Evaluation/Calibration Report

Ohio, SPS 2

Task Order 3, CLIN 2
Visit Date: April 14 and 15, 2004

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1 Executive Summary

A visit was made to the Ohio SPS-2 on April 14 and 15, 2004 for the purposes of conducting a field performance evaluation and calibration of the WIM system located on US route 23 at milepost 19.7. The calibration procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 31, 2001.

This site met LTPP precision requirements for loading at the completion of this validation visit.

The system currently does not use weight as part of the classification algorithm. Therefore the system is unable to provide research quality classification information.

The site is instrumented with Mettler-Toledo load cell sensors and WIM controller.

The validation used the following trucks:

1) 3S2 with a tractor having an air suspension and split rear tandem trailer having air suspension, loaded to 78,050 lbs.
2) 3S2 with a tractor having an air suspension and trailer having an air suspension, loaded to 52,170 lbs.
3) 3S2 with a tractor having an air suspension and trailer having a standard two leaf spring suspension, unloaded, weighing 32,430 lbs.

The validation speeds ranged from 43.0 to 59.0 miles per hour. The pavement temperatures ranged from 37.5 to 91.5 degrees Fahrenheit.

Table 1 Post-Validation results – 390200 - 15 April 2004

SPS-1, -2, -5, -6 and –8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	±20 percent	-4.6% ± 7.9%	Pass
Loaded tandem axles	±15 percent	1.5% ± 10.0%	Pass
Gross vehicle weights	±10 percent	-0.8% ± 7.2%	Pass
Vehicle speed	±1 mph [2 km/hr]		
Axle spacing length	± 0.5 ft [150 mm]	0.0 ± 0.2 ft	Pass

Verification of speeds post-calibration was not completed. Speed was not an influence on the classification outcome.

In the field, there were no distresses observed that would influence truck motions significantly. A visual survey of truck movement over the site determined that there is no discernable vertical or horizontal movement of the trucks prior to, passing over, or beyond the WIM scale area.

MACTEC field staff worked with the agency and vendor representative to compute factor adjustments. The agency representative made all equipment changes. This was expected given the information on the Traffic Sheet 18 completed as part of the assessment visit held on November 12th and 13th, 2003.

Based on the profile data analysis, the Ohio SPS-2 WIM site does not meet the smoothness requirements for WIM site locations since more than half of the calculated LRI and SRI values for the pavement site are higher than the index limits. Therefore, the replacement of the pavement was and remains the preferred option for improving the quality of data from the WIM System.

2 Corrective Actions Recommended

The system's classification algorithms should be augmented with weight parameters to correct the problem of small Class 5 vehicles being classified as Class 3 vehicles.

The system's calibration should also be set up to allow for speed dependency compensation, rather than the overall span compensation currently being used. This would permit calibration factors that are speed dependent rather than using one factor to try to cover all conditions.

It was noted in the field that there were technical problems with the WIM scales themselves, which caused ghost axles. This then caused misclassification of the vehicles. This was identified on site, investigated by the vendor representative, but no definite conclusions as to the cause were discovered. Test truck runs with ghost axles were not included in the analysis and additional runs were substituted for them. The agency is aware of the problem and will work with the vendor to further investigate the cause of the ghost axles and will make repairs accordingly.

The backup of the water being drained from the sensors identified during the assessment was reevaluated. The condition described at that time remains. Although there appears to be adequate room for a significant amount of water, if the drainage pipe was to back up and become frozen, the scale pit will begin to fill eventually keeping the scale from operating properly.

3 Post Calibration Analysis

This final analysis is based on test runs conducted April 15, 2004 from 2:40 p.m. till 5:10 p.m. at test site 390200 on US 23 at 7.6 miles north of SR 37. This SPS-2 site is at milepost 19.7 on the northbound, right hand lane of a divided four-lane facility. No auto-calibration was used during test runs. The three trucks used for initial calibration and for the subsequent testing included:

1) 3S2 with a tractor having an air suspension and split rear tandem trailer having an air suspension, loaded to 78,050 lbs.
2) 3S2 with a tractor having an air suspension and trailer having an air suspension, loaded to 52,170 lbs.
3) 3S2 with a tractor having an air suspension and trailer having a standard two leaf spring suspension, unloaded, weighing 32,430 lbs.

All three trucks made a total of 41 passes over the WIM scale. Speeds ranged from 43.0 to 59.0 miles per hour. Pavement surface temperatures recorded during the test runs ranged from 37.5 to 91.5 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are in Table 2.

As seen in Table 2 **the site passed the LTPP precision requirements for loading.**

Table 2 Post-Validation Results - 390200 - 15 April 2004

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	±20 percent	-4.6% ± 7.9%	Pass
Loaded tandem axles	±15 percent	1.5% ± 10.0%	Pass
Gross vehicle weights	±10 percent	-0.8% ± 7.2%	Pass
Vehicle speed	±1 mph [2 km/hr]		
Axle spacing length	± 0.5 ft [150 mm]	0.0 ± 0.2 ft	Pass

The test runs were conducted during the morning till late afternoon hours, resulting in a very wide range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed and temperature groups. The distribution of runs within these groupings is illustrated in Figure 3-1. The speed groups were divided as follows: Low speed = 43.0-45.0 mph, Medium speed = 46.0-50.0 mph and High speed = 51.0+ mph. The three temperature groups were created by splitting the runs between those from 37.5 to 50.0 degrees Fahrenheit for Low temperature, 51.0 to 70.0 degrees Fahrenheit for Medium temperature and 71.0 degrees Fahrenheit and above for High temperature.

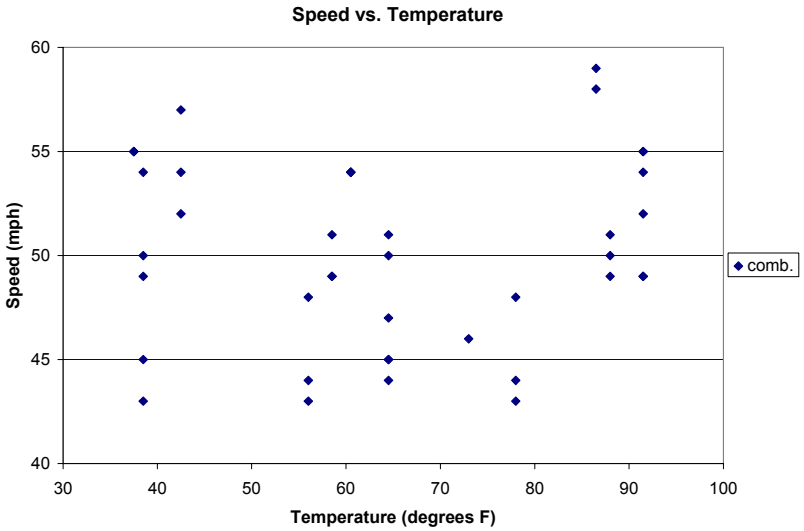


Figure 3-1 Post-Validation Speed-Temperature Distribution – 390200 - 15 April 2004

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. From the figure it appears that the GVW percent error is not varying significantly for all the trucks except for a couple of instances for heavy truck (squares) and light truck (triangles) where the percent error is significantly high.

