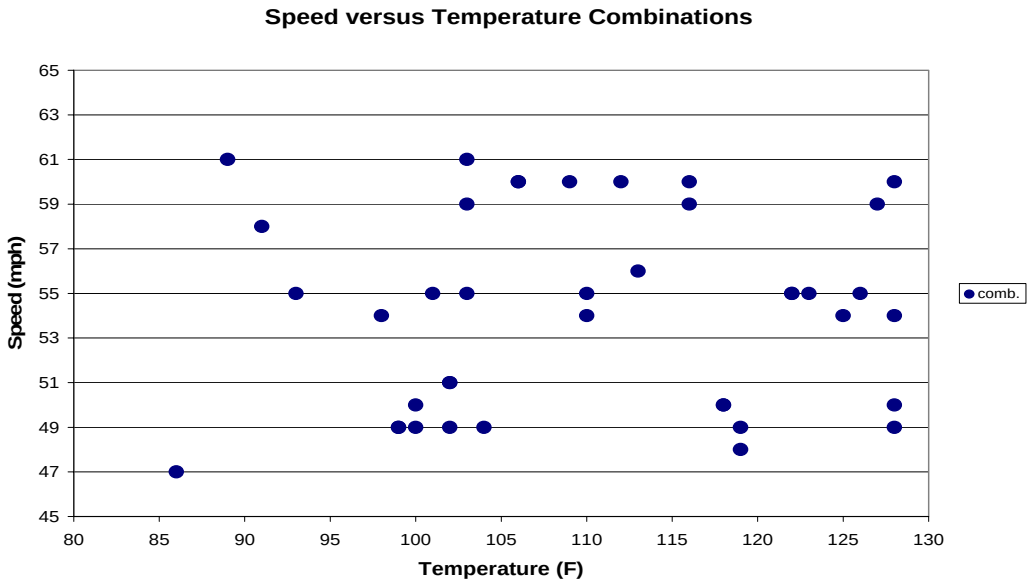

Figure 6-1 Pre-Validation Speed-Temperature Distribution – 170600 – 07-Sep-2005

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 WIM equipment appears to overestimate the GVW at the lower and higher speeds. Variability in GVW error is reasonably constant throughout the entire speed range.

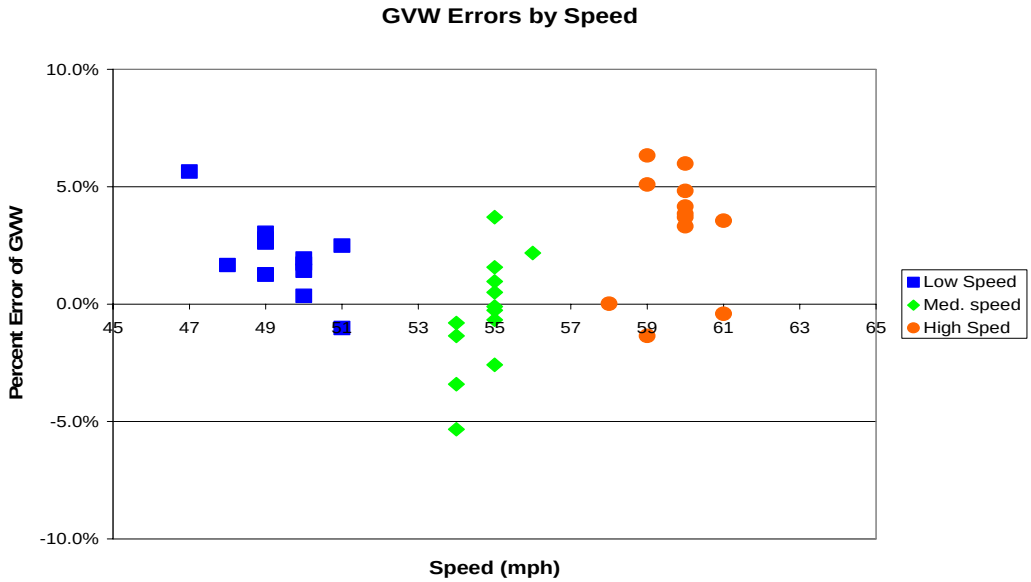

Figure 6-2 Pre-Validation GVW Percent Error vs. Speed – 170600 – 07-Sep-2005

Figure 6-3 shows the relationship between temperature and GVW percentage error. There does not appear to be a relationship between GVW error and temperature at this site.

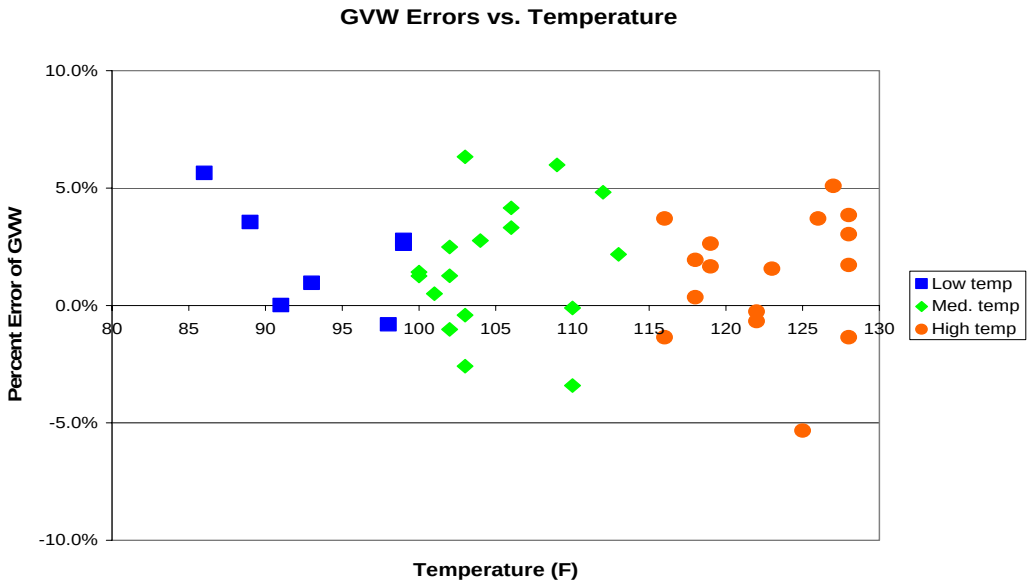

Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 170600 – 07-Sep-2005

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. This figure indicates that there is no effect from speed on the ability of the WIM equipment to measure axle spacing.

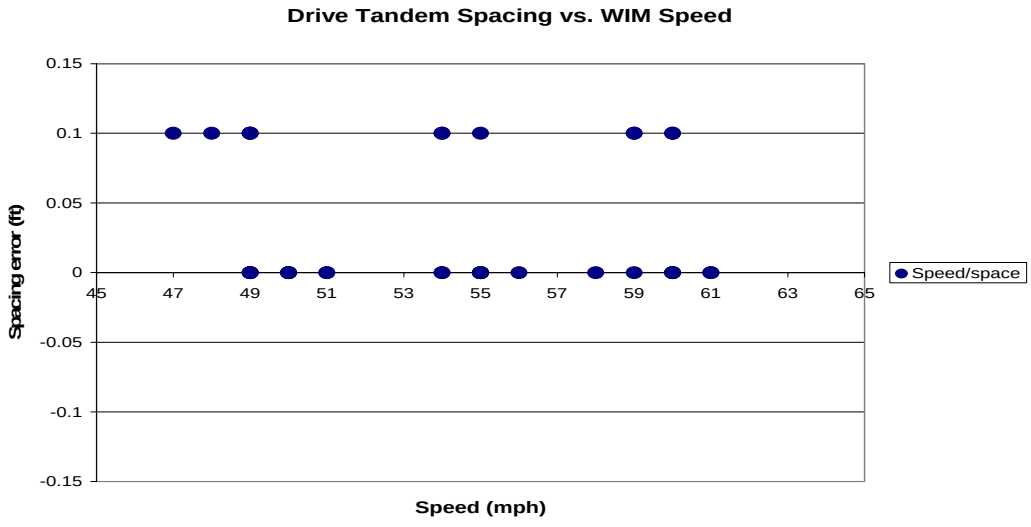

Figure 6-4 Pre-Validation Spacing vs. Speed - 170600 – 07-Sep-2005

6.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 86 to 99 degrees Fahrenheit for low temperature, 100 to 113 degrees Fahrenheit for Medium temperature and 114 to 128 degrees Fahrenheit for High temperature.

Table 6-2 Pre-Validation Results by Temperature Bin - 170600 – 07-Sep-2005

Element	95% Limit	Low Temp. 86-99 °F	Med. Temp. 100-113 °F	High Temp. 114-128 °F
Steering axles	±20 %	-5.1±11.4%	-1.9±12.9%	-4.5±9.0%
Tandem axles	±15 %	3.2±8.0%	2.5±6.6%	2.4±8.0%
GVW	±10 %	2.1±5.4%	1.7±5.8%	1.3±5.6%
Speed	±1 mph	0.3±1.2 mph	-0.1±0.9 mph	0.1±0.7 mph
Axle spacing	± 0.5 ft	0.0±0.1 ft	0.0±0.1 ft	0.0±0.1 ft

As shown in Table 6-2, mean error and variability in error are fairly consistent over the course of the entire speed range, with only a moderate decrease in the underestimation of single axles at the medium temperatures.

Figure 6-3 shows the distribution of GVW errors versus temperature by truck. The WIM equipment appears to generally overestimate the GVW for both trucks over the course of the entire temperature range. The scatter of the errors for both trucks also appears to be consistent.

