

Evaluation/Calibration Report

Florida, SPS 5

Task Order 3, CLIN 2
Visit Date: December 18, 2003

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1 Executive Summary

A visit was made to the Florida SPS-5 on December 18, 2003 for the purpose of conducting a field evaluation/calibration of the WIM system located on US Route 1, 4.5 miles North of SR 706.

The site is instrumented with Kistler quartz sensors and PAT DAW190 WIM Controller.

The validation used the following trucks:

- 1) 3S2 with air suspension tandems loaded to 76,213 lbs.
- 2) 2A with leaf spring suspension loaded to 16,127 lbs.

The speeds ranged from 44 to 56 mph. The temperatures ranged from 71.5 to 86.5 degrees Fahrenheit.

Table 1 Post-Validation results – 120500 –18 December 2003

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	± 20 percent	$3.4\% \pm 9.8\%$	Pass
Loaded tandem axles	± 15 percent	$-0.3\% \pm 7.4\%$	Pass
Gross vehicle weights	± 10 percent	$-0.6\% \pm 5.7\%$	Pass
Vehicle speed	± 1 mph [2 km/hr]	± 1.4 mph	Fail
Axle spacing length	± 0.5 ft [150 mm]	± 0.1 ft	Pass

This site meets all LTPP precision requirements except speed, which is not considered sufficient to disqualify the site as having research quality data for weight information. The classification algorithm however has yet to be corrected and thus the classification information cannot be considered of research quality.

The agency did all computations for factor adjustments and made all equipment changes. This was expected given the information on the Traffic Sheet 18 completed as part of the assessment visit held on December 4, 2003.

The pavement condition was satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area. Profile data was collected Fugro BRE, Inc., on November 12, 2003. The WIM index was exceeded at 3 locations, none of which had a significant impact on equipment performance.

There are no immediate remedial actions required to improve the precision of the weight data. The correction of the classification algorithm identified during the assessment is still outstanding.

2 Corrective Actions Recommended

No corrective actions to site equipment or WIM system components or operating parameters are required at this time to bring the weight data up to research quality.

Pavement grinding may be considered as a corrective action since the profile index values exceed the threshold value on the right side of the travel lane. There is however, no apparent affect of this discrepancy on the data currently being collected.

A correction to the system classification algorithm needs to be performed to circumvent Class 5 vehicles being classified as Class 3 vehicles. This can be achieved by reducing the minimum axle spacing of Class 5 vehicles, decreasing the maximum axle spacing of Class 3 vehicles and including weight characteristics in the classification process for these two vehicle types. The agency is aware of this problem and is taking steps to correct it. A date for the correction of this system has not been provided. This is an outstanding action from the assessment completed December 4, 2003.

3 Post Calibration Analysis

The final analysis is based on test runs conducted on the afternoon of December 18, 2003, at test site 120500 on US Route 1. These runs were conducted at the agency's request to reduce the bias for a site for which it had already been determined that research quality data was being collected. This SPS-5 site is on the southbound, 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. A five-axle tractor semi-trailer loaded to 76,213 lbs.
2. A two-axle box truck loaded to 16,120lbs.

The front axle suspension of the five-axle tractor semi-trailer consisted of two taper leaf springs. The drive tandem axles of the tractor and the axle tandem of the trailer used air suspension. Both axles of the type 2A box truck used leaf spring suspension, with 6 taper leafs on the front axle and 11 standard leafs on the rear axle.

Each truck made a total of 6 passes over the WIM scale at speeds ranging from approximately 45 to 55 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 74 to 81 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are within Table 2.

This site meets all LTPP precision requirements except speed, which is not considered sufficient to disqualify the site as having research quality data.

Table 2 Post-Validation Results - 120500 – 18 December 2003

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	± 20 percent	3.4% $\pm$ 9.8%	Pass
Loaded tandem axles	± 15 percent	-0.3% $\pm$ 7.4%	Pass
Gross vehicle weights	± 10 percent	-0.6% $\pm$ 5.7%	Pass
Vehicle speed	± 1 mph [2 km/hr]	± 1.4 mph	Fail
Axle spacing length	± 0.5 ft [150 mm]	± 0.1 ft	Pass

These test runs were conducted mid-afternoon and resulted in a very narrow 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 3 speed groups and 2 temperature groups.

The distribution of runs within these groupings is illustrated in Figure 3-1. The speed groups were divided as follows: Low speed = 45-49 mph, Medium speed = 50-54 mph and High speed = 55+ mph. The two temperature groups were created by splitting the runs between those at 74 – 78 for low temperature, 79 – 81 for High temperature.

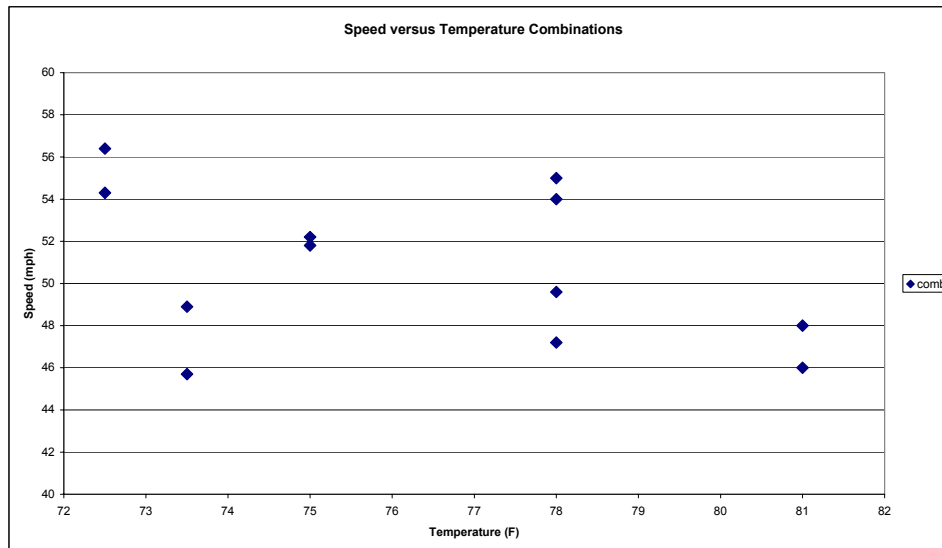


Figure 3-1 Post-Validation Speed-Temperature Distribution Graph – 120500 – 18 December 2003

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

Figure 3-2 shows the by truck GVW percent error vs. Speed graph for the population as a whole. As seen from the figure there is not sufficient data to provide any conclusions although it would appear that the error of the Class 9 is changing with speed.

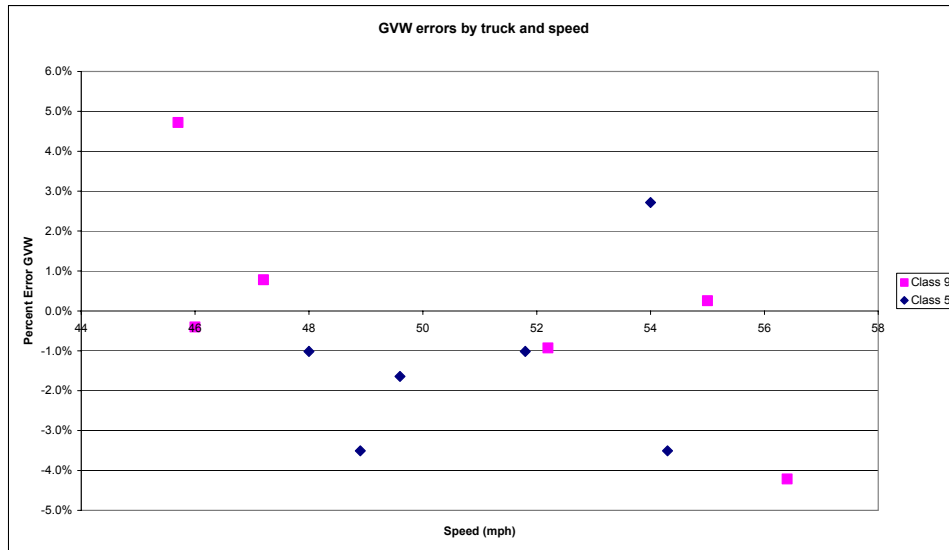


Figure 3-2 Post-validation GVW Percent Error vs. Speed by truck – 120500 – 18 December 2003

Figure 3-3 shows the relationship between temperature and GVW percentage error. It can be seen from the figure that the percent error of GVW might decrease at higher temperatures.

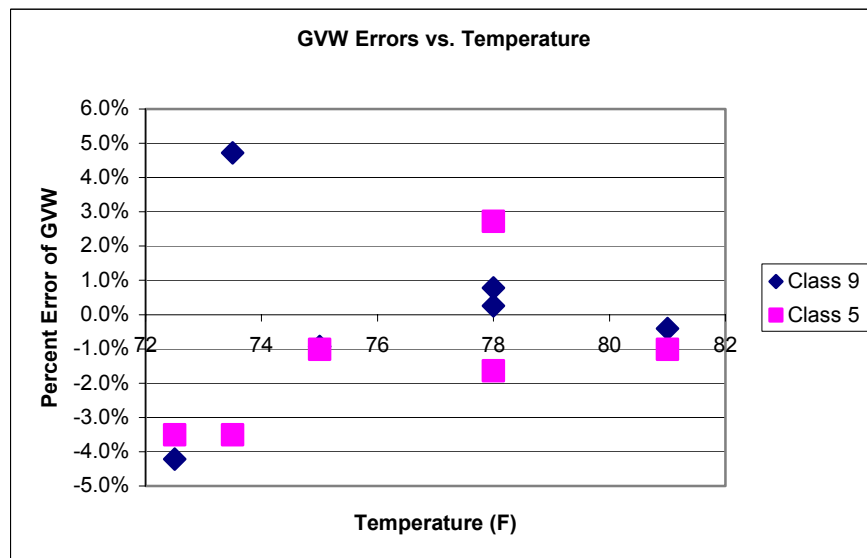


Figure 3-3 Post-Validation GVW Percent Error vs. Temperature by Truck – 120500 – 18 December 2003

Figure 3-4 shows the relationship between the spacing errors in feet and speeds. From the figure it appears that the speed does not affect the measurement of axle spacing.

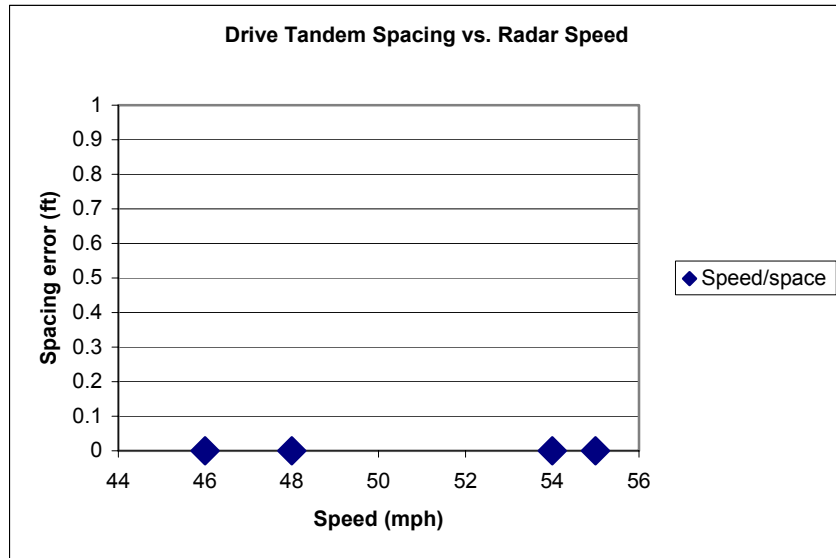


Figure 3-4 Post-Validation Speed versus spacing graph - 120500 –18 December 2003

3.1 Temperature-based Analysis

Due to the limited amount of data and the fact that no temperature dependencies showed over a wider range of temperatures in the earlier runs, no temperature-based analysis was completed.