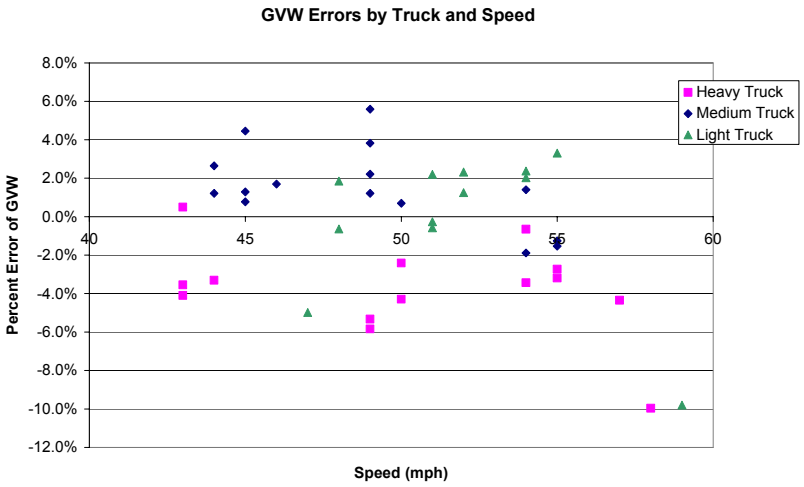


Figure 3-2 Post-validation GVW Percent Error vs. Speed by Truck – 390200 - 15 April 2004

Figure 3-3 shows the relationship between temperature and GVW percentage error. From the figure it appears that the error in GVW for all the trucks is slightly increasing with increase in temperature. Primarily the shift is from the weights being underestimated to overestimated.

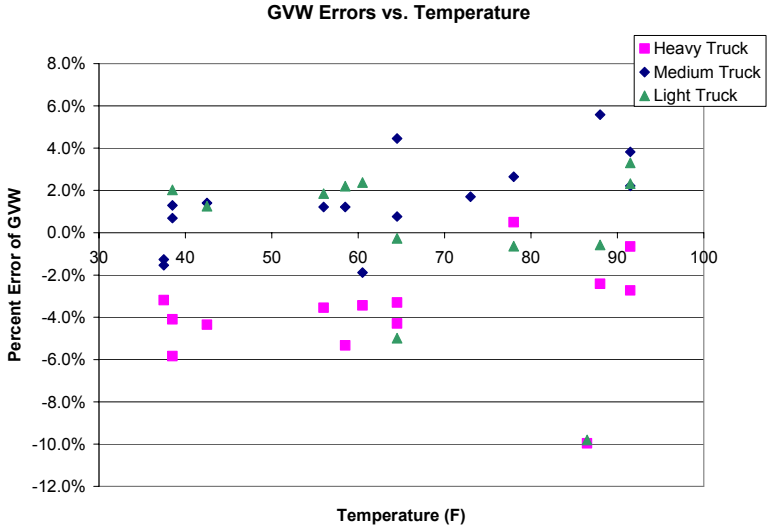


Figure 3-3 Post-Validation GVW Percent Error vs. Temperature by Truck – 390200 - 15 April 2004

Figure 3-4 shows the relationship between the spacing errors in feet and speeds. From the figure it appears that the spacing error may increase with increasing speeds.

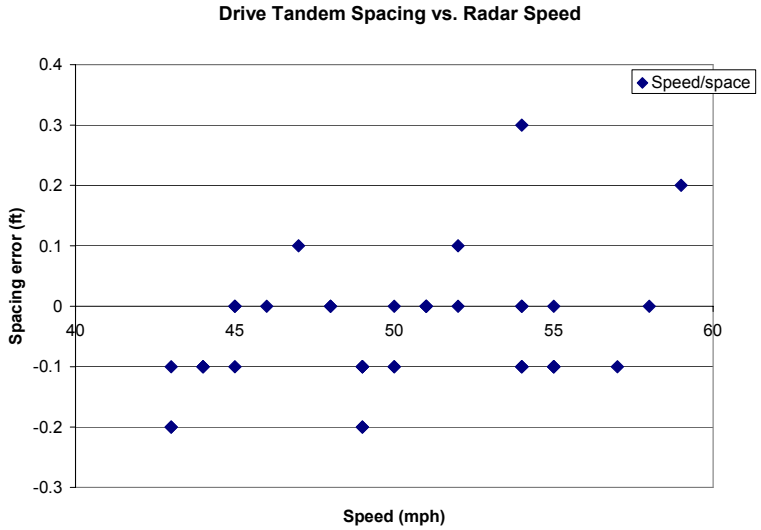


Figure 3-4 Post-Validation Speed vs. Spacing - 390200 - 15 April 2004

3.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those from 37.5 to 50.0 degrees Fahrenheit for Low temperature, 51.0 to 70.0 degrees Fahrenheit for Medium temperature and 71.0 degrees Fahrenheit and above for High temperature.

Table 3 Post-Validation Results by Temperature Bin – 390200 - 15 April 2004

Element	95% Limit	Low Temp.	Med. Temp.	High Temp.
Single axles	±20 %	-5.0% ± 7.5%	-4.0% ± 5.4%	-4.9% ± 10.9%
Tandem axles	±15 %	1.1% ± 8.8%	1.1% ± 10.6%	2.1% ± 11.4%
GVW	±10 %	-1.2% ± 6.2%	-0.9%± 6.7%	-0.3%± 9.7%
Speed	±1 mph			
Axle spacing	± 0.5 ft	0.0 ± 0.3 ft	-0.1 ± 0.2 ft	0.0 ± 0.2 ft

From Table 3, Figure 3-5 and Figure 3-6 it appears that there is some temperature sensitivity in the equipment. Single axle and tandem axle average errors are increasing with increasing temperatures. The variability tends to increase as well.

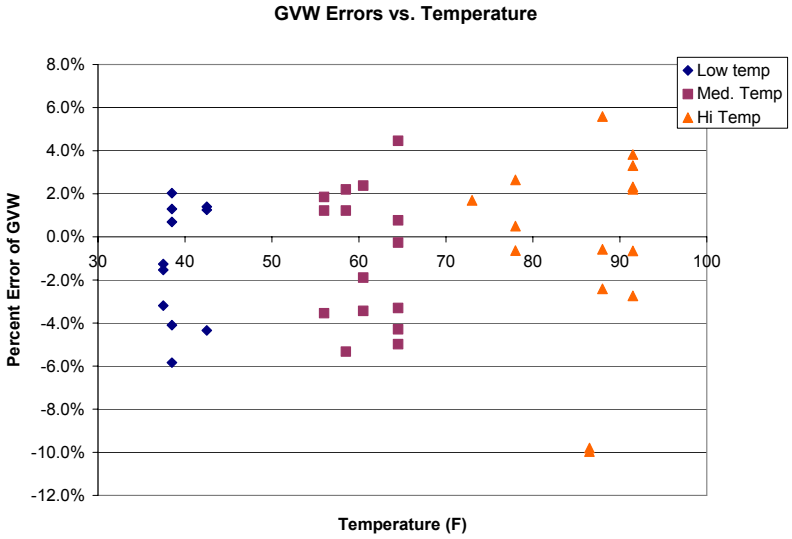


Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Group – 390200 - 15 April 2004