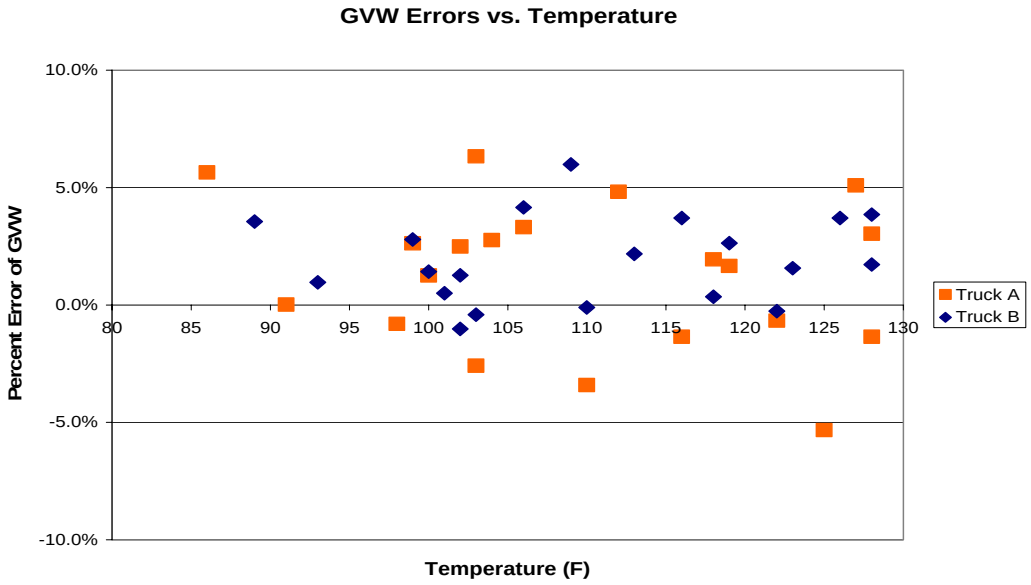

Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 170600 – 07-Sep-2005

Figure 6-6 shows the relationship between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. From the figure it can be seen that the equipment consistently underestimates steering axle weights at all temperatures, however variability in the steering axle error is slightly larger at medium temperatures when compared to low and high temperatures.

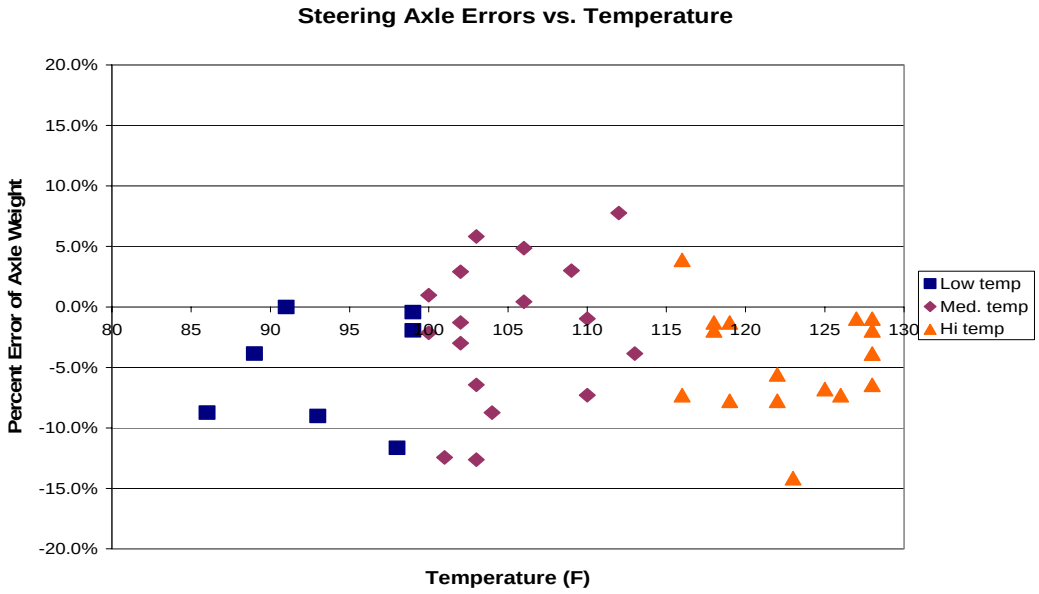

Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group - 170600 – 07-Sep-2005

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 47 to 51 mph, Medium speed – 52 to 56 mph and High speed – 57 to 61 mph.

Table 6-3 Pre-Validation Results by Speed Bin - 170600 – 07-Sep-2005

Element	95% Limit	Low Speed 47-51 mph	Medium Speed 52-56 mph	High Speed 57-61 mph
Steering axles	±20 %	-2.9±7.5%	-7.7±9.3%	0.3±10.8%
Tandem axles	±15 %	3.0±5.0%	1.0±7.2%	3.8±8.8%
GVW	±10 %	2.0±3.1	-0.4±5.2%	3.3±5.5%
Speed	±1 mph	0.0±2.0 mph	0.0±0.0 mph	0.0±0.0 mph
Axle spacing	± 0.5 ft	0.1±0.1 ft	0.0±0.1 ft	0.0±0.1 ft

It appears from Table 6-3 that for the truck population as a whole there is a dip in mean error for all weights at the medium speeds. The variability appears to increase as the speed of the trucks increase.

Figure 6-7 shows the tendency of the errors in GVW estimation to dip at the medium speeds for both trucks, although the change appears to be larger for Truck A (squares) than for Truck B (diamonds). GVW for both trucks appears to be overestimated by the WIM equipment at both the lower and higher speeds. At medium speeds, the GVW is slightly overestimated for Truck B, and slightly underestimated for Truck A. The combined variability for the test trucks is fairly consistent at all speeds, but appears to be slightly smaller for Truck B at all speeds when viewed separately.

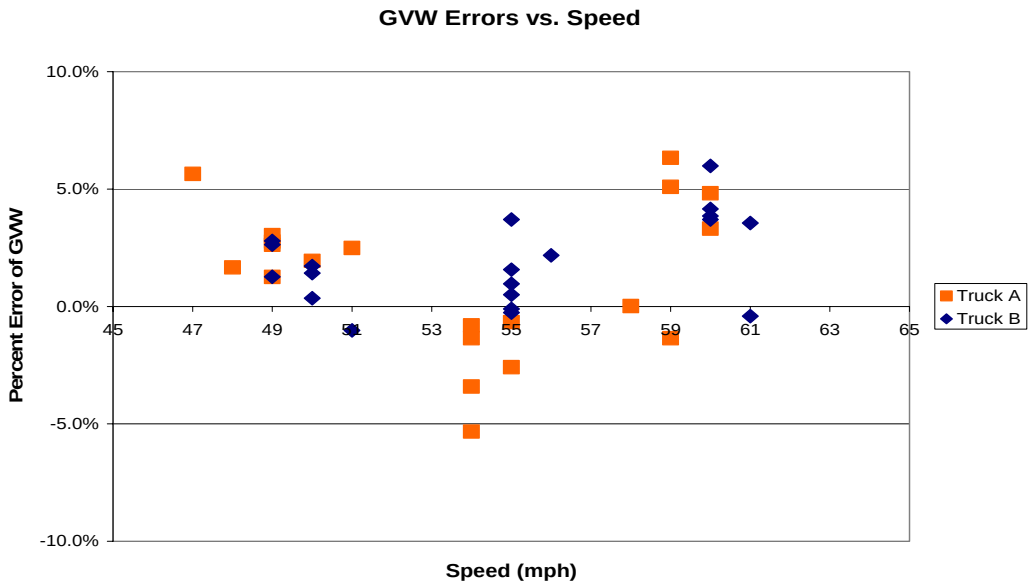

Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 170600 – 07-Sep-2005

Figure 6-8 shows the relationship between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. From the figure it can be seen that the mean error for steering axles dips at the medium speeds. Distribution of error is generally similar at all speeds.

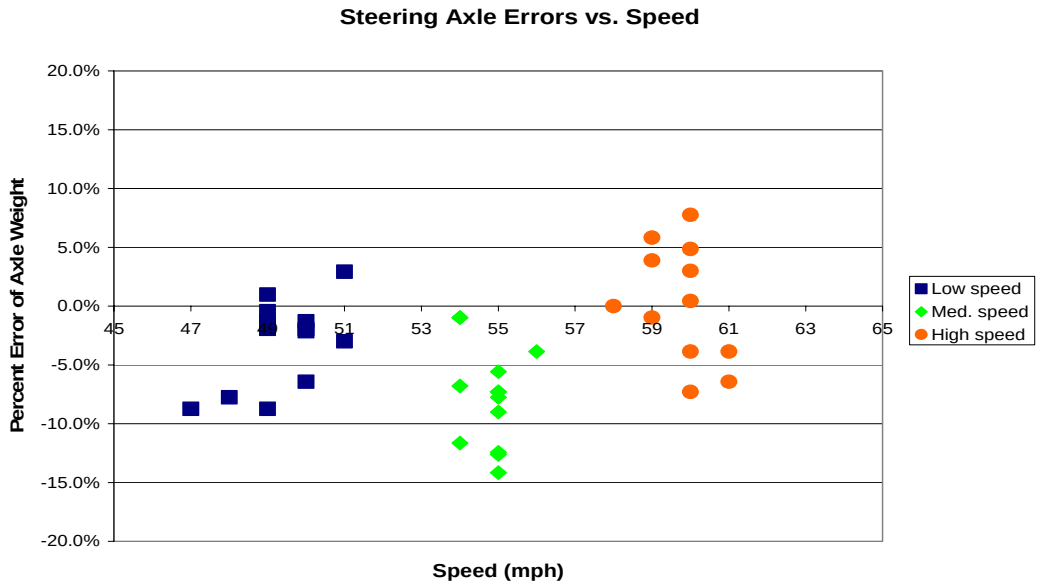

Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 170600 – 07-Sep-2005

6.3 Classification Validation

The agency uses the FHWA 13-bin classification scheme. Classification 0 has been added to define unclassified vehicles.

A sample of 100 trucks was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 percent unknown vehicles and 0 percent unclassified vehicles.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 6-4 has the classification error rates by class. The overall misclassification rate is 6.9 percent and is the result of Class 3, 4 and 5 misclassifications.

Table 6-4 Truck Misclassification Percentages for 170600 – 07-Sep-2005

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	75.0%	5	66.7%	6	0.0%
7	N/A				
8	0.0%	9	0.0%	10	0.0%
11	0.0%	12	0.0%	13	N/A

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

Table 6-5 Truck Classification Mean Differences for 170600 – 07-Sep-2005

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	300.0	5	-66.7	6	0.0
7	N/A				
8	0.0	9	0.0	10	0.0
11	0.0	12	0.0	13	N/A

These error rates are normalized to represent how many vehicles of the class are expected to be over- or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown are those identified by the equipment but no vehicles of the type were seen the observer. There is no way to tell how many more than those that might actually present exist. N/A means no vehicles of the class recorded by either the equipment or the observer. As can be seen in Table 6-5 the misclassification appears to be limited to Class 4 and Class 5 vehicles.

6.4 Evaluation by ASTM E-1318 Criteria

The ASTM E-1318 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 and our validation did not include verification of that information.