3.2 Speed-based Analysis

In spite of the limited number of data points, a speed analysis was done to see if there was a trend as a function of the truck. The speed groups were divided as follows: Low speed = 45-49 mph, Medium speed = 50-54 mph and High speed = 55+ mph.

Table 3 Post-Validation Results by Speed Bin – 120500 – 18 December 2003

Element	95% Limit	Low Speed	Med. Speed	High Speed
Single axles	+20 %	$3.5 \pm 9.0\%$	$6.8 \pm 9.5\%$	$-1.5 \pm 17.2\%$
Tandem axles	+15 %	$1.4 \pm 9.1\%$	$-2.0 \pm 22.7\%$	$-2.0 \pm 8.5\%$
GVW	+10 %	$0.1 \pm 8.4\%$	$-0.2 \pm 6.3\%$	$-2.5 \pm 10.3\%$
Speed	± 1 mph	N/A	N/A	N/A
Axle spacing	± 0.5 ft	N/A	N/A	N/A

There were not enough comparison radar speeds for this data set to generate speed precision information by speed group. Additionally, the limited number of drive tandems provided insufficient data to calculate axle spacing precision by speed group.

The individual speed groups as shown in Figure 3-5 are too small to definitively identify a trend although it would appear that higher speeds have poorer results when viewed in conjunction with the actual statistics in Table 3.

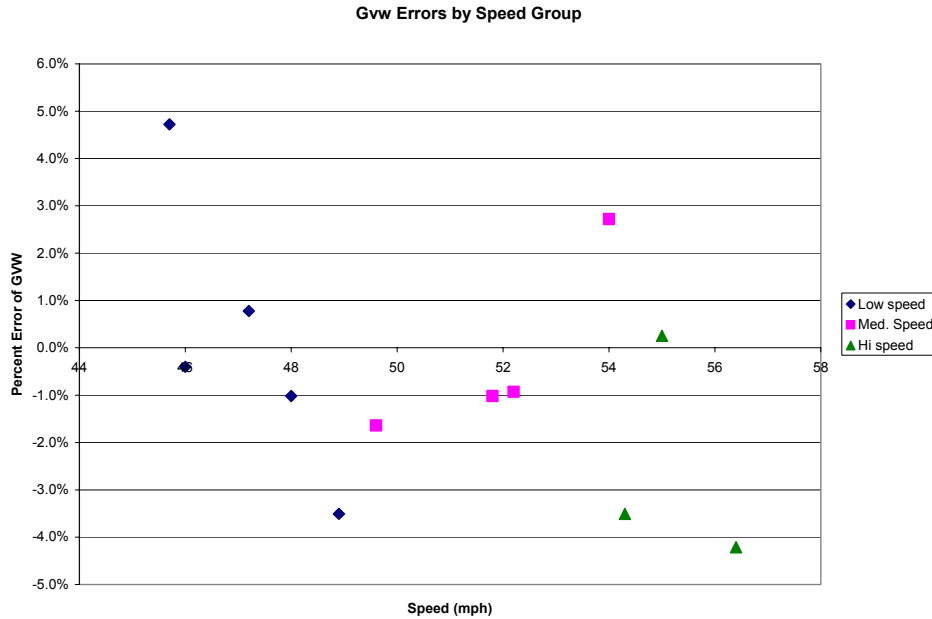


Figure 3-5 Post-Validation GVW Percent Error vs. Speed group - 120500 –18 December 2003

The why of the change is more clearly explained when looking at Figure 3-6. The errors for the heavier truck, the Class 9, definitely trend down in magnitude. As this pattern was observed both in the initial runs and at the SPS-1 where the pavement smoothness was different, this change should be attributed to the truck rather than the site.

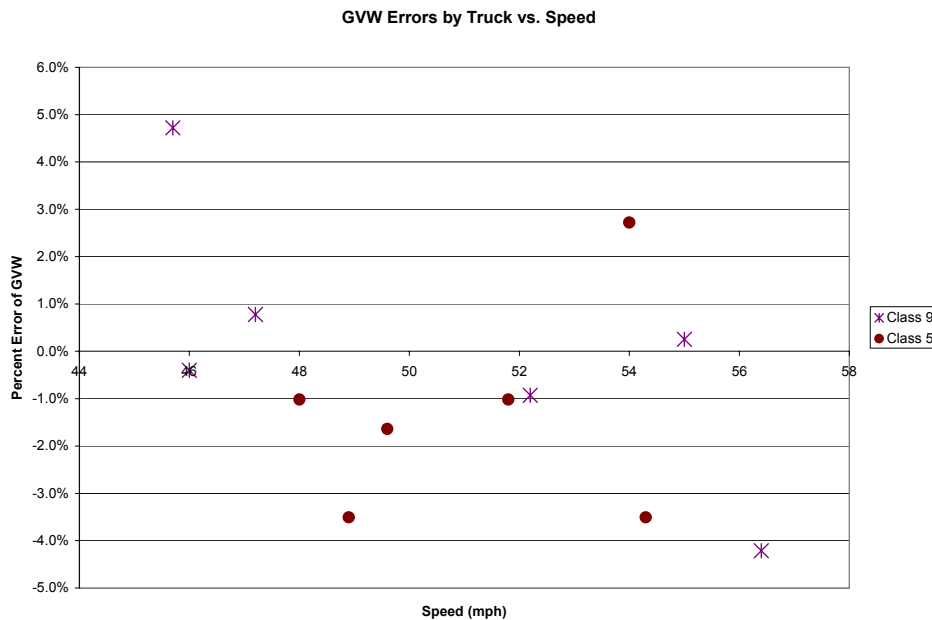


Figure 3-6 Post-Validation GVW Percent Error vs. Speed by Truck – 120500 – 18 December 2003

The steering axle graph in Figure 3-7 shows a trend of increasing errors with speed and then potentially a drop or the last point may just be an outlier. The meaning is subject to individual interpretation.

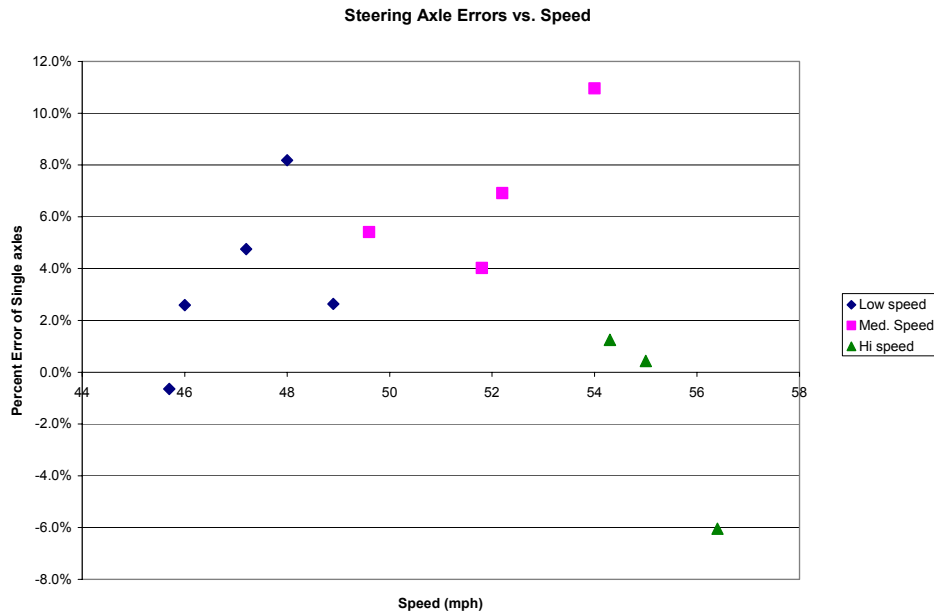


Figure 3-7 Post-Validation Steering Axle Percent Error vs. Speed group - 120500 – 18 December 2003

Figure 3-8, looking a steering axles by truck shows a pattern where the errors for the Class 5 are larger than those of the Class 9 throughout the speed range.

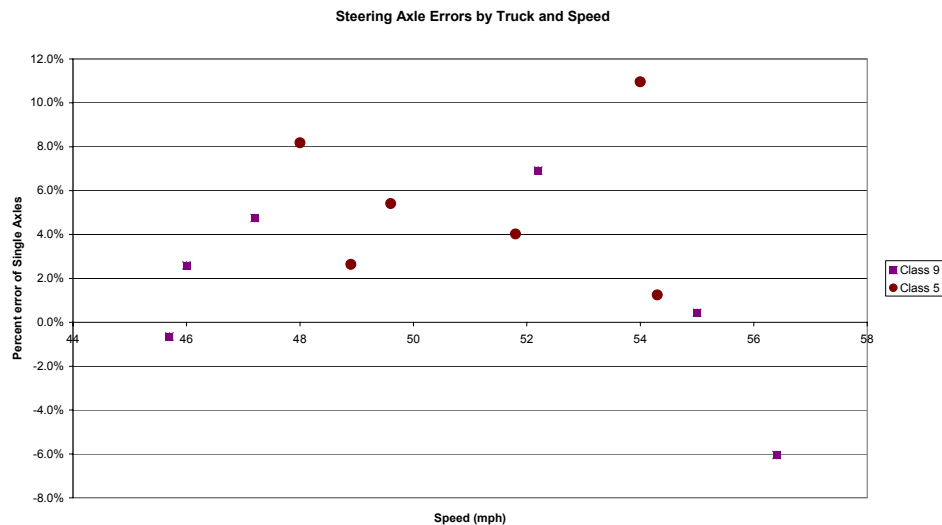


Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by truck - 120500 – 18 December 2003

4 Pavement Discussion

The pavement smoothness did not contribute to out-of-range results.

The pavement condition did not 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. The Long Range Index (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 short Range Index (SRI) incorporates a shorter section of pavement profile beginning 2.7 m prior to the WIM scale and ending 0.5 m after the scale.

Profile data collected at the SPS WIM location by Fugro BRE Inc., on November 12, 2003 were processed through the LTPP SPS WIM Index software. This WIM scale is installed on an asphalt concrete pavement. The results are shown in Table 4.

A total of 7 profiler passes were conducted over the WIM site. Since the issuance of the LTPP directive on collection of longitudinal profile data for SPS WIM section, the requirements have been a minimum of 3 passes in the center of the lane and one shifted to each side. For this site the RSC has done 4 passes at the center of the lane, 1 pass shifted to the left side of the lane, and 2 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).

Table 4 shows the computed index values for all the 7 profiler passes for this WIM site. The average values over the passes at each path were also calculated when three or more passes are completed. These are shown in the right most column of the table. Values above the index limits are presented in italics.

Table 4 Long Range Index (LRI) and Short Range Index (SRI)

Profiler Passes			Pass 1	Pass 2	Pass 3	Pass 4	Ave.
Center	LWP	LRI (m/km)	0.636	0.638	0.519	0.576	0.592
		SRI (m/km)	0.402	0.437	0.225	0.371	0.359
	RWP	LRI (m/km)	0.567	0.615	0.626	0.681	0.622
		SRI (m/km)	0.480	0.600	0.572	0.627	0.570
Left Shift	LWP	LRI (m/km)	0.555				
		SRI (m/km)	0.454				
	RWP	LRI (m/km)	0.509				
		SRI (m/km)	0.348				
Right Shift	LWP	LRI (m/km)	0.734	0.591			
		SRI (m/km)	0.638	0.416			
	RWP	LRI (m/km)	<i>0.806</i>	<i>0.866</i>			

Profiler Passes			Pass 1	Pass 2	Pass 3	Pass 4	Ave.
		SRI (m/km)	1.288	0.618			

There are only 3 locations at which the WIM Index value of 0.789 m/km is exceeded as can be seen in the table. When all values are less than 0.789 it is presumed unlikely that pavement conditions will significantly influence sensor output. Values above that level may or may not influence the reported weights and potentially vehicle spacings. Since the values above the threshold are in the right wheel path in the extreme right side of the lane, grinding can be considered as a potential remediation option.

