Validation Report

Texas, SPS-1
Task Order 27, CLIN 2
December 9 and 10, 2008

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1 Executive Summary

A visit was made to the Texas 0100 on December 9 and 10, 2008 for the purposes of conducting a validation of the WIM system located on US 281, 9.1 miles north of State Route 186, near Edinburg, Texas. The SPS-1 is located in the righthand, southbound lane of a four-lane divided facility. The posted speed limit at this location is 70 mph. The LTPP lane is one of four lanes instrumented at this site using this controller. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

The site was installed in Febuary 2005 by the agency as a relocation of the site and installation of new sensors and controller. This is the fourth validation visit to this location.

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

The site is instrumented with PAT bending plate and DAW 190 electronics. It is installed in portland cement concrete, 400 feet long. There is additional instrumentation downstream in this lane.

The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 77,960 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 3 tapered steel leaf suspension loaded to 65,180 lbs., the "partial" truck.
3) 5-axle tractor semi-trailerwith a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 78,210 lbs., the "loaded" truck.

The validation speeds ranged from 57 to 70 miles per hour. The pavement temperatures ranged from 54 to 67 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was not achieved for the post validation runs. This site visit is unusual in that nearly a sixty degree temperature range was observed from the very first to the very last validation run undertaken.

Table 1-1 - Post-Validation Results – 480100 – 10-Dec-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-3.1 ± 5.9%	Pass
Tandem axles	±15 percent	1.4 ± 5.3%	Pass
GVW	±10 percent	0.7 ± 2.8%	Pass
Axle spacing	± 0.5 ft [150mm]	-0.1 ± 0.3 ft	Pass

Prepared: ea *Checked: bko*

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. The upper WIM index threshold was exceeded at two locations, none of which had a significant impact on equipment performance.

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

Prepared: ea *Checked: bko*

Upon our arrival at the site, we found the system parameters were not the same as we left them at the conclusion of our last validation on November 7, 2007. This is an agency site which undergoes regular calibration of sensors.

This site needs one more year of data to meet the goal of five years of research quality data assuming a sufficient quantity of data is received in 2008.

2 Corrective Actions Recommended

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

As the classification failures are virtually identical for this location and the site downstream, some review of the definitions of single unit vehicles in the classification algorithm may be warranted.

3 Post Calibration Analysis

This final analysis is based on test runs conducted December 10, 2008 from late morning through early afternoon at test site 480100 on US 281. This SPS-1 site is on the southbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The three trucks used for the validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and air suspension loaded to 77,960 lbs., the “golden” truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 3 tapered steel leaf suspension loaded to 65,180 lbs., the “partial” truck.
3. 5-axle tractor semi-trailerwith a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 78,210 lbs., the “loaded” truck.

Each truck made a total of 14 passes over the WIM scale at speeds ranging from approximately 57 to 70 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 54 to 67 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

Statistics in Table 3-1 indicates that the loading data meets the conditions for research quality data.

Table 3-1 - Post-Validation Results – 480100 – 10-Dec-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	$\pm$20 percent	-3.1 ± 5.9%	Pass
Tandem axles	$\pm$15 percent	1.4 ± 5.3%	Pass
GVW	$\pm$10 percent	0.7 ± 2.8%	Pass
Axle spacing	$\pm$ 0.5 ft [150mm]	-0.1 ± 0.3 ft	Pass

Prepared: ea *Checked: bko*

The test runs were conducted primarily during the late morning to early afternoon hours, resulting in a limited range of pavement temperatures. The runs were conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the data set was split into three speed groups and two temperature groups. The distribution of runs by speed and temperature is illustrated in Figure 3-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs due to the limited temperature range.

The three speed groups were divided as follows: Low speed – 57 to 62 mph, Medium speed – 63 to 67 mph and High speed – 68 + mph. The two temperature groups were created by splitting the runs between those at 54 to 57 degrees Fahrenheit for Low temperature and 58 to 67 degrees Fahrenheit for High temperature.

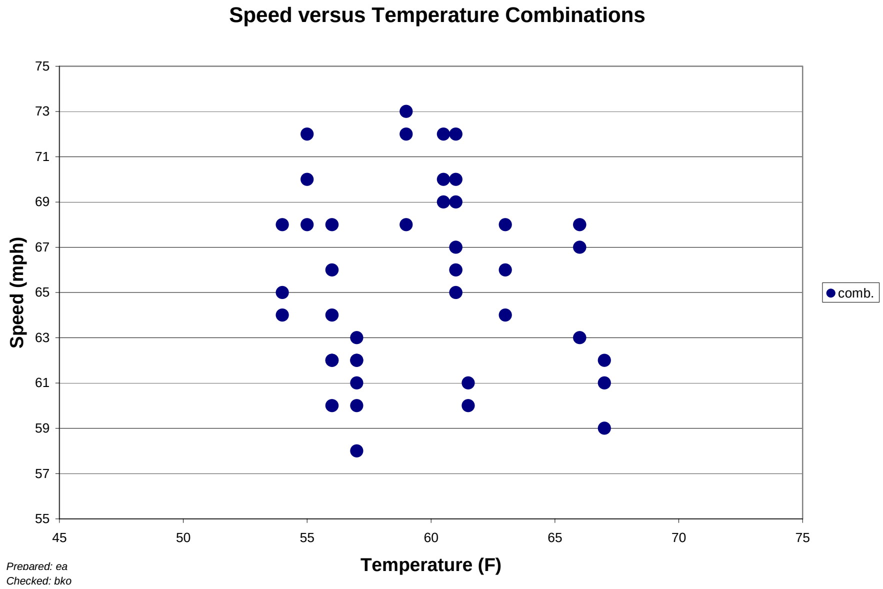

Figure 3-1 - Post-Validation Speed-Temperature Distribution – 480100 – 10-Dec-2008

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

Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. It can be seen from Figure 3-2 that the equipment tends to overestimate GVW errors at all speeds. Variability in error is greater at low and medium speed when compared to high speed. The “large” underestimate is a valid equipment reading.

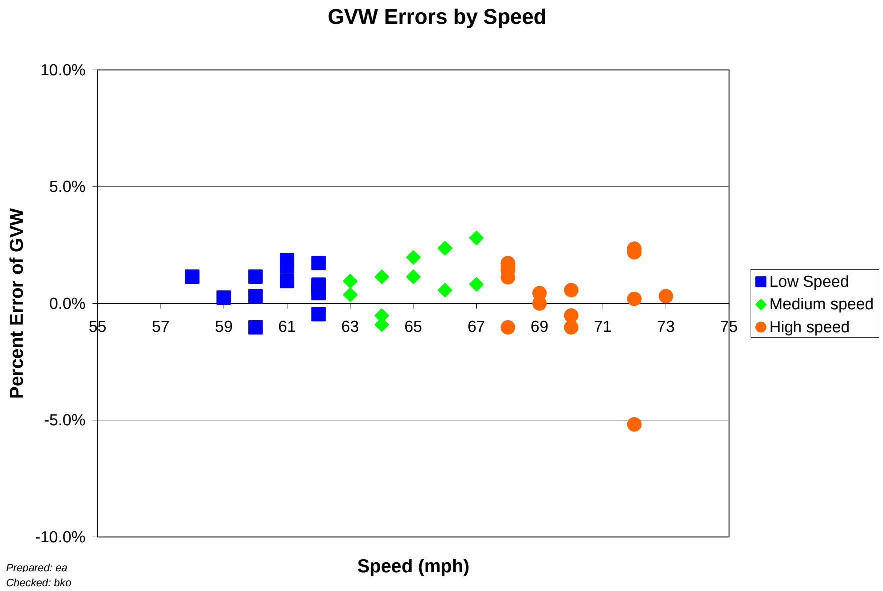

Figure 3-2 - Post-Validation GVW Percent Error vs. Speed – 480100 – 10-Dec-2008

Figure 3-3 shows the relationship between temperature and GVW percentage error. It can be seen from Figure 3-3 that the equipment generally overestimates GVW errors within this temperature range. The "large" underestimate is a valid equipment reading.

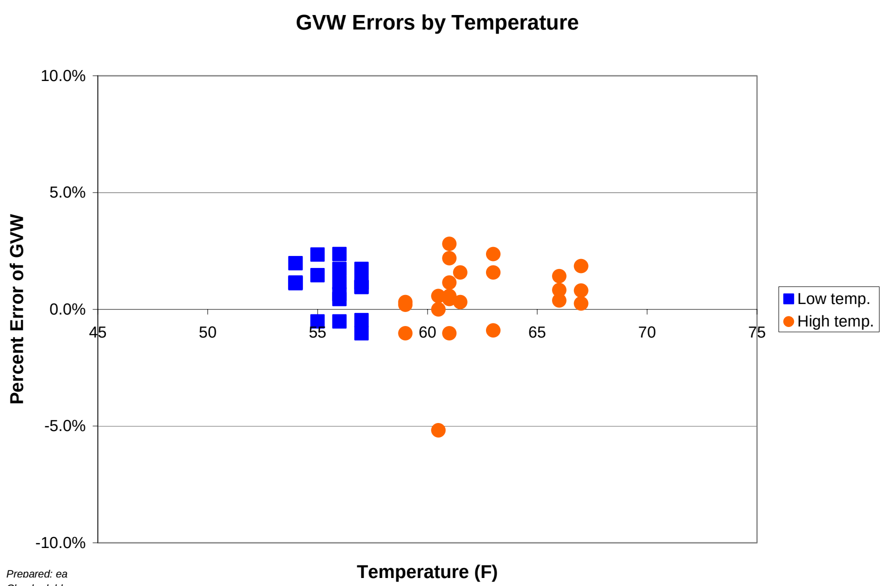

Figure 3-3 - Post-Validation GVW Percent Error vs. Temperature – 480100 – 10-Dec-2008

Figure 3-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. There is no apparent relationship between speed and axle spacing measurements. The wide scatter is of some concern in conjunction with the classification failures.

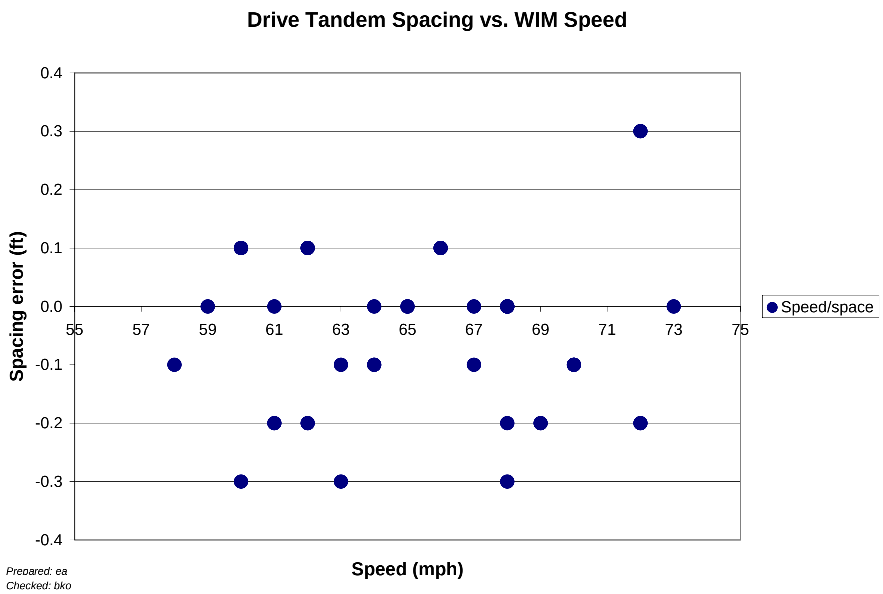

Figure 3-4 - Post-Validation Spacing vs. Speed – 480100 – 10-Dec-2008

3.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 54 to 57 degrees Fahrenheit for Low temperature and 58 to 67 degrees Fahrenheit for High temperature.

Table 3-2 - Post-Validation Results by Temperature Bin – 480100 – 10-Dec-2008

Element	95% Limit	Low Temperature 54 to 57 °F	High Temperature 58 to 67 °F
Steering axles	±20 %	-2.6 ± 6.2%	-3.6 ± 6.0%
Tandem axles	±15 %	1.7 ± 4.6%	1.1 ± 5.9%
GVW	±10 %	0.9 ± 2.1%	0.5 ± 3.3%
Axle spacing	± 0.5 ft	-0.1 ± 0.4 ft	0.0 ± 0.3 ft

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It can be seen from Table 3-2 that the equipment underestimates steering axles at both low and high temperature. GVW and tandem axle weights are overestimated.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. From Figure 3-5 it can be seen that the golden truck (squares) and the partial truck (diamonds) are overestimated throughout the temperature range. The loaded truck (triangles) shows a reasonable estimation of GVW. Variability in error is consistent. The sole underestimate is a valid equipment reading.

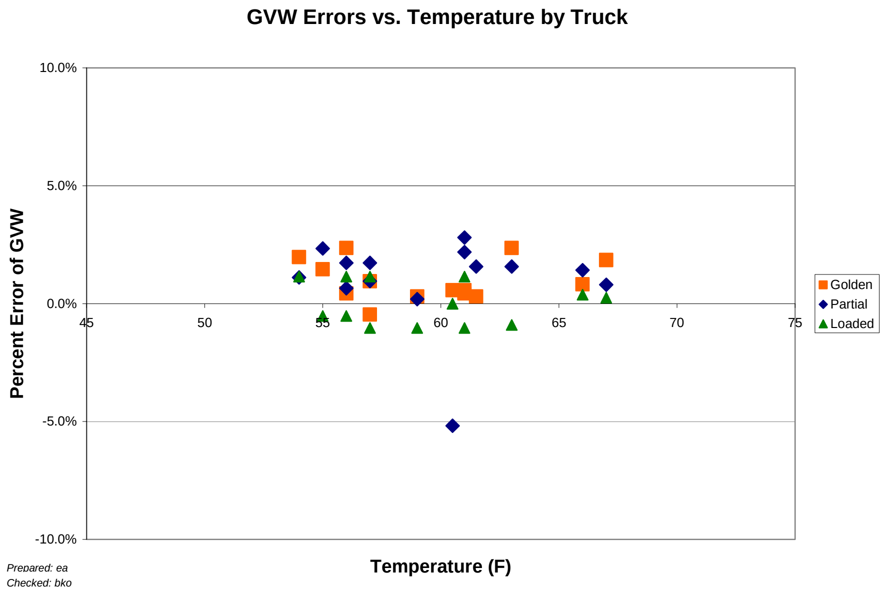

Figure 3-5 - Post-Validation GVW Percent Error vs. Temperature by Truck – 480100 – 10-Dec-2008

Figure 3-6 shows the relation between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. As it can be seen in Figure 3-6, steering axle errors are underestimated at low and high temperature. Variability in error is somewhat greater at low temperature.

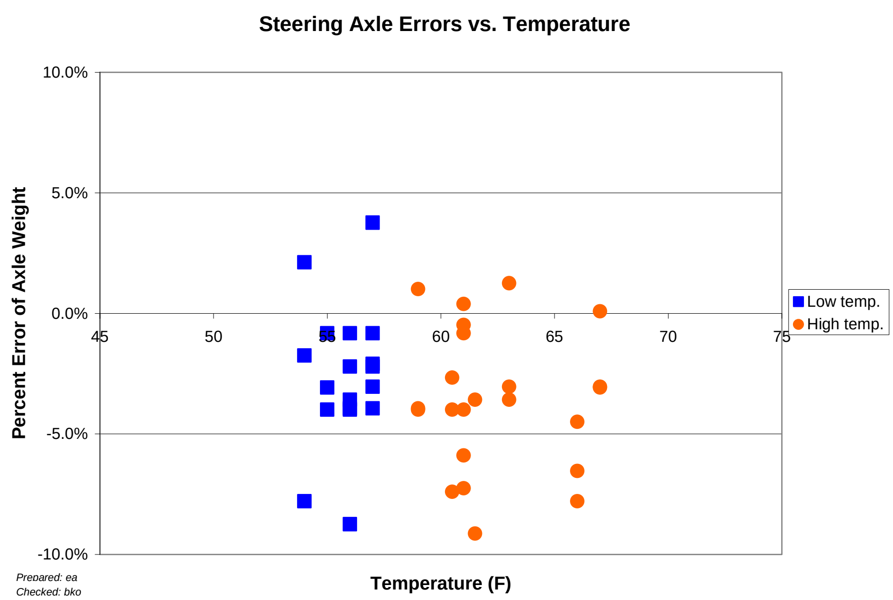

Figure 3-6 - Post-Validation Steering Axle Error vs. Temperature by Group – 480100 – 10-Dec-2008

3.2 Speed-based Analysis

The three speed groups were created using 57 to 62 mph for Low speed, 63 to 67 mph for Medium speed and 68+ mph for High speed.