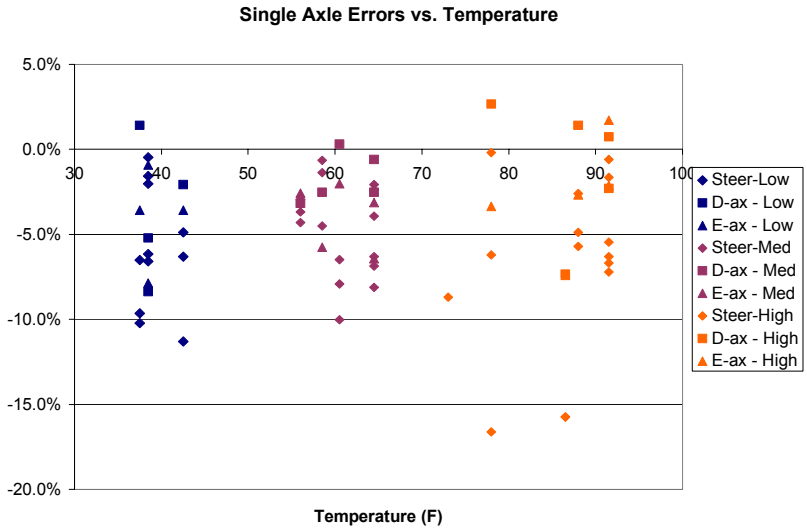


Figure 3-6 Post-Validation Single Axle Error vs. Temperature by Group - 390200 - 15 April 2004

3.2 Speed-based Analysis

The speed groups were divided as follows: Low speed = 43.0-45.0 mph, Medium speed = 46.0-50.0 mph and High speed = 51.0+ mph.

From Table 4 it appears that the mean error is decreasing for tandem axles and GVW but the variability is increasing with increasing speeds.

Table 4 Post-Validation Results by Speed Bin – 390200 - 15 April 2004

Element	95% Limit	Low Speed	Med. Speed	High Speed
Single axles	±20 %	-4.8% ± 8.7%	-3.5% ± 5.4%	-4.2% ± 10.0%
Tandem axles	±15 %	2.2% ± 8.3%	1.3% ± 10.4%	1.3% ± 11.4%
GVW	±10 %	0.0% ± 6.9%	-0.3% ± 7.3%	-1.6% ± 8.5%
Speed	±1 mph			
Axle spacing	± 0.5 ft	0.2 ± 0.2 ft	-0.1 ± 0.2 ft	0.0 ± 0.3 ft

From Figure 3-7 it appears that the error in GVW is not significantly affected by increase in speeds. The numeric trends in Table 4 are attributable to a couple of outliers at the upper end of the reported speed range.

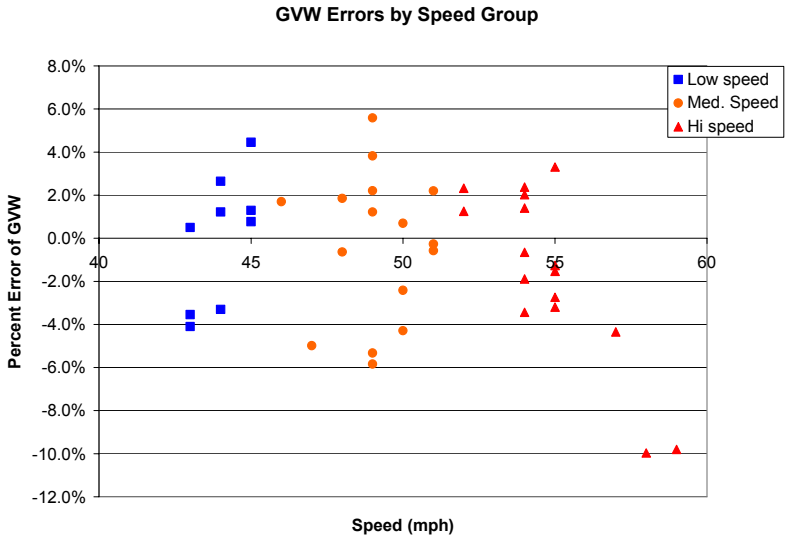


Figure 3-7 Post-Validation GVW Percent Error vs. Speed Group - 390200 - 15 April 2004

From Figure 3-8 it appears that the error in GVW for the light truck (triangles) is slightly increasing with increase in speeds. For the medium truck (diamonds) the error is decreasing with increasing speeds. For the heavy truck (squares) the error is not changing much.

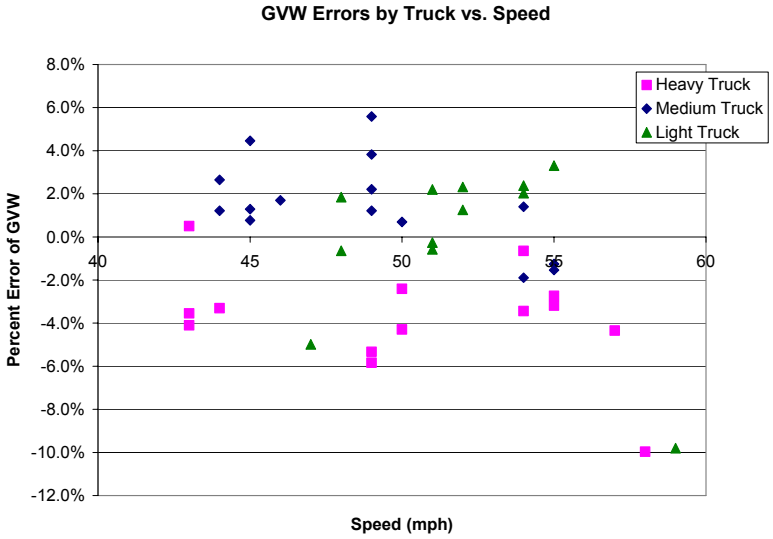


Figure 3-8 Post-Validation GVW Percent Error vs. Speed by Truck – 390200 - 15 April 2004

From Figure 3-9 it appears that the average error in single axle weights is greater at lower speeds and at higher speeds in the test range.

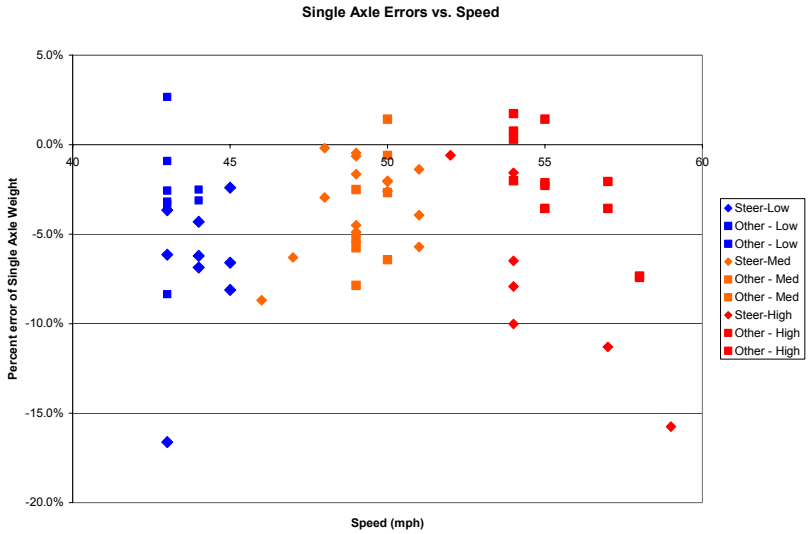


Figure 3-9 Post-Validation Single Axle Percent Error vs. Speed Group - 390200 - 15 April 2004

From Figure 3-10 it appears that the error in steering axle weights is shifting from larger to smaller to larger values across all trucks in the test fleet.