4.2 Distress survey and any applicable photos

A visual distress survey of the pavement 425 feet prior to and 75 feet following the WIM scale area was conducted. No significant rutting was discovered nor were there other distresses that would influence the dynamics of truck traffic as it passes over the WIM scales. Pavement distress that was discovered, but determined not to significantly influence the dynamics of truck traffic were two prior WIM equipment installations that have been abandoned. Both of these areas have been sufficiently repaired to apparently eliminate any negative effect on truck dynamics.

4.3 Vehicle-pavement interaction discussion

During pavement-truck interaction surveys, no discernable truck dynamics such as swerving, bouncing, sudden accelerating or decelerating was discovered. All traffic appeared to travel in the center of the lane.

5 Equipment Discussion

The traffic monitoring equipment at this location includes Kistler quartz sensors and a DAW190 WIM Controller. These 6 ft long sensors are installed in a staggered configuration in asphalt concrete pavement 12 feet apart. The roadway outside this short section is asphalt.

There were no changes in basic equipment operating condition since the assessment on December 4, 2003.

5.1 Pre-Evaluation Diagnostics

A complete electronic and electrical check of all system components including in-road sensors, solar panel and charging circuit and telephone service were performed immediately prior to the evaluation. All sensors and system components were found to be in working order.

A complete visual inspection of all WIM system and support components was also performed. All components were found to be in excellent 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.

5.3 Historical calibration information

This site has validation information from previous visits as follows:

Table 5 Classification Validation History - 120500 –18 December 2003

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
07/10/2003	No data is available					

Table 6 Weight Validation History - 120500 –18 December 2003

Date	Method	Mean Error and SD		
		GVW	Single Axles	Tandem Axles
07/10/2003	Traffic Stream (Static Scale)	0.9_2.5	4.1_3.1	0.4_3.3

There is no calibration factor information available prior to this evaluation.

5.4 Projected Maintenance/Replacement Requirements

No maintenance activities are recommended beyond that customarily implemented by the agency or suggested by the manufacturer.

There are no replacements of equipment or sensors required.

The classification algorithm modification has been recommended previously.

6 Pre-Validation Analysis

The initial analysis is based on test runs conducted December 18, 2003 at from late morning to early afternoon at test site 120500 on US Route 1, 4.5 miles North of SR 706.

For the initial validation each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 45 to 55 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 71 to 86 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are within Table 7.

This site meets all LTPP precision requirements except speed, which is not considered sufficient to disqualify the site as having research quality data.

Table 7 Pre-Validation Results - 120500 –18 December 2003

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	± 20 percent	$-6.6\% \pm 7.6\%$	Pass
Loaded tandem axles	± 15 percent	$-5.4\% \pm 4.8\%$	Pass
Gross vehicle weights	± 10 percent	$-5.9\% \pm 4.0\%$	Pass
Vehicle speed	± 1 mph [2 km/hr]	1.6 mph	Fail
Axle spacing length	± 0.5 ft [150 mm]	0.1 ft	Pass

The test runs period resulted in a very narrow range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into 3 speed groups and 2 temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The speed groups were divided as follows: Low speed = 43-48 mph, Medium speed = 49-53 mph and High speed = 54+ mph. The two temperature groups were created by splitting the runs between those at 71 – 76 for low temperature, 77 – 87 for High temperature. The latter while not exactly an even division of points is reasonable in view of the groupings of Figure 6-1.

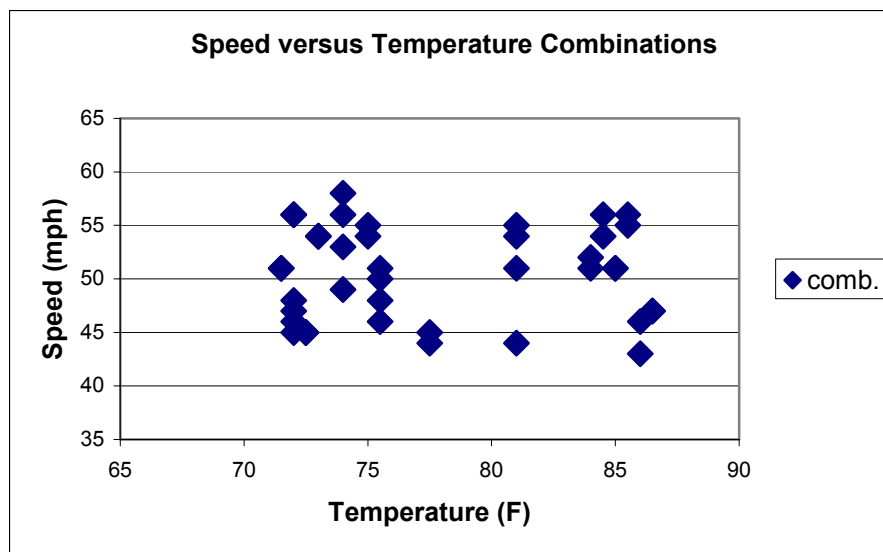


Figure 6-1 Pre-Validation Speed -Temperature Distribution Graph – 120500 – 18 December 2003

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

Figure 6-2 shows the by truck GVW percent error vs. Speed graph for the population as a whole. The data collected prior to the evaluation is probably biased with an underestimate of weights. As seen from the figure the percent error in GVW for Class 5 is possibly

decreasing with increase in speed. However, for Class 9 the speed does not appear to have a significant effect on bias, but may affect the precision of the information.

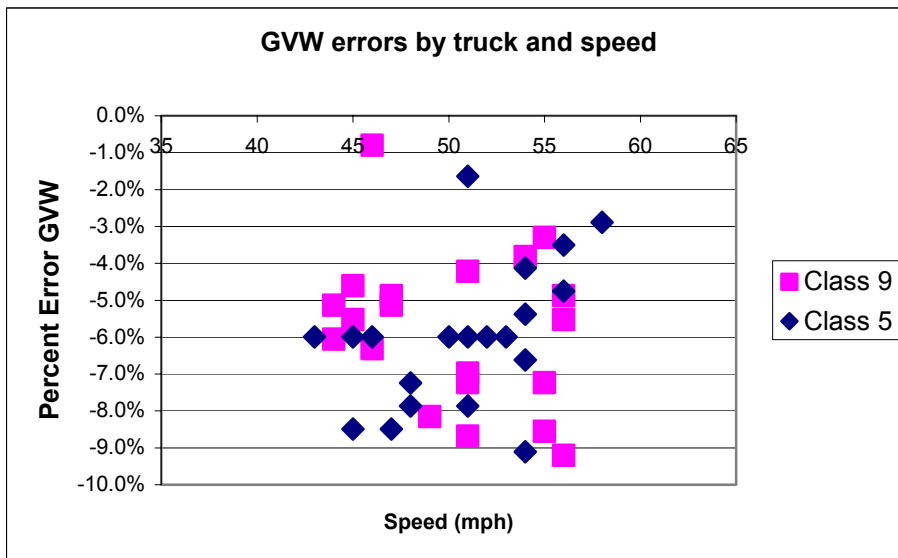


Figure 6-2 Pre-validation GVW Percent Error vs. Speed by truck– 120500 –18 December 2003

Figure 6-3 shows the relationship between temperature and GVW percentage error. From the figure it appears that the temperature does not have any discernable effect on the percent error in GVW.

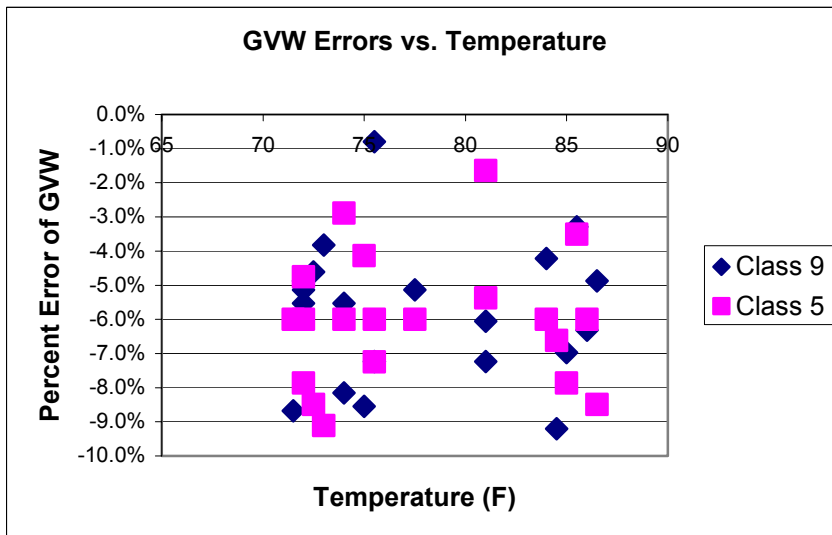


Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature by Truck – 120500 18 December 2003

Figure 6-4 shows the relationship between the spacing errors in feet and speeds. The figure shows that the speed does not have any particular effect on the measurement of axle spacing.

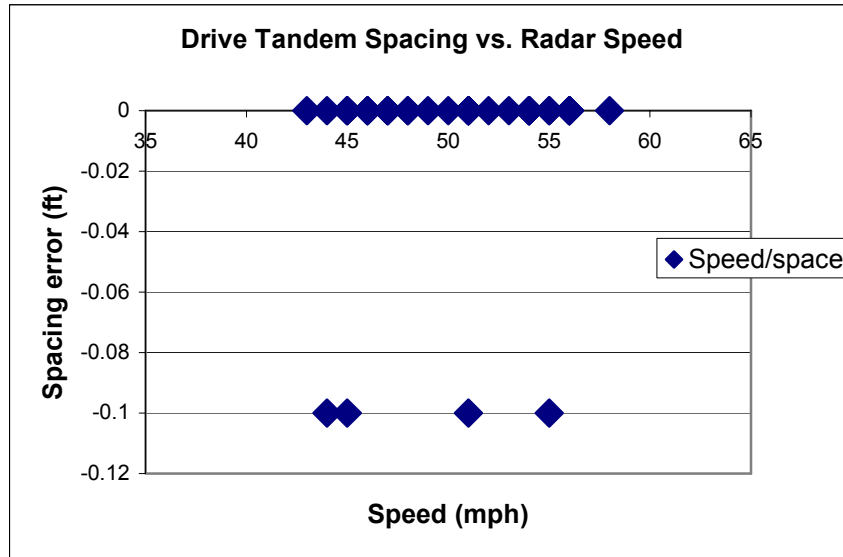


Figure 6-4 Pre-Validation Speed versus spacing graph - 120500 –18 December 2003

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 71 – 76 for Low temperature, 77 – 87 for High temperature.

Table 8 Pre-Validation Results by Temperature Bin – 120500 – 18 December 2003

Element	95% Limit	Low Temp.	Med. Temp.	High Temp.
Single axles	$\pm 20\%$	$-6.9\% \pm 7.6\%$	N/A	$-6.2\% \pm 8.4\%$
Tandem axles	$\pm 15\%$	$-5.4\% \pm 5.5\%$	N/A	$-5.4\% \pm 4.3\%$
GVW	$\pm 10\%$	$-6.0\% \pm 4.3\%$	N/A	$-5.8\% \pm 4.0\%$
Speed	± 1 mph	± 1.6 mph	N/A	± 1.7 mph
Axle spacing	± 0.5 ft	± 0.5 ft	N/A	± 0.1 ft

From Table 8, Figure 6-5 and Figure 6-6. It appears that the temperature does not have significant effect on the percent error in GVW.