Table 3-3 - Post-Validation Results by Speed Bin – 480100 – 10-Dec-2008

Element	95% Limit	Low Speed 57 to 62 mph	Medium Speed 63 to 67 mph	High Speed 68+ mph
Steering axles	±20 %	-2.8 ± 7.4%	-4.1 ± 5.5%	-2.7 ± 6.0%
Tandem axles	±15 %	1.4 ± 3.7%	2.0 ± 4.1%	0.9 ± 7.1%
GVW	±10 %	0.7 ± 1.8%	1.1 ± 2.5%	0.3 ± 3.9%
Axle spacing	± 0.5 ft	-0.1 ± 0.3 ft	0.0 ± 0.3 ft	-0.1 ± 0.4 ft

Prepared: ea *Checked: bko*

From Table 3-3 that the equipment underestimates steering axles at all speeds. GVW and tandem axle weights are overestimated at all speeds. Variability in error is highest for tandems and GVW at the high speed.

From Figure 3-7 it can be seen that the golden truck (squares) and the partial truck (diamonds) are overestimated throughout the speed range. The loaded truck (triangles) shows a reasonable estimate of GVW throughout the range. Variability in error is consistent. The sole underestimate is a valid equipment reading.

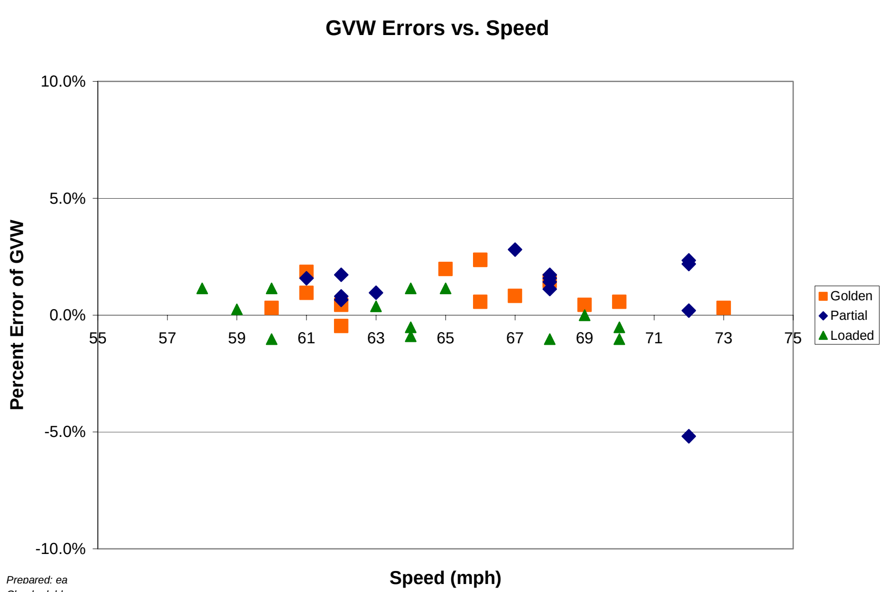

Figure 3-7 - Post-Validation GVW Percent Error vs. Speed by Truck – 480100 – 10-Dec-2008

Figure 3-8 shows the relationship between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. As it can be seen in Figure 3-8, steering axle errors are underestimated throughout the speed range. Variability in error is somewhat greater at low speed when compared to medium and high speed.

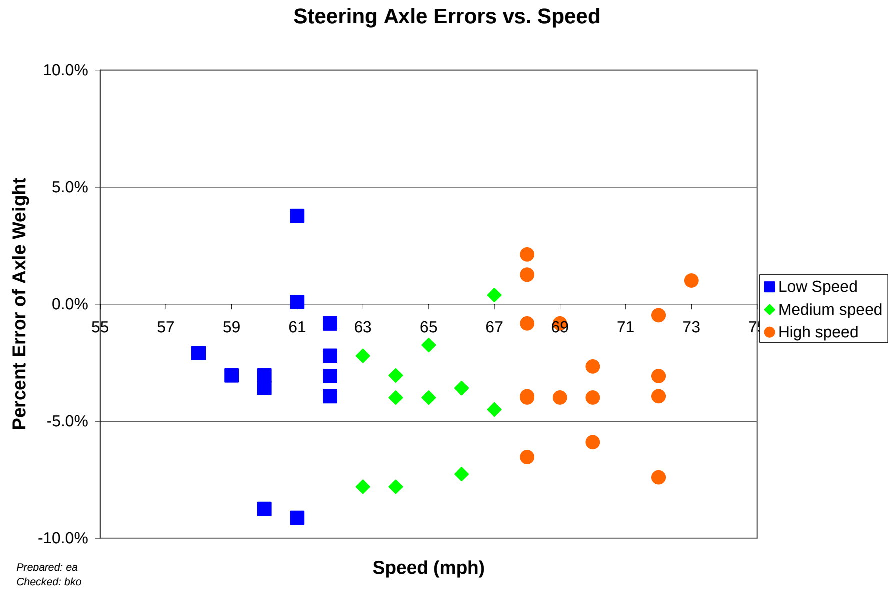

Figure 3-8 - Post-Validation Steering Axle Percent Error vs. Speed by Group – 480100 – 10-Dec-2008

3.3 Classification Validation

The agency uses the FHWA 13 class scheme at this site. Classification 15 has been added to define unclassified vehicles. A copy of the algorithm used has not yet been provided.

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 the sample it was determined that there are zero percent unknown vehicles and four percent unclassified vehicles. The unclassified vehicles are typically Class 8s although one Class 5 was also included in the unclassified sample.

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 11.3 percent. The size of the misclassification rate is a reflection of the relatively large number misclassified in the observed sample. The large by class misclassification reflect the relative small sample sizes for the individual vehicle classes.

Table 3-4 - Truck Misclassification Percentages for 480100 – 10-Dec-2008

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	67	5	17	6	20
7	N/A				
8	75	9	0	10	0
11	N/A	12	N/A	13	0

Prepared: ea *Checked: bko*

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

Table 3-5 - Truck Classification Mean Differences for 480100 – 10-Dec-2008

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	200	5	- 17	6	- 20
7	N/A				
8	- 75	9	0	10	0
11	N/A	12	N/A	13	0

Prepared: ea *Checked: bko*

These error rates are normalized to represent how many vehicles of the class are expected to be over or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual “hundred observed”. Classes marked Unknown (UNK) are those identified by the equipment but no vehicles of the type were seen by the observer. There is no way to tell how many vehicles of that type might actually exist. N/A means no vehicles of the class were recorded by either the equipment or the observer. There would appear to be difficulty in differentiating between single unit vehicles. There was only one Class 4 but the WIM equipment identified three. There were twelve Class 5s only ten of which were picked up by the WIM equipment and of five observed Class 6s only four were identified by the equipment. The large mean differences are a reflection of the small number of vehicles other than Class 9s in the observed sample.

A limited investigation of the precision and bias of the speeds reported by the equipment was undertaken. The values were not within the expected tolerances. The classification data did not met research quality standards. Whether the source of the classification errors is in the algorithm or error in speed measurement cannot be determined from the available information. .

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

Prepared: ea Checked: bko

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.

For this Texas SPS-1 WIM site, the WIM scale is comprised of two staggered bending plates. The leading plate is installed on the right half of the lane and the trailing plate is installed on the left half. The distance between these two plates is about 4.8 meters (16 feet). As the midpoint of these two bending plates is 274.5 meters from the beginning of the test section, the leading and trailing plates are located at 272.1 and 276.9 meters, respectively, from the starting point of the profiling.

Profile data collected at the SPS WIM location by Fugro South on May 12, 2008 were processed through the LTPP SPS WIM Index software, version 1.1. This WIM scale is installed on 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 Regional Support Contractor has completed 5 passes at the center of the lane, 3 passes shifted to the left side of the lane, and 3 passes shifted to the right side of the lane. Shifts to the sides of the lanes were made such that data were collected as close to the lane edges as was safely possible. For each profiler pass, profiles were recorded under the left wheel path (LWP) and the right wheel path (RWP).

The SPS WIM Index software, version 1.0 was developed with four different indices: LRI, SRI, Peak LRI and Peak SRI. The LRI incorporates the pavement profile starting

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

Table 4-1 - Thresholds for WIM Index Values

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

Prepared: als Checked: jrn

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 while values below the lower index limits are presented in italics.

Table 4-2 - WIM Index Values – 480100 – 12-May-2008

Profiler Passes			Pass 1	Pass 2	Pass 3	Pass 4	Pass 5	Ave.
Center	LWP	LRI (m/km)	0.755	0.860	0.819	0.782	0.737	0.791
		SRI (m/km)	1.057	0.824	0.743	1.071	0.816	0.902
		Peak LRI (m/km)	0.850	0.861	0.864	0.861	1.000	0.887
		Peak SRI (m/km)	1.074	1.153	1.093	1.175	0.887	1.076
	RWP	LRI (m/km)	0.920	0.920	0.980	1.057	1.219	1.019
		SRI (m/km)	1.010	1.055	1.027	1.333	1.238	1.133
		Peak LRI (m/km)	0.964	0.924	0.980	1.062	1.224	1.031
		Peak SRI (m/km)	1.268	1.129	1.097	1.382	**2.926**	1.560
Left Shift	LWP	LRI (m/km)	0.876	0.889	0.889			0.885
		SRI (m/km)	1.028	0.791	0.996			0.938
		Peak LRI (m/km)	0.876	0.896	0.899			0.890
		Peak SRI (m/km)	1.129	0.956	0.996			1.027
	RWP	LRI (m/km)	0.927	0.795	0.888			0.870
		SRI (m/km)	1.057	1.080	1.146			1.094
		Peak LRI (m/km)	0.980	0.890	0.996			0.955
		Peak SRI (m/km)	1.099	1.179	1.348			1.209
Right Shift	LWP	LRI (m/km)	0.959	0.945	1.131			1.012
		SRI (m/km)	0.705	1.252	1.528			1.162
		Peak LRI (m/km)	1.034	0.989	1.146			1.056
		Peak SRI (m/km)	0.834	1.567	1.598			1.333
	RWP	LRI (m/km)	0.972	1.190	1.331			1.164
		SRI (m/km)	0.836	**2.103**	1.455			1.465
		Peak LRI (m/km)	1.015	1.206	1.331			1.184
		Peak SRI (m/km)	1.015	2.222	1.527			1.588

Prepared: als Reviewed: jrn

Table 4-2 illustrates that two of the values are above the upper threshold values. Given that the equipment was successfully validated, the roughness present at the site does not appear to be interfering with data collection and calibration of the WIM equipment.

Table 4-3 shows the computed index values for the prior profile data available. All of the values computed for the prior visit were between the upper and lower threshold values. In general, these values are comparable to those calculated from the data collected in May 2008.

Table 4-3 - WIM Index Values – 480100 – 27-May-2005

Profiler Passes			Pass 1	Pass 2	Pass 3	Pass 4	Pass 5	Ave.
Center	LWP	LRI (m/km)	0.860	0.913	0.917	0.870	0.960	0.904
		SRI (m/km)	0.799	0.712	0.775	0.686	0.901	0.775
		Peak LRI (m/km)	0.899	0.961	1.052	0.964	0.989	0.973
		Peak SRI (m/km)	0.926	0.927	1.004	0.918	1.066	0.968
	RWP	LRI (m/km)	1.124	1.076	1.132	0.785	1.106	1.045
		SRI (m/km)	1.180	1.355	1.982	0.683	0.967	1.233
		Peak LRI (m/km)	1.150	1.078	1.142	1.054	1.196	1.124
		Peak SRI (m/km)	1.283	1.474	2.136	0.782	1.026	1.340
Left Shift	LWP	LRI (m/km)	1.029	0.827	1.013			0.956
		SRI (m/km)	1.166	0.963	1.088			1.072
		Peak LRI (m/km)	1.089	0.867	1.021			0.992
		Peak SRI (m/km)	1.366	1.091	1.088			1.182
	RWP	LRI (m/km)	1.103	1.221	1.181			1.168
		SRI (m/km)	1.133	1.220	1.416			1.256
		Peak LRI (m/km)	1.202	1.306	1.224			1.244
		Peak SRI (m/km)	1.420	1.483	1.519			1.474
Right Shift	LWP	LRI (m/km)	1.087	0.874	1.092			1.018
		SRI (m/km)	1.012	0.850	1.013			0.958
		Peak LRI (m/km)	1.313	0.913	1.277			1.168
		Peak SRI (m/km)	1.033	0.894	1.143			1.023
	RWP	LRI (m/km)	1.191	0.925	1.249			1.122
		SRI (m/km)	1.342	1.363	1.457			1.387
		Peak LRI (m/km)	1.279	1.026	1.290			1.198
		Peak SRI (m/km)	1.342	1.374	1.479			1.398

Prepared: ea *Checked: bko*

4.2 Distress Survey and Any Applicable Photos

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

4.3 Vehicle-pavement Interaction Discussion

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

5 Equipment Discussion

The traffic monitoring equipment at this location includes PAT bending plate sensors and DAW 190 electronics. The sensors are installed in a portland cement concrete pavement about 400 ft in length. The roadway outside this short section is asphalt.

There were no changes in basic equipment operating condition since the validation on November 7, 2007.

5.1 Pre-Evaluation Diagnostics

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

5.2 Calibration Process

Upon our arrival at the site, we found the system parameters were not the same as we left them at the conclusion of our last validation on November 7, 2007. This is an agency site which undergoes regular evaluation of sensors.

The equipment required no iterations of the calibration process between the initial 40 runs and the final 40 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 5-1 has the information for TRF_CALIBRATION_AVC for Sheet 16s submitted prior to this validation as well as the information for the current visit. The Sheet 16s available reflect only this contractor's validation visits.

Table 5-1 - Classification Validation History – 480100 – 10-Dec-2008

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
12/10/2008	Manual	0	-75	CL 5: -17		4.0
12/9/2008	Manual	1	-67	CL 5: -8		2.0
11/7/2007	Manual	-1	0			2.8
11/6/2007	Manual	0	-20			1.9
5/10/2006	Manual	3				2.0
5/09/2006	Manual	3				2.0
4/27/2005	Manual	0		CL 5: -13		0
4/26/2005	Manual	-5				0

Prepared: ea Checked: bko

Table 5-2 has the information for TRF_CALIBRATION_WIM for Sheet 16s submitted prior to this validation as well as the information for the current visit. The Sheet 16s available reflect only this contractor's validation visits.

Table 5-2 - Weight Validation History – 480100 – 10-Dec-2008

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
12/10/2008	Test Trucks	0.2% (1.4)	-2.7% (3.5)	0.6% (2.5)
12/09/2008	Test Trucks	0.7% (1.4)	-3.1% (2.9)	1.4% (2.7)
11/7/2007	Test Trucks	1.3% (1.8)	-1.2% (3.1)	1.8% (2.8)
11/6/2007	Test Trucks	1.0% (1.6)	-1.5% (3.1)	1.5% (2.8)
5/10/2006	Test Trucks	-0.5% (1.8)	-2.6% (2.8)	-0.1% (4.4)
5/09/2006	Test Trucks	0.5% (2.4)	-2.4% (2.2)	1.2% (6.1)
4/27/2005	Test Trucks	1.4% (1.3)	-4.9% (3.1)	1.8% (3.3)
4/26/2005	Test Trucks	0.5% (2.0)	-2.5% (2.5)	0.5% (3.4)

Prepared: ea Checked: bko

5.4 Projected Maintenance/Replacement Requirements

This site is maintained according to agency guidelines. No items were identified for maintenance to the agency staff on site.