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
GWV	± 10%	100%	Pass

7 Data Availability and Quality

As of September 22, 2005 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 and 1998 have a sufficient quantity to be considered complete years of data. In the absence of previously gathered validation information it can be seen that at least 5 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 – 07-Sep-2005

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1991	0	0	None	17	2	Full Week
1992	0	0	None	1	1	Weekend day(s)
1993	44	2	Full Week	48	3	Full Week
1994	96	7	Full Week	0	0	None
1995	60	5	Full Week	0	0	None
1996	23	6	Full Week	40	5	Full Week
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	5	1	Weekday(s) and Weekend day(s)	2	1	Weekday(s) and Weekend day(s)

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. Based on the data collected on September 7th and September 8th, 2005 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 – 07-Sep-2005

Characteristic	**Class 9**
Percentage Overweights	0.0%
Percentage Underweights	0.1%
Unloaded Peak	40 kps
Loaded Peak	78 kps

The expected percentage of unclassified vehicles is 5.1 percent. 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.

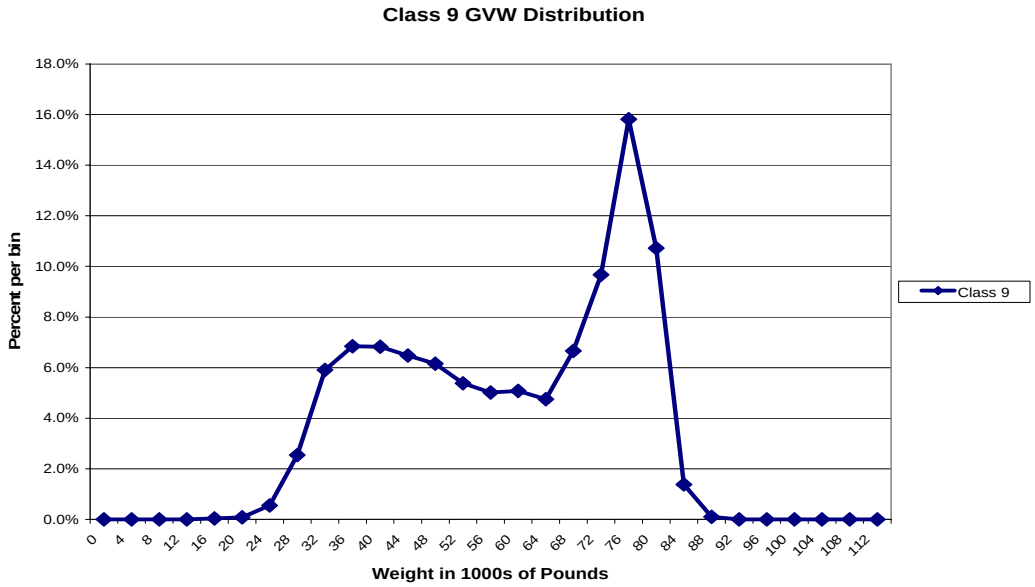

Figure 7-1 Expected GVW Distribution Class 9 – 170600 – 07-Sep-2005

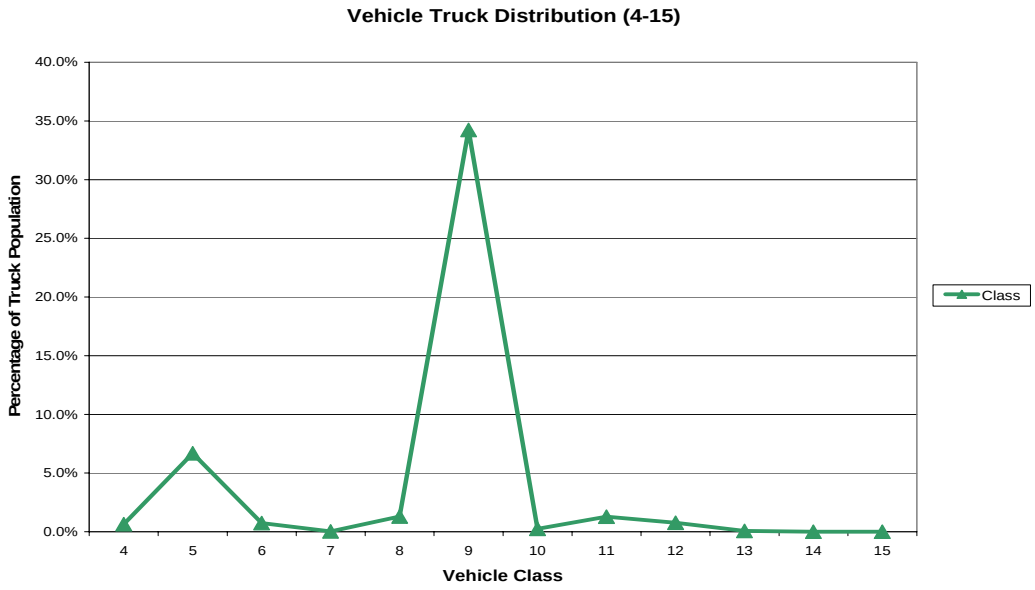

Figure 7-2 Expected Vehicle Distribution - 170600 – 07-Sep-2005

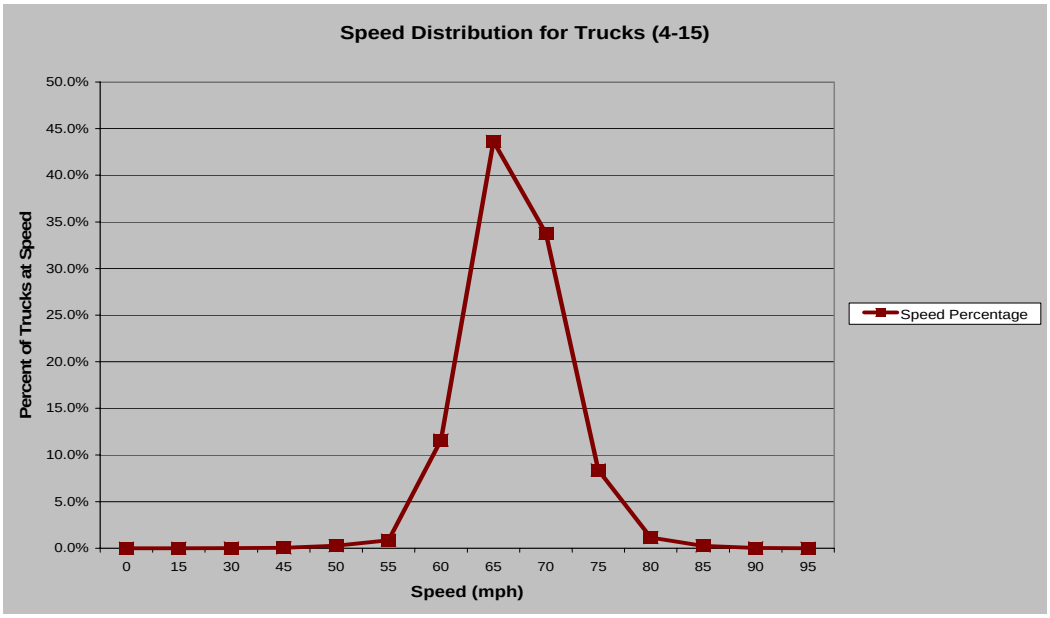

Figure 7-3 Expected Speed Distribution - 170600 – 07-Sep-2005

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 loaded air 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 (5 pages)
Sheet 21 – Post-Validation (5 pages)

Truck Photographs (10 pages)

9 Updated handout guide and Sheet 17

A copy of the post-visit handout guide has been included beginning on the following 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

Photos

1. General Information

SITE ID: *170600*

LOCATION: *I-57 North, milepost 255.6, approximately 10.0 miles south of the I-7/I-72 interchange in Champaign.*

VISIT DATE: *September 7th, 2005*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

William Comer, 301-210-5101, wjcomer@mactec.com

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

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

Tom Winkelman, 217-782-2940, winkelmantj@nt.dot.state.il.us

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:

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

3. Agenda

BRIEFING DATE: *None Requested*

ON SITE PERIOD: *Beginning September 7, 2005 at 8:00 am.*

TRUCK ROUTE CHECK: *Completed at Phase II Site Evaluation visit March 7-8, 2005 – See Truck Route*

4. Site Location/ Directions

NEAREST AIRPORT: *Chicago O'Hara International Airport*

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

MEETING LOCATION: *On site beginning at 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:

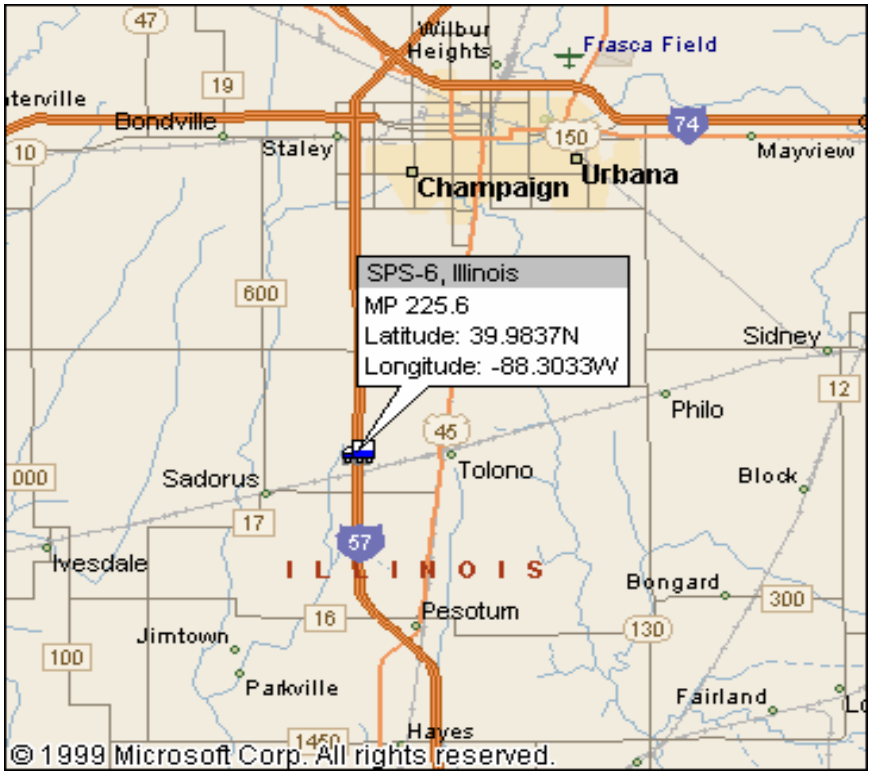

Figure 4-1 - WIM Site Location - 170600 - Illinois

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; $8.00 per weigh; located 13.3 miles from WIM site.*