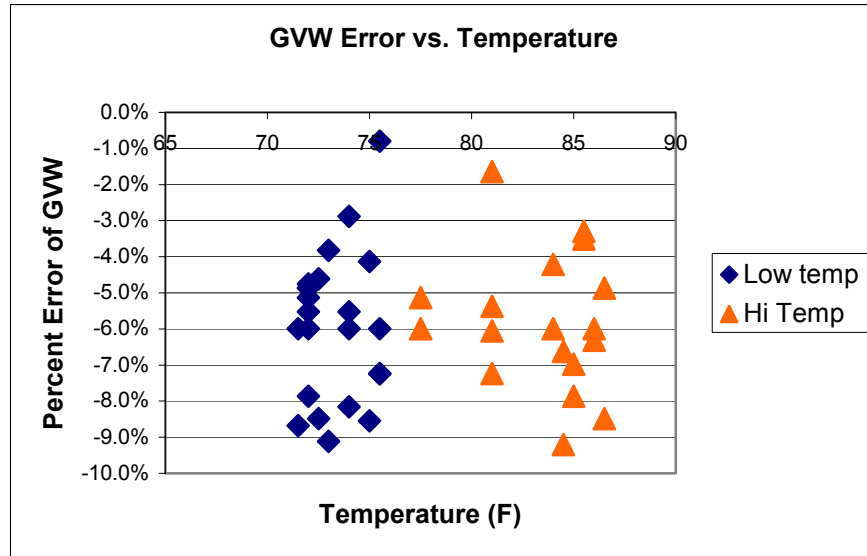


Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Group – 120500–18 December 2003

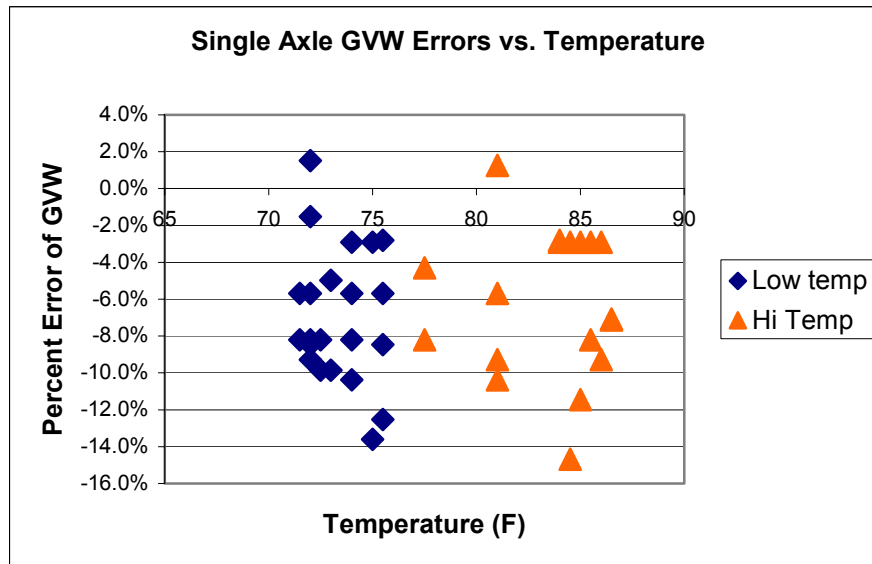


Figure 6-6 Pre-Validation Steering Axle error vs. Temperature by group - 120500 –18 December 2003

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed = 43-48 mph, Medium speed = 49-53 mph and High speed = 54+ mph.

From Table 9 it would appear that there is no particular trend in bias or variability with speed.

Table 9 Pre-Validation Results by Speed Bin - 120500 –18 December 2003

Element	95% Limit	Low Speed	Med. Speed	High Speed
Single axles	$\pm 20\%$	$-6.2\% \pm 7.3\%$	$-5.9\% \pm 9.0\%$	$-7.6\% \pm 8.6\%$
Tandem axles	$\pm 15\%$	$-4.7\% \pm 4.5\%$	$-6.6\% \pm 5.2\%$	$-5.4\% \pm 5.4\%$
GVW	$\pm 10\%$	$-5.9\% \pm 4.0\%$	$-6.3\% \pm 4.4\%$	$-5.6\% \pm 4.7\%$
Speed	± 1 mph	<u>2.1 mph</u>	1.8 mph	1.3 mph
Axle spacing	± 0.5 ft	0.1 ft	0.1 ft	0.1 ft

In Figure 6-7 the precision may slightly increase with speed but not without removing the outliers for low and medium speed from the calculations.



Figure 6-7 Pre-Validation GVW Percent Error vs. Speed group - 120500 –18 December 2003

In Figure 6-8 it appears that the percent error in GVW for Class 9 is not significantly affected with speed. However, for Class 5 the error may slightly decrease with increases in speed.

In contrast a distinct trend with speeds for single axle weights appears in Figure 6-9. As speeds increase the size of the under estimate appears to increase. The trend is driven by the error estimates of the Class 9 vehicles as shown in Figure 6-10. Whether this is site or vehicle related would not normally be subject to determination. However the same vehicle, with a different weight was used earlier in the week at a different site and a similar trend emerged even with different smoothness characteristics.

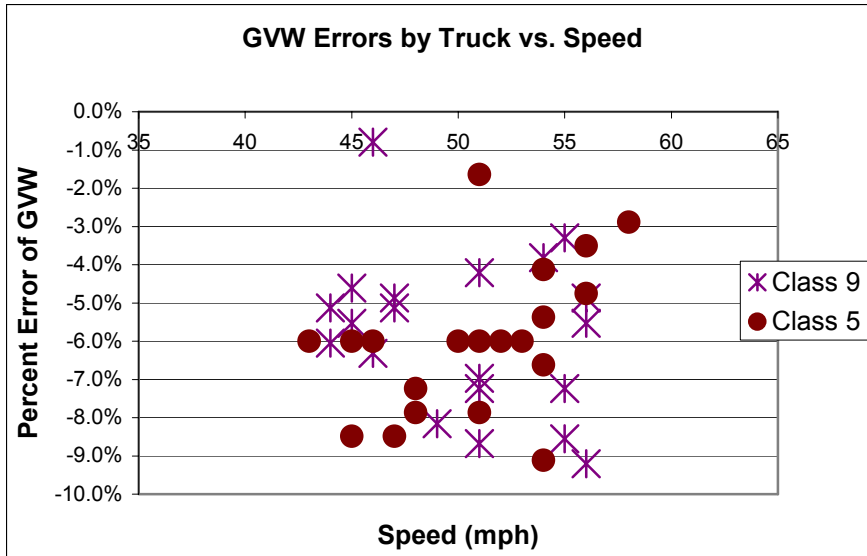


Figure 6-8 Pre-Validation GVW Percent Error vs. Speed by Truck – 120500 – 18 December 2003

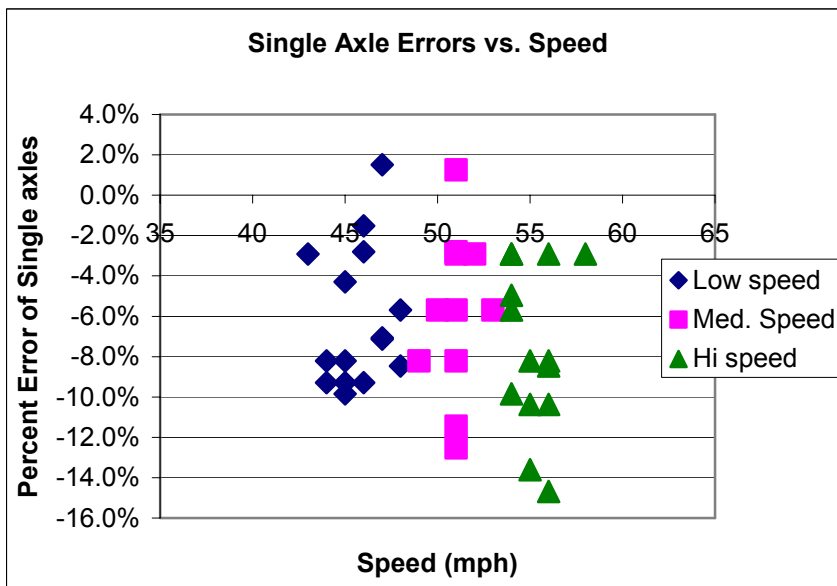


Figure 6-9 Pre-Validation Steering Axle Percent Error vs. Speed group - 120500 – 18 December 2003

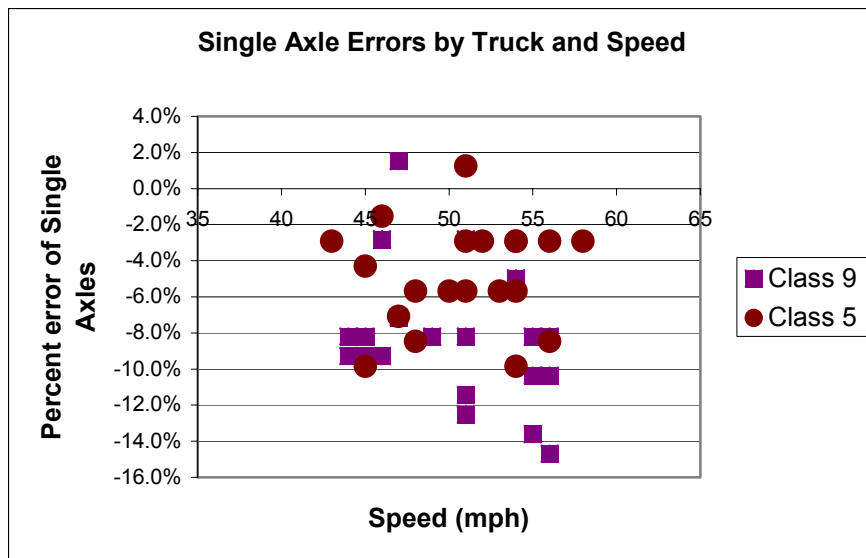


Figure 6-10 Pre-Validation Steering Axle Percent Error vs. Speed by truck - 120500 –18 December 2003

7 Data Availability and Quality

As of December 25, 2003 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 10. 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 1994, 1997, 1998, 2000 and 2001 have a sufficient quantity of classification data and 1998 and 1999 have a sufficient quantity of weight data to be considered complete years of data. In the absence of previously gathered validation information it can be seen that at least 5 years of research quality data are needed to meet the goal of a minimum of 5 years of research weight data.

Table 10 Amount of Traffic Data Available 120500 –18 December 2003

Year	Class Days	Months	Coverage	Weight Days	Months	Coverage
1991	32	3	Complete Week	14	2	Complete Week
1992	183	8	Complete Week	21	3	Complete Week

Year	Class Days	Months	Coverage	Weight Days	Months	Coverage
1993	N/A	N/A	N/A	7	2	Week Days and Weekend
1994	244	8	Complete Week	15	2	Complete Week
1995	57	2	Complete Week	N/A	N/A	N/A
1996	98	5	Complete Week	87	7	Complete Week
1997	280	11	Complete Week	21	3	Complete Week
1998	347	12	Complete Week	357	12	Complete Week
1999	257	9	Complete Week	270	9	Complete Week
2000	362	12	Complete Week	31	1	Complete Week
2001	355	12	Complete Week	N/A	N/A	N/A

Class 5's constitute more than 60 percent of the truck population. Based on the data collected from the end of the last calibration iteration the following are the expected values for the populations. The precise values 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.

There is not sufficient information to provide comments on key values for use in evaluating GVW graphs for Class 9 vehicles. The Class 5 is the dominant truck at this site.

Table 11 GVW Characteristics of Major sub-groups of Trucks - 120500 –18 December 2003

	Class 9	Class 5
Percentage Overweights	N/A	0
Percentage Underweights	N/A	N/A
Unloaded Peak	N/A	N/A
Loaded Peak	N/A	16,000 lbs

The percentage of overweights for Class 5s was based on 40,000 pounds. Since the minimum weight for Class 5s in the algorithm used is 1,000 pounds and the minimum bin size for GVW is 4,000 pounds an underweight percentage could not be established. There is only one significant peak based on data collected after the last adjustments as shown in Figure 7-1. It is defined to be the loaded peak.

The expected percentage unclassified is Zero.