6 Pre-Validation Analysis

Upon our arrival at the site, we found the system parameters were not the same as we left them at the conclusion of our last validation on November 7, 2007. This is an agency site which undergoes regular evaluation of sensors.

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

Table 6-1 - Calibration Factor Change – 480100 – since 07-Nov-2007

	Date	
	09-Dec-2008	07-Nov-2007
Cf 1	965	985
Cf 2	975	985
Cf 3	995	1015

Prepared: ea Checked: bko

This Pre-Validation analysis is based on test runs conducted December 09, 2008 during the late morning and afternoon at test site 480100 on US 281. This SPS-1 site is on the southbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The three trucks used for initial validation included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and an air suspension loaded to 78,140 lbs., the “golden” truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 3 full steel leaf suspension loaded to 62,590 lbs., the “partial” truck.

3. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 77,970 lbs., "loaded" truck.

For the initial validation each truck made a total of 15 passes over the WIM scale at speeds ranging from approximately 57 to 69 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 47 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 6-2.

As shown by Table 6-2 this site passed the weight and spacing precision requirements for research quality data.

Table 6-2 - Pre-Validation Results – 480100 – 09-Dec-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-2.7 ± 7.0%	Pass
Tandem axles	±15 percent	0.6 ± 5.0%	Pass
GVW	±10 percent	0.2 ± 2.8%	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.4 ft	Pass

Prepared: ea *Checked: bko*

The test runs were conducted primarily from late morning to late afternoon hours with final runs conducted in the early morning of the following day, resulting in a reasonable range of pavement temperatures. The runs were conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed groups and two temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The figure indicates that the desired distribution of speed and temperature combinations was achieved for this set of validation runs.

The three speed groups were divided into 57 to 62 mph for Low speed, 63 to 67 mph for Medium speed and 68+ mph for High speed. The two temperature groups were created by splitting the runs between those at 47 to 75 degrees Fahrenheit for Low temperature and 76 to 103 degrees Fahrenheit for High temperature.

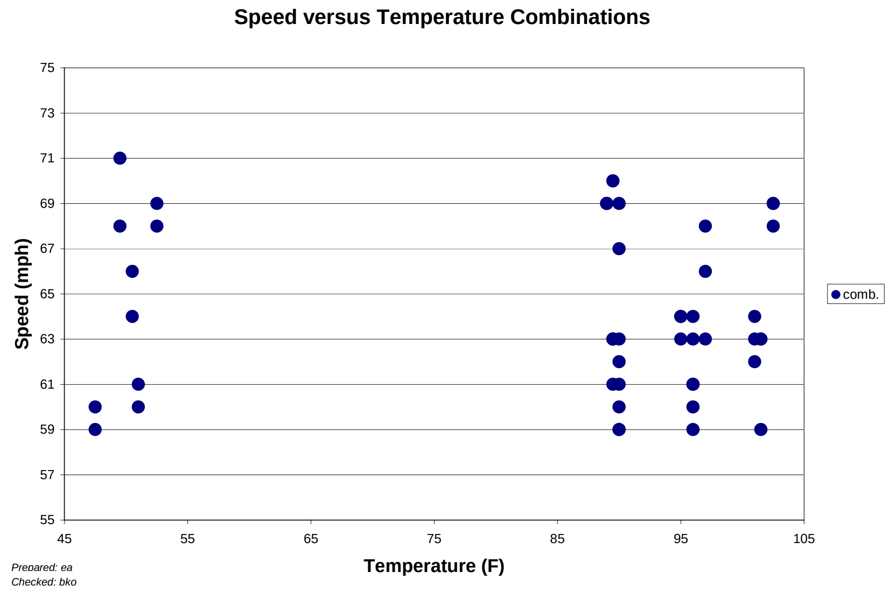

Figure 6-1 - Pre-Validation Speed-Temperature Distribution – 480100 – 09-Dec-2008

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

Figure 6-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. It can be seen in Figure 6-2 that the equipment estimates GVW errors with reasonable accuracy. Variability in error is greater at high speed.

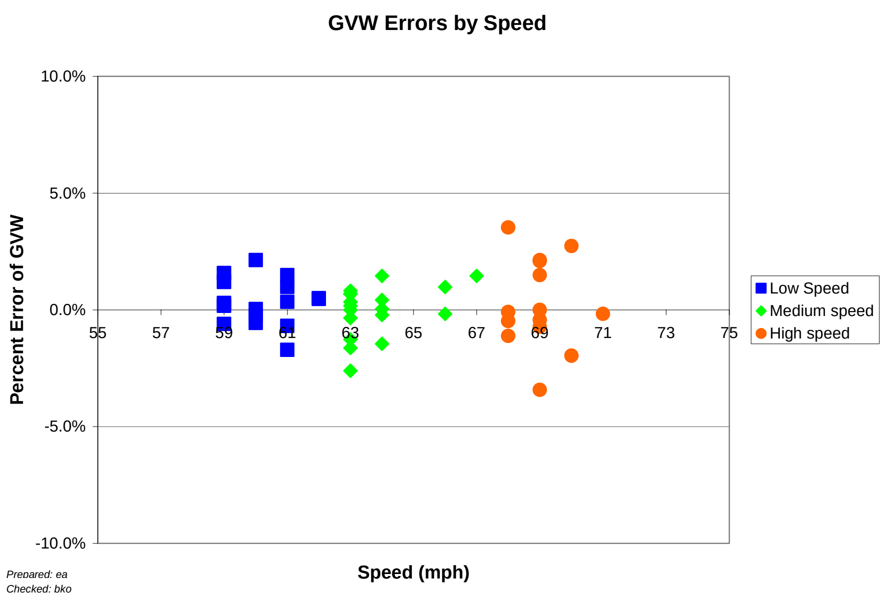

Figure 6-2 - Pre-Validation GVW Percent Error vs. Speed – 480100 – 09-Dec-2008

Figure 6-3 shows the relationship between temperature and GVW percentage error. Figure 6-3 shows that GVW errors are estimated with reasonable accuracy at low and high temperature. Variability in error is greater at high temperature. This may be a result of more runs and use of three rather than two trucks. Only two of the original truck configurations were available to complete the run set on the morning of the second day.

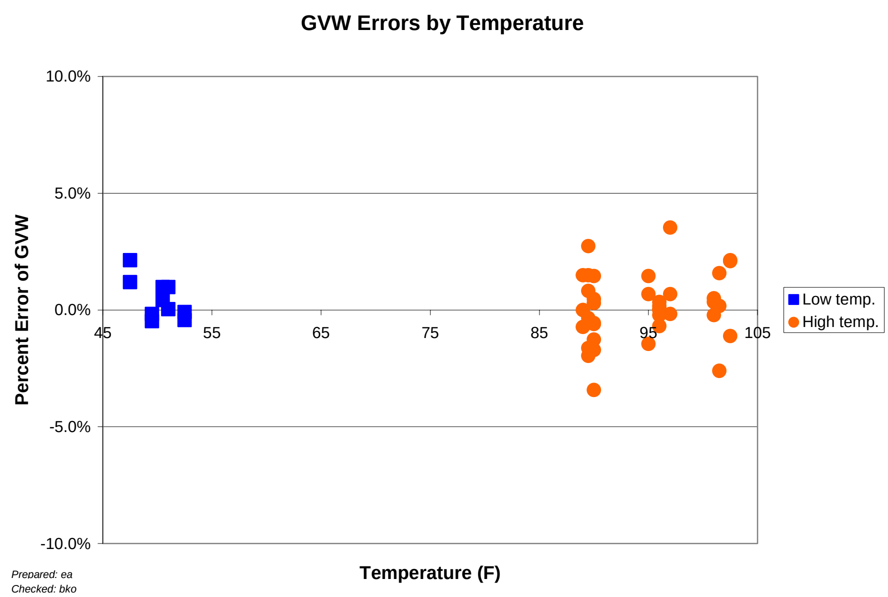

Figure 6-3 - Pre-Validation GVW Percent Error vs. Temperature – 480100 – 09-Dec-2008

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

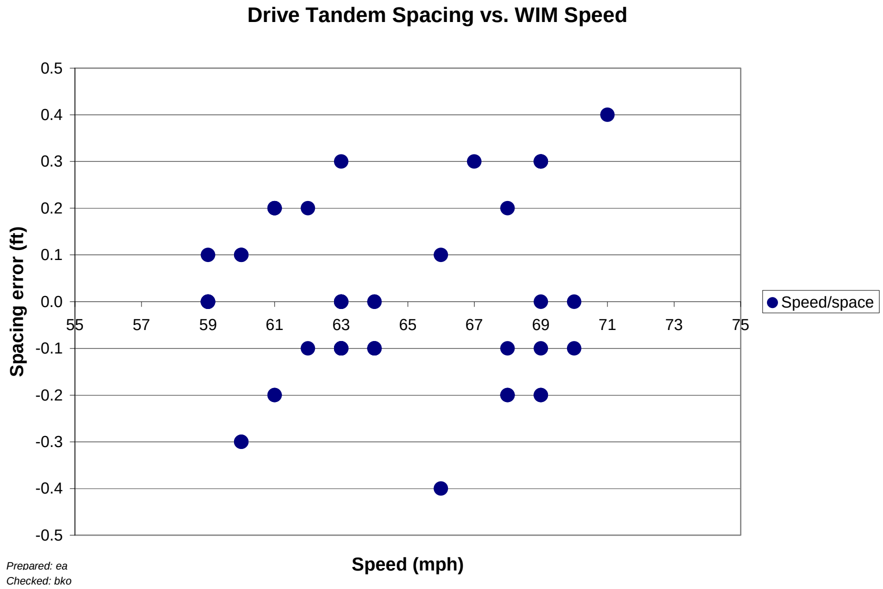

Figure 6-4 - Pre-Validation Spacing vs. Speed - 480100 – 09-Dec-2008

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 47 to 75 degrees Fahrenheit for Low temperature and 76 to 103 degrees Fahrenheit for High temperature.

Table 6-3 - Pre-Validation Results by Temperature Bin – 480100 – 09-Dec-2008

Element	95% Limit	Low Temperature 47 to 75 °F	High Temperature 76 to 103 °F
Steering axles	±20 %	-2.3 ± 6.9%	-2.8 ± 7.3%
Tandem axles	±15 %	0.7 ± 3.8%	0.6 ± 5.4%
GVW	±10 %	0.5 ± 1.9%	0.1 ± 3.0%
Axle spacing	± 0.5 ft	-0.1 ± 0.6 ft	0.0 ± 0.3 ft

Prepared: ea *Checked: bko*

From Table 6-3 it is shown that the equipment underestimates steering axles at both low and high temperature. **It should be noted that there is an axle spacing failure condition for the low temperature runs.**

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. Figure 6-5 shows that the golden truck (squares) and the loaded truck (triangles) are estimated with reasonable accuracy. The partial truck (diamonds) tends to be overestimated at high temperature. Variability in error is greater at high temperature. This may be more closely related to the third truck than to temperature itself.

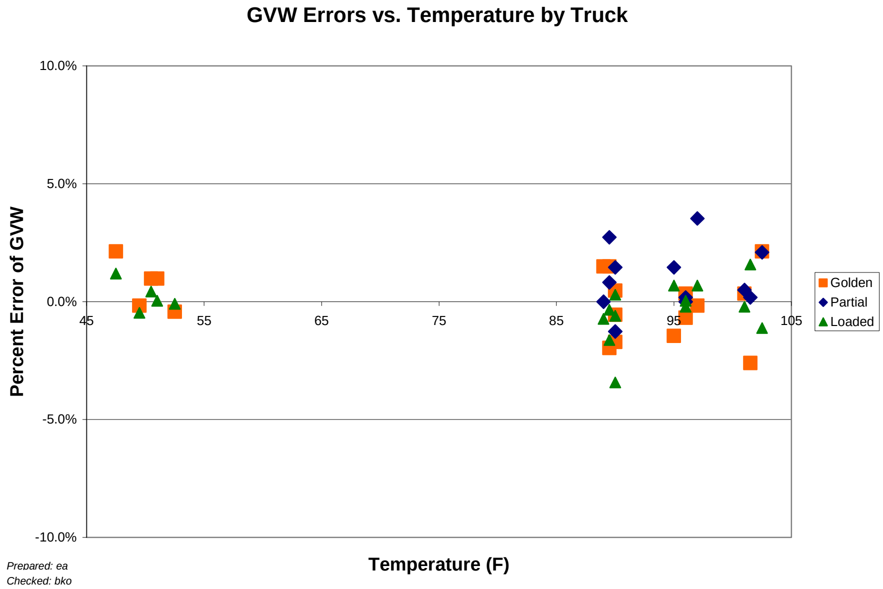

Figure 6-5 - Pre-Validation GVW Percent Error vs. Temperature by Truck – 480100 – 09-Dec-2008

Figure 6-6 shows the relation between steering axle errors and temperature. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. It can be seen in Figure 6-6 that steering axle errors are generally underestimated at low and high temperature. Variability in error is somewhat greater at high temperature when compared to low temperature.

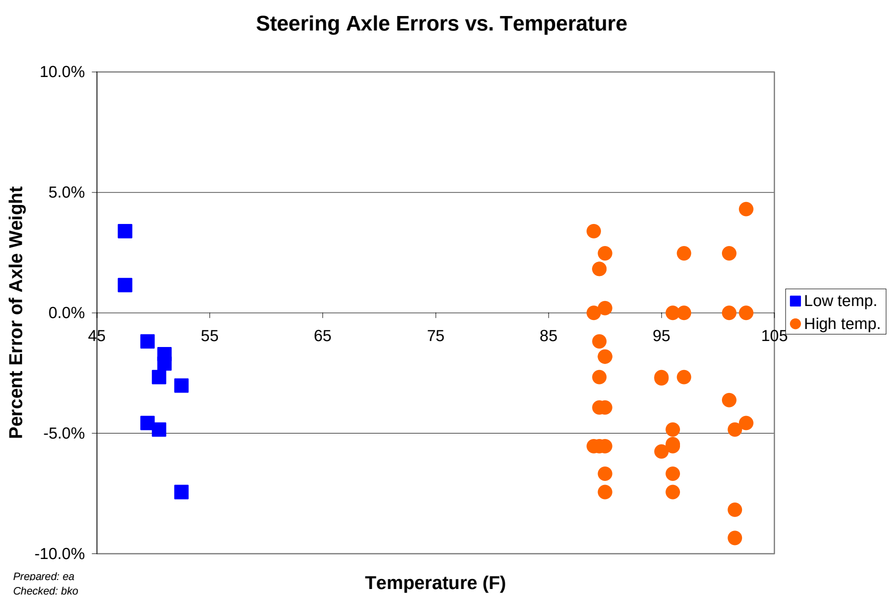

Figure 6-6 - Pre-Validation Steering Axle Error vs. Temperature by Group – 480100 – 09-Dec-2008

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 57 to 62 mph, Medium speed – 63 to 67 mph and High speed – 68+ mph.

Table 6-4 - Pre-Validation Results by Speed Bin – 480100 – 09-Dec-2008

Element	95% Limit	Low Speed 57 to 62 mph	Medium Speed 63 to 67 mph	High Speed 68+ mph
Steering axles	+20 %	-3.5 ± 7.9%	-3.0 ± 6.6%	-1.4 ± 7.7%
Tandem axles	+15 %	1.1 ± 4.0%	0.4 ± 4.3%	0.4 ± 7.3%
GVW	+10 %	0.3 ± 2.1%	0.0 ± 2.4%	0.3 ± 4.4%
Axle spacing	+ 0.5 ft	0.0 ± 0.4 ft	0.0 ± 0.3 ft	0.0 ± 0.5 ft

Prepared: ea *Checked: bko*

Table 6-4 shows that steering axles are underestimated at all speeds.

Figure 6-7 shows the tendency of the equipment to estimate GVW errors with reasonable accuracy. Variability is greater at the upper end of the speed range.