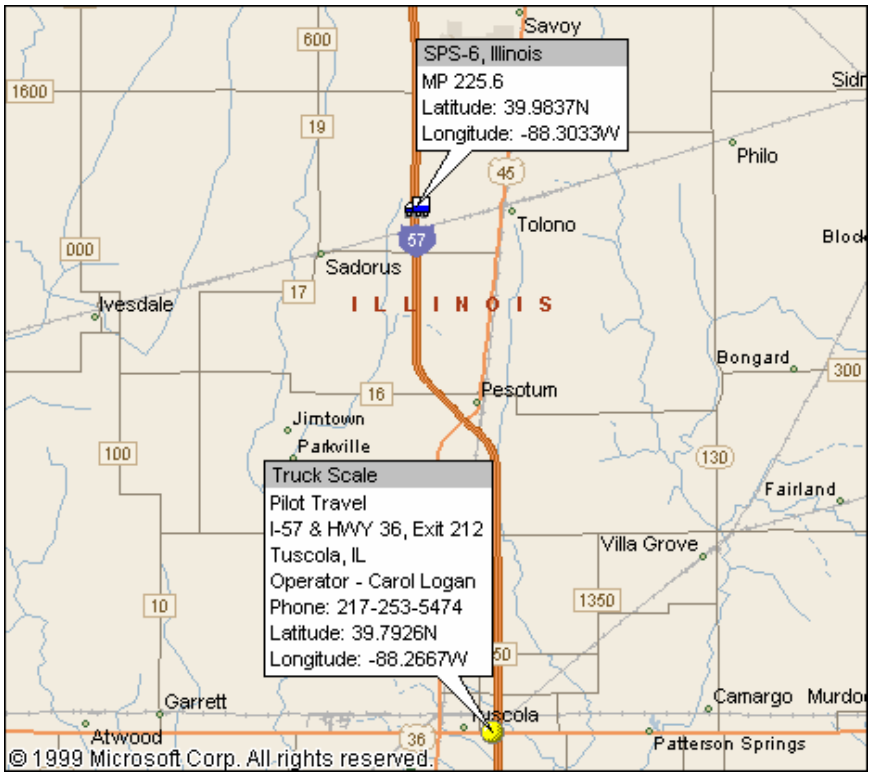

Figure 5-1 – Truck Scale Location – 170600 - Illinois

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 Miles *Estimated lap time - 20 Minutes*

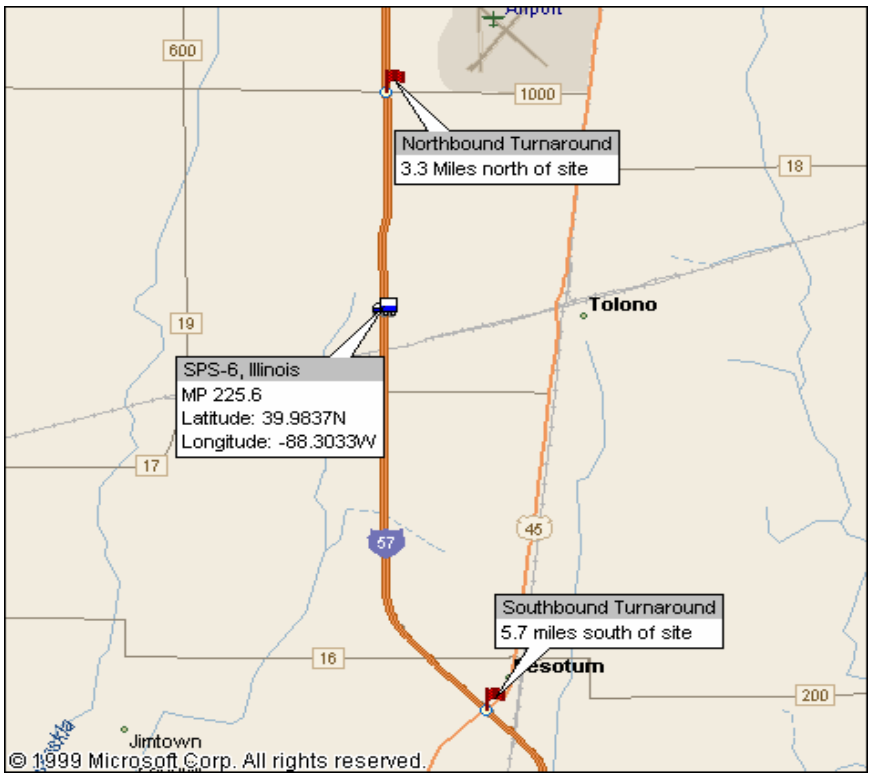

Figure 5-2 - Truck Route - 170600 - Illinois

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 _____ Distress Photo_____
Date _____ Distress Photo_____
Date _____ Distress Photo_____

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 / under ground / 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 Power_Service_Box_TO_11_17_2.54_0600_09_08_05.JPG
Phone source Telephone_Service_Pedestal_TO_11_17_2.54_0600_09_08_05.JPG
Cabinet exterior Cabinet_Exterior_TO_11_17_2.54_0600_09_08_05.JPG
Cabinet interior Cabinet_Interior_Front_TO_11_17_2.54_0600_09_08_05.JPG
Cabinet_Interior_Back_TO_11_17_2.54_0600_09_08_05.JPG
Weight sensors Leading_Weighpad_Right_TO_11_17_2.54_0600_09_08_05.JPG
Trailing_Weighpad_Left_TO_11_17_2.54_0600_09_08_05.JPG
Classification sensors _____
Other sensors Leading_Loop_Sensor_TO_11_17_2.54_0600_09_08_05.JPG
Trailing_Loop_Sensor_TO_11_17_2.54_0600_09_08_05.JPG
Description_____
Downstream direction at sensors on LTPP lane
Downstream_TO_11_17_2.54_0600_09_08_05.JPG
Upstream direction at sensors on LTPP lane
Upstream_TO_11_17_2.54_0600_09_08_05.JPG

COMMENTS Power trench has sunk up to 6" in some areas and over 95% of the 777' length of the trench (see Photo 3).