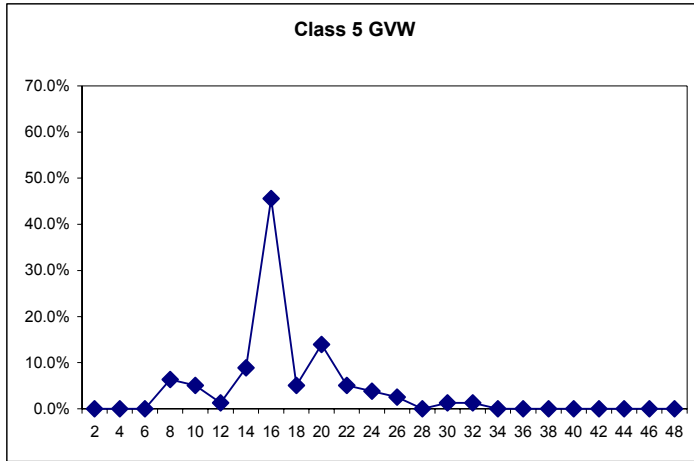


Figure 7-1 Graph of Expected GVW distribution Class 5 – 120500 –18 December 2003

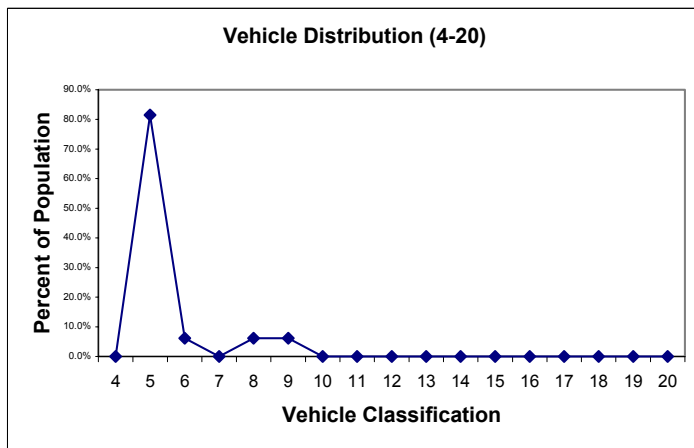


Figure 7-2 Expected vehicle distribution - 120500 – 18 December 2003

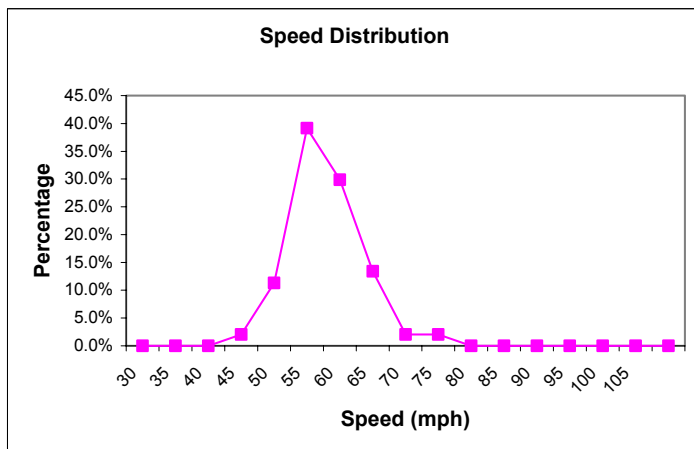


Figure 7-3 Expected speed distribution - 120500 –18 December 2003

8 Data Sheets

The following is a listing of data sheets incorporated in this report in Appendix A:

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

Sheet 19 – Truck 2 – Class 5 (4 pages)

Sheet 20 – Speed verification pre-validation (2 pages)

Sheet 20 – Classification verification – pre-validation (2 pages)

Sheet 21 – Pre-validation (5 pages)

Sheet 21 – Post-validation (2 pages)

9 Updated handout guide and Sheet 17

A copy of the handout has been included following page 20. 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 Updated Sheet 18.

HANDOUT GUIDE FOR SPS WIM EVALUATION

STATE: Florida

SHRP ID: 0500

1.	General Information.....	1
2.	Contact Information.....	1
3.	Agenda	1
4.	Site Location/ Directions	2
5.	Truck Route Information	3
6.	Sheet 17 – Florida (120500)	4

Figures

Figure 4.1: Site 120500 in Florida	2
Figure 5.1: Truck Route Map of 120500	3
Figure 6.1: Site Map of 120500	8

1. General Information

SITE ID: *120500*

LOCATION: *US 1 South, 4.5 miles North of SR 706*

VISIT DATE: *December 18, 2003*

VISIT TYPE: *Evaluation*

2. Contact Information

POINTS OF CONTACT:

Assessment Team: *Dean J. Wolf, 301-210-5105, djwolf@mactec.com*
Charlie R. Copeland, 301-210-5105,
crcopeland@mactec.com

Highway Agency: *Walton Jones, 850-414-4726, walton.jones@dot.state.fl.us*
Mike Leggett, 850-414-4727, Michael.Leggett@dot.state.fl.us

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

FHWA Division Office Liaison: *Greg Schiess, 850-942-9650, Ext. 3023,*
greg.scheiss@fhwa.dot.gov

LTPP SPS WIM WEB PAGE: <http://www.tfhr.gov/pavement/ltp/spstraffic/index.htm>

3. Agenda

BRIEFING DATE: *No briefing scheduled.*

ONSITE PERIOD: *December 18, 2003*

TRUCK ROUTE CHECK: *Completed (See Truck Route).*

4. Site Location/ Directions

NEAREST AIRPORT: *Palm Beach International Airport, West Palm Beach, Florida or Fort Lauderdale/Hollywood International Airport, Fort Lauderdale, Florida.*

DIRECTIONS TO THE SITE: *4.5 miles north of SR 706, near Tequesta.*

MEETING LOCATION: *On Site – 8:00 a.m., December 18th, 2003*

WIM SITE LOCATION: *US 1 (Latitude: 26.99734; Longitude: -80.09726)*

WIM SITE LOCATION MAP: *See Figure 4.1*

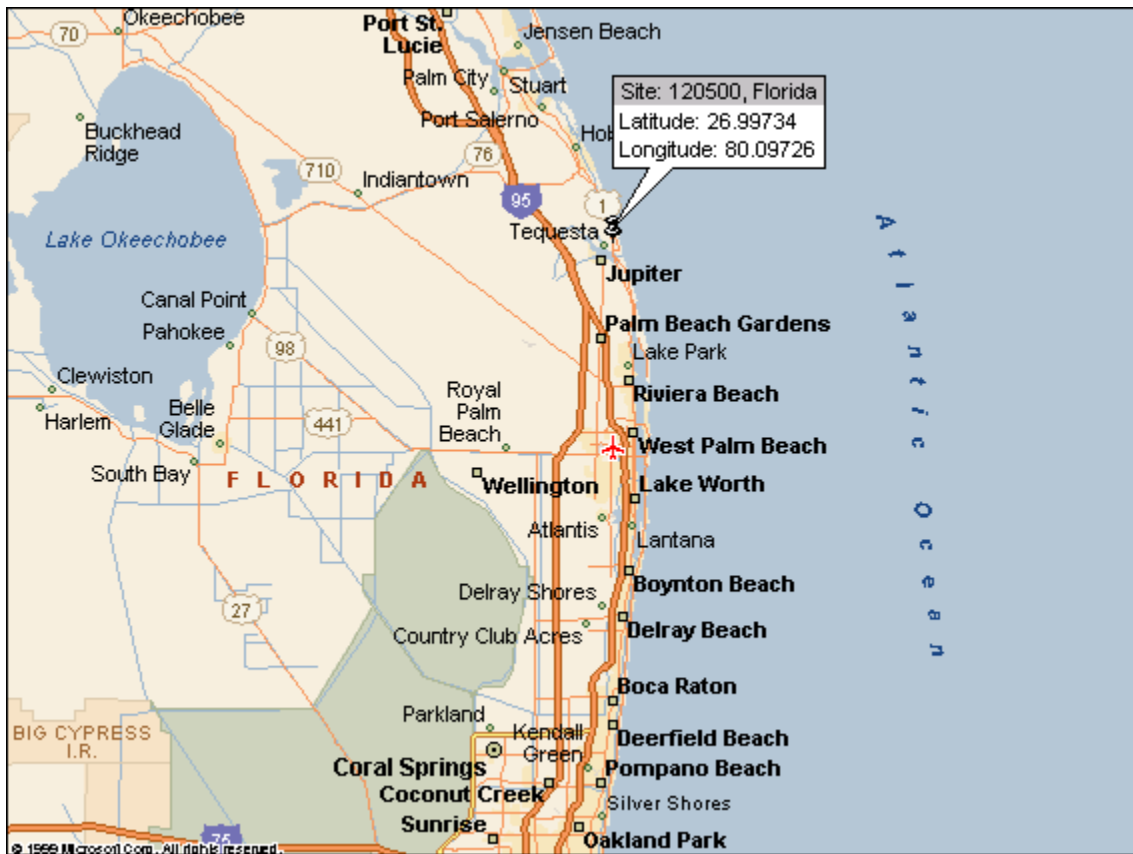


Figure 4.1: Site 120500 in Florida

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *Brown Mayflower Moving and Storage, 1900 Old Okeechobee Rd., West Palm Beach, FL. \$10.00 per run, open M-F, 8:00am to 4:45pm. Contact – Henry Wilkinson, 561-686-1400. Located off of Okeechobee Blvd.*

TRUCK ROUTE:

- *Northbound Turnaround: 1.779 miles from the site (27° 00.783' North and 80° 06.246' West).*
- *Southbound Turnaround: 0.52 miles from site (26° 59.399' North and 80° 05.659' West).*

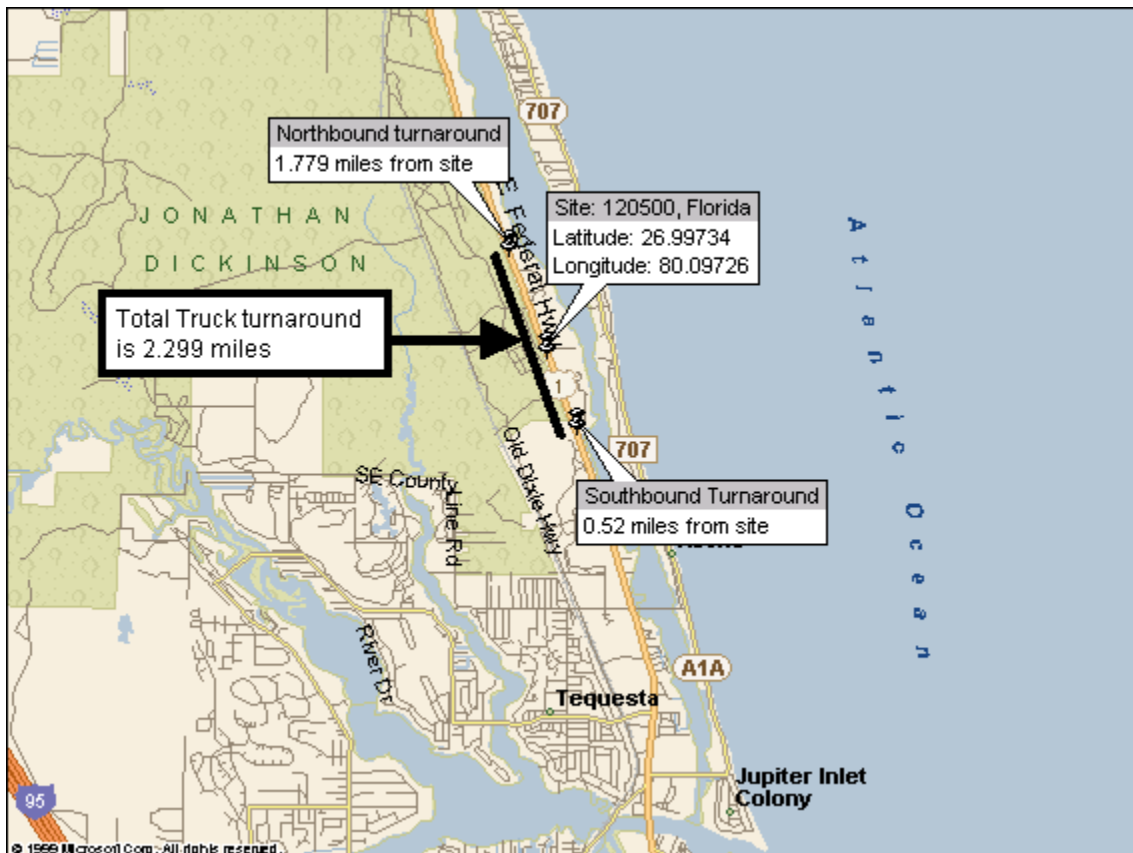


Figure 5.1: Truck Route Map of 120500

6. Sheet 17 – Florida (120500)

1.* ROUTE US 1 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 0 5 5 4
Distance from sensor to nearest upstream SPS Section 1 8 2 ft