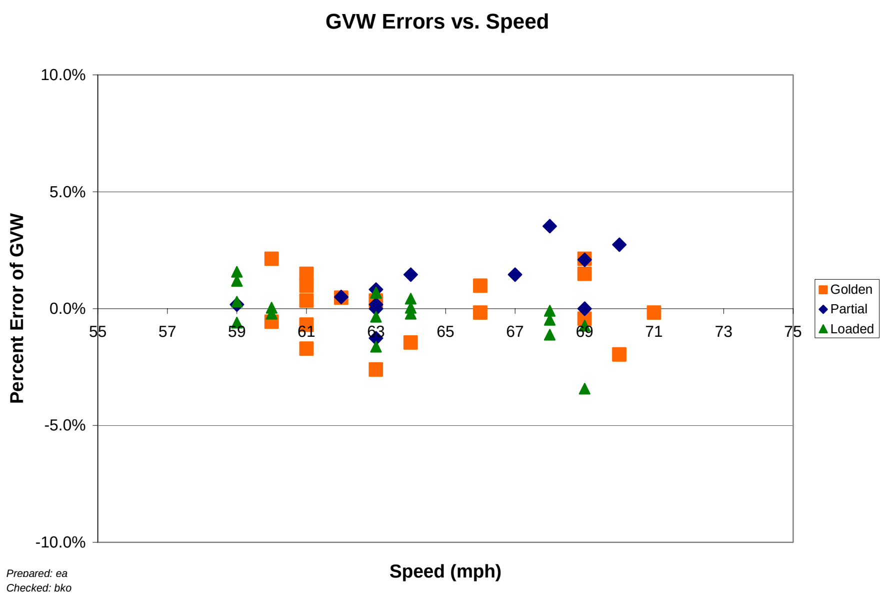

Figure 6-7 - Pre-Validation GVW Percent Error vs. Speed Group - 480100 –09-Dec-2008

Figure 6-8 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. It can be seen in Figure 6-8 steering axle errors are generally underestimated with an upward trend from low to high speed.

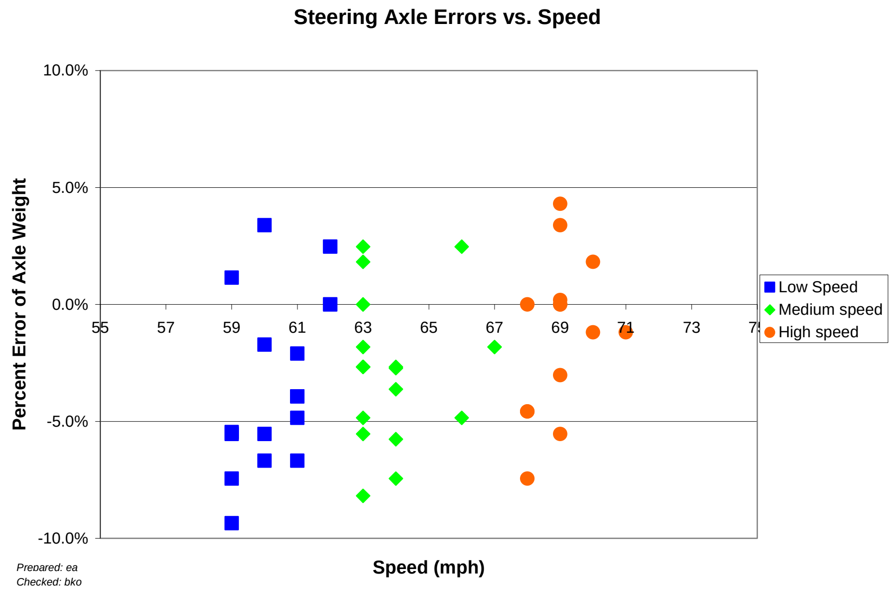

Figure 6-8 - Pre-Validation Steering Axle Percent Error vs. Speed Group - 480100 – 09-Dec-2008

6.3 Classification Validation

The agency uses the FHWA 13 class scheme at this site. Classification 15 has been added to define unclassified vehicles. A copy of the algorithm used has not yet been provided.

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 the sample it was determined that there are zero percent unknown vehicles and two percent unclassified vehicles. The unclassified vehicles are typically Class 8s.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 6-5 has the classification error rates by class. The overall misclassification rate is 8.7 percent. The large misclassification rates for Classes 4 and 8 are related to the small number in the sample.

Table 6-5 - Truck Misclassification Percentages for 480100 – 09-Dec-2008

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	100	5	15	6	0
7	N/A				
8	100	9	1	10	0
11	0	12	0	13	N/A

Prepared: ea *Checked: bko*

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

Table 6-6 - Truck Classification Mean Differences for 480100 – 09-Dec-2008

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	0	5	- 8	6	0
7	N/A				
8	- 67	9	1	10	0
11	0	12	0	13	N/A

Prepared: ea Checked: bko

These error rates are normalized to represent how many vehicles of the class are expected to be over or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual “hundred observed”. Classes marked Unknown (UNK) are those identified by the equipment but no vehicles of the type were seen the observer. There is no way to tell how many vehicles of that type might actually exist. N/A means no vehicles of the class were recorded by either the equipment or the observer. The large difference for Class 8 vehicles comes from a sample population of three observed and one classified as a Class 9 by the equipment.

A limited investigation of the precision and bias of the speeds reported by the equipment was undertaken. The values were not within the expected tolerances. The existing information is insufficient to determine if the algorithm and or the speed measurement errors are contributing to the misclassification and or percentage of unknowns.

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

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

Prepared: ea Checked: bko

6.5 Prior Validations

The last validation for this site was completed on November 7, 2007. It was the third 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 three trucks. The “Golden” truck was loaded to 75,950 lbs. The “partial” truck which had air suspension on the tractor and a 3 taper steel leaf suspension on the trailer tandem was loaded to 68,860 lbs. The “Golden 2” truck which had air suspension on both tandems was loaded to 77,920 lbs.

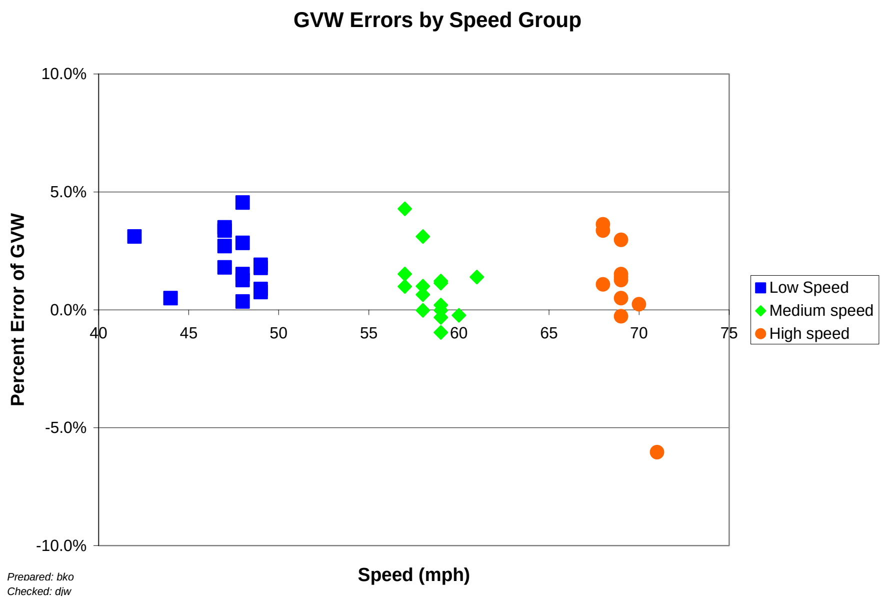

Figure 6-9 - Last Validation GVW Percent Error vs. Speed – 480100 – 07-Nov-2007

Table 6-8 shows the overall results from the last validation. The interim agency evaluations do not allow a comparison between this contractor’s validations.

Table 6-8 - Last Validation Final Results – 480100 – 07-Nov-2007

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.2 ± 6.2%	Pass
Tandem axles	±15 percent	1.8 ± 5.6%	Pass
Gross vehicle weights	±10 percent	1.3 ± 3.6%	Pass
Axle spacing	± 0.5 ft [150 mm]	-0.1 ± 0.3 ft	Pass

Prepared: ea *Checked: bko*

Table 6-9 has the results at the end of the last validation by temperature. Through this validation the equipment has been observed at temperature from 47 to 142 degrees Fahrenheit.

Table 6-9 - Last Validation Results by Temperature Bin – 480100 – 07-Nov-2007

Element	95% Limit	Low Temperature 72 to 81 °F	Medium Temperature 82 to 89 °F	High Temperature 90 to 97 °F
Steering axles	±20 %	-0.7 ± 7.3%	-1.3 ± 8.0%	-1.5 ± 5.9%
Tandem axles	±15 %	2.7 ± 4.7%	1.7 ± 5.9%	1.2 ± 6.4%
GVW	±10 %	2.1 ± 3.0%	1.2 ± 3.2%	0.8 ± 4.4%
Axle spacing	± 0.5 ft	-0.1 ± 0.4 ft	0.0 ± 0.4 ft	-0.1 ± 0.3 ft

Prepared: ea *Checked: bko*

Table 6-10 has the results of the prior post validation by speed groups. The current validation used a speed range that only spanned the medium and high speed ranges of the last validation.

Table 6-10 - Last Validation Results by Speed Bin – 480100 – 07-Nov-2007

Element	95% Limit	Low Speed 42 to 53 mph	Medium Speed 54 to 63 mph	High Speed 64+ mph
Steering axles	±20 %	-0.6 ± 4.9%	-3.2 ± 6.0%	0.8 ± 6.4%
Tandem axles	±15 %	2.6 ± 4.6%	1.8 ± 4.7%	0.9 ± 7.9%
GVW	±10 %	2.1 ± 2.7%	0.9 ± 2.9%	0.9 ± 5.8%
Axle spacing	± 0.5 ft	-0.1 ± 0.3 ft	0.0 ± 0.3 ft	-0.1 ± 0.5 ft

Prepared: ea *Checked: bko*

7 Data Availability and Quality

As of December 09, 2008 this site does not have at least 5 years of research quality data. Research quality data is defined to be at least 210 days in a year of data of known calibration meeting LTPP's precision requirements.

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

The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. As can be seen from the table only 2005 through 2007 have a sufficient quantity to be considered complete years of data. Together with the previously gathered calibration information it can be seen that only one additional year of research quality data is needed to meet the goal of a minimum of 5 years of research weight data if sufficient data is received for 2008.

Table 7-1 - Amount of Traffic Data Available 480100 – 09-Dec-2008

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
2000	362	12	Full Week	n/a		
2001	275	10	Full Week	122	4	Full Week
2002	213	8	Full Week	89	3	Full Week
2003	55	2	Full Week	61	2	Full Week
2004	44	2	Full Week	49	2	Full Week
2005	290	11	Full Week	30	1	Full Week
2006	232	9	Full Week	241	9	Full Week
2007	222	9	Full Week	246	9	Full Week
2008	52	2	Full Week	88	3	Full Week

Prepared: ea Checked: bko

As of December 18, 2008 no data has been received that would permit developing representative vehicle distributions, loading distributions or speed distributions for data evaluation.

8 Data Sheets

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

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

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

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

Test Truck Photographs (11 pages)

Final System Parameters (1 page)

9 Updated Handout Guide and Sheet 17

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

10 Updated Sheet 18

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

11 Traffic Sheet 16(s)

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

POST-VISIT HANDOUT GUIDE FOR SPS WIM VALIDATION

STATE: Texas

SHRP ID: 480100
Additional Lane ID: 480199

Figures

Photos

1. General Information

SITE ID: *480100 and 480199*

LOCATION: *US 281 South, 9.1 Miles North of State Route 186*

VISIT DATE: *December 9, 2008*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *Dar Hao Chen, 512-467-3963, dchen@dot.state.tx.us*

James Neidigh, 512-465-7657, JNeidigh@dot.state.tx.us

Mike Murphy, 512-465-3686, mmurphy@dot.state.tx.us

Luis (Carlos) Peralez, 956-702-6162, lperalez@dot.state.tx.us

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

FHWA Division Office Liaison: *Darrin Grenfell, 512-536-5922, darrin.grenfell@fhwa.dot.gov*

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

3. Agenda

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

ON-SITE PERIOD: *Beginning December 9, 2008 and continuing through December 10, 2008*

TRUCK ROUTE CHECK: *Completed on previous visit to site.*

4. Site Location/ Directions

NEAREST AIRPORT: *McAllen International Airport, McAllen, Texas.*

DIRECTIONS TO THE SITE: *9.1 Miles North of SR -186, approximately 30 miles north of Pharr, Texas.*

MEETING LOCATION: *Beginning at 9 a.m., December 9, 2008.*

WIM SITE LOCATION: *US 281 South, 9.1 Miles North of State Route 186 (Latitude: 26.6860; Longitude: -98.1147)*

WIM SITE LOCATION MAP:

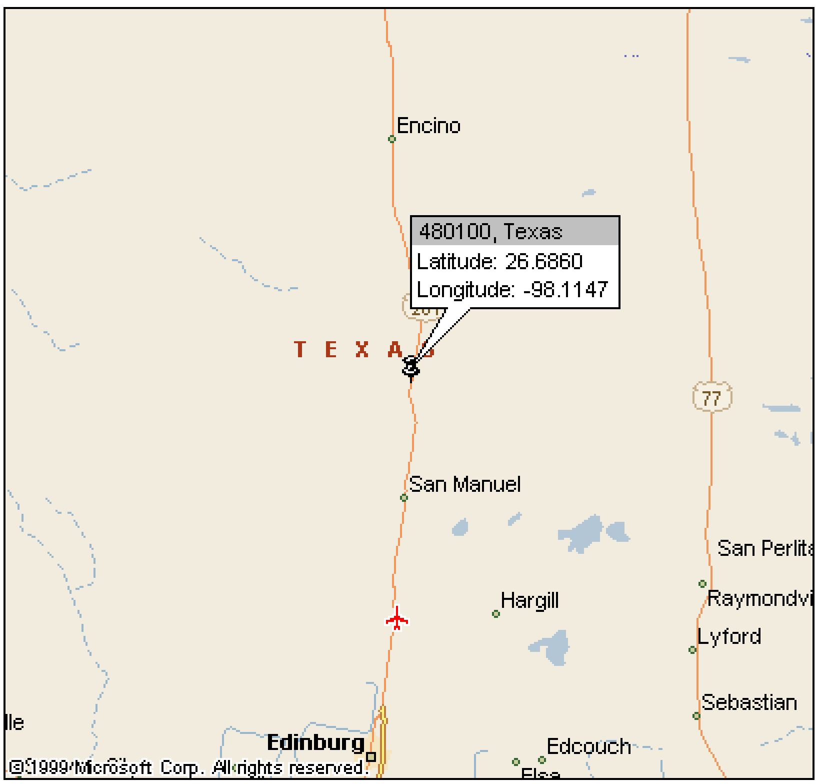

Figure 4-1 - Site 480100 and 480199 in Texas

5. Truck Route Information

ROUTE RESTRICTIONS: *None.*

SCALE LOCATION: *Travel Centers of America (aka Edinburg 76 Truck Stop), 8301 N Hwy 281, Edinburg, Texas; Phone – (956) 383-0788; Lat: 26.45269, Long: -98.13128*