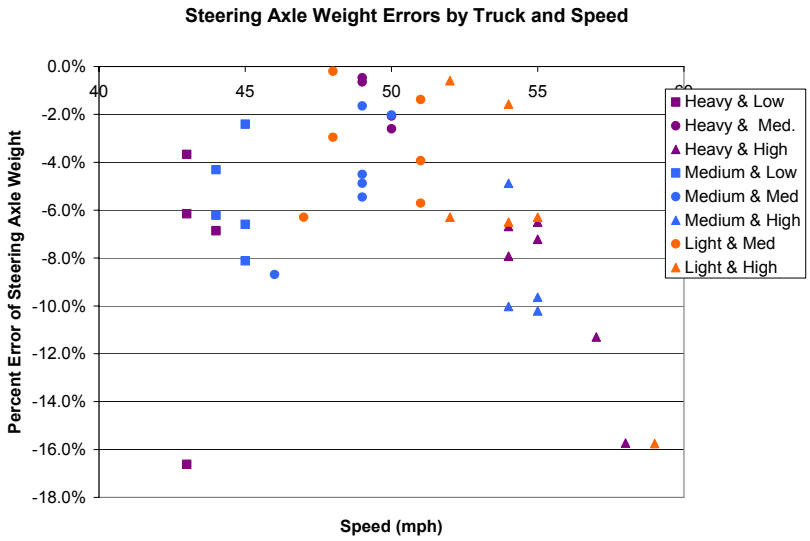


Figure 3-10 Post-Validation Steering Axle Percent Error vs. Speed by Truck - 390200 - 15 April 2004

3.3 Classification Validation

According to the agency, they use the 13-bin FHWA Classification scheme from the Traffic Monitoring Guide with a revision for Class 14, which accounts for the Michigan grain trucks. However, as per the vendor ASCII format data files, the system collects and reports using the 6-digit Truck Weight System scheme for its native file format. The classification algorithm is strictly based on number of axles and has no provision for unknown or un-classified vehicles (Class 15s).

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

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. The following are the classification error rates by class:

Table 5 Truck Misclassification Percentages for 390200 – 15 April 2004

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	N/A	5	33	6	20
7	100				
8	17	9	5	10	0
11	0	12	N/A	13	100

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

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

Table 6 Truck Classification Mean Differences for 390200 – 15 April 2004

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	N/A	5	-33	6	25
7	Unknown				
8	20	9	-5	10	0
11	0	12	N/A	13	Unknown

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 were either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown are those identified by the equipment but no vehicles of the type were seen the observer. There is no way to tell how many more than those that might actually be present exist. N/A means that neither the equipment nor the observer recorded any vehicles of that particular class.

It was noted in the field that there were technical problems with the WIM scales themselves that caused ghost axles. This caused misclassification of the vehicles. This was identified on site, investigated by the vendor's representative, but no definite conclusions as to the cause were discovered. The test trucks, which demonstrated the ghost axles, were not included in the validation runs. The agency is aware of the problem and will work with the vendor to further investigate the cause of the ghost axles and will make repairs accordingly. As of the date of this report no resolution of the problem has been reported to us.

4 Pavement Discussion

This site was not recommended for validation based on the smoothness index values. Slightly more than half of the index values from the February 4, 2004 profiling are higher than the values from the assessment. The assessment values used data collected in December 2002. Most values are still clearly higher than the threshold currently identified for little if any influence on the results.

There have been no changes in condition or any maintenance activities since the assessment. 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. 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 Stantec Inc. on February 4, 2004 was processed through the LTPP SPS WIM Index software. This WIM scale is installed in a portland cement concrete pavement. The results are shown in Table 7.

A total of 11 profiler passes have been 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 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 have been made such that data are collected as close to the lane edges as is safely possible. For each profiler pass, profiles are recorded under the left wheel path (LWP), and the right wheel path (RWP).

Table 7 shows the computed index values for all 11 profiler passes for this WIM site. The average values over the passes at each path are also calculated when three or more passes are completed. These are reflected in the next to last column of the table. Values above the index limits are presented in italics. Seven of twelve of these values are higher than those contained in the assessment report for profile runs done in December 2002. The right-most column includes the 2002 averages for comparison purposes.

Table 7 Long Range Index (LRI) and Short Range Index (SRI) - 390200 - 4 February 2004

Profiler Passes			**Pass 1**	**Pass 2**	**Pass 3**	**Pass 4**	**Pass 5**	**Ave. (2004)**	**Ave. (2002)**
Center	LWP	LRI (m/km)	*1.206*	*1.190*	*1.215*	*1.276*	*1.274*	***1.232***	***1.210***
		SRI (m/km)	*1.490*	*1.293*	*1.672*	*1.448*	*1.781*	***1.537***	***1.548***
	RWP	LRI (m/km)	*0.863*	*0.858*	*0.822*	*0.838*	0.770	***0.830***	***0.823***
		SRI (m/km)	0.657	0.581	0.700	0.587	0.664	**0.638**	***0.878***
Left Shift	LWP	LRI (m/km)	*1.240*	*1.187*	*1.312*			***1.246***	***1.254***
		SRI (m/km)	*2.026*	*1.567*	*1.824*			***1.806***	***1.667***
	RWP	LRI (m/km)	*1.020*	*0.817*	*1.028*			***0.955***	***0.988***
		SRI (m/km)	*0.979*	*0.834*	*1.174*			***0.996***	***1.532***
Right Shift	LWP	LRI (m/km)	*1.580*	*1.561*	*1.510*			***1.550***	***1.289***
		SRI (m/km)	*1.754*	*1.894*	*1.685*			***1.778***	***1.712***
	RWP	LRI (m/km)	*0.959*	*0.985*	*0.960*			***0.968***	**0.651**
		SRI (m/km)	*1.525*	*1.466*	*1.553*			***1.515***	**0.670**

At all locations except the Right Wheel Path SRI locations the WIM Index value exceeds the limit of 0.789 m/km as can be seen in the table. These six values were slightly higher

than the values reported in the assessment report. When all values are less than 0.789 it is presumed unlikely that pavement roughness will significantly influence sensor output. Values above that level may or may not influence the reported weights and potentially vehicle spacings. Based on the profile data analysis, the Ohio SPS-2 WIM site does not meet the smoothness requirements for WIM site locations. Eighty-five percent of the calculated LRI and SRI values for the pavement site are higher than the index limits. If any remedial action is taken it should be done for the entire section. Suggested alternatives for pavement corrections are grinding or slab replacement. It should be noted that the existing pavement is tined portland cement concrete. This tining makes it highly unlikely that the resulting profile index values will be below the performance threshold.

4.2 Distress survey and any applicable photos

The pavement condition is satisfactory. There were no distresses observed that would influence truck motions significantly.

4.3 Vehicle-pavement interaction discussion

A visual survey of truck movement over the site determined that there is no discernable vertical or horizontal movement of the trucks prior to, passing over, or beyond the WIM scale area. Most of the trucks were traveling along the wheel path. Daylight cannot be seen between the tires and any of the sensors of the equipment indicating that the truck tires appear to be fully touching the sensors.

5 Equipment Discussion

The traffic monitoring equipment at this location includes Mettler-Toledo load cell sensors and WIM controller. These sensors are installed in a staggered configuration in the concrete pavement.