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

COMPLETED BY Dean J. Wolf

PHONE 301-210-5105 DATE COMPLETED 09 / 08 / 2005

Sketch of equipment layout

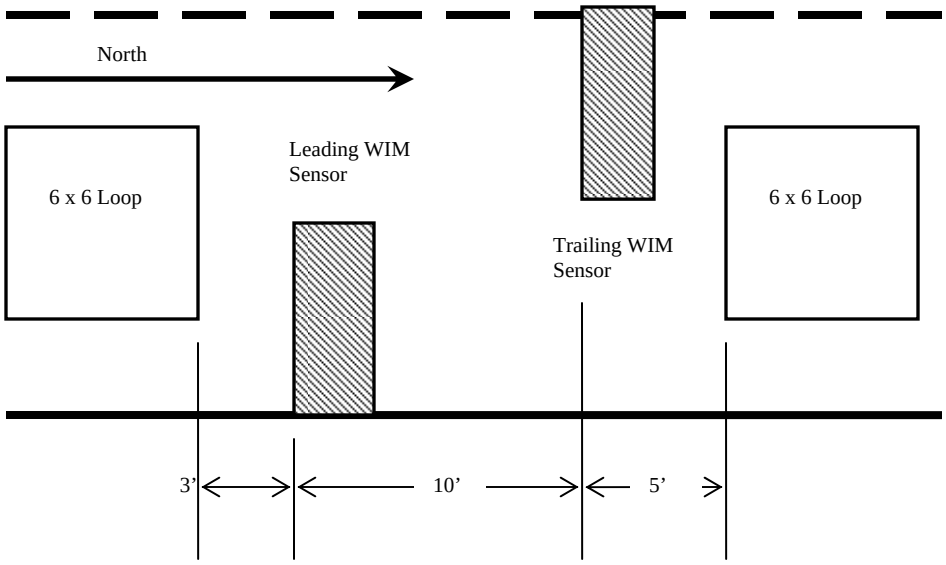

Photo 1 - Downstream_TO_11_17_2.54_0600_09_08_05.JPG

Photo 2 - Upstream_TO_11_17_2.54_0600_09_08_05.JPG

Photo 3 - Cabinet_Exterior_TO_11_17_2.54_0600_09_08_05.JPG

Photo 4 - Cabinet_Interior_Back_TO_11_17_2.54_0600_09_08_05.JPG

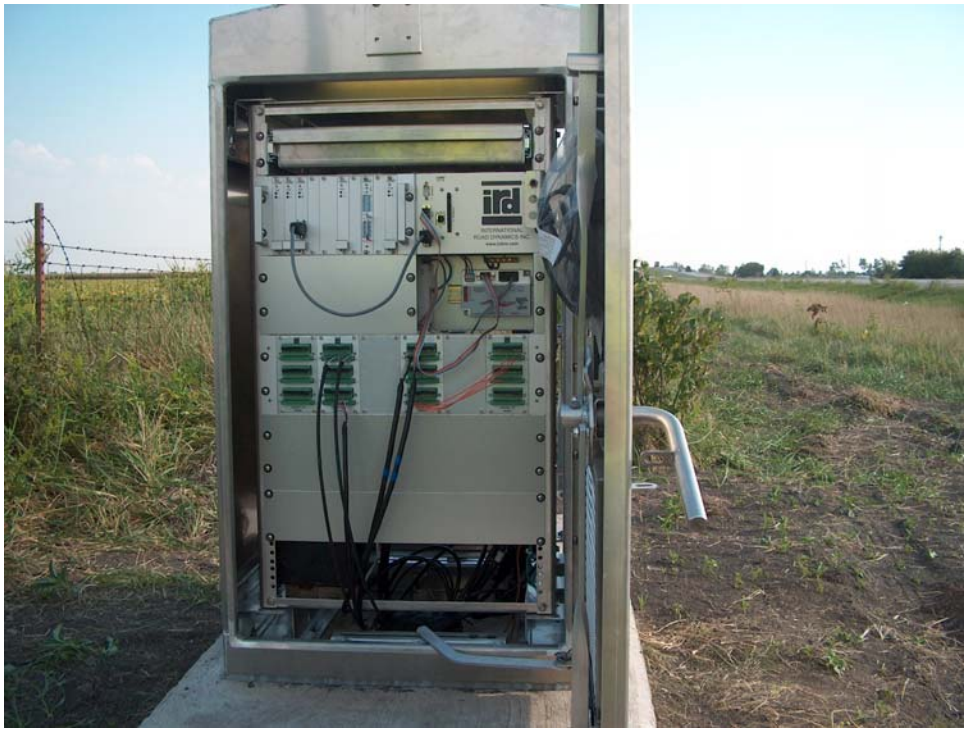

Photo 5 - Cabinet_Interior_Front_TO_11_17_2.54_0600_09_08_05.JPG

Photo 6 - Leading_Loop_Sensor_TO_11_17_2.54_0600_09_08_05.JPG

Photo 7 - Leading_Weighpad_Right_TO_11_17_2.54_0600_09_08_05.JPG

Photo 8 - Trailing_Weighpad_Left_TO_11_17_2.54_0600_09_08_05.JPG

Photo 9 - Trailing_Loop_Sensor_TO_11_17_2.54_0600_09_08_05.JPG

Photo 10 - Power_Service_Box_TO_11_17_2.54_0600_09_08_05.JPG

Photo 11 - Telephone_Service_Pedestal_TO_11_17_2.54_0600_09_08_05.JPG

Photo 12 - Power_Service_Conduit_Trench_1_TO_11_17_2.54_0600_09_08_05.JPG

Photo 13 - Power_Service_Conduit_Trench_2_TO_11_17_2.54_0600_09_08_05.JPG

Traffic Sheet 18	*STATE_CODE 17
LTPP MONITORED TRAFFIC DATA	*SPS PROJECT ID 0500
WIM SITE COORDINATION	*DATE 09 / 07 / 2005

Rev. 6/26/2004

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 –
      - ☒ LTPP
      - ☐ State

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

   c. Maintenance –
      - ☐ Contract with purchase
      - ☒ Separate contract LTPP
      - ☐ Separate contract State
      - ☐ 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. Maintenance and Rehabilitation Options –
- ☐ 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. Calibration Routine –
- ☒ LTPP – ☐ Semi-annually ☒ Annually
- ☐ State per LTPP protocol – ☐ Semi-annually ☐ Annually
- ☐ State other – _____

Traffic Sheet 18	*STATE_CODE 17
LTPP MONITORED TRAFFIC DATA	*SPS PROJECT ID 0500
WIM SITE COORDINATION	*DATE 09 / 07 / 2005

Rev. 6/26/2004

d. * Test Vehicles

i. Trucks –

1st – Air suspension 3S2	☐ State	☒ LTPP
2nd – 3S2 (65K)	☐ State	☐ LTPP
3rd – _____	☐ State	☐ LTPP
4th – _____	☐ State	☐ LTPP

ii. Loads – ☐ State ☒ LTPP

iii. Drivers – ☐ State ☒ LTPP

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

IRD

f. Access to cabinet

i. * Personnel with access –
☐ State only
☒ Joint
☐ LTPP

ii. Physical Access –
☒ Key
☐ Combination

g. * State personnel required on site – ☒Yes Activities - VALIDATIONS ONLY ☐No

h. * Traffic Control Required – ☒Yes Activities - SENSOR MAINT. ☒No

i. * Enforcement Coordination Required ☐Yes Activities - _____ ☒No

j. * Authorization to calibrate site –
☐ State only
☒ LTPP

5. SITE SPECIFIC CONDITIONS –

a. Funds and accountability – LTPP

b. Reports – _____

c. Other – _____

6. * CONTACTS –

a. State personnel required on-site

Name: TOM WINKELMAN Phone: 217-782-2940

Name: RAY TAYLOR Phone: 217-782-2065

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

Name: RAY TAYLOR Phone: 217-782-2065

Agency: ILLINOIS DOT

Traffic Sheet 18	*STATE_CODE 17
LTPP MONITORED TRAFFIC DATA	*SPS PROJECT ID 0500
WIM SITE COORDINATION	*DATE 09 / 07 / 2005

Rev. 6/26/2004

c. Data Processing and Pre-Visit Data –

Name: BASEL ABUKHATER Phone: 716-632-0804

Agency: STANTEC

d. Construction schedule and verification –

Name: _____ Phone: _____

Agency: I DOT DISTRICT 5, REGION 3

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

Name: BRIAN PATTERSON Phone: 317-271-8545

Agency: B.A. PATTERSON TRUCKING

f. Traffic Control –

Name: _____ Phone: _____

Agency: I DOT DISTRICT 5, REGION 3

g. Enforcement Coordination –

Name: _____ Phone: _____

Agency: ILLINOIS STATE POLICE

Completed by: DEAN J. WOLF Date: 09/07/05

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [810] *STATE CODE [17] *SHRP SECTION ID [0500]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [09 / 07 / 2005]

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

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

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

   X NUMBER OF TRUCKS COMPARED 2 NUMBER OF TEST TRUCKS USED

   20 PASSES PER TRUCK

TYPE PER FHWA 13 BIN SYSTEM SUSPENSION: 1 - AIR; 2 - LEAF SPRING 3 - OTHER (DESCRIBE)	TRUCK	TYPE	SUSPENSION
	1	9	1
	2	9	1
	3		

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW 1.6 STANDARD DEVIATION 2.6
   DYNAMIC AND STATIC SINGLE AXLES -3.5 STANDARD DEVIATION 5.2
   DYNAMIC AND STATIC DOUBLE AXLES 2.6 STANDARD DEVIATION 3.6

8. 3 NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

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

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) 3710 . ___

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

CLASSIFIER TEST SPECIFICS***

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

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

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

PERSON LEADING CALIBRATION EFFORT: DEAN J. WOLF
CONTACT INFORMATION: 301-210-5105 MACTEC ENGINEERING + CONSULTING, INC.

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [010] *STATE CODE [17] *SHRP SECTION ID [0500]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [09 / 08 / 2005]

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

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

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

5. EQUIPMENT MANUFACTURER IRD/IAT TRAFFIC

WIM SYSTEM CALIBRATION SPECIFICS**

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

___ NUMBER OF TRUCKS COMPARED

__2__ NUMBER OF TEST TRUCKS USED

__20__ PASSES PER TRUCK

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

TRUCK	TYPE	SUSPENSION
1	9	1
2	9	1
3		

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   - DYNAMIC AND STATIC GVW ___1.5 STANDARD DEVIATION __2.9
   - DYNAMIC AND STATIC SINGLE AXLES ___-3.0 STANDARD DEVIATION __6.5
   - DYNAMIC AND STATIC DOUBLE AXLES ___2.4 STANDARD DEVIATION __3.5

8. ___3___ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

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

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___3710___.___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   - *** FHWA CLASS 9 ____0.0
   - *** FHWA CLASS 8 ____0.0
   - FHWA CLASS ____ ____
   - FHWA CLASS ____ ____
   - FHWA CLASS ____ ____
   - FHWA CLASS ____ ____
   - *** PERCENT "UNCLASSIFIED" VEHICLES: ____0.0

PERSON LEADING CALIBRATION EFFORT: DEAN J. WOLF
CONTACT INFORMATION: MACTEC ENGINEERING + CONSULTING, INC 301-210-5105 rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK # 1	* DATE	09/07/2005

Rev. 08/31/01

Cell - 317-491-0020

PART I.

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

AXLES - units - lbs / 100s lbs / kg

pre-validation / post-validation

	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		10.54 / 10.13	10.13 / 9.9	D / C
B		15.69 / 15.63	15.63 / 15.43	D / C
C		15.69 / 15.63	15.63 / 15.43	D / C
D		15.64 / 15.59	15.59 / 15.63	D / C
E		15.64 / 15.59	15.59 / 15.63	D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 73.20 / 72.57

*c) Post Test Loaded Weight 72.57 / 72.02

*d) Difference Post Test – Pre-test .63 / .55

GEOMETRY

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

9. a) * Make: Peterbilt b) * Model: 349

10.* Trailer Load Distribution Description:

jersey rail loaded evenly along tractor, steel watertanks over last axle

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #__	* DATE	09/07/2005

Rev. 08/31/01

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

A to B 20' 2" B to C 4' 4" C to D 27' 5"

D to E 4' 1" E to F _____

Wheelbased (measured A to last) 56' 11 1/2" Computed _____

13. *Kingpin Offset From Axle B (units) + 2' 2 1/2" (_____)

(+ is to the rear)

SUSPENSION

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

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #__	* DATE	09|07|2005

Rev. 08/31/01

PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK # 1	* DATE	09/07/2005

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10540	15680	15680	15650	15650		73200
2	10540	15690	15690	15630	15630		73180
3	10540	15690	15690	15650	15650		73220
Average	10540	15687	15687	15643	15643		73200

pre-weigh
pre-valid.

Table 6. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10200	15590	15590	15600	15600		72580
2	10100	15660	15660	15580	15580		72580
3	10100	15650	15650	15580	15580		72560
Average	10133	15633	15633	15587	15587		72573

post weigh
pre-valid
+
pre-weigh
post-valid

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9860	15460	15460	15610	15610		72000
2	9940	15410	15410	15640	15640		72040
3	9900	15420	15420	15640	15640		72020
Average	9900	15430	15430	15630	15630		72020

post. weigh
post valid

Measured By DJW Verified By _____

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK # 2	* DATE	09/07/2005

Rev. 08/31/01

CELL - 317-491-0022

PART I.