3.* LANE CONFIGURATION

Lanes in LTPP direction 2

Lane width 1 2 ft

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

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

Shoulder width 4 ft

4.* PAVEMENT TYPE Asphalt Concrete

5.* PAVEMENT SURFACE CONDITION – Distress Survey

Date 12-04-03 Distress Map Photo Filename

Downstream TO_2_12_13A_0500_12_04_03.JPG

Date 12-04-03 Distress Map Photo Filename

Upstream_TO_2_12_13A_0500_12_04_03.JPG

Date _____ Distress Map Filename _____

6.* SENSOR SEQUENCE Quartz Sensor – Loop – Quartz Sensor

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

8. RAMPS OR INTERSECTIONS

Intersection/driveway within 300 m upstream of sensor location Y / N
distance _____

Intersection/driveway within 300 m downstream of sensor location Y / N
distance _____

Is shoulder routinely used for turns or passing? Y / N

9. DRAINAGE (*Bending plate and load cell systems only*)

1 – Open to ground
2 – Pipe to culvert
3 – None

Clearance under plate . in

Clearance/access to flush fines from under system Y / N

10. * CABINET LOCATION

Same side of road as LTPP lane Y / N Median Y / N Behind barrier Y / N
Distance from edge of traveled lane 3 2 ft
Distance from system 0 ft
TYPE 334 B

CABINET ACCESS controlled by LTPP / STATE / JOINT

Contact - name and phone number Kip Jones (850) 414-4726

Alternate - name and phone number Michael Leggett (850) 414-4726

11. * POWER

Distance to cabinet from drop 5 ft Overhead / underground / solar /
AC in cabinet?
Service provider _____ Phone number _____

12. * TELEPHONE

Distance to cabinet from drop 2 0 ft Overhead / under ground / cell?
Service provider _____ Phone Number _____

13.* SYSTEM (software & version no.)- PAT DAW 190 Ver. 3.18 4/2/03
Computer connection – RS232 / Parallel port / USB / Other _____

14. * TEST TRUCK TURNAROUND time 6 minutes DISTANCE 3.4 mi.

15. PHOTOS

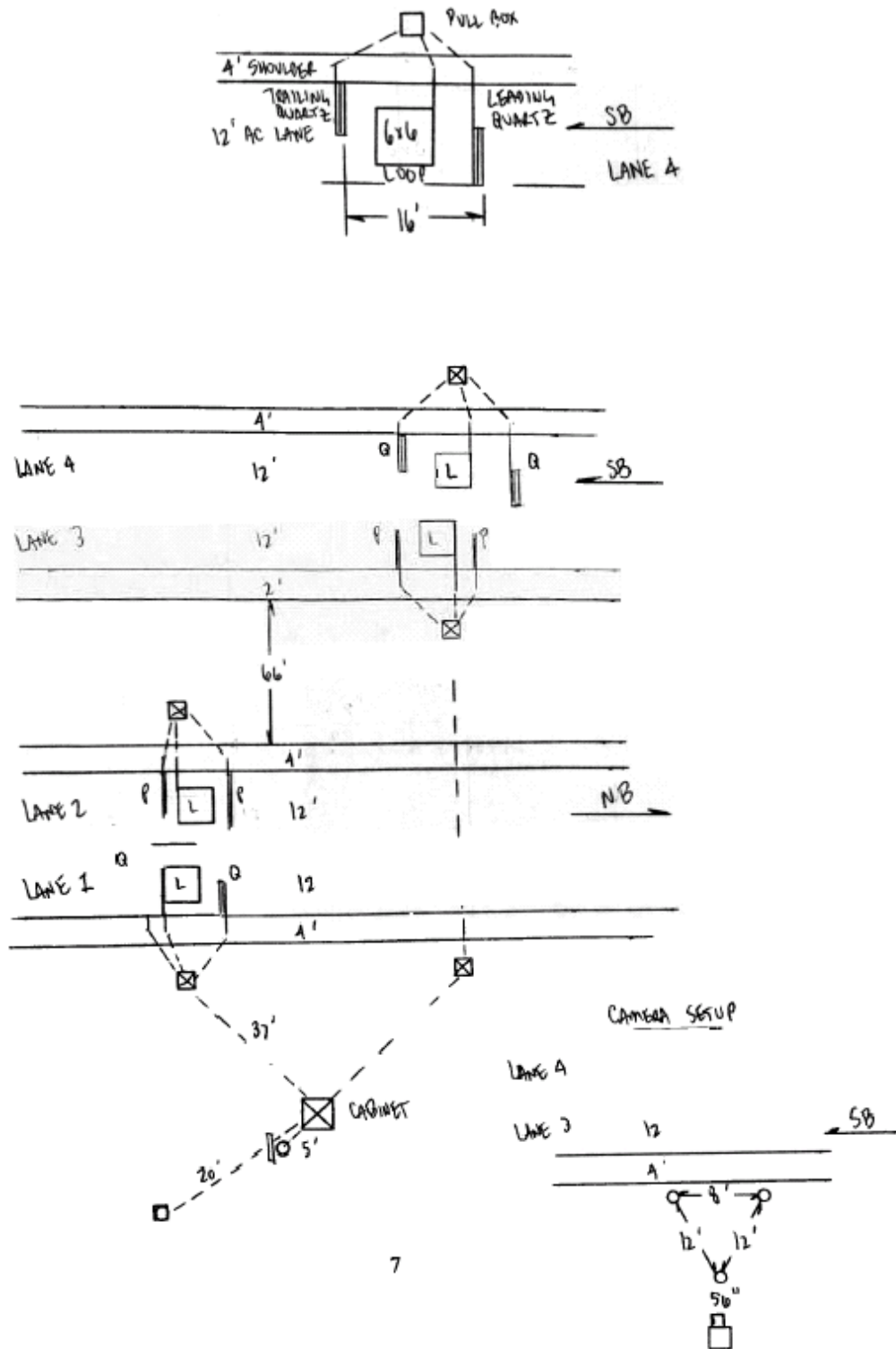
FILENAME

Power source Solar_Panels_TO_2_12_13A_0500_12_04_03.JPG
Phone source Telephone_Drop_TO_2_12_13A_0500_12_04_03.JPG
Cabinet exterior _____
Cabinet interior Cabinet_Interior_1_TO_2_12_13A_0500_12_04_03.JPG
Weight sensors Leading_Quartz_Sensor_TO_2_12_13A_0500_12_04_03.JPG
Classification sensors Loop_Sensor_TO_2_12_13A_0500_12_04_03.JPG
Other sensors _____
Description _____
Downstream direction at sensors on LTPP lane _____
Downstream TO_2_12_13A_0500_12_04_03.JPG
Upstream direction at sensors on LTPP lane _____
Upstream TO_2_12_13A_0500_12_04_03.JPG

[illegible]

PHONE 301-210-5105 DATE COMPLETED 1 2 / 1 8 / 2 0 0 3

Sketch of equipment layout



Site Map



Figure 6.1: Site Map of 120500



Downstream_TO_2_12_13A_0500_12_04_03.JPG (Distress Photo 1)



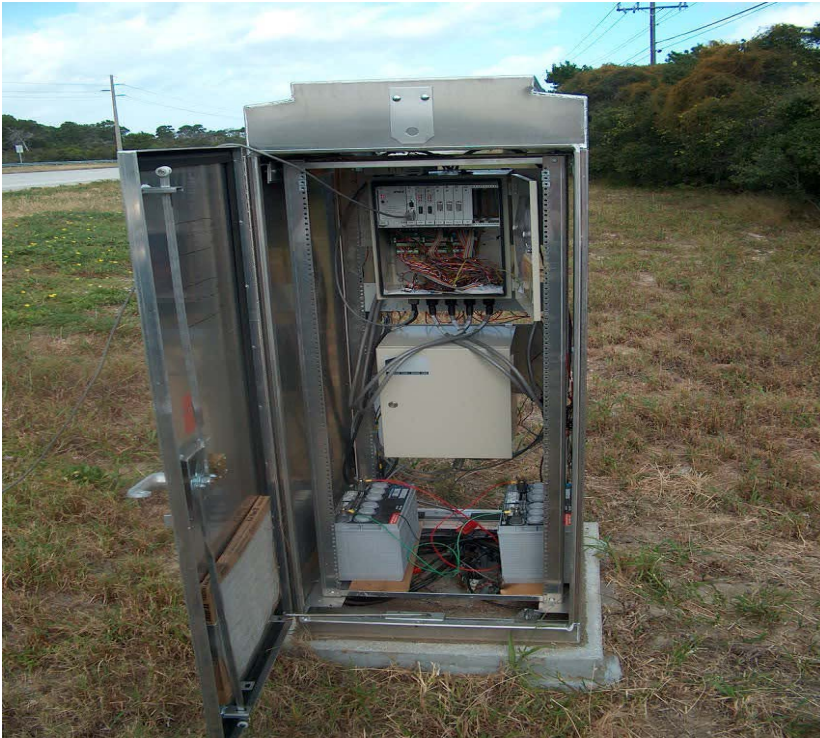
Upstream_TO_2_12_13A_0500_12_04_03.JPG (Distress Photo 2)



Solar_Panels_TO_2_12_13A_0500_12_04_03.JPG



Telephone_Drop_TO_2_12_13A_0500_12_04_03.JPG



Cabinet_Interior_1_TO_2_12_13A_0500_12_04_03.JPG



Leading_Quartz_Sensor_TO_2_12_13A_0500_12_04_03.JPG



Loop_Sensor_TO_2_12_13A_0500_12_04_03.JPG



Downstream_TO_2_12_13A_0500_12_04_03.JPG



Upstream_TO_2_12_13A_0500_12_04_03.JPG

WIM SITE COORDINATION

SPS Project_ID _0 _5 _0 _0

- Trucks – air suspension 3S2 State / LTPP
 2nd common State / LTPP
 Loads State / LTPP
 Drivers State / LTPP

Contractors with prior successful experience in WIM calibration in state:

_____ FTE, DTS, MACTEC, Inc. _____

- Profiling – straight edge -- permanent / temporary site marking
 -- long wave – permanent / temporary site marking
- Pre-visit data
 – Classification and speed: Contact ____Richard Reel__ (850) 414 4709 ____
 -- Equipment operational status: Contact ____Michael Leggett (850) 414-4727 ____
- Access to cabinet
 State only / Joint / LTPP Key / Combination
- State personnel required on site Y / N
Contact information _____ Kip Jones (850) 414-4726 _____
- Enforcement Coordination required Y / N
Contact information _____
- Traffic Control Required Y / N
Contact information _____
- Authorization to calibrate site -- State only / LTPP
- Special conditions _____

6. Special conditions

- Funds and accountability
- Reports
- Other

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [9 9 2 1] *STATE CODE [1 2] *SHRP SECTION ID [0 5 0 0]
--	--

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [12 / 18 / 2 0 0 3]

2. * TYPE OF EQUIPMENT CALIBRATED [] WIM [] CLASSIFIER [XX] BOTH

3. * REASON FOR CALIBRATION

[] REGULARLY SCHEDULED SITE VISIT

[] RESEARCH

[] EQUIPMENT REPLACEMENT

[] TRAINING

[] DATA TRIGGERED SYSTEM REVISION

[] NEW EQUIPMENT INSTALLATION

[XX] OTHER (SPECIFY) [] SITE ASSESSMENT

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):