Since the validation on February 3 and 4, 2004 and before this evaluation the vendor performed static load tests and made adjustments to the operating parameters. These adjustments appeared to have improved reduced the variability of the reported weights. Ghost axles were observed in the course of the validation. Possible causes were investigated including vehicle type dependencies, vehicle weight dependencies and vehicle tracking. No generalization could be made as to a cause(s). This condition affected only the light truck during the validation process requiring additional runs.

Vendor and agency representatives discussed the possibility that one of the load cells was operating at a degraded level. After further testing by the vendor's representative, replacement of one of the load cells was considered and then determined unnecessary.

5.1 Pre-Evaluation Diagnostics

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

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

The backup of the water being drained from the sensors identified during the assessment was reevaluated. The condition described at that time remains. Although there appears to be adequate room for a significant amount of water, if the drainage pipe was to back up and become frozen, the scale pit will begin to fill eventually keeping the scale from operating properly.

5.2 Calibration Process

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

5.2.1 Calibration Iteration 1

The results of the 42 pre-calibration runs performed by the three test trucks produced a range of –7.0% to 0.0% for the average GVW error. The factor to be adjusted was the P4 factor, which is modified so that if weights are underestimated it is increased. If weights are overestimated it is decreased. The adjustment increment used was the absolute value of half the difference in the minimum and maximum percent errors. The value of P4 was increased by 3.5 from 7.98 to 11.49 to reduce the size of the underestimate for GVW. The first 11 runs were performed by the three trucks and produced an average error of –1.2% for GVW. Based on this result and the values for the single and tandem axles it was determined that no further adjustments were needed. An additional 30 runs were performed to complete the required minimum 40 post calibration runs.

Table 8 Calibration Iteration 1 Results - 390200 - 15 April 2004(beginning 7:57 a.m.)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	±20 percent	-5.0% ± 7.5%	Pass
Loaded tandem axles	±15 percent	1.1% ± 8.8%	Pass
Gross vehicle weights	±10 percent	-1.2% ± 6.2%	Pass
Vehicle speed	±1 mph [2 km/hr]		
Axle spacing length	± 0.5 ft [150 mm]	0.0 ± 0.3 ft	Pass

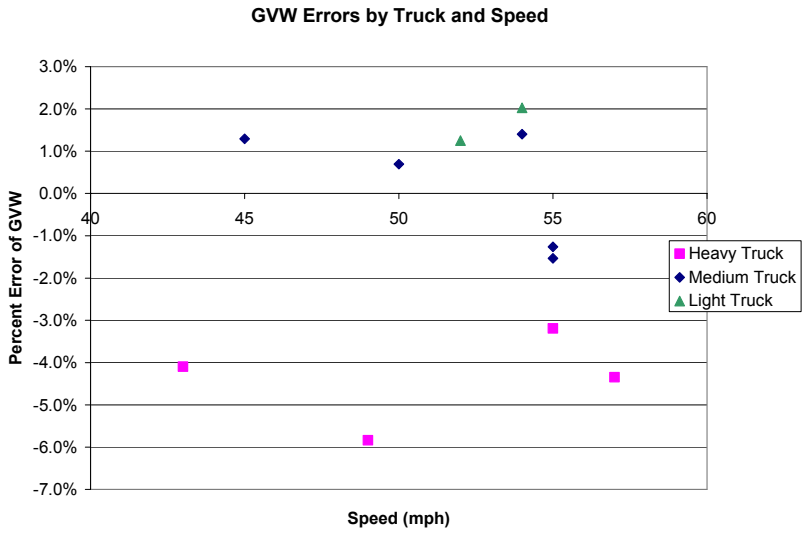


Figure 5-1 Calibration Iteration 1 GVW Percent Error vs. Speed Group - 390200 - 15 April 2004(beginning 7:57 a.m.)

The difference in errors by truck was not large enough to impact the group averages.

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 9 Classification Validation History - 390200

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
09/17/1999	No data available					
04/09/2001	No data available					
05/29/2002	No data available					
11/12/2003	No. Trucks	0	17	N/A	N/A	0
2/4/2004	No. Trucks	-3	0	-70 (Class 5)	N/A	0
4/14/2004	No. Trucks	-6	50	200 (Class 7)	-67 (Class 6)	0
4/15/2004	No. Trucks	-5	20	25 (Class 5)	-33 (Class 6)	0

Table 10 Weight Validation History - 390200

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
09/17/1999	Test Trucks	No data available		
04/09/2001	Test Trucks	No data available		
05/29/2002	Test Trucks	-1.5 (3.2)	2.1 (3.4)	-2.0 (3.1)

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
2/3/2004	Test Trucks	6.4 (3.6)	-1.3 (3.5)	10.5 (8.9)
2/4/2004	Test Trucks	0.4 (5.1)	-7.2 (2.8)	4.0 (9.8)
4/14/2004	Test Trucks	-2.7 (3.6)	-6.6 (3.7)	0.0 (5.4)
4/15/2004	Test Trucks	-0.8 (3.6)	-4.6 (4.1)	-1.5 (5.0)

It should be noted that the 2002 validation was done with a single truck whereas both validations in 2004 were done using three trucks.

The equipment has been Mettler-Toledo load cells since the installation of the site.

5.4 Projected Maintenance/Replacement Requirements

Corrective maintenance on each WIM scale to resolve drainage deficiencies should be investigated and performed.

Corrective actions for the ghost axle problem should be determined and implemented.

6 Pre-Validation Analysis

This initial analysis is based on test runs conducted in the afternoon on April 14, 2004 at test site 390200 on US 23 North at 7.6 miles north of SR 37.

For the initial validation all the trucks made a total of 42 passes over the WIM scale at speeds ranging from 42.0 to 59.0 miles per hour. Pavement surface temperatures were recorded during the test runs and ranged from between 63.5 to 82.0 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are within Table 11.

As seen in Table 11 the site passed for all the values except the gross vehicle weights.

Table 11 Pre-Validation Results - 390200 - 14 April 2004

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Loaded single axles	±20 percent	-6.6% ± 7.0%	Pass
Loaded tandem axles	±15 percent	0.0% ± 10.7%	Pass
Gross vehicle weights	±10 percent	-2.7% ± 7.3%	**Fail**
Vehicle speed	±1 mph [2 km/hr]	0.4 ±1.3	**Fail**
Axle spacing length	± 0.5 ft [150 mm]	0.0 ± 0.2 ft	Pass

The test runs were conducted during the afternoon hours. The runs were conducted at various speeds to determine the effect of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed and temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The speed groups were divided as follows: Low speed = 42.0-45.0 mph, Medium speed =

46.0-51.0 mph and High speed = 52.0+ mph. The three temperature groups were created by splitting the runs between those at 63.5 to 68.0 degrees Fahrenheit for Low temperature, 69.0 to 75.0 degrees Fahrenheit for Medium temperature and 76.0 degrees Fahrenheit and above for High temperature.