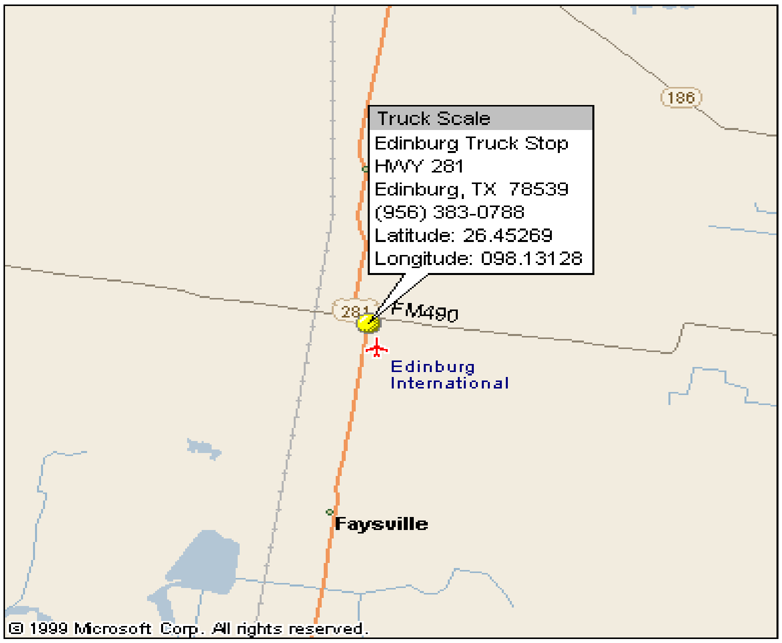

Figure 5-1 - Truck Scale Location for 480100 and 480199 in Texas

TRUCK ROUTE: *See Figure 5-2.*

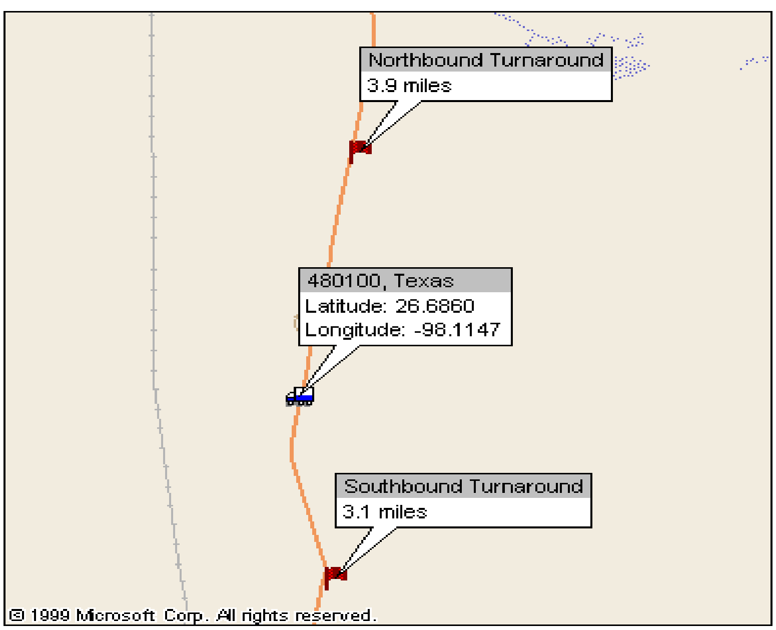

Figure 5-2 - Truck Route at 480100 and 480199 in Texas

6. Sheet 17 – Texas (480100)

1.* ROUTE ___US 281____ MILEPOST __N/A__ ___LTPP DIRECTION – N S E W

2.* WIM SITE DESCRIPTION - Grade ___<1__ % Sag vertical Y / N
Nearest SPS section upstream of the site __4_8_0_1_6_6__
Distance from sensor to nearest upstream SPS Section ____1_6_5_3______ 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 __12/09/2008____Photo__48_0100_Upstream_12_09_08.jpg
Date __12/09/2008____Photo__48_0100_Downstream_12_09_08.jpg
Date __12/09/2008____ Photo_ 48_0199_Upstream_12_09_08.jpg
Date __12/09/2008____Photo__48_0199_Downstream_12_09_08.jpg

6. * SENSOR SEQUENCE _____Loop – Bending Plate – Loop – Bending Plate_____

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_8__ ft
Distance from system __8_0__ ft
TYPE ______M___________________________

CABINET ACCESS controlled by LTPP / STATE / JOINT
Contact - name and phone number _Jim Neidigh_512-465-7657________
Alternate - name and phone number _Mike Lloyd____________________

11. * POWER
Distance to cabinet from drop __8_5_5____ ft Overhead / underground / solar /
AC in cabinet?
Service provider ____________________ Phone number _________________

12. * TELEPHONE
Distance to cabinet from drop ___1___ ___ ft overhead / under ground / cell?
Service provider ___ Valley Telephone __ Phone Number __800-292-7596___

13.* SYSTEM (software & version no.)- ____DAW-190______________
Computer connection – RS232 / Parallel port / USB / Other_______________

14. * TEST TRUCK TURNAROUND time __10__ minutes DISTANCE _7.0_ mi.

15. PHOTOS	FILENAME
Power source	48_0100_Power_Service_12_09_08.jpg
	48_0100_Power_Service_Mast_#1_12_09_08.jpg
	48_0100_Power_Service_Mast_#2_12_09_08.jpg
	48_0100_Power_Meter_12_09_08.jpg
Phone source	48_0100_Telephone_Service_Drop_12_09_08.jpg
	48_0100_Telephone_Pedestal_12_09_08.jpg
Cabinet exterior	48_0100_Cabinet_Exterior_12_09_08.jpg
Cabinet interior	48_0100_Cabinet_Interior_12_09_08.jpg
Cabinet exterior	48_0199_Cabinet_Exterior_12_09_08.jpg
Cabinet interior	48_0199_Cabinet_Interior_Front_12_09_08.jpg
	48_0199_Cabinet_Interior_Back_12_09_08.jpg

Weight sensors 48_0100_Leading_WIM_Sensor_12_09_08.jpg
48_0100_Trailing_WIM_Sensor_12_09_08.jpg
48_0199_Leading_WIM_Sensor_12_09_08.jpg
48_0199_Trailing_WIM_Sensor_12_09_08.jpg

Other sensors 48_0100_Leading_Loop_12_09_08.jpg
48_0100_Trailing_Loop_12_09_08.jpg
48_0199_Leading_Loop_12_09_08.jpg

Description __Loops__________________

Downstream direction at sensors on LTPP lane
48_0100_Downstream_12_09_08.jpg
48_0199_Downstream_12_09_08.jpg

Upstream direction at sensors on LTPP lane
48_0100_Upstream_12_09_08.jpg
48_0199_Upstream_12_09_08.jpg

COMMENTS _______GPS Coordinates: Latitude: 26.6860; Longitude -98.1147______
_ Posted speed limit – 70 mph
________Amenities:

COMPLETED BY ____Dean J. Wolf______________________________

PHONE __(301) 210-5105___________ DATE COMPLETED 1 2 _ / _ 0 9 _/ _2 _0 _0 _8_

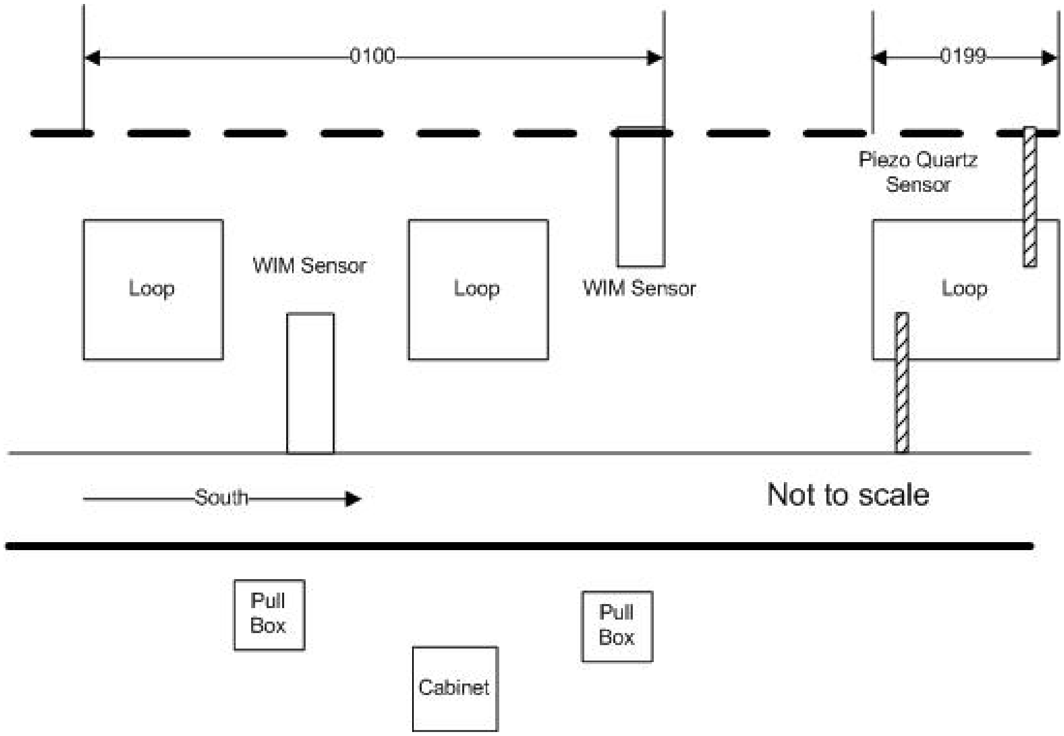

Figure 6-1 - Sketch of Equipment Layout - 480100 & 480199 in Texas

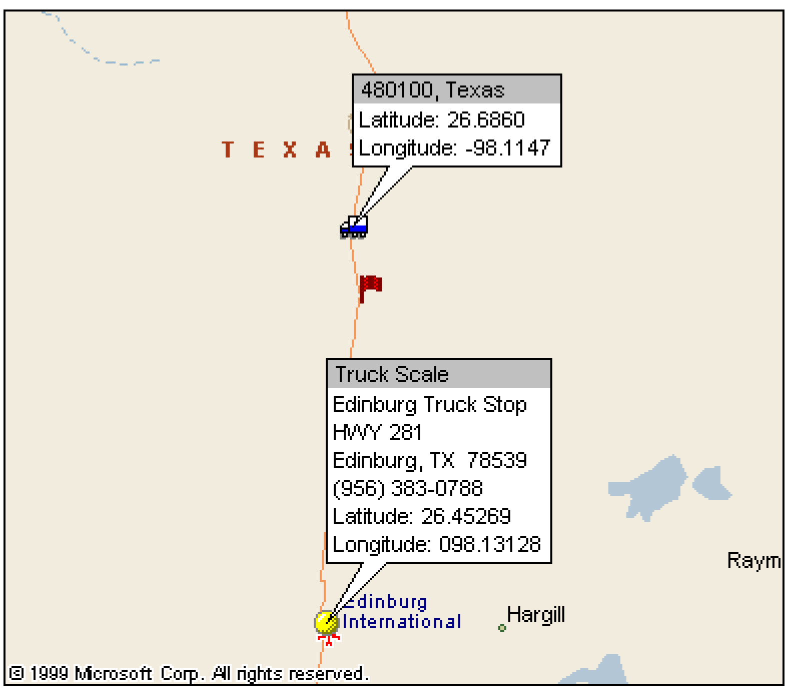

Figure 6-2 - Site Map 480100 and 480199 in Texas

Photo 1 - 48_0100_Upstream_12_09_08.jpg

Photo 2 - 48_0100_Downstream_12_09_08.jpg

Photo 3 - 48_0199_Upstream_12_09_08.jpg

Photo 4 - 48_0199_Downstream_12_09_08.jpg

Photo 5 - 48_0100_Power_Service_12_09_08.jpg

Photo 6 - 48_0100_Power_Service_Mast_#1_12_09_08.jpg

Photo 7 - 48_0100_Power_Service_Mast_#2_12_09_08.jpg

Photo 8 - 48_0100_Power_Meter_12_09_08.jpg

Photo 9 - 48_0100_Telephone_Service_Drop_12_09_08.jpg

Photo 10 - 48_0100_Telephone_Pedestal_12_09_08.jpg

Photo 11 - 48_0100_Cabinet_Exterior_12_09_08.jpg

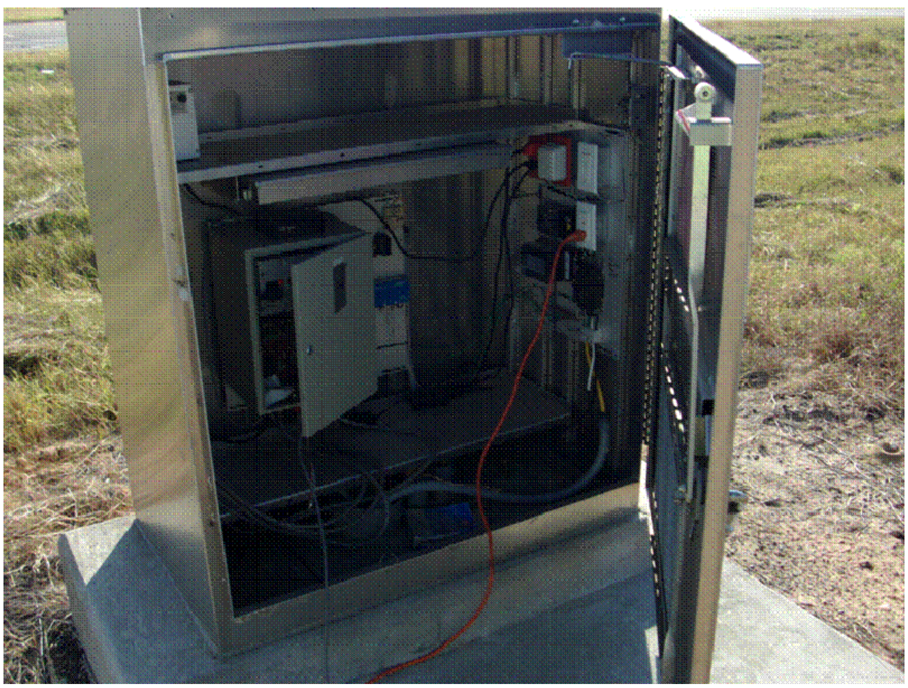

Photo 12 - 48_0100_Cabinet_Interior_12_09_08.jpg

Photo 13 - 48_0199_Cabinet_Exterior_12_09_08.jpg

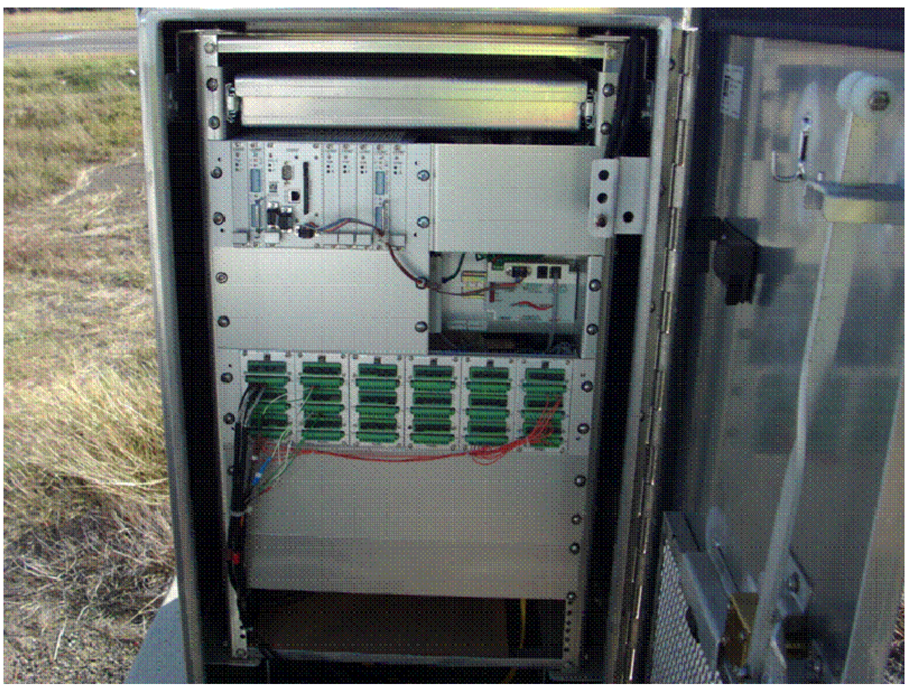

Photo 14 - 48_0199_Cabinet_Interior_Front_12_09_08.jpg

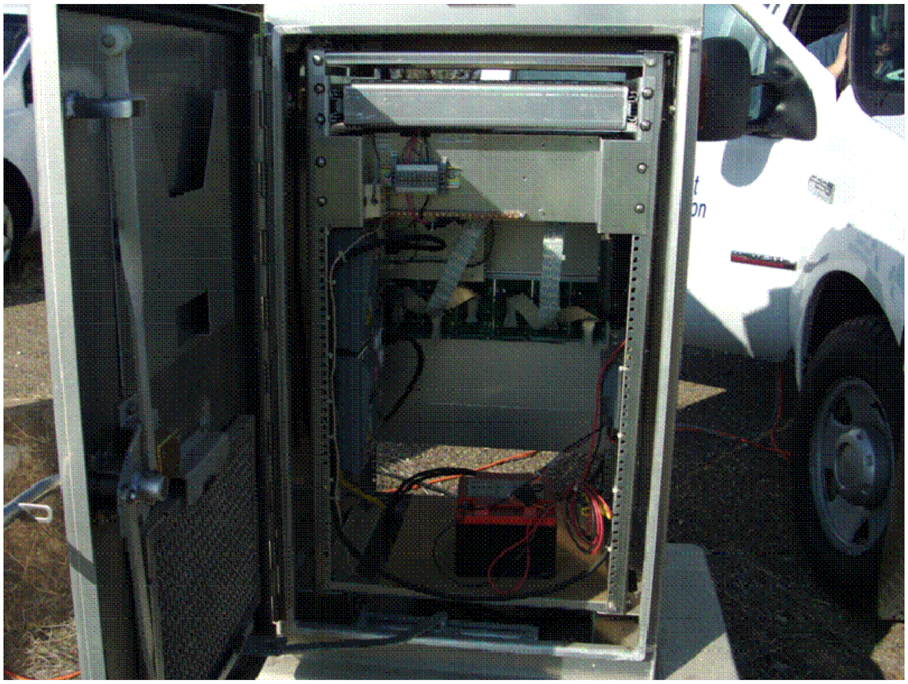

Photo 15 - 48_0199_Cabinet_Interior_Back_12_09_08.jpg

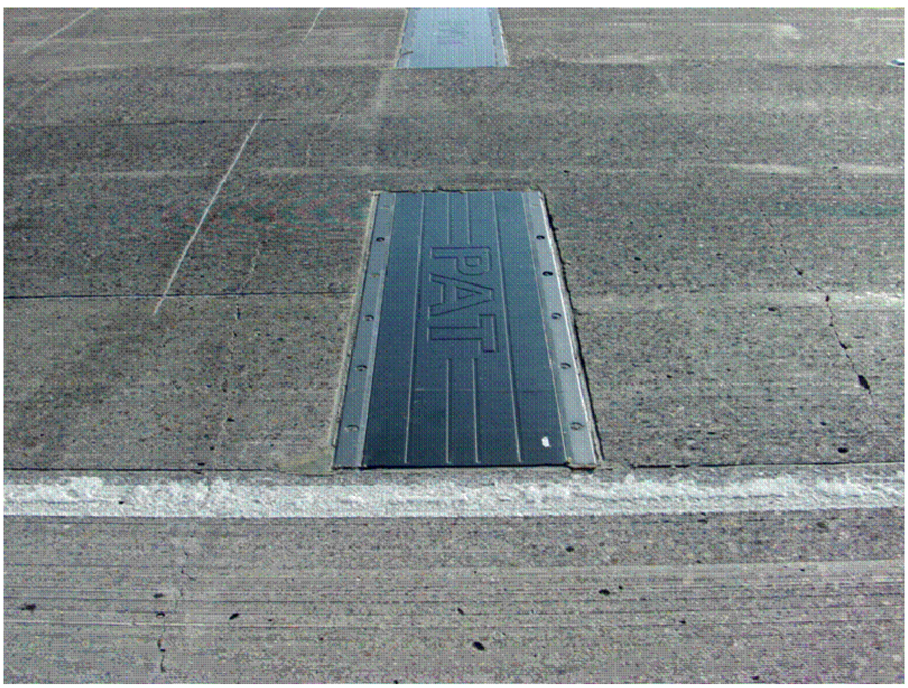

Photo 16 - 48_0100_Leading_WIM_Sensor_12_09_08.jpg

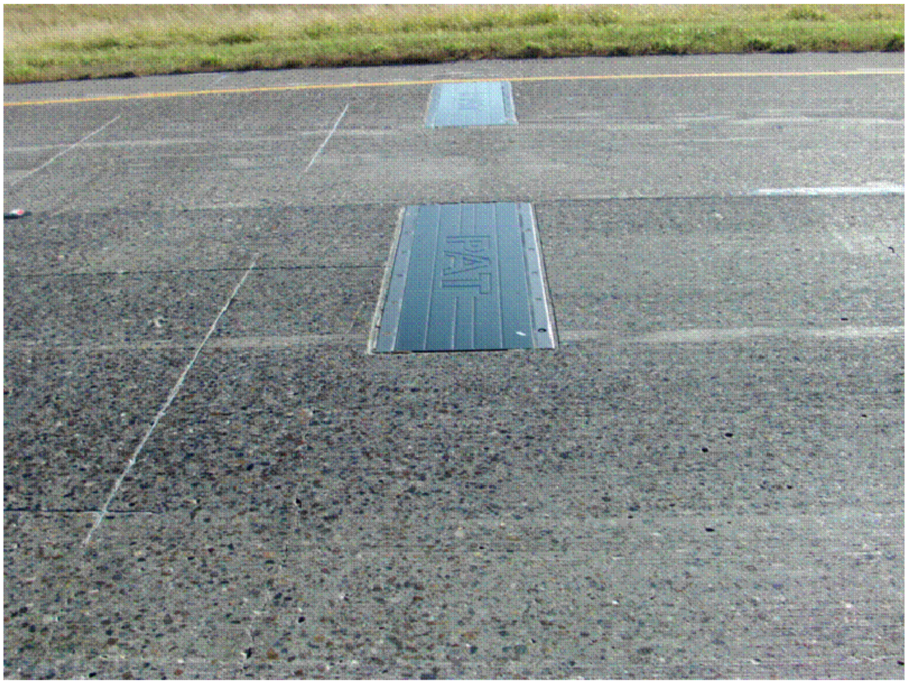

Photo 17 - 48_0100_Trailing_WIM_Sensor_12_09_08.jpg

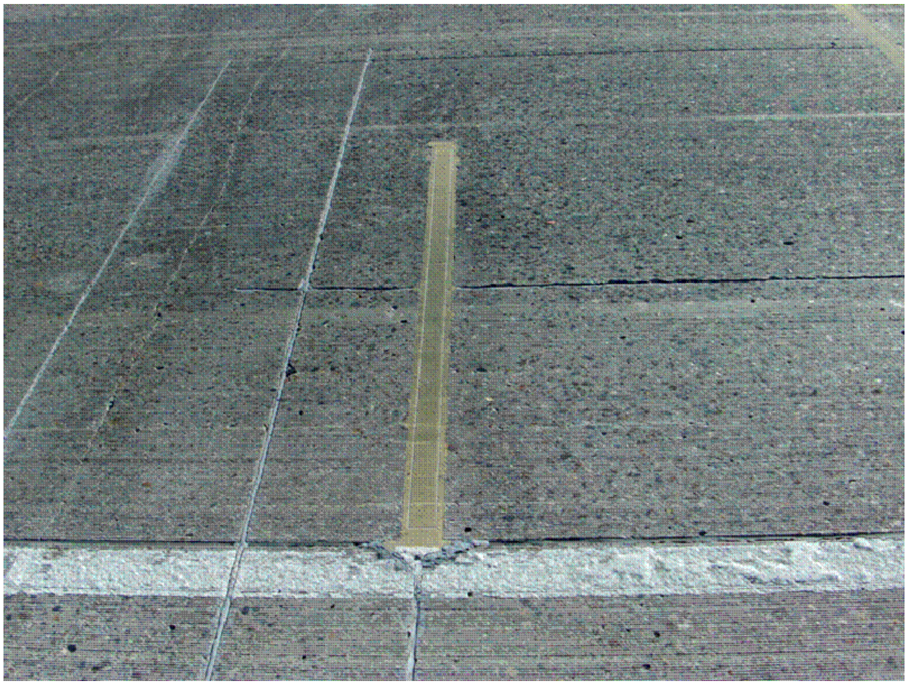

Photo 18 - 48_0199_Leading_WIM_Sensor_12_09_08_08.jpg

Photo 19 - 48_0199_Trailing_WIM_Sensor_12_09_08.jpg

Photo 20 - 48_0100_Leading_Loop_12_09_08.jpg

Photo 21 - 48_0100_Trailing_Loop_12_09_08.jpg

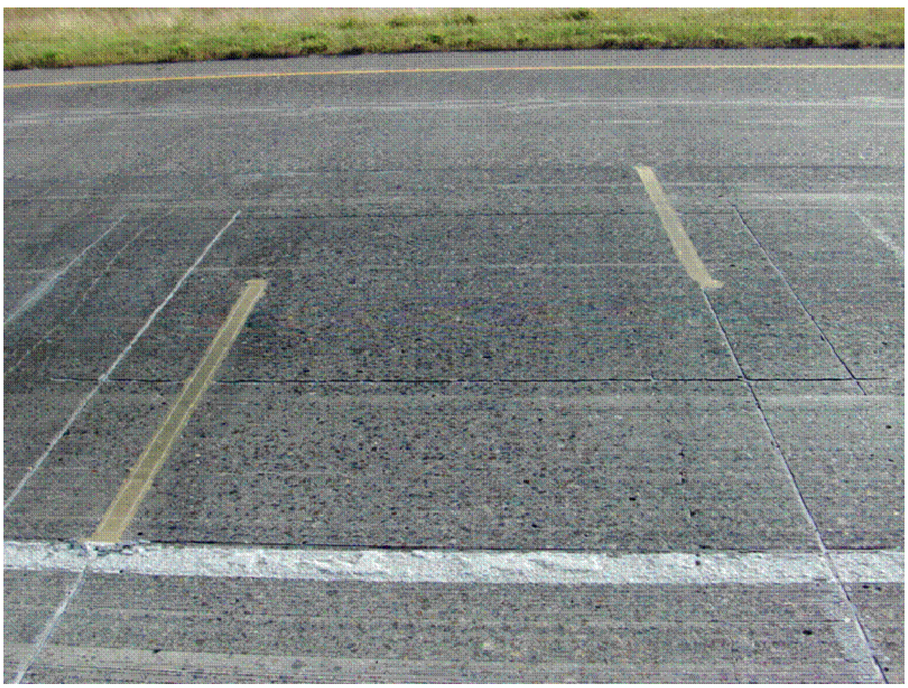

Photo 22 - 48_0199_Leading_Loop_12_09_08.jpg

SHEET 18	STATE CODE [48]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0 1 0 0]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 12/09/2008

Rev. 05/15/07

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

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

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

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

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

   c. Maintenance –
      - ☐ Contract with purchase – Expiration Date _______
      - ☐ Separate contract LTPP – Expiration Date _______
      - ☐ Separate contract State – Expiration Date _______
      - ☒ 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 _6__ ☐ days ☒ weeks

b. Notice for straightedge and grinding check - __6_ ☐ days ☒ weeks

i. On site lead –
- ☒ State
- ☐ LTPP

ii. Accept grinding –
- ☒ State
- ☐ LTPP

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

d. Calibration Routine –
- ☐ LTPP – ☐ Semi-annually ☐ Annually
- ☐ State per LTPP protocol – ☐ Semi-annually ☐ Annually
- ☒ State other – _4 times per year________________

e. Test Vehicles
   i. Trucks –
      1st – Air suspension 3S2 ☐ State ☒ LTPP
      2nd – _3S2 different weight/suspension__ ☒ State ☐ LTPP
      3rd – ________________ ☒ State ☐ LTPP
      4th – ________________ ☐ State ☐ LTPP
   ii. Loads – ☒ State ☒ LTPP
   iii. Drivers – ☒ State ☒ LTPP

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

i. Traffic Control Required – ☐Yes ☒No

j. Enforcement Coordination Required – ☐Yes ☒No

5. SITE SPECIFIC CONDITIONS –
   a. Funds and accountability – State and Pooled Fund_
   b. Reports – _______
   c. Other – _________
   d. Special Conditions – ________

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

      Name: Jim Neidigh Phone:(512)-465-7657

      Agency: TXDOT

b. Maintenance (equipment) –

Name: Jim Neidigh Phone:(512)-465-7657

Agency: TXDOT

c. Data Processing and Pre-Visit Data –

Name: Jim Neidigh Phone:(512)-465-7657

Agency: TXDOT

d. Construction schedule and verification –

Name: Jim Neidigh Phone:(512)-465-7657

Agency: TXDOT

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

Name: Jay Hale Phone:(361)-289-1710

Agency: Hale Boys

f. Traffic Control –

Name: Jim Neidigh Phone:(512)-465-7657

Agency: TXDOT

g. Enforcement Coordination –

Name: _____ Phone:_____

Agency: _____

h. Nearest Static Scale

Name: TA Travel Center Location:22 mi South, Edinburg

Phone: 956-383-0788

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [48] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [12/9/2008]

2. * TYPE OF EQUIPMENT CALIBRATED ____ WIM ____ CLASSIFIER _X_ BOTH

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
____ BARE ROUND PIEZO CERAMIC ____ BARE FLAT PIEZO _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 __ 3__ NUMBER OF TEST TRUCKS USED

__ 15__ PASSES PER TRUCK

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

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
MEAN DIFFERENCE BETWEEN ---
DYNAMIC AND STATIC GVW ___0.2 STANDARD DEVIATION ___1.4
DYNAMIC AND STATIC SINGLE AXLES ___-2.7 STANDARD DEVIATION ___3.5
DYNAMIC AND STATIC DOUBLE AXLES ___0.6 STANDARD DEVIATION ___2.5

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

9. DEFINE THE SPEED RANGES USED (MPH) ______ _60_ __65__ __70_ ______ __ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___995___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
*** FHWA CLASS 9 ____ 1 FHWA CLASS _5_ ____ ____ -8
*** FHWA CLASS 8 ____ -67 FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
*** PERCENT "UNCLASSIFIED" VEHICLES: ____ 2.0

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, MACTEC____
CONTACT INFORMATION: ______301-210-5105______ rev. November 9, 1999

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [48] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [12/10/2008]

2. * TYPE OF EQUIPMENT CALIBRATED ____ WIM ____ CLASSIFIER _X_ BOTH

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
____ BARE ROUND PIEZO CERAMIC ____ BARE FLAT PIEZO _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 __ 3__ NUMBER OF TEST TRUCKS USED

__ 14__ 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	9	2

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
MEAN DIFFERENCE BETWEEN ---
DYNAMIC AND STATIC GVW ___0.7 STANDARD DEVIATION ___1.4
DYNAMIC AND STATIC SINGLE AXLES ___-3.1 STANDARD DEVIATION ___2.9
DYNAMIC AND STATIC DOUBLE AXLES ___1.4 STANDARD DEVIATION ___2.7

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

9. DEFINE THE SPEED RANGES USED (MPH) ______ _60_ __65__ __70_ ______ ______ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___995___

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 _5_ ____ ____ -17
*** FHWA CLASS 8 ____ -75 FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
*** PERCENT "UNCLASSIFIED" VEHICLES: ____ 4.0

PERSON LEADING CALIBRATION EFFORT: __Dean J. Wolf, MACTEC__
CONTACT INFORMATION: ______301-210-5105______ rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE 48
LTPP Traffic Data	* SPS PROJECT ID 0 1 0 0 / 0199
*CALIBRATION TEST TRUCK # 1	* DATE 12/9/08

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

GEOMETRY

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

9. a) * Make: PETERBUILT b) * Model: ______________

10.* Trailer Load Distribution Description:

STEEL WEIGHTS LOADED EVENLY ACROSS TRAILER

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

b). Trailer Tare Weight (units): ______________________

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

A to B 19.9 B to C 4.3 C to D 30

D to E 4.1 E to F ______

Wheelbase (measured A to last) ____________ Computed 58.3

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	11R 24.5	2 FULL LEAF
B	11R 24.5	AIR
C	11R 24.5	AIR
D	23575 R17.5	AIR
E	23575 R17.5	AIR
F		

6420070022_SPSWIM_TO_27_48_2.112_0100_Sheet_19_axle_scales_truck_1

Sheet 19	* STATE_CODE	48
LTPP Traffic Data	* SPS PROJECT ID	0100/0199
*CALIBRATION TEST TRUCK # 1	* DATE	12/9/08

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 78350
*c) Post Test Loaded Weight 77920
*d) Difference Post Test – Pre-test -430