[] BARE ROUND PIEZO CERAMIC

[] BARE FLAT PIEZO

[] BENDING PLATES

[] CHANNELIZED ROUND PIEZO

[] LOAD CELLS

[XX] QUARTZ PIEZO

[] CHANNELIZED FLAT PIEZO

[XX] INDUCTANCE LOOPS

[] CAPACITANCE PADS

[] OTHER (SPECIFY)

5. EQUIPMENT MANUFACTURER [] PAT DAW 190

WIM SYSTEM CALIBRATION SPECIFICS**

6.**CALIBRATION TECHNIQUE USED:

[] TRAFFIC STREAM -- [] STATIC SCALE (Y/N) [XX] TEST TRUCKS

[] NUMBER OF TRUCKS COMPARED [2] NUMBER OF TEST TRUCKS USED

[20] PASSES PER TRUCK

TRUCK	TYPE	SUSPENSION
1	[9]	[1]
2	[5]	[2]
3		

TYPE PER FHWA 13 BIN SYSTEM

SUSPENSION: 1 - AIR; 2 - LEAF SPRING

3 - OTHER (DESCRIBE)

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)

MEAN DIFFERENCE BETWEEN ---

DYNAMIC AND STATIC GVW

[-5.9%]

STANDARD DEVIATION

[2.0%]

DYNAMIC AND STATIC SINGLE AXLES

[-6.6%]

STANDARD DEVIATION

[3.8%]

DYNAMIC AND STATIC DOUBLE AXLES

[5.4%]

STANDARD DEVIATION

[2.4%]

8. [3] NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) [43-48, 49-53,54-58]

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) [980 (60 mph), 980 (45 mph), 995 (30 mph)]

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:

[XX] VIDEO

[] - MANUAL

[] PARALLEL CLASSIFIERS

13. METHOD TO DETERMINE LENGTH OF COUNT [XX] TIME [] NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:

*** FHWA CLASS 9 [0]

FHWA CLASS [5]

*** FHWA CLASS 8 [-20]

FHWA CLASS []

FHWA CLASS []

FHWA CLASS []

*** PERCENT "UNCLASSIFIED" VEHICLES: []

PERSON LEADING CALIBRATION EFFORT:	[] Dean J. Wolf
CONTACT INFORMATION:	[301-210-5105] rev. November 9, 1999

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [9 9 2 1] *STATE CODE [1 2] *SHRP SECTION ID [0 5 0 0]
--	--

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [12 / 18 / 2 0 0 3]

2. * TYPE OF EQUIPMENT CALIBRATED XX WIM CLASSIFIER BOTH

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

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

5. EQUIPMENT MANUFACTURER PAT DAW 190

WIM SYSTEM CALIBRATION SPECIFICS**

6.**CALIBRATION TECHNIQUE USED:
TRAFFIC STREAM -- STATIC SCALE (Y/N) XX TEST TRUCKS
NUMBER OF TRUCKS COMPARED 2 NUMBER OF TEST TRUCKS USED
6 PASSES PER TRUCK
TRUCK TYPE SUSPENSION
TYPE PER FHWA 13 BIN SYSTEM
SUSPENSION: 1 - AIR; 2 - LEAF SPRING
3 - OTHER (DESCRIBE)
1 9 1
2 5 2
3

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
MEAN DIFFERENCE BETWEEN ---
DYNAMIC AND STATIC GVW -0.6% STANDARD DEVIATION 2.6%%
DYNAMIC AND STATIC SINGLE AXLES 3.4% STANDARD DEVIATION 4.5%
DYNAMIC AND STATIC DOUBLE AXLES -0.3% STANDARD DEVIATION 3.3%

8. 3 NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) 45-49, 50-54, 55-60 mph

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) 1030 (60mph), 1030 (45 mph) 995 (30 mph)

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 XX MANUAL PARALLEL CLASSIFIERS

13. METHOD TO DETERMINE LENGTH OF COUNT XX TIME NUMBER OF TRUCKS

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

PERSON LEADING CALIBRATION EFFORT:	Dean J. Wolf
CONTACT INFORMATION:	301-210-5105 rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK # 1	* DATE	12/18/03

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight	5.* Post-Test Average Loaded Axle Weight	6.* Measured D)irectly or C)alculated? D / C
A		<u>9340</u>	<u>9180</u>	D / C
B		<u>13870</u> <u>13860</u>	<u>13800</u>	D / C
C		<u>13510</u>	<u>13610</u>	D / C
D		<u>19330</u>	<u>19270</u>	D / C
E		<u>20200</u>	<u>20140</u>	D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW	*b) Average Pre-Test Loaded weight	<u>76213</u>
	*c) Post Test Loaded Weight	<u>76060</u>
	*d) Difference Post Test - Pre-test	<u>213</u>

GEOMETRY

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

9. a) * Make: WEIGHT LINEER b) * Model: FL112

10.* Trailer Load Distribution Description:

60' BOOM LIFT, 40' BOOM LIFT, 3000 LB COUNTERWEIGHT

11. a) Tractor Tare Weight (units): 15,000 } 31,000
b). Trailer Tare Weight (units): 15,000

Sheet 19	* STATE CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #	* DATE	12/18/03

Rev. 08/31/01

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

A to B 13' 10 B to C 4' 4 C to D 30' 1

D to E 4' E to F

Wheelbased (measured A to last) 52' 2 Computed

13. *Kingpin Offset From Axle B (units) + 1' 10" ()
(+ is to the rear)

SUSPENSION

Axle 14. Tire Size

A 295/75R 22.5

B 295/75R 22.5

C 295/75R 22.5

D 10R17.5

E 10R17.5

F

15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)

LEAF - 2 TAPER SPRINGS

AIR

AIR

AIR

AIR

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

Steering Axle

Axle B

Axle C

Axle D

Axle E

Sheet 19	* STATE CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #	* DATE	12/18/03

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	9340	II -I	13960	III -II	13400	IV -III	19920	V -IV	19620	V	76240
V -VI	9320	VI- VII	13780	VII- VIII	13620	VIII- IX	18740	IX'	20780	X	76240
										XI	76160
Avg.	9330	13870		13510		19330		20200		76213	

Table 2. Raw Axle and GVW measurements

Axles	Meas.	Pre-test Weight			Post-test Weight
A	I	9340 9360			9180
A + B	II	23300			23140
A + B + C	III	36700			36580
A + B + C + D	IV	56620			56460
A + B + C + D + E (1)	V	76240			76000
B + C + D + E	VI	66920			66820
C + D + E	VII	53140			53180
D + E	VIII	39520			39400
E	IX	20780			20740
A + B + C + D + E (2)	X	76240			
A + B + C + D + E (3)	XI	76160			

Table 3. Axle and GVW computations - post-test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I	9180	II -I	13960	III -II	13440	IV -III	19880	V -IV	19540	V	76000
V -VI	9180	VI- VII	13640	VII- VIII	13780	VIII- IX	18660	IX'	20740	X	
										XI	
Avg.	9180	13800		13610		19270		20140		76000	

Sheet 19	* STATE CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #	* DATE	12/18/03

Rev. 08/31/01

Table 4 . Axle and GVW computations -

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II		III		IV		V		V	
		-I		-II		-III		-IV			
V		VI-		VII-		VIII-		IX		X	
-VI		VII		VIII		IX					
										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							
2							
3							
Average							

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							
2							
3							
Average							

Measured By _____ Verified By _____

Sheet 19	* STATE CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK # 2	* DATE	12/18/07

Rev. 08/31/01

PART I

* FHWA Class 5 2.* Number of Axles 2

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight	5.* Post-Test Average Loaded Axle Weight	6.* Measured D)irectly or C)alculated?
A	_____	<u>7160</u>	<u>7260</u>	D / ☒
B	_____	<u>8940</u>	<u>9040</u>	D / ☒
C	_____	_____	_____	D / C
D	_____	_____	_____	D / C
E	_____	_____	_____	D / C
F	_____	_____	_____	D / C

GVW (same units as axles)

7. a) Empty GVW _____	*b) Average Pre-Test Loaded weight	<u>16127</u>
	*c) Post Test Loaded Weight	<u>16000</u>
	*d) Difference Post Test – Pre-test	<u>127</u>

GEOMETRY

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

9. a) * Make: gmc b) * Model: 6000 (V-Wheel)

10.* Trailer Load Distribution Description:

2 scissor lifts

a) Tractor Tare Weight (units): _____

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE CODE	12
LTPP Traffic Data	* SPS PROJECT ID	0500
*CALIBRATION TEST TRUCK #	* DATE	12/18/03

Rev. 08/31/01

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

A to B 7

B to C

C to D

D to E

E to F

Wheelbased (measured A to last) 17' Computed _____

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

SUSPENSION

Axle 14. Tire Size

15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)

A 8R19.5

LEAF SPRINGS - 6 TAPER LEAFS

B 8R19.5

LEAF SPRING - 11 LEAFS

C

D

E

F

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

Steering Axle

Axle B

Axle C

Axle D

Axle E

_____	_____
_____	_____
_____	_____
_____	_____

9935
9921

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PART II

Table 1. Axle and GVW computations - pre-test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I	7100	II -I	9000	III -II		IV -III		V -IV		V	16100
V -VI	7220	VI- VII	8880	VII- VIII		VIII- IX		IX		X	16140
										XI	16120
Avg.	7160	8940								16127	

Table 2. Raw Axle and GVW measurements

Axles	Meas.	Pre-test Weight			Post-test Weight
A	I	7100			7220
A + B	II	16100			16000
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	8880			8700
A + B + C + D + E (2)	X	16160			
A + B + C + D + E (3)	XI	16120			

Table 3. Axle and GVW computations - post -test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I	7220	II -I	8780	III -II		IV -III		V -IV		V	16000
V -VI	7300	VI- VII	8700	VII- VIII		VIII- IX		IX		X	
										XI	
Avg.	7260	8740								16000	

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ations -

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I		II		III		IV		V		V	
		-I		-II		-III		-IV			
V		VI-		VII-		VIII-		IX		X	
-VI		VII		VIII		IX					
										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							
2							
3							
Average							

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

Measured By _____

Pre-Calibration

Sheet 20	* STATE CODE	1 2
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SPEED CHECKS

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
57			57		59			57	
63			63		65			63	
51			52		58			59	
53			52		59			58	
57			56		60			59	
59			59		58			57	
56			55		63			62	
59			58		58			58	
59			58		59			59	
62			61		54			54	
62			62		60			60	
60			59		69			69	
54			54		58			57	
58			57		65			64	
57			57		56			56	
64			63		68			68	
62			60		72			72	
60			61		55			53	
66			67		62			61	
69			68		49			48	
60			59		53			53	
65			65		56			57	
63			63		59			58	
58			58		56			57	
46			46		59			58	

Recorded by DSW Direction S Lane 4 Time from 9:57 to 9:33

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Speed and Classification Checks * 2 of 2	* DATE	1 2 / 1 0 / 2 0 0 3

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51509 CHECKS

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
61			60		50			50	
54			53		59			59	
58			57		61			62	
61			61		59			58	
59			59		62			61	
69			68		62			61	
64			63		58			58	
60			60		54			53	
65			64		57			56	
52			51		65			64	
56			55		60			60	
69			68		66			66	
57			56		58			57	
59			58		57			57	
65			64		60			60	
63			62		59			59	
62			62		63			62	
56			55		59			58	
58			57		49			48	
71			69		54			53	
65			65		67			66	
61			60		73			73	
58			59		58			57	
64			63		54			53	
64			64		70			69	

Recorded by DLW Direction 5 Lane 4 Time from 9:33 to

Pre Calibration

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Speed and Classification Checks * 1 of * 2	* DATE	12/18/2003

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Class Checks

WIM speed	WIM class	WIM Record	Obs. Speed	Obs. Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs. Class
	9			9		6			6
	5			5		3			5
	5			5		5			5
	9			9		3			3
	5			5		3			3
	5			5		3			3
	9			9		5			5
	5			5		3			3
	3			3		3			5
	9			9		3			3
	5			5		8			8
	3			3		3			3
	3			3		3			3
	8			8		3			5
	9			9		3			3
	5			5		3			5
	5			5		8			8
	5			5		3			3
	9			9		3			3
	5			5		3			3
	9			9		3			3
	5			5		5			5
	3			3		3			3
	3			5		3			3
	5			5		3			5