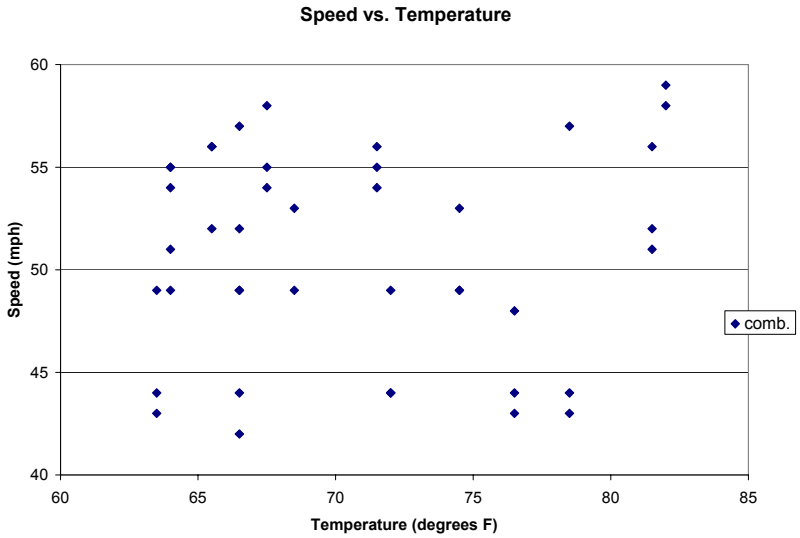


Figure 6-1 Pre-Validation Speed-Temperature Distribution – 390200 - 14 April 2004

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. From the figure it appears that the percent error in GVW is stable at low and medium speed but increases at high speeds for all of the trucks.

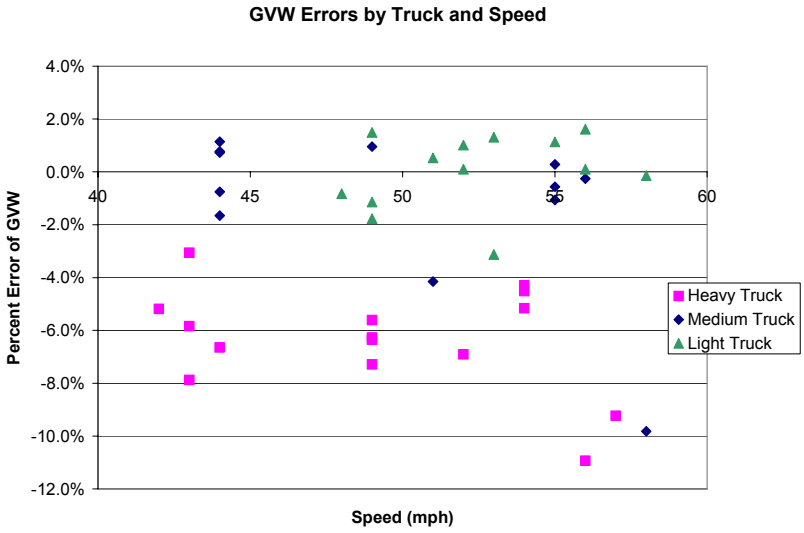


Figure 6-2 Pre-validation GVW Percent Error vs. Speed by Truck– 390200 - 14 April 2004

Figure 6-3 shows the relationship between temperature and GVW percentage error. From the figure it appears that the percent error in GVW is stable at low and medium temperatures but increases at high temperatures for all of the trucks.

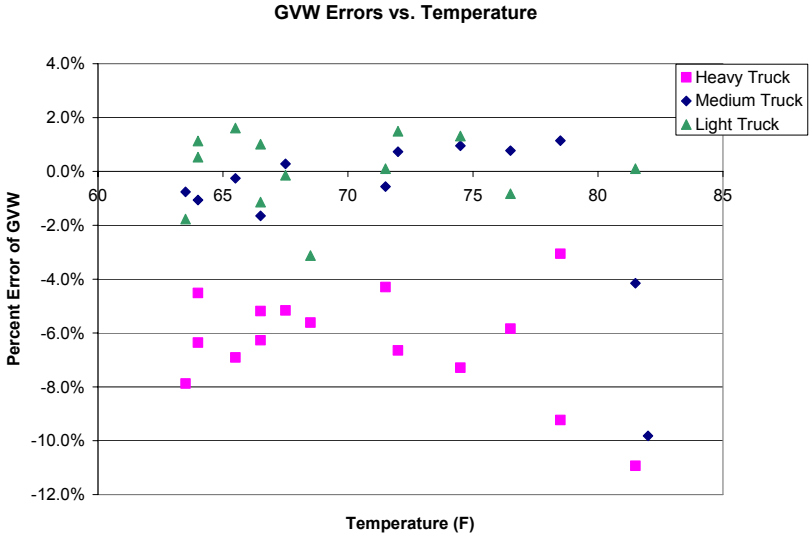


Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature by Truck – 390200 - 14 April 2004

Figure 6-4 shows the relationship between the spacing errors in feet and speeds. From the figure it appears that the average error in spacing increases with increasing speeds.

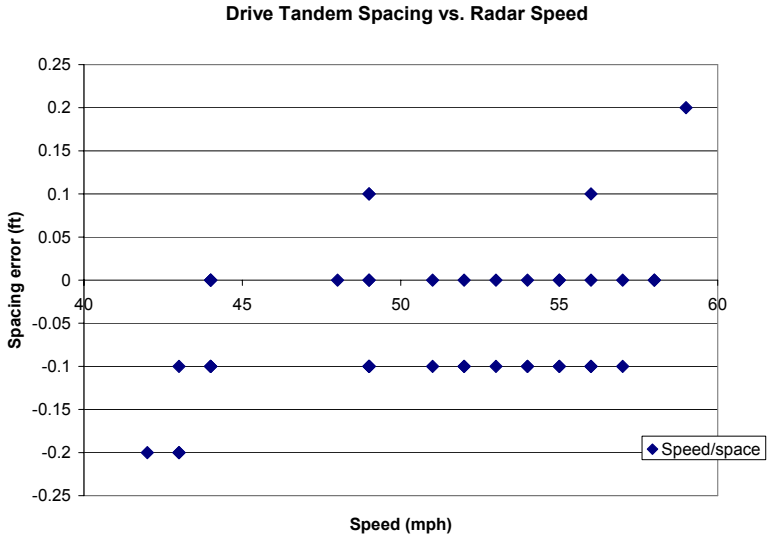


Figure 6-4 Pre-Validation Speed vs. Spacing - 390200 - 14 April 2004

6.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 63.5 to 68.0 degrees Fahrenheit for Low temperature, 69.0 to 75.0 degrees Fahrenheit for Medium temperature and 76.0 degrees Fahrenheit and above for High temperature.

Table 12 Pre-Validation Results by Temperature Bin - 390200 - 14 April 2004

Element	95% Limit	Low Temp.	Med. Temp.	High Temp.
Single axles	±20 %	-6.5% ± 5.8%	-5.4% ± 5.5%	-8.0% ± 10.1%
Tandem axles	±15 %	-0.7% ± 11.7%	0.1% ± 10.8%	-1.3% ± 10.3%
GVW	±10 %	-2.3% ± 6.5%	-2.1% ± 7.6%	-4.2% ± 10.4%
Speed	±1 mph			
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.2 ft	-0.1 ± 0.2 ft

From Table 12, Figure 6-5 and Figure 6-6 it appears that the variability of the error in GVW and single axle weights increases with increases in temperature.