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11000	14060	14060	19620	19620		78360
2	11040	14020	14020	19630	19630		78340
3							
Average	11020	14040	14040	19625	19625		78350

Table 6. Raw data – Axle scales –

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10820	13920	13920	19630	19630		77920
2	10860	13900	13900	19630	19630		77920
3							
Average	10840	13910	13910	19630	19630		77920

Measured By DW Verified By MZ Weight date 12/9/08

6420070022_SPSWIM_TO_27_48_2.112_0100_Sheet_19_axle_scales_truck_1

Sheet 19	* STATE_CODE	48
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0 / 0199
*CALIBRATION TEST TRUCK # 1	* DATE	12/10/08

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 78170

*c) Post Test Loaded Weight 77750

*d) Difference Post Test – Pre-test -420

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10940	13970	13970	19640	19640		78160
2	10980	13950	13950	19650	19650		78180
3							
Average	10960	13960	13960	19645	19645		78170

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10780	13850	13850	19630	19630		77740
2	10860	13800	13800	19650	19650		77760
3							
Average	10820	13825	13825	19640	19640		77750

Measured By ~~Ad~~ RP Verified By MZ Weight date 12/10

6420070022_SPSWIM_TO_27_48_2.112_0100_Sheet_19_axle_scales_truck_1

Sheet 19	* STATE_CODE	48
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0 / 0199
*CALIBRATION TEST TRUCK # 2	* DATE	12/9/08

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

GEOMETRY

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

9. a) * Make: FREIGHTLINER b) * Model: ________

10.* Trailer Load Distribution Description:

STEEL WEIGHTS LOADED ALONG TRAILER

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

b). Trailer Tare Weight (units): ________

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

A to B 16.2 B to C 4.2 C to D 32.4

D to E 4.0 E to F ______

Wheelbase (measured A to last) ______ Computed 56.8

13. *Kingpin Offset From Axle B (units) 2.1 FT (______)
(+ 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	2 FULL LEAF
B	11R22.5	AIR
C	11R22.5	AIR
D	11R22.5	3 TAPERED LEAF
E	11R22.5	3 TAPERED LEAF
F		

Sheet 19	* STATE_CODE 48
LTPP Traffic Data	* SPS PROJECT ID 0 1 0 0 / 0199
*CALIBRATION TEST TRUCK # 2	* DATE 12/9/08

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 62760

*c) Post Test Loaded Weight 62420

*d) Difference Post Test – Pre-test -340

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11180	12840	12840	13000	13000		62860
2	11040	12810	12810	13000	13000		62660
3							
Average	11110	12825	12825	13000	13000		62760

Table 6. Raw data – Axle scales –

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10920	12790	12790	12970	12970		62440
2	10860	12800	12800	12970	12970		62400
3							
Average	10890	12795	12795	12970	12970		62420

Measured By DW Verified By MZ Weight date 12/9/08

Sheet 19	* STATE CODE
LTPP Traffic Data	* SPS PROJECT ID
*CALIBRATION TEST TRUCK # 2 (day 2)	* DATE 12/10/08

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

GEOMETRY

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

9. a) * Make: PETERBUILT b) * Model: ________

10.* Trailer Load Distribution Description:

CONCRETE BLOCK LOADED ON TRAILER

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

b). Trailer Tare Weight (units): ________

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

A to B 23.1 B to C 4.5 C to D 32.1

D to E 4.1 E to F ______

Wheelbase (measured A to last) ______ Computed ______

13. *Kingpin Offset From Axle B (units) 2.1 (63.8)
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R 22.5	2 FULL LEAF
B	11R 22.5	AIR
C	11R 22.5	AIR
D	11R 22.5	~~AIR~~ 3 tapered leaf
E	11R 22.5	~~AIR~~ 3 TAPERED LEAF
F		

6420070022_SPSWIM_TO_27_48_2.112.0100_Sheet 19

Sheet 19	* STATE_CODE	48
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0 / 0199
*CALIBRATION TEST TRUCK # 2	* DATE	12/10/08

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 65410
*c) Post Test Loaded Weight 64940
*d) Difference Post Test – Pre-test ~~8~~ -470

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11660	13860	13860	13020	13020		65420
2	11640	13800	13800	13080	13080		65400
3							
Average	11650	13830	13830	13050	13050		65410

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11460	13790	13790	12950	12950		64940
2							
3							
Average	11460	13790	13790	12950	12950		64940

Measured By RP Verified By MZ Weight date 12/10

Sheet 19	* STATE_CODE 48
LTPP Traffic Data	* SPS PROJECT ID 0 1 0 0 / 0199
*CALIBRATION TEST TRUCK #_3_	* DATE 12/9/08

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

GEOMETRY

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

9. a) * Make: FREIGHTLINER b) * Model: ______________

10.* Trailer Load Distribution Description:

~~STEEL~~ CONCRETE WEIGHTS LOADED EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): ______________

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

A to B 12.2 B to C 4.3 C to D 31.1

D to E 4.1 E to F ______

Wheelbase (measured A to last) ______ Computed 51.7

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	11R22.5	2 FULL LEAF
B	11R 22.5	AIR
C	11R 22.5	AIR
D	11R 22.5	AIR
E	11R 22.5	AIR
F		

Sheet 19	* STATE_CODE	48
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0 / 0199
*CALIBRATION TEST TRUCK # 3	* DATE	12/9/08

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 78180
*c) Post Test Loaded Weight 77760
*d) Difference Post Test – Pre-test -420

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10600	16830	16830	16960	16960		78180
2	10680	16790	16790	16960	16960		78180
3							
Average	10640	16810	16810	16960	16960		78180

Table 6. Raw data – Axle scales –

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10300	16790	16790	16950	16950		77780
2	10340	16730	16730	16970	16970		77740
3							
Average	10320	16760	16760	16960	16960		77760

Measured By DW Verified By MZ Weight date 12/9/08

6420070022_SPSWIM_TO_27_48_2.112_0100_Sheet_19_axle_scales_truck_3

Sheet 19	* STATE_CODE	48
LTPP Traffic Data	* SPS PROJECT ID	0 1 0 0 / 0199
*CALIBRATION TEST TRUCK # 3	* DATE	12/10/08

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight ~~78170~~ 78570
*c) Post Test Loaded Weight 77840
*d) Difference Post Test – Pre-test ~~-330~~ -730

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10640	16800	16800	16960	16960		78960
2	10520	16860	16860	16970	16970		78180
3							
Average	10580	16830	16830	16965	16965		78170

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10480	16720	16720	16970	16970	[illegible]	77860
2	10440	16720	16720	16970	16970		77820
3							
Average	10460	16720	16720	16970	16970		77840

Measured By RP Verified By MZ Weight date 12/10/08

6420070022_SPSWIM_TO_27_48_2.112_0100_Sheet_19_axle_scales_truck_3

Sheet 20	* STATE_CODE 48
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 1 of* 2	* DATE 12/09/2008

Rev. 08/31/2001

	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
	59	12	1875	59	12	66	5	1975	65	5	
	67	9	1880	67	9	71	5	1977	68	5	
	67	9	1882	66	9	65	9	1978	62	9	
	73	9	1896	73	9	68	9	1980	66	9	
	64	9	1899	63	9	67	9	1981	65	9	
	67	9	1900	67	9	63	9	1988	61	9	
*	72	5	1907	71	4	66	9	1990	64	9	
	71	9	1908	69	9	66	9	2001	65	9	
	67	9	1911	67	9	71	6	2005	70	6	
	68	9	1912	65	9	67	4	2006	65	5	*
	66	9	1913	65	9	68	9	2007	67	9	
	66	9	1917	64	9	69	5	2008	63	5	
	65	9	1918	64	9	65	9	2010	64	9	
	63	9	1926	61	9	69	9	2022	66	9	
	65	9	1927	65	9	64	9	2023	62	9	
	66	9	1929	66	9	69	9	2037	68	9	
	~~66~~ 66	9	1935	65	9	71	9	2040	68	9	
	66	11	1938	64	11	69	10	2043	68	10	
	70	9	1943	67	9	67	9	2045	66	9	
	62	9	1947	60	9	70	9	2046	69	9	
	71	9	1951	69	9	69	9	2062	67	9	
	67	9	1961	65	9	62	9	2064	60	9	
	65	9	1965	62	9	71	5	2069	70	5	
	60	9	1966	58	9	67	9	2091	66	9	
	68	5	1972	67	5	59	15	2092	59	8	*

Recorded by MARK Z Direction S Lane 4 Time from 817 AM to 844

6420070022_SPSWIM_TO_27_48_2.112_0100_pre-Validation_Sheet_20

Sheet 20	* STATE_CODE 48
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 2 of* 2	* DATE 12/10/2008

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
65	9	2094	68	9	68	9	2305	67	9	
66	9	2111	64	9	69	9	2309	69	8	*
62	9	2127	60	9	68	5	2311	65	5	
62	9	2146	58	9	65	9	2312	63	9	
71	9	2192	69	9	65	9	2338	64	9	
69	9	2195	69	9	66	9	2341	64	9	
68	9	2197	65	9	67	9	2342	66	9	
65	9	2203	61	9	71	9	2343	69	9	
80	5	2238	73	5	65	9	2349	62	9	
66	9	2243	64	9	62	9	2350	60	9	
66	9	2244	65	9	64	8	2355	60	5	*
73	9	2248	71	9	67	15	2360	65	8	*
69	10	2253	68	10	64	6	2361	62	6	
65	9	2254	64	9	73	5	2387	72	5	
60	9	2255	60	9	64	5	2419	63	5	
70	6	2262	70	6	62	9	2431	60	9	
55	9	2266	54	9	67	9	2433	62	9	
72	9	2271	70	9	65	9	2435	64	9	
72	9	2272	70	9	70	9	2438	67	9	
73	5	2274	70	5	64	9	2441	63	9	
65	9	2279	63	9	64	9	2442	63	9	
75	5	2280	75	5	68	9	2445	66	9	
67	9	2282	65	9	63	9	2448	60	9	
65	9	2287	62	9	69	9	2453	69	9	
64	9	2302	63	9	70	9	2464	68	9	

Recorded by MARK Z Direction S Lane 4 Time from 844 to 922

6420070022_SPSWIM_TO_27_48_2.112_0100_pre-Validation_Sheet_20

Sheet 20	* STATE_CODE 48
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 1 of* 2	* DATE 12/10/2008

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
71	5	5490	66	5	66	9	5672	64	9
59	9	5496	57	9	64	9	5678	62	9
70	9	5514	68	9	58	9	5687	54	9
68	5	5516	66	5	71	9	5695	68	9
72	9	5547	68	9	73	9	5705	69	9
66	9	5553	64	9	64	9	5707	59	9
69	5	5573	68	5	71	5	5708	70	5
73	9	5577	70	9	67	9	5711	65	9
73	9	5583	73	9	67	9	5716	68	9
65	9	5585	62	9	67	6	5718	65	6
70	9	5587	67	9	66	9	5720	66	9
62	9	5609	63	9	68	9	5721	70	9
* 64	15	5612	63	5	77	9	5724	74	9
70	9	5624	65	9	77	9	5726	74	9
69	9	5626	69	9	71	9	5732	68	9
73	9	5631	70	9	73	9	5734	70	9
64	9	5633	62	9	83	9	5740	83	9
64	9	5634	62	9	66	9	5752	63	9
66	9	5635	65	9	69	9	5755	65	9
61	6	5640	58	6	69	9	5761	65	9
61	9	5647	60	9	67	9	5762	66	9
67	9	5649	66	9	69	9	5765	67	9
69	9	5654	67	9	65	9	5768	62	9
* 65	13	5662	58	13	73	9	5778	71	9
* 64	64	5663	62	6	69	9	5779	68	9

Recorded by MARK Z Direction S Lane 4 Time from 215PM to 238PM

6420070022_SPSWIM_TO_27_48_2.112_0100_post-Validation_Sheet_20

Sheet 20	* STATE_CODE 48
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 2 of* 2	* DATE 12/10/2008

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	5784	66	9	67	9	5954	66	9
*	61	15	5798	62	8	61	9	5957	61	9
*	62	15	5799	60	8	67	9	5959	67	9
	73	5	5801	69	5	68	9	5977	64	9
	58	5	5808	56	5	58	5	5979	55	5
	58	9	5809	53	9	67	9	5991	63	9
	62	9	5818	62	9	59	6	6006	58	6
	71	9	5822	69	9	60	5	6008	55	5
	68	9	5826	66	9	65	8	6014	63	8
	70	9	5843	68	9	66	9	6021	63	9
	68	9	5844	67	9	59	6	6023	58	6
	65	9	5853	66	9	69	9	6036	68	9
	62	9	5856	60	9	69	9	6038	66	9
	65	9	5866	63	9	68	9	6044	66	9
	65	9	5869	63	9	76	9	6051	72	9
*	69	4	5884	68	5	73	9	6053	70	9
	69	9	5888	68	9	65	5	6065	62	5
	67	5	5894	63	5	73	9	6069	72	9
	69	9	5904	65	9	73	9	6074	68	9
*	68	15	5908	67	8	66	9	6078	64	9
	70	9	5925	69	9	72	9	6079	69	9
	64	9	5939	62	9	65	9	6081	63	9
	61	4	5941	60	4	71	9	6085	66	9
	61	9	5949	59	9	74	9	6097	71	9
	70	9	5951	68	9	67	10	6102	66	10

Recorded by MARK Z Direction S Lane 4 Time from 238PM to 305PM

6420070022_SPSWIM_TO_27_48_2.112_0100_post-Validation_Sheet_20

Sheet 21	* STATE_CODE 48
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 1 of 4	* DATE 12 / 9 / 2008

Rev. 08/31/2001

LANE 4

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
96	62	1	1	1341		62	11.2	14.4	13.8	19.2	19.9		78.5	19.3	4.5	29.6	4.1	
98	52	3	1	1341		59	9.7	17.1	16.9	17.1	16.7		77.5	11.7	4.3	31.3	3.9	
101	63	1	2	1351	5262	63	11.2	13.7	14.3	19.0	20.2		78.4	19.6	4.6	29.6	4.2	
101	62	2	2	1351	5264	62	11.0	13.2	12.8	12.1	13.7		62.9	16.0	4.1	32.0	4.1	
101	63	3	2	1351	5267	64	10.1	17.0	16.7	16.7	17.2		77.8	12.3	4.2	30.9	3.8	
102.5	68	1	3	1401	5361	69	11.4	12.8	13.5	20.6	21.5		79.8	19.7	4.6	29.9	4.1	
102.5	68	2	3	1401	5363	69	11.0	13.1	13.6	12.2	14.1		63.9	16.0	4.1	32.4	4.1	
102.5	68	3	3	1401	5364	68	10.0	17.7	15.7	17.0	16.7		77.1	11.8	4.5	30.9	4.1	
96	60	1	4	1412	5461	61	10.4	14.6	14.4	19.1	19.9		78.4	19.6	4.1	29.9	4.1	
96	60	2	4	1412	5462	59	10.4	12.9	13.1	12.1	14.1		62.7	15.8	4.3	32.4	3.9	
96	59	3	4	1412	5463	60	9.9	17.1	16.9	17.1	16.9		77.8	12.0	4.0	31.2	4.0	
95	64	1	5	1422	5568	64	10.3	13.6	14.2	19.0	19.8		77.0	20.0	4.2	29.8	3.6	
95	64	2	5	1422	5570	64	10.7	13.0	13.1	11.4	15.3		63.5	16.2	4.2	32.4	3.8	
95	63	3	5	1422	5572	63	10.2	17.1	17.0	17.0	17.1		78.5	11.8	4.2	31.2	3.8	
89	68	1	6	1434	5674	69	11.3	13.8	13.2	20.2	20.8		79.3	20.1	4.1	29.7	4.1	
NOT IN LANE	*	2			5676	69	9.9	8.6	7.8	5.9	8.7		40.8	16.6	4.2	32.3	4.2	

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LANE 4

Sheet 21	* STATE_CODE 48
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 2 of 4	* DATE 12 / 9 / 2004