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

AXLES - units - lbs / 100s lbs / kg pre validation / post validation

	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		11.76 / 11.46	11.46 / 11.17	D / C
B		13.99 / 13.93	13.93 / 13.81	D / C
C		13.99 / 13.93	13.93 / 13.81	D / C
D		13.09 / 13.06	13.06 / 13.10	D / C
E		13.09 / 13.06	13.06 / 13.10	D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 65.91 / 65.10
*c) Post Test Loaded Weight 65.10 / 64.99
*d) Difference Post Test – Pre-test .81 / .11

GEOMETRY

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

9. a) * Make: Freightliner b) * Model: FL70

10.* Trailer Load Distribution Description:

jersey rail evenly distributed over trailer

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #	* DATE	09 | 07 | 2005

Rev. 08/31/01

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

A to B 17' 4 1/2" B to C 4' 3" C to D 28' 1"

D to E 4' 1" E to F

Wheelbased (measured A to last) 53' 10" Computed

13. *Kingpin Offset From Axle B (units) + 1' 9" ( )

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	15R24.5	spring, 2 full leaves
B	"	~~spri~~ air
C	"	air
D	8.25 R15	air
E	"	"
F		

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #__	* DATE	09/07/2005

Rev. 08/31/01

PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

Sheet 19	* STATE_CODE	17
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK # 2	* DATE	09/07/2005

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11760	13990	13990	13080	13080		65900
2	11760	13990	13990	13090	13090		65920
3	11740	13990	13990	13090	13090		65900
Average	11753	13990	13990	13087	13087		65907

pre-weigh
pre-val

Table 6. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11460	13910	13910	13070	13070		65420
2	11460	13940	13940	13050	13050		65440
3	11480	13910	13910	13070	13070		65440
Average	11467	13930	13930	13063	13063		65100

post weigh
pre-val

pre-weigh
post-val

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11160	13820	13820	13090	13090		64980
2	11180	13810	13810	13110	13110		65020
3	11160	13810	13810	13100	13100		64980
Average	11167	13813	13813	13100	13100		64993

post weigh

post val.

Measured By DJW Verified By _____

Sheet 20	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
Speed and Classification Checks * 1 of* 2	* DATE 09/07/2005

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	60194	60	9	68	3 (14.9')	60439	67	5	dual r. tires
62	9	60200	62	9	57	9	60451	57	9	
65	4 (26.9')	60213	65	5	58	9	60454	58	9	del. trk.
64	9	60214	63	9	59	9	60465	59	9	
60	9	60223	60	9	64	9	60471	64	9	
65	9	60228	65	9	56	9	60479	56	9	
64	9	60232	64	9	62	9	60482	61	9	
63	9	60239	62	9	59	9	60485	57	9	
55	9	60244	56	9	64	9	60488	63	9	
66	6	60251	65	6	64	9	60492	63	9	
60	9	60259	60	9	67	9	60495	66	9	
61	9	60263	61	9	58	9	60505	58	9	
67	9	60269	66	9	59	9	60511	59	9	
55	4 (20.9')	60271	56	5	50	9	60516	50	9	del. trk.
62	9	60280	62	9	50	9	60517	50	9	
73	4	60283	73	4	55	9	60606	55	9	3 axle bus T1
60	9	60285	61	9	55	9	60607	55	9	T2
60	9	60286	60	9	59	9	60676	59	9	
66	9	60291	65	9	60	9	60624	60	9	T1
54	9	60301	54	9	60	9	60724	60	9	T1 T2
55	9	60302	55	9	58	9	60760	58	9	T2
64	9	60329	63	9	64	9	60767	63	9	
69	3	60430	69	3	54	9	60777	56	9	
64	9	60434	64	9	57	9	60782	57	9	
59	9	60437	58	9	55	9	60798	54	9	

Recorded by DJW Direction N Lane 1 Time from 10:21 to 12:25

Sheet 20	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
Speed and Classification Checks * 1 of* 2	* DATE 09/07/2005

Rev. 08/31/2001....

	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
T1	55	9	60950	54	9	60	9	62123	60	9	
T2	55	9	61015	55	9	60	9	62176	62	~~12~~ 9	OK
T1	59	9	61084	59	9	66	10	62193	65	10	
T2	60	9	61144	60	9	49	9	62233	49	9	T1
T1	49	9	61226	49	9	49	9	62282	49	9	T2
T2	50	9	61286	50	9	62	9	62366	62	9	
del. trk.	57	4 23.0	61369	57	5	61	8	62375	61	8	
T1	55	9	61374	54	9	59	9	62378	58	9	
	59	9	61393	59	9	64	9	62382	64	9	
	62	9	61397	61	9	55	9	62384	54	9	T1
	61	8	61406	61	8	64	12	62393	63	12	
	61	9	61408	60	9	56	9	62422	56	9	T2
	67	9	61412	66	9	63	9	62453	62	9	
	62	9	61416	61	9	64	11	62459	64	11	
	65	9	61421	65	9	66	9	62472	65	9	
	71	5 15.9	61424	71	5	60	9	62477	60	9	
	64	6	61427	63	6	60	9	62480	60	9	
T2	55	9	61431	55	9	71	9	62484	71	9	
	62	9	62058	62	9	60	9	62492	60	9	
	64	9	62069	64	9	60	9	62493	60	9	
	69	9	62073	69	9	65	9	62496	65	9	
	61	9	62076	61	9	60	9	62511	60	9	T1
T1	59	9	62080	59	9	63	9	62550	62	9	
	70	9	62107	70	9	60	9	62558	60	9	T2
	59	5 18.3	62116	58	5	58	9	62578	58	9	

Recorded by OJW Direction N Lane 1 Time from 1:52 to 4:50

Sheet 20	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
Speed and Classification Checks * 1 of* 2	* DATE 09/08/2005

Rev. 08/31/2001.... POST VALIDATION

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
64	9	1839	63	9	60	9	2304	60	9	T2
59	9	1849	58	9	61	5 (18.6)	2342	61	5	
62	5 (17.7)	1850	61	5	68	9	2386	67	9	
64	9	1855	64	9	62	9	2397	62	9	
64	9	1858	63	9	68	9	2413	68	9	
59	9	1863	59	9	65	9	2415	64	9	
T1 59	9	1865	59	9	67	9	2419	66	9	
64	9	1900	64	9	58	6	2422	58	6	
58	9	1903	58	9	60	6	2424	60	6	
60	9	1905	60	9	62	9	2453	62	9	
68	9	1907	68	9	62	5	2454	62	5	
60	9	1911	60	9	60	9	2458	60	9	
65	9	1919	64	9	67	4 (21.5, 4.3')	2462	67	6	
64	9	1921	64	9	65	9	2466	65	9	
60	9	1924	59	9	61	9	2476	61	9	
67	9	1929	67	9	58	9	2499	58	9	
59	4	1933	59	5	58	9	2500	58	9	
T2 61	9	1936	60	9	62	3 (13.2)	2504	62	5	dual wheels
65	9	2181	65	9	63	9	2506	63	9	
T2 56	9	2186	56	9	64	9	2509	64	9	
64	9	2223	63	9	62	9	2511	62	9	
60	9	2269	60	9	68	9	2522	67	9	
64	9	2290	64	9	66	9	2527	65	9	
65	9	2291	64	9	68	9	2530	67	9	
62	9	2295	63	9	64	9	2533	63	9	

Recorded by DJW Direction N Lane 1 Time from 9:42 to 11:35

Sheet 20	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
Speed and Classification Checks * 1 of* 2	* DATE 09/08/2005

Rev. 08/31/2001.... POST VALIDATION

	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
	63	9	2554	63	9	62	9	3125	62	9	
	57	9	2555	56	9	64	9	3128	63	9	
	61	9	2556	60	9	50	9	3135	50	9	T2
	60	9	2561	60	9	60	9	3171	60	9	
	59	9	2564	59	9	63	9	3173	62	9	
	59	9	2565	58	9	67	3 (13.3)	3176	67	5	dual wheel
	59	9	2570	59	9	64	5	3177	64	5	
T2	57	9	2571	56	9	64	9	3186	63	9	
	64	9	2610	64	9	59	5	3197	58	5	
T1	58	9	2614	58	9	61	8	3200	61	8	
	64	9	2655	64	9	64	9	3208	63	9	
	68	5 (18.4)	2658	68	5	60	9	3213	60	9	
	62	9	2664	62	9	54	9	3215	54	9	T1
	58	9	2669	57	9	62	9	3232	62	9	
	62	9	2673	61	9	64	4 (21.3)	3237	64	5	
	62	9	2676	62	9	64	9	3238	64	9*	5 dxles
	64	9	2679	63	9	64	9	3255	64	9	
	58	6	2684	58	6	63	9	3260	63	9	
	65	9	2685	65	9	56	9	3269	55	9	T2
	55	9	2689	55	9	64	9	3294	64	9	
T2	61	9	2691	60	9	61	9	3299	61	9	
	71	9	2711	70	9	64	9	3305	64	9	
T1	49	9	3072	49	9	57	9	3311	57	9	
	65	9	3118	65	9	60	9	3317	60	9	
	62	9	3123	62	9	59	9	3319	59	9	

Recorded by DJW Direction N Lane 1 Time from 11:35 to 1:28

50, 55, 60 mph

Sheet 21	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 1 of 5	* DATE 09/07/2005

Rev. 08/31/2001

pre-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
102	51	1	1	10:17:44	60162	50	5.1 / 5.5	6.9 / 8.7	7.0 / 9.4	6.7 / 8.9	7.5 / 8.8		74.7	20.4	4.3	27.6	4.0	
102	51	2	1	10:17:45	60163	52	5.4 / 5.9	7.0 / 6.9	7.0 / 6.8	7.0 / 6.7	6.5 / 6.3		65	12.7	4.3	28.4	4.1	
110	54	1	2	10:39:44	60301	54	4.7 / 5.5	6.5 / 7.9	6.8 / 8.8	6.9 / 7.9	7.2 / 8.2		70.4	20.4	4.3	27.6	4.0	
110	55	2	2	10:39:45	60302	55	4.9 / 5.9	7.0 / 7.4	7.0 / 6.4	6.4 / 6.4	6.9 / 6.3		65.6	12.7	4.3	28.4	4.1	
118	50	1	3	11:22:44	60516	50	4.3 / 5.8	6.3 / 9.4	6.9 / 9.5	6.6 / 8.7	7.5 / 9.3		74.3	20.3	4.3	27.6	4.0	
118	50	2	3	11:22:45	60517	50	5.7 / 5.8	7.0 / 7.1	6.9 / 7.1	7.0 / 6.3	6.3 / 6.7		65.9	12.7	4.3	28.2	4.1	
122	55	1	4	11:44:29	60606	55	4.7 / 4.8	7.2 / 7.9	7.1 / 8.8	7.0 / 8.1	7.4 / 9.3		72.4	20.4	4.3	27.6	4.0	
122	55	2	4	11:44:29	60607	55	5.2 / 5.8	7.0 / 7.5	6.9 / 6.2	6.8 / 6.3	6.7 / 7.2		65.5	12.7	4.3	28.3	4.1	

Recorded by J.C.