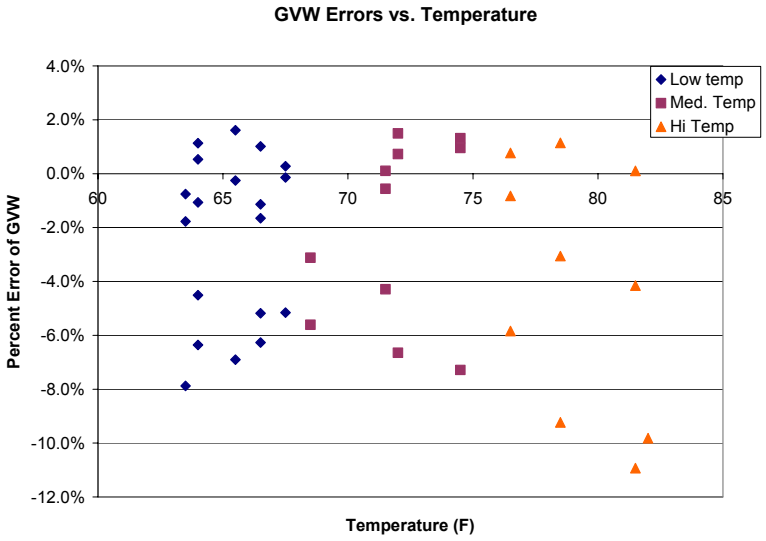


Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Group – 390200 - 14 April 2004

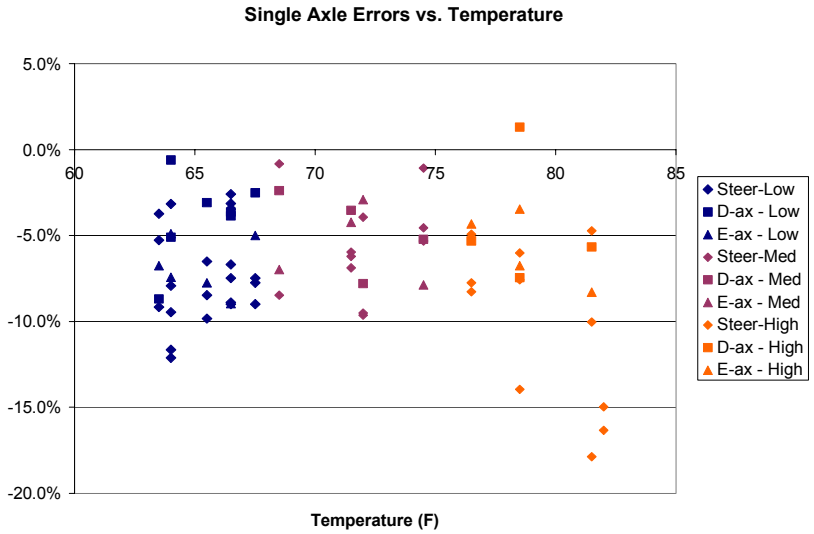


Figure 6-6 Pre-Validation Single Axle Error vs. Temperature by Group - 390200 - 14 April 2004

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed 42.0-45.0 mph, Medium speed = 46.0-51.0 mph and High speed = 52.0+ mph.

Table 13 indicates that the mean error for all weight values is almost stable. The variability is essentially unchanged by speed.

Table 13 Pre-Validation Results by Speed Bin - 390200 - 14 April 2004

Element	95% Limit	Low Speed	Med. Speed	High Speed
Single axles	±20 %	-6.3% ± 6.1%	-5.3% ± 6.2%	-6.8% ± 7.9%
Tandem axles	±15 %	-0.5% ± 8.2%	-1.2% ± 11.8%	0.9% ± 11.7%
GVW	±10 %	-2.8% ± 7.6%	-2.8% ± 7.2%	-2.7% ± 8.6%
Speed	±1 mph			
Axle spacing	± 0.5 ft	0.2 ± 0.2 ft	0.0 ± 0.2 ft	0.0 ± 0.2 ft

From Figure 6-7 it appears the variability in GVW is stable for low and medium speeds but is greater at high speeds.

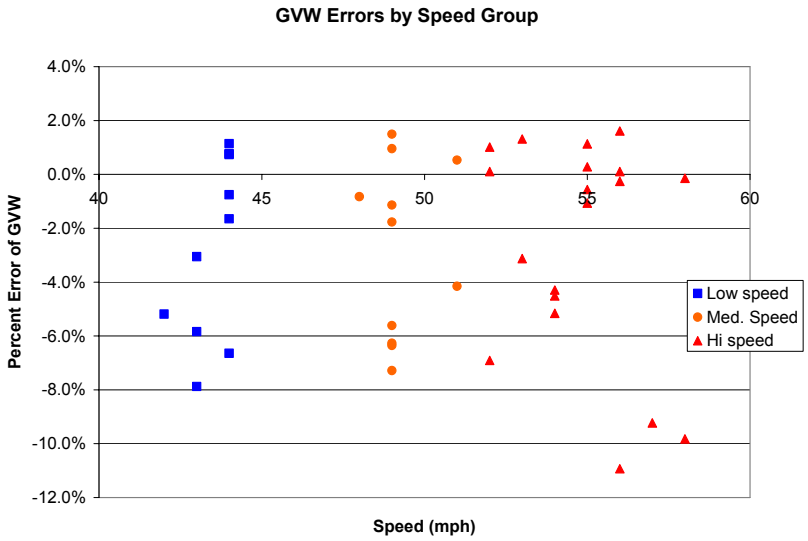


Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 390200 - 14 April 2004

From Figure 6-8 it appears that the average error in GVW for all trucks is stable for low and medium speeds but is different at high speeds.

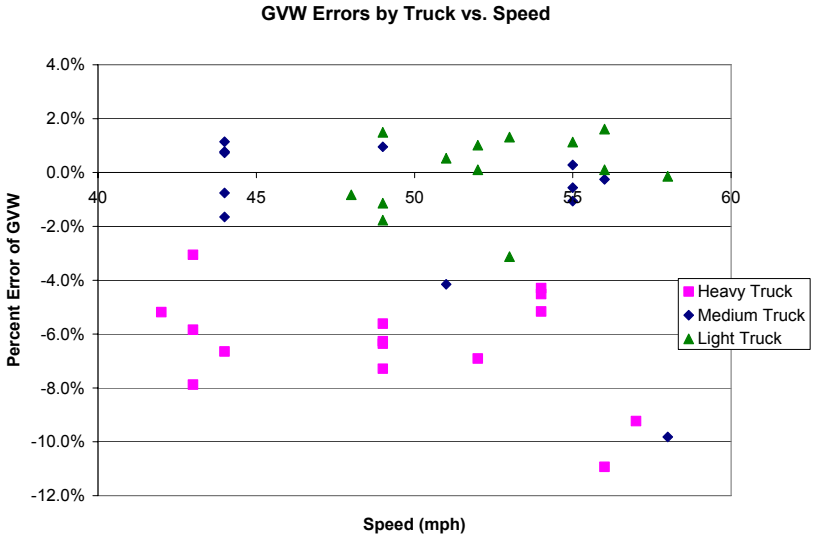


Figure 6-8 Pre-Validation GVW Percent Error vs. Speed by Truck – 390200 - 14 April 2004

From Figure 6-9 it appears that the mean error and variability of single axle weights is increasing with increasing speeds.