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
89	68	3	6	1434	5677	69	9.9	17.7	17.0	16.5	16.3		77.4	11.9	4.6	31.1	4.1	
96	61	1	7	1445	5787	61	10.2	14.7	14.9	19.4	18.4		77.6	19.6	4.5	29.8	4.1	
~~not in lane~~		~~2~~			~~5788~~	~~63~~	~~10.9~~	~~13.7~~	~~13.0~~	~~6.7~~	~~8.0~~		~~52.3~~	~~16.3~~	~~4.2~~	~~32.5~~	~~3.8~~	
96	63	3	7	1445	5789	64	9.7	17.2	16.6	16.8	17.6		78.0	11.9	4.2	30.9	4.2	
101.5	63	1	8	1455	5940	63	10.4	14.4	14.0	18.4	18.8		76.1	19.6	4.2	30.0	3.8	
101.5	61	2	8	|	5942	63	10.1	13.2	13.7	11.9	13.8		62.7	15.9	4.2	32.3	3.8	
101.5	60	3	8	|	5945	59	9.5	17.4	17.0	17.1	18.2		79.2	11.7	4.3	31.3	3.9	
97	66	1	9	1506	6070	66	11.2	13.5	13.7	19.5	20.1		78.0	19.7	4.4	30.2	3.9	
97	67	2	9	|	6071	68	11.0	13.4	13.4	12.7	14.3		64.8	16.2	4.1	32.5	4.1	
97	64	3	9	|	6074	63	10.2	17.5	17.0	16.9	17.0		78.5	11.8	4.2	30.8	3.8	
90	64	1	10	1524	6255	61	10.5	14.5	13.5	19.3	19.1		76.8	19.5	4.5	29.3	4.5	
90	66	2	10	|	6256	67	10.8	12.8	13.6	11.9	14.4		63.5	16.1	4.5	32.2	4.0	
90	67	3	10	|	6258	69	10.5	16.2	17.0	16.0	15.6		75.3	11.9	4.1	31.5	4.1	
90	61	1	11	1538	6404	60	10.2	14.3	14.4	19.4	19.5		77.7	19.6	4.4	29.6	4.4	
90	63	2	8	1538	6407	63	10.8	12.8	13.2	11.7	13.3		61.8	16.0	4.2	32.0	4.2	
90	59	3	11	1538	6411	59	9.9	17.0	17.0	16.6	17.9		78.2	12.2	4.3	31.2	3.9	

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Checked by [signature]

6420070022_SPSWIM_TO_27_48_2.112_0100_pre-Validation_sheet_21

LANE 4

Sheet 21	* STATE_CODE	48
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 5 of 4	* DATE	12/ 9/ 2008

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
89.5	68	1	12	1557	6623	70	10.8	13.4	13.3	19.1	20.0		76.6	19.6	4.2	29.9	4.2	
89.5	67	2	~~12~~ 9	1557	6630	70	11.2	13.7	13.3	11.7	14.5		64.3	16.4	4.2	32.7	4.2	
89.5	63	3	12	1557	6634	63	9.9	16.7	16.6	17.6	16.8		77.7	11.8	4.2	30.8	3.8	
89.5	60	1	13	1607	6745	61	10.5	14.3	14.3	19.7	20.5		79.3	19.6	4.5	29.8	4.1	
89.5	63	2	13	|	6747	63	11.2	13.0	12.8	11.8	14.3		63.1	16.4	4.2	32.4	3.8	
89.5	62	3	13	|	6748	63	10.2	16.3	16.4	16.9	16.9		76.7	12.2	4.2	31.0	4.2	
47.5	62	1	14	09:44	2646	60	11.3	13.9	13.8	19.7	21.0		79.8	20.0	4.0	30.1	4.0	
47.5	58	3	14	09:44	2666	59	10.6	17.5	17.0	16.7	17.2		78.9	12.1	4.3	30.9	4.3	
52.5	69	1	15	09:53	2775	69	10.6	13.3	13.9	19.5	20.4		77.8	19.9	4.6	30.0	4.2	
52.5	69	3	15	09:53	2778	68	9.7	16.2	17.3	17.4	17.3		77.9	12.2	4.1	31.2	4.1	
51.0	59	1	16	10:02	2887	61	10.7	14.2	13.8	20.2	20.0		78.9	20.0	4.1	29.8	4.1	
51.0	59	3	16	10:03	2890	60	10.3	16.9	17.0	16.7	17.1		78.0	12.3	4.4	31.4	4.0	
50.5	64	1	17	10:13	2989	66	10.4	14.1	13.6	19.6	21.2		78.9	20.1	3.9	30.2	3.9	
50.5	63	3	17	10:13	2990	64	10.2	17.1	17.4	16.8	16.8		78.3	12.0	4.3	31.2	4.3	

Recorded by [signature]   Checked by [signature]

Sheet 21	* STATE_CODE 48
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 4 of 4	* DATE 12 / 9 / 2008

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
49.5	68	1	18	10:23	3084	71	10.8	13.6	13.9	20.0	19.7	~~[illegible]~~	78.0	19.7	4.7	29.6	4.2	
49.5	68	3	18	10:23	3088	68	10.0	17.0	17.0	16.3	17.4		77.6	11.8	4.1	30.9	4.1	

Recorded by DJWJ

Checked by JEH

6420070022_SPSWIM_TO_27_48_2.112_0100_~~Cal~~_sheet_21
Pre_Val

Sheet 21
LTPP Traffic Data
WIM System Test Truck Records 1 of 3

* STATE_CODE
*SPS PROJECT_ID 48
* DATE 12 / 10 / 2008

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
55	70	2	6	12:23PM	4268	72	11.2	14.8	13.1	12.2	15.4		66.7	22.5	4.8	31.6	4.3	
55	68	3	6	12:23PM	4269	70	10.1	16.9	16.7	16.8	17.3		77.8	12.1	4.2	31.3	4.2	
56	59	1	7	12:32PM	4374	62	10.8	14	13.8	19.6	20		78.3	19.9	4.1	30.3	3.7	
56	61	2	7	12:32PM	4377	62	11.3	14	14.3	11.4	14.6		65.6	22.8	4.6	31.9	3.7	
56	58	3	7	12:33PM	4378	60	9.6	17.6	16.8	17.1	17.9		79.1	12	4.4	31.1	4	
56	65	1	8	12:42PM	4491	66	10.5	14.2	13.5	21	20.7		79.8	20.1	4.4	29.7	3.9	
56	67	2	8	12:42PM	4493	68	11.1	14.9	13.8	12.7	14.8		66.3	22.4	4.5	31.9	4	
56	62	3	8	12:42PM	4496	64	10.1	16.8	17	16.7	17.4		77.8	12.3	4.3	31.1	3.8	
61	69	1	9	12:50PM	4584	69	10.8	13.8	13.1	20.1	20.6		78.3	19.7	4.1	29.9	4.1	
61	71	2	9	12:50PM	4587	72	11.5	14.6	14.4	11	15		66.6	23.1	4.8	31.7	3.8	
61	68	3	9	12:51PM	4590	70	9.9	16.9	17	15.5	18		77.4	12.1	4.2	31.1	3.7	
67	61	1	10	12:59PM	4682	61	10.9	14.6	13.5	19.5	20.8		79.4	19.9	4.1	30.1	4.1	
67	61	2	10	12:59PM	4683	62	11.2	13.7	14.1	11.3	15.3		65.7	22.8	4.6	31.9	4.1	
67	58	3	10	12:59PM	4684	59	10.2	17.1	16.7	17	17.3		78.4	11.8	4.3	31	3.9	
66	67	1	11	1:08PM	4769	67	10.4	13.9	14.2	19.6	20.5		78.6	19.7	4.2	29.8	4.2	
66	67	2	11	1:08PM	4771	68	10.8	14.2	13.8	12.6	14.6		66.1	22.1	4.5	31.9	4	

Recorded by JEH Checked by ea.

64200700Z2_SPSWIM_TO_27_48_2.112_Post_Validation_Sheet_21_0100

Sheet 21
LTPP Traffic Data
WIM System Test Truck Records 2 of 3

* STATE_CODE
*SPS PROJECT_ID 48
* DATE 12 / 10 / 2008

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
57	62	1	1	11:33AM	3750	62	10.8	13.8	13.8	19.3	19.9		77.6	19.9	4.1	29.9	4.1	
57	62	2	1	11:33AM	3752	62	11.1	14.6	13.9	11.6	15.2		66.3	22.8	4.6	31.5	4.1	
57	57	3	1	11:33AM	3755	58	10.3	17.5	17.2	16.8	17.3		79.1	12.3	4.2	30.8	4.2	
61	64	1	2	11:43AM	3854	66	10.1	14.1	13.9	19.5	20.7		78.4	20.1	4.4	30.2	3.9	
61	66	2	2	11:43AM	3855	67	11.6	14.9	14	11.4	15		67	22.8	4.5	31.7	4	
61	65	3	2	11:43AM	3858	65	10.1	17.3	17.4	16.7	17.7		79.1	12.2	4.3	30.9	3.9	
59	70	1	3	11:53AM	3948	73	11	13.2	13	19.7	21.3		78.2	19.8	4.3	30	3.9	
59	70	2	3	11:53AM	3949	72	11.1	13.7	14.4	12.1	14.1		65.3	22.9	4.3	32	4.3	
59	68	3	3	11:53AM	3951	68	10.1	16.5	17.7	16.1	17		77.4	12.3	4.1	31.3	4.1	
57	60	1	4	12:05PM	4095	61	11.3	13.8	14.9	19.5	19.2		78.7	19.9	4.1	29.7	4.1	
57	62	2	4	12:05PM	4096	63	11.3	14	13.9	11.6	14.9		65.8	23.1	4.2	32.3	4.2	
57	60	3	4	12:05PM	4098	60	10.2	17.6	16.2	16.6	16.8		77.4	11.9	4	30.9	4	
54	67	1	5	12:14PM	4174	65	10.7	14.6	13.9	19.5	20.8		79.5	19.4	4.3	29.7	3.9	
54	64	2	5	12:14PM	4175	64	11.8	14.9	14.1	11.1	14		65.9	23.2	4.5	32.2	4.1	
54	67	3	5	12:14PM	4179	64	9.7	17.8	17.4	17.4	16.8		79.1	12	4.3	31.2	3.9	
55	68	1	6	12:23PM	4266	68	10.8	13.4	14.3	19.8	20.8		79.1	19.8	4	29.6	4	

Recorded by JEH Checked by ea

6420070022_SPSWIM_TO_27_48_2.112_Post_Validation_Sheet21

Sheet 21
LTPP Traffic Data
WIM System Test Truck Records 3 of 3

* STATE_CODE	
*SPS PROJECT_ID	48
* DATE	12/10/2008

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
66	63	3	11	1:08PM	4774	63	9.7	17.6	17.4	16.6	17.1		78.5	11.7	4.2	31	3.8	
63	63	1	12	1:17PM	4883	66	10.5	14.1	13.7	20.6	21		79.8	19.4	4.4	30	4	
63	67	2	12	1:17PM	4886	68	11.7	14.2	13.3	12.2	14.9		66.2	23.2	4.5	31.8	9.1	
63	64	3	12	1:17PM	4888	64	10.2	16.6	16.8	16.7	17.2		77.5	11.9	4.2	30.9	4.2	
60.5	64	1	13	1:27PM	4981	70	10.6	12.8	13.5	20.3	21.2	-	78.4	20	4.2	30.2	4.2	
60.5	71	2	13	1:27PM	4982	72	10.7	13.1	13.7	11.4	12.9		61.8	23.1	4.3	32.2	3.8	
60.5	68	3	13	1:27PM	4983	69	10.1	17.2	16.2	16.7	17.9		78.2	12.4	4.1	31.2	3.7	
61.1	60	1	14	1:33PM	5051	60	10.5	14	14.1	19.8	19.8		78.2	19.8	4.4	30.2	4.1	
61.5	60	2	14	1:33PM	5053	61	10.5	14.3	15.2	11.8	14.4		66.2	23.2	4.5	32.1	4.1	

Recorded by JEH Checked by ea

6420070022_SPSWIM_TO_27_48-2.112_0100_Post_Validation_Sheet_21_0100

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

December 9-10, 2008

STATE: TEXAS

SHRP ID: 480100

Additional Lane: 480199

Photo 1 - Truck_1_Tractor_ 48_0100_12_09_08.jpg

Photo 2 - Truck_1_Trailer_48_0100_12_09_08.jpg

Photo 3 - Truck_1_Suspension_1_48_0100_12_09_08.jpg

Photo 4 - Truck_1_Suspension_2_48_0100_12_09_08.jpg

Photo 5 - Truck_1_Suspension_3_48_0100_10_09_08.jpg

Photo 6 - Truck_2_Tractor_Day 1_ 48_0100_12_09_08.jpg

Photo 7 - Truck_2_Trailer_Day_1_48_0100_12_09_08.jpg

Photo 8 - Truck_2_Suspension_1_Day 1_48_0100_12_09_08.jpg

Photo 9 - Truck_2_Suspension_2_Day 1_48_0100_12_09_08.jpg

Photo 10 - Truck_2_Suspension_3_Day 1_48_0100_12_09_08.jpg

Photo 11 - Truck_2_Tractor_Day_2_48_0100_12_10_08.jpg

Photo 12 - Truck_2_Trailer_Day_2_48_0100_12_10_08.jpg

Photo 13 - Truck_2_Suspension_1_Day_2_48_0100_12_10_08.jpg

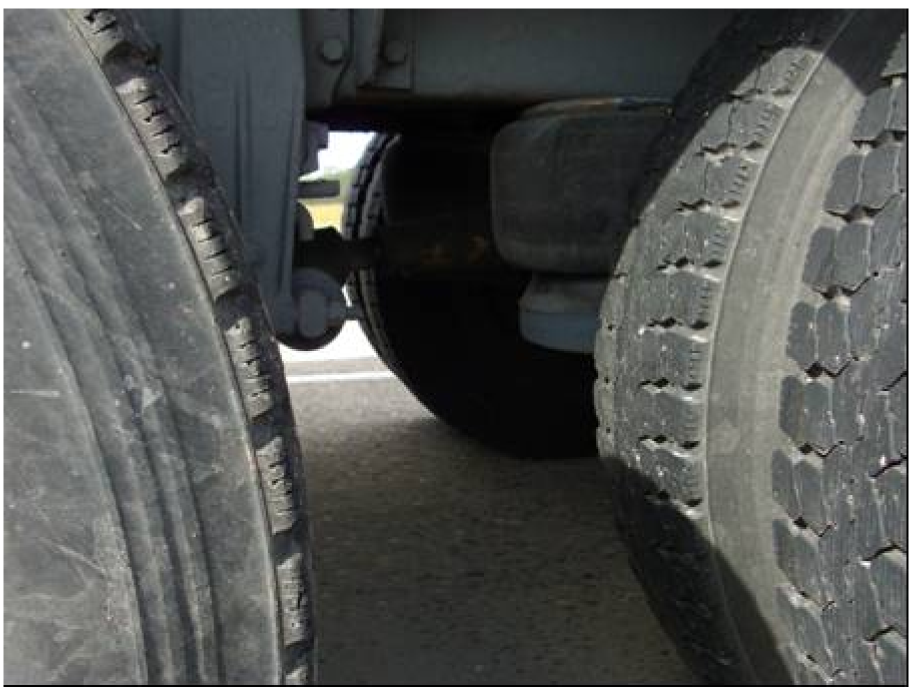

Photo 14 - Truck_2_Suspension_2_Day_2_48_0100_12_10_08.jpg

Photo 15 - Truck_2_Suspension_3_Day_2_48_0100_12_10_08.jpg

Photo 16 - Truck_3_Tractor_48_0100_12_09_08.jpg

Photo 17 - Truck_3_Trailer_48_0100_12_09_08.jpg

Photo 18 - Truck_3_Suspension_1_48_0100_12_09_08.jpg

Photo 19 - Truck_3_Suspension_2_48_0100_12_09_08.jpg

Photo 20 - Truck_3_Suspension_3_48_0100_12_09_08.jpg

Texas SPS 1

Bending Plate Sensors (LTPP Lane)

System Parameters

	December 10, 2008	December 9, 2008	November 7, 2007
Cf 1	965	965	985
Cf 2	975	975	985
Cf 3	995	995	1015