Checked by _____

563-940-4059 Tim

Sheet 21	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 2 of 5	* DATE 09/07/2005

Rev. 08/31/2001

pre-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
106	60	1	5	12:10:14	60724	60	4.8 / 6.0	5.4 / 10.8	6.6 / 9.7	6.9 / 8.7	7.6 / 8.9		75.3	20.3	4.4	27.7	4.0	
106	60	2	5	12:10:19	60725	60	4.9 / 6.8	6.9 / 7.5	6.9 / 7.3	7.4 / 6.7	6.5 / 7.5		68.4	12.7	4.3	28.3	4.1	
119	50	1	6	12:31:33	60835	48	4.3 / 5.2	7.6 / 8.5	6.8 / 9.1	6.8 / 9.1	7.5 / 9.6		74.1	20.3	4.4	27.6	4.0	
119	49	2	6	12:31:34	60836	49	5.6 / 5.9	7.2 / 7.1	7.3 / 7.0	7.2 / 6.3	6.9 / 6.8		67.4	17.6	4.3	28.3	4.1	
125	54	1	7	12:53:05	60750	55	4.3 / 5.3	5.8 / 8.3	6.2 / 8.8	6.5 / 8.0	7.3 / 8.5		69.0	20.2	4.4	27.7	4.0	
126	55	2	7	13:02:09	61015	55	5.2 / 5.6	6.9 / 8.2	6.8 / 7.10	6.8 / 8.4	6.1 / 7.0		68.1	17.6	4.3	28.3	4.1	
127	59	1	8	13:14:31	61084	59	4.0 / 6.2	7.9 / 9.5	7.0 / 9.3	6.7 / 8.9	7.6 / 9.6		76.6	20.4	4.4	27.6	4.0	
128	60	2	8	13:22:17	61144	60	4.6 / 6.6	6.9 / 7.6	6.9 / 7.4	7.4 / 6.4	6.5 / 7.8		68.2	17.7	4.3	28.3	4.1	

Recorded by J.C. Checked by

Sheet 21	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 3 of 5	* DATE 09/07/2005

Rev. 08/31/2001

pre-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
128	49	1	9	13:35:20	61226	49	4.4 / 5.7	7.6 / 9.2	7.2 / 9.0	6.5 / 8.8	7.2 / 9.4		75.1	20.2	4.4	27.6	4.0	
129	50	2	9	13:43:24	61286	50	5.2 / 5.7	7.4 / 7.2	7.6 / 6.9	7.5 / 6.6	6.5 / 6.3		66.8	17.6	4.3	28.3	4.1	
128	54	1	10	13:56:03	61374	55	4.6 / 5.6	6.8 / 9.2	6.9 / 8.6	7.0 / 7.8	7.1 / 8.2		71.9	20.4	4.4	22.6	4.0	
123	55	2	10	14:05:09	61481	55	4.7 / 5.3	7.1 / 7.6	7.1 / 7.1	6.7 / 7.9	6.3 / 6.8		66.7	17.6	4.3	28.3	4.1	
116	59	1	11	15:40:11	62085	59	4.6 / 6.1	5.0 / 7.7	6.2 / 9.3	7.0 / 8.6	7.4 / 9.4		71.9	20.3	4.3	27.7	4.0	
116	60	2	11	15:45:42	62123	60	4.3 / 6.5	6.8 / 7.8	6.8 / 7.2	7.5 / 7.9	6.5 / 6.7		68.1	17.6	4.3	28.2	4.1	
104	49	1	12	16:00:50	62233	49	4.4 / 5.0	8.2 / 9.2	7.0 / 9.1	6.2 / 9.1	7.3 / 9.6		74.9	20.2	4.4	27.6	4.0	
102	49	2	12	16:07:01	62282	49	5.6 / 5.9	7.1 / 7.2	7.4 / 6.7	6.9 / 6.7	6.4 / 6.8		66.5	17.7	4.3	28.3	4.1	

Recorded by J.C. Checked by _____

Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	D500
WIM System Test Truck Records 4 of 5	* DATE	09/07/2005

Rev. 08/31/2001

pre-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
103	54	1	13	16:21:26	62384	55	4.3 / 4.7	7.3 / 4.6	6.5 / 4.8	6.7 / 8.0	7.3 / 8.8		71.0	20.4	4.4	27.1	4.0	
113	56	2	13	16:28:10	62422	56	5.0 / 6.2	6.9 / 7.7	6.8 / 7.6	7.0 / 6.9	6.0 / 7.1		67.1	17.6	4.3	28.3	4.1	
112	60	1	14	16:41:44	62511	60	4.7 / 6.4	6.8 / 10.3	6.9 / 9.1	6.8 / 8.7	7.8 / 8.8		76.4	20.4	4.4	27.7	4.0	
109	60	2	14	16:49:45	62558	60	5.2 / 6.8	7.0 / 7.6	6.9 / 7.3	7.1 / 7.8	7.0 / 7.0		69.6	17.7	4.3	28.2	4.1	
100	49	1	15	17:05:40	62659	49	5.1 / 5.3	7.1 / 7.9	7.1 / 9.0	6.4 / 9.0	7.3 / 9.6		73.8	20.4	4.3	27.6	4.0	
100	50	2	15	17:11:09	62722	50	5.8 / 5.6	7.5 / 7.1	7.2 / 6.7	7.2 / 7.3	5.9 / 6.4		66.6	17.6	4.3	28.3	4.1	
103	59	1	16	17:44:57	62962	59	4.8 / 6.1	7.8 / 10.0	6.8 / 9.6	6.9 / 8.8	7.6 / 9.1		77.5	20.3	4.4	27.7	4.0	
101	55	2	16	17:32:51	62869	55	4.6 / 5.6	6.9 / 7.5	6.7 / 6.9	7.1 / 8.2	6.0 / 6.4		66.0	17.6	4.3	28.2	4.1	

Recorded by J.C.

Checked by _____

Sheet 21	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 5 of 5	* DATE 09/07/2005

Rev. 08/31/2001

pre-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
103	61	2	17	17:59:15	63028	61	4.1 / 6.8	7.1 / 7.9	6.8 / 7.2	7.5 / 6.9	6.1 / 5.0		65.4	17.6	4.3	28.3	4.1	
99	49	1	17	18:05:33	63098	49	5.1 / 5.0	8.4 / 8.7	6.6 / 9.0	6.6 / 8.8	7.3 / 9.3		74.8	20.3	4.4	27.6	4.0	
99	49	2	18	18:15:41	63155	49	5.7 / 5.9	7.1 / 6.8	7.2 / 6.9	7.0 / 7.1	7.0 / 6.9		67.5	17.6	4.3	28.3	4.1	
98	54	1	18	18:25:44	63214	54	4.3 / 4.8	6.9 / 9.6	6.5 / 9.1	6.5 / 8.3	7.3 / 8.9		72.3	20.3	4.3	27.6	4.0	
93	55	2	19	18:37:00	63287	55	5.3 / 5.3	7.0 / 7.5	6.9 / 7.3	6.3 / 6.3	6.6 / 7.7		66.3	17.6	4.3	28.2	4.1	
91	59	1	19	18:46:01	63349	59	4.7 / 5.6	5.9 / 7.7	6.5 / 9.7	6.8 / 9.2	7.3 / 9.5		72.9	20.3	4.3	27.6	4.0	
89	61	2	20	18:58:09	63405	62	4.3 / 6.9	7.0 / 7.4	6.8 / 7.5	7.8 / 7.3	6.0 / 7.2		68.0	17.7	4.3	28.3	4.1	
86	47	1	20	19:27:15	63540	47	4.2 / 5.2	8.2 / 10.5	7.2 / 9.0	6.4 / 9.4	7.9 / 8.8		72.0	20.2	4.4	27.5	4.0	

Recorded by J.C.

Checked by _____

Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0500
WIM System Test Truck Records 1 of 5	* DATE	09/08/2005

Rev. 08/31/2001

post validation 40 runs

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
84	50	2	1	08:14:45	1413	50	5.4 / 5.7	7.1 / 6.8	7.0 / 6.9	7.2 / 7.5	6.6 / 6.2		66.5	17.7	4.3	28.2	4.1	
86	54	1	1	08:26:49	1433	54	4.5 / 4.5	7.2 / 8.4	6.4 / 9.3	6.6 / 8.5	7.4 / 8.7		71.4	20.3	4.4	27.5	4.0	
86	55	2	2	08:36:11	1446	55	5.3 / 5.6	2.1 / 7.5	2.1 / 7.2	6.7 / 6.1	6.2 / 6.9		65.7	12.6	4.3	28.2	4.1	
87	59	1	2	08:49:02	1507	59	4.6 / 6.0	5.7 / 7.8	6.9 / 9.1	6.8 / 8.9	7.8 / 9.5		73.4	20.4	4.3	27.7	4.0	
91	61	2	3	08:57:05	1560	61	5.2 / 6.5	7.0 / 7.2	6.9 / 7.5	7.6 / 7.7	6.0 / 6.9		68.5	17.6	4.3	28.3	4.1	
93	49	1	3	09:06:49	1619	49	4.9 / 5.6	6.5 / 8.3	6.9 / 9.0	6.4 / 9.3	7.7 / 9.6		74.3	20.4	4.4	27.6	4.0	
96	50	2	4	09:18:01	1679	50	5.4 / 5.7	7.3 / 6.7	7.3 / 6.7	7.0 / 6.3	6.9 / 6.5		65.8	17.6	4.3	28.2	4.1	
93	54	1	4	08:26:58	1726	54	4.3 / 4.8	6.8 / 7.8	6.4 / 8.6	7.0 / 8.4	7.4 / 8.9		70.3	20.3	4.3	27.6	4.0	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0500
WIM System Test Truck Records 2 of 5	* DATE	09/08/2005