Recorded by DJW/CRC

Direction 5

Lane 4

Time from 11:30

to 1:58

Pre Post - calibration

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Speed and Classification Checks * 2 of* 2	* DATE	12 / 18 / 2003

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CLASS CHECKS

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
	3			3		3			5
	3			5		9			9
	5			5		3			3
	3			3		3			3
	3			8		3			5
	3			3		5			5
	3			5		5			4
	3			3		9			9
	3			3		5			5
	6			6		3			3
	3			3		9			9
	3			3		5			5
	3			3		5			5
	3			3		5			5
	3			3		5			5
	8			8		3			3
	5			5		3			3
	5			5		3			3
	3			3		5			5
	5			4		3			3
	5			4		6			6
	3			3		3			3
	5			5		3			3
	3			3		5			5
	5			5		5			5

21.2

21.2

Recorded by CRC

Lane 4 Time from 2:00 to 3:30

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WIM System Test Truck Records		* DATE	12/18/2003

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PAE TEST (15540)

Sheet 1 70213
Sheet 2 16127

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axe A right / left weight.	Axe B right / left weight.	Axe C right / left weight.	Axe D right / left weight.	Axe E right / left weight.	Axe F right / left weight.	GWV	A-B space	B-C space	C-D space	D-E space	E-F space
72.5	45	1	1	11:21:12	7051	46.5 46	3.2 / 4.4	4.3 / 4.7	4.3 / 4.7	8.9 / 10.5	9.3 / 9.2		72.6	13.9	4.3	30.3	4.0	—
72.5	45	2	1	11:21:14	7053	46 47	3.2 / 3.3	4.3 / 4.0					14.7	17.1	✓			✓
73	54	1	2	11:30:35	7232	54 54.7	4.2 / 4.6	6.8 / 6.8	6.4 / 4.7	8.8 / 10.4	9.2 / 9.3		73.2	13.9	4.3	30.3	4.0	✓
73	54	2	2	11:30:41	7233	54 54.6	3.3 / 3.2	3.9 / 4.2					14.6	17.2	✓			
72	45	1	3	11:35:02	7325	46 46.3	3.7 / 4.7	6.3 / 6.5	6.2 / 6.6	8.9 / 10.2	9.0 / 9.9		71.9	13.9	4.2	30.3	4.0	✓
72	46	2	3	11:35:15	7328	46 46.9	3.6 / 3.5	4.2 / 3.8					15.1	17.1	✓			—
71.5	51	1	4	11:40:24	7418	50 50.8	3.8 / 4.7	6.1 / 6.5	6.1 / 6.4	8.2 / 10.0	8.4 / 9.3		69.5	13.8	4.2	30.2	4.0	✓
71.5	51	2	4	11:40:26	7420	52 52.5	3.3 / 3.5	4.0 / 4.3					15.1	17.2	✓			✓

Recorded by DM

Checked by KMA

4.7
7
3
3
2
2
8

Recorded by DSW

Checked by hust

Pwrnt 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.	GWV	A-B space	B-C space	C-D space	D-E space	E-F space
72	56	1	5	11:45:34	7543	56 56.8	3.7 / 4.8	6.7 / 6.7	6.3 / 6.6	8.1 / 10.6	9.0 / 9.5		72.4	13.9	4.3	30.3	4.0	✓
72	56	2	5	11:45:34	7545	56 56.7	3.2 / 3.4	4.3 / 4.4					15.3	17.2	✓			
72	47	1	6	11:45:55	7629	46 47	4.6 / 4.8	6.2 / 6.7	6.1 / 6.3	8.8 / 10.6	8.7 / 9.4		72.2	13.9	4.3	30.3	4.1	✓
72	48	2	6	11:45:58	7630	48 48.7	3.5 / 3.3	4.0 / 4.1					14.8	17.1 17.2	✓		—	
74	49	1	7	11:54:41	7731	51 51.2	3.9 / 4.5	6.0 / 6.7	6.1 / 6.4	8.3 / 10.2	8.8 / 9.0		69.9	14.0	4.3	30.2	4.0	✓
74	53	2	7	11:54:46	7733	54 54.2	3.5 / 3.3	4.2 / 4.1					15.1	17.1	✓			
74	56	1	8	12:01:20	7856	57 57.7	3.5 / 4.8	6.3 / 6.9	6.5 / 6.2	8.6 / 10.7	9.2 / 9.7		71.9	13.9	4.3	30.2	4.0	✓
74	58	2	6	12:01:25	7858	60 60.1	3.4 / 3.4	4.5 / 4.0					15.6	17.1 17.2	✓			

3

45

7



6. $\frac{1}{2}$

5

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	GW	A-B space	B-C space	C-D space	D-E space	E-F space
46	1	9	12:07:04	7990	47 47.6	4.4 / 4.6	6.7 / 6.8	6.6 / 6.7	9.3 / 11.2	9.4 / 9.7		75.5	13.8	4.3	30.2	4.1	✓
48	2	9	12:07:15	7994	48 48.7	3.3 / 3.3	4.2 / 4.1					14.9	17.1	✓			—
51	1	10	12:11:33	8072	52 52.7	3.2 / 4.5	6.6 / 7.1	6.3 / 6.5	8.1 / 10.0	8.5 / 9.4		70.6	13.9	4.3	30.3	4.0	✓
50	2	10	12:11:32	8076	52 52.2	1.4 / 3.4	4.1 / 4.1					15.1	17.2	✓			
55	1	11	12:17:09	8208	56 56.1	3.4 / 4.6	6.3 / 6.6	6.1 / 6.9	8.7 / 10.0	8.4 / 8.8		69.6	13.9	4.2	30.3	4.0	✓
54	2	11	12:18:01	8209	54 54.3	3.7 / 3.3	4.1 / 4.2					15.4	17.1	✓			
44	1	12	12:24:27	8347	46 46.2	3.9 / 4.6	6.4 / 6.9	6.3 / 6.9	8.7 / 11.0	8.9 / 9.5		72.2	13.5	4.2	30.1	4.0	✓

Checked by 92m Date 12/18/2003

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WIM System Test Truck Records		* DATE	12/18/2003

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Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axe A right / left weight	Axe B right / left weight	Axe C right / left weight	Axe D right / left weight	Axe E right / left weight	Axe F right / left weight	GWV	A-B space	B-C space	C-D space	D-E space	E-F space
81	55	1	13	12:29:44	8866	57	3.7 / 4.6	4.3 / 4.6	4.3 / 4.4	8.6 / 10.2	8.7 / 9.1		70.6	13.9	4.3	30.2	4.1	
X	81	54	2	12:34:46	88469	54.6	3.4 / 3.4	4.1 / 4.4					15.2	17.2	✓			
X	81	44	1	12:34:01	8549	46	3.8 / 4.6	4.5 / 4.8	6.1 / 6.4	8.6 / 10.6	8.8 / 9.6		71.5	13.8	4.3	30.2	4.0	
X	81	51	2	12:34:08	8553	53.8	3.7 / 3.6	4.0 / 4.5					15.8	17.1	✓			
X	85.5	55	1	12:44:41	8765	56.9	3.9 / 4.6	4.7 / 4.8	6.9 / 6.6	9.0 / 10.4	9.3 / 9.6		73.6	13.9	4.3	30.3	4.0	
X	85.5	56	2	12:44:44	8768	57	3.7 / 3.5	4.0 / 4.4					15.5	17.2	✓			
X	86.5	47	1	12:50:39	8867	48	4.0 / 4.6	4.2 / 4.7	6.4 / 6.6	8.6 / 10.4	8.9 / 9.3		72.4	13.5	4.3	30.3	4.0	
X	86.5	47	2	12:50:37	8868	49	3.7 / 3.4	4.2 / 3.8					14.7	17.2	✓			

Recorded by OLW

Checked by KWA

73
 13
 -5.5
 -10
 18
 3.2
 3.7
 -18
 8.7

DATE *

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.	GWV	A-B space	B-C space	C-D space	D-E space	E-F space
84		1	17	12:54:38	8971	52 52.3	4.1 / 4.9	6.4 / 6.8	6.3 / 6.8	8.9 10.5	8.1 9.6		72.9	13.9	4.3	30.4	4.0	✓
84	52	2	17	12:54:46	8973	53 54	3.5 / 3.5	3.1 4.2					15.1	17.3 17.2	✓			✓
84	51	1	18	12:59:30	9066	57 57.6	3.5 / 4.4	6.3 / 6.7	6.1 / 6.3	8.5 / 9.6	8.5 / 9.2		69.1	13.9	4.3	30.3	4.0	
84.5	54	2	18	12:59:32	9068	54 54.7	3.2 / 3.7	3.9 / 4.2					15.0	17.2	✓			
84	4	1	19	13:04:28	9152	47 47.3	3.9 / 4.6	4.5 / 6.6	4.6 / 6.4	8.6 / 10.5	8.3 / 9.2		71.3	13.9	4.3	30.3	4.0	
84	43	2	19	13:04:24	9153	42 43	3.7 / 3.3	4.2 / 4.0					15.1	17.1	✓			
85	2		20	13:06:21	9278	52 52.3	3.7 / 4.5	6.7 / 6.6	6.2 / 6.7	8.6 / 10.1	8.6 / 9.1		70.8	13.9	4.3	30.2	4.0	
85	2		20	13:06:23	9280	52 52.2	3.4 / 3.9	3.9 / 3.9					14.8	17.2	✓			

1400

7007
1051
1051
1051

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.	GW	A-B space	B-C space	C-D space	D-E space	E-F space
81	46	1	1	14:56:42	11610	45 45.9	9.5	13.3 13.4	13.3	20.0	19.6		75.8	13.9	4.3	30.3	4.0	
81	48	2	1	14:58:53	11612	46 48.9	7.8	8.1					15.9	17.2 17.4				
78	55	1	2	15:07:46	11863	56 56.5	4.1 / 5.2	6.2 7.1	6.5 / 7.1	9.2 / 11.3	8.9 / 10.6		76.3	14.0	4.3	30.3	4.0	
78	54	2	2	15:07:49	11867	55 55.7	3.9 / 4.1	3.7 / 4.8					16.5	17.3 17.2				
78	54	1	3	15:11:47	11970	47	4.7 / 5.0	6.5 / 6.9	6.5 / 7.1	9.2 / 11.0	9.2 / 10.9		76.7	13.9	4.3	30.4	4.0	
78	↑	2	3	15:11:50	11954	47 49.6	2.9 / 3.8 4.7 / 4.8	3.9 / 4.2					15.8	17.2 17.1				
75		1	4	15:15:56	12058	52	4.7 / 5.2	6.6 / 7.1	6.6 / 7.0	9.1 / 10.9	8.5 / 9.6		75.4	13.9	4.2	30.3	4.0	
75		2	4	15:16:52	12064	51 51.8	3.7 / 3.8	3.9 / 4.5					15.9	17.2				

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LTPP Traffic Data		*SPS PROJECT ID	0500
WIM System Test Truck Records		* DATE	12/18/2003

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GWV	A-B space	B-C space	C-D space	D-E space	E-F space
72.5		1	5	15:21:27	12226	56.4 56	3.8 / 4.9	6.2 / 7.1	6.4 6.9	8.9 / 10.5	8.6 9.5		72.9	13.9	4.3	38.4	4.1	
72.5		2	5	15:21:32	12232	54 70.3	3.5 / 3.8	3.5 / 4.8					15.5	12.1				
73.5		1	6	15:27:34	12357	45 45.9	4.5 / 4.7	7.1 / 7.6	6.9 / 7.5	9.6 / 11.4	9.5 10.6		79.7	13.9	4.3	30.3	4.0	
73.5		2	6	15:27:48	12364	46 46.9	3.7 / 3.7	4.1 / 4.1					15.5	17.1 17.2				
		1	7															
		2	7															
		1	8															
		2																

Recorded by 92W

Checked by luuA