Rev. 08/31/2001

post-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
97	57	2	5	09:38:53	1811	57	4.9 / 5.7	7.1 / 7.5	6.8 / 7.1	7.0 / 7.7	6.3 / 7.0		67.2	17.6	4.3	28.3	4.1	
102	59	1	5	09:46:20	1865	59	4.9 / 6.9	8.5 / 8.1	6.8 / 8.8	6.8 / 9.2	7.7 / 9.6		76.3	20.4	4.4	27.6	4.0	
105	60	2	6	09:59:32	1936	61	4.4 / 6.4	6.9 / 7.3	6.9 / 7.2	7.0 / 6.9	6.7 / 7.1		66.9	17.7	4.3	28.4	4.2	
108	47	1	6	10:08:18	1980	47	5.2 / 5.2	7.7 / 8.6	6.9 / 9.0	6.4 / 9.3	7.6 / 9.1		74.8	20.4	4.4	27.5	4.0	
110	51	2	7	10:19:52	2042	52	5.2 / 5.4	7.2 / 7.0	7.0 / 6.6	7.1 / 6.9	6.8 / 6.2		65.4	17.6	4.3	28.4	4.1	
112	54	1	7	10:27:49	2104	54	4.4 / 4.8	7.6 / 8.0	6.7 / 9.1	6.9 / 8.4	7.3 / 8.6		71.8	20.4	4.4	27.6	4.0	
114	56	2	8	10:40:35	2186	56	5.0 / 5.4	7.0 / 7.5	6.7 / 6.6	7.3 / 6.4	6.4 / 6.4		64.6	17.7	4.3	28.2	4.1	
117	59	1	8	10:47:31	2231	59	4.0 / 5.2	7.0 / 9.6	6.6 / 9.2	6.8 / 9.2	7.5 / 9.7		74.8	20.3	4.4	27.6	4.0	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 3 of 5	* DATE 09/08/2005

Rev. 08/31/2001

post-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
119	60	2	9	11:00:48	2304	60	4.4 / 6.7	7.0 / 7.5	7.1 / 7.3	7.4 / 6.3	6.8 / 7.1		67.6	17.7	4.3	28.3	4.1	
119	48	1	9	11:07:36	2345	49	4.1 / 4.9	7.0 / 7.8	6.7 / 9.1	6.1 / 8.9	7.5 / 9.3		71.2	20.2	4.4	22.6	4.0	
122	50	2	10	11:20:40	2428	50	5.0 / 6.0	7.2 / 7.2	6.9 / 6.9	7.6 / 7.1	6.2 / 5.9		66.1	17.6	4.3	28.4	4.1	
122	54	1	10	11:27:56	2480	55	4.3 / 5.1	5.6 / 8.0	6.7 / 8.9	6.8 / 8.0	7.7 / 8.7		69.7	20.3	4.3	27.6	4.0	
125	56	2	11	11:40:48	2571	57	4.7 / 5.5	7.0 / 7.6	6.8 / 7.2	6.4 / 7.6	6.1 / 7.4		66.2	17.7	4.3	28.3	4.1	
126	58	1	11	11:48:12	2614	58	4.4 / 5.7	8.0 / 9.8	6.9 / 9.5	6.9 / 9.2	7.6 / 9.7		77.8	20.3	4.4	27.6	4.0	
124	61	2	12	12:00:55	2691	61	4.3 / 6.2	7.2 / 7.5	6.9 / 7.5	7.9 / 7.7	6.2 / 7.4		68.8	17.7	4.3	28.4	4.1	
124	49	1	12	12:53:40	3072	49	4.6 / 5.6	7.2 / 9.5	6.7 / 8.6	6.3 / 8.9	7.1 / 9.5		74.0	20.3	4.4	27.6	4.0	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE	17
LTPP Traffic Data	*SPS PROJECT_ID	0500
WIM System Test Truck Records 4 of 5	* DATE	09/08/2005

Rev. 08/31/2001

post-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
102	50	2	13	13:01:27	3135	58	5.8 / 5.4	7.5 / 7.0	7.0 / 6.7	7.0 / 6.3	6.4 / 7.5		66.5	17.7	4.3	28.3	4.1	
128	54	1	13	13:13:34	3215	54	4.3 / 5.3	7.2 / 9.9	6.1 / 9.2	6.9 / 8.1	7.3 / 9.1		73.5	20.3	4.4	27.6	4.0	
128	55	2	14	13:21:46	3269	56	4.8 / 5.1	6.8 / 8.0	6.6 / 7.2	7.5 / 7.4	6.5 / 5.5		65.4	17.6	4.3	28.3	4.1	
130	59	1	14	13:34:45	3363	59	4.6 / 5.6	7.5 / 8.5	6.6 / 9.5	6.6 / 9.3	7.3 / 9.7		75.1	20.4	4.3	27.6	4.0	
129	60	2	15	13:41:45	3419	60	5.2 / 6.7	6.8 / 7.9	7.0 / 7.6	7.7 / 8.2	6.4 / 5.5		69.0	17.7	4.3	28.3	3.9	
122	49	1	15	13:54:16	3496	49	4.2 / 5.0	5.6 / 7.2	6.7 / 9.2	6.4 / 9.1	7.6 / 9.6		70.8	20.3	4.3	27.6	4.0	
116	52	2	16	14:02:25	3521	52	4.9 / 6.3	6.9 / 7.2	7.2 / 6.8	7.9 / 7.7	6.4 / 5.8		67.2	17.6	4.3	28.3	4.1	
115	54	1	16	14:13:52	3649	54	4.4 / 4.7	6.3 / 7.5	6.8 / 8.9	6.9 / 8.2	7.1 / 8.7		69.5	20.3	4.3	27.5	4.1	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE 17
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 5 of 5	* DATE 09/08/2005

Rev. 08/31/2001

post-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
118	56	2	17	14:23:15	3725	55	4.6 / 5.7	6.6 / 7.8	6.6 / 7.2	7.0 / 7.3	6.3 / 7.9		63.8	17.6	4.3	29.2	4.1	
128	58	1	17	14:33:50	3795	58	4.5 / 5.8	5.1 / 10.3	6.5 / 9.2	6.7 / 8.2	7.4 / 9.1		73.6	20.3	4.3	27.7	4.0	
128	61	2	18	14:43:55	3873	60	4.7 / 6.4	6.8 / 8.0	6.9 / 7.5	7.9 / 7.3	6.5 / 5.5		67.4	17.6	4.3	28.4	4.0	
121	49	1	18	14:53:43	3943	49	4.7 / 5.8	7.5 / 8.6	6.9 / 8.6	6.2 / 6.9	7.6 / 9.8		74.6	20.3	4.4	27.6	4.0	
126	50	2	19	15:03:52	4022	50	5.0 / 6.0	7.1 / 7.1	6.9 / 6.9	7.7 / 7.8	6.2 / 5.8		66.6	17.6	4.3	28.3	4.0	
128	54	1	19	15:13:14	4079	54	4.5 / 5.2	6.5 / 8.6	6.3 / 9.0	7.0 / 8.0	7.2 / 8.7		71.0	20.3	4.3	27.6	4.0	
129	55	2	20	15:24:24	4160	55	4.5 / 5.1	6.9 / 6.6	6.7 / 6.6	6.7 / 7.0	6.5 / 5.5		62.0	17.6	4.3	28.1	4.0	
127	59	1	20	15:32:36	4211	59	4.3 / 6.0	7.3 / 9.0	6.7 / 9.0	6.9 / 9.1	7.5 / 9.2		75.0	20.3	4.4	27.6	4.0	

Recorded by _____ Checked by _____

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

STATE: Illinois

SHRP ID: 0600

Photo 1 - Truck_1_Tractor_TO_11_17_2.54_0600_09_07_05.JPG

Photo 2 - Truck_1_Trailer_Load_1_TO_11_17_2.54_0600_09_07_05.JPG

Photo 3 - Truck_1_Trailer_Load_2_TO_11_17_2.54_0600_09_07_05.JPG

Photo 4 - Truck_1_Axle_1_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 5 - Truck_1_Axle_2_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 6 - Truck_1_Axle_3_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 7 - Truck_1_Axle_4_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 8 - Truck_1_Axle_5_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 9 - Truck_1_King_Pin_Offset_TO_11_17_2.54_0600_09_07_05.JPG

Photo 10 - Truck_2_Tractor_TO_11_17_2.54_0600_09_07_05.JPG

Photo 11 - Truck_2_Trailer_1_TO_11_17_2.54_0600_09_07_05.JPG

Photo 12 - Truck_2_Trailer_2_TO_11_17_2.54_0600_09_07_05.JPG

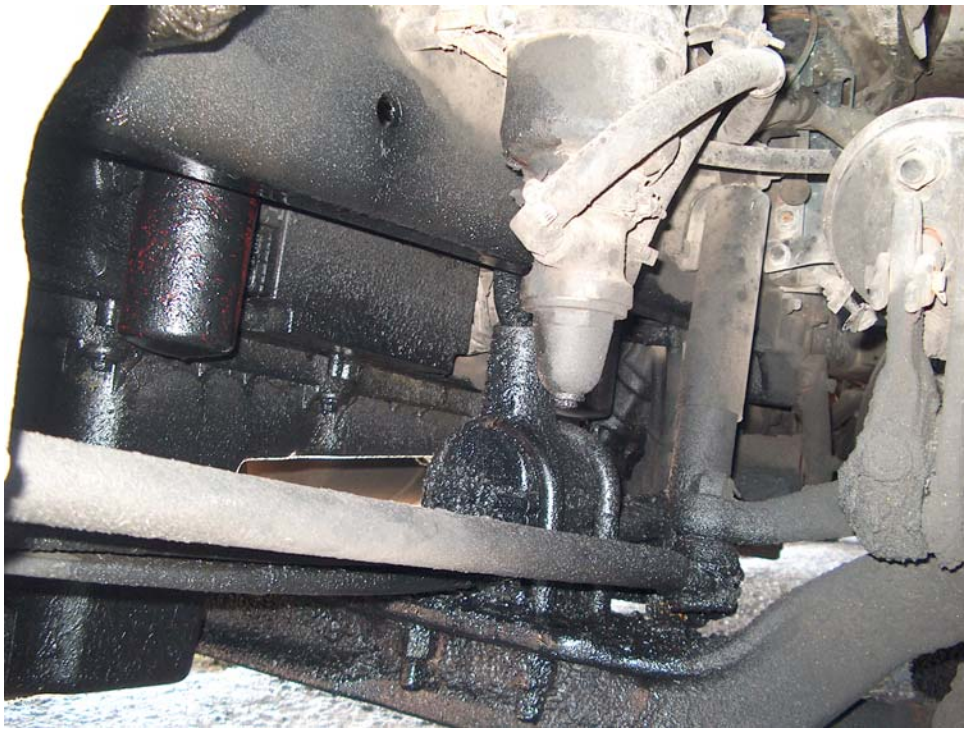

Photo 13 - Truck_2_Axle_1_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 14 - Truck_2_Axle_2_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 15 - Truck_2_Axle_3_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 16 - Truck_2_Axle_4_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 17 - Truck_2_Axle_5_Suspension_TO_11_17_2.54_0600_09_07_05.JPG

Photo 18 - Truck_2_King_Pin_TO_11_17_2.54_0600_09_07_05.JPG