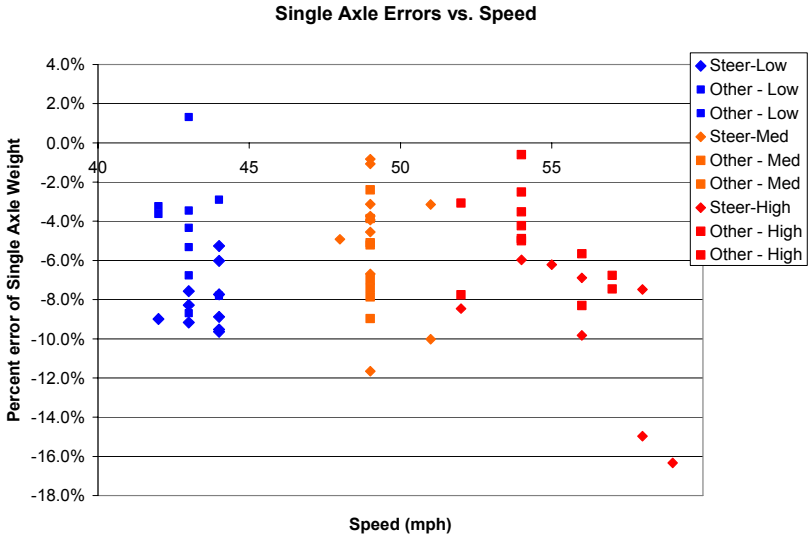


Figure 6-9 Pre-Validation Single Axle Percent Error vs. Speed Group - 390200 - 14 April 2004

From Figure 6-10 it appears that the mean error and variability of steering axle weights for all trucks is increasing with increasing speeds.

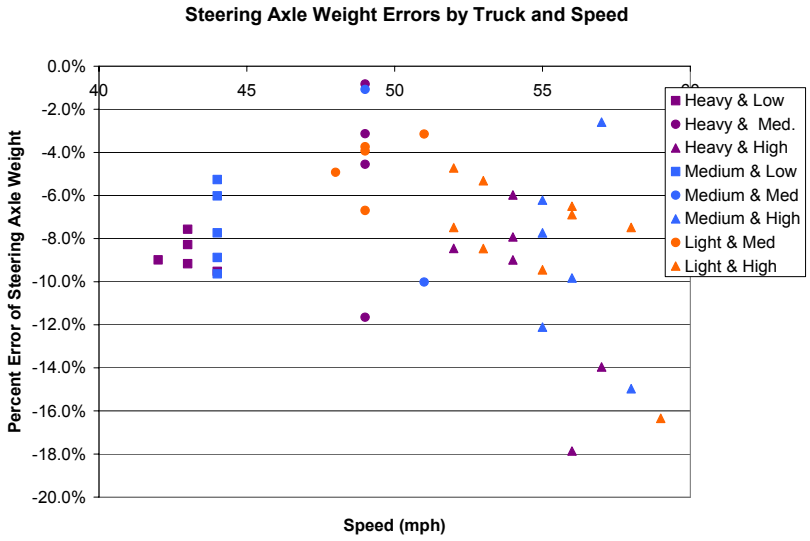


Figure 6-10 Pre-Validation Steering Axle Percent Error vs. Speed by Truck - 390200 - 14 April 2004

6.3 Classification Validation

According to the agency, they use the 13-bin FHWA Classification scheme from the Traffic Monitoring Guide with a revision for Class 14, which accounts for the Michigan grain trucks. However, as per the vendor ASCII format data files, the system collects and reports using the 6-digit Truck Weight System scheme for its native file format. The

classification algorithm is strictly based on number of axles and has no provision for unknown or un-classified vehicles (Class 15s).

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

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. The following are the classification error rates by class:

Table 14 Truck Misclassification Percentages for 390200 – 14 April 2004

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	25	5	17	6	67
7	67				
8	33	9	6	10	100
11	0	12	0	13	100

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

Table 15 Truck Classification Mean Differences for 390200 – 14 April 2004

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	33	5	-17	6	-67
7	200				
8	50	9	-6	10	Unknown
11	0	12	0	13	Unknown

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 were either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown are those identified by the equipment but no vehicles of the type were seen the observer. There is no way to tell how many more than those that might actually present exist. N/A means no vehicles of the class recorded by either the equipment or the observer.

7 Data Availability and Quality

As of April 15, 2004 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 16. 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 1998, 2000 and 2001 have a sufficient quantity to be considered "full" years. Calibration of classification and weight equipment was done on September 17th 1999, April 9th 2001 and May 29th 2002 as of December 2003 upload. Statistics on data quality are only available for the May 29th 2002 validation. Together with the previously gathered calibration information it can be seen that at least 5 additional years of research quality data are needed to meet the goal of a minimum of 5 years of research classification and weight data.

Table 16 Amount of Traffic Data Available 390200 – 15 April 2004

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1998	255	11	Complete Week	272 (229)*	11	Complete Week
2000	274	11	Complete Week	323	12	Complete Week
2001	273	12	Complete Week	290	11	Complete Week

* Days of Data after eliminating suspect February and March information

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

Class 9s constitutes more than 10 percent of the truck population. Based on the data collected from the end of the last calibration iteration the following are the expected values for these populations. The precise values to be used in data review will need to be determined by the RSCs on receipt of the first 14 days of data after the successful

validation. For sites that do not meet LTPP precision requirements, this period may still be used as a starting point from which to track scale changes.

Table 17 GVW Characteristics of Major sub-groups of Trucks - 390200 - 16 April 2004

	Class 9
Percentage Overweights	3.0%
Percentage Underweights	12.0%
Unloaded Peak	32,000 lbs
Loaded Peak	78,000 lbs

The expected percentage of unclassified vehicles is zero.

The graphical screening comparison figures are found in Figure 7-1 through Figure 7-3.

In Figure 7-1 the GVW values below 16,000 pounds were excluded while generating the graph since the data does not appear to represent truly the Class 9 GVWs for this site.

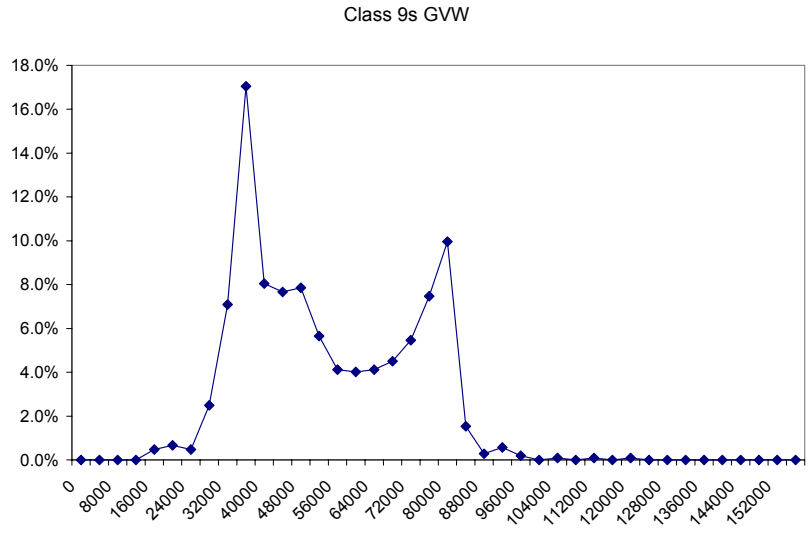


Figure 7-1 Expected GVW Distribution Class 9 – 390200 - 16 April 2004

The Class 15s shown in Figure 7-2 are obtained from the raw data file. This Class may not appear in the processed traffic data in which case the vehicle distribution pattern will change in the graphs generated using the processed traffic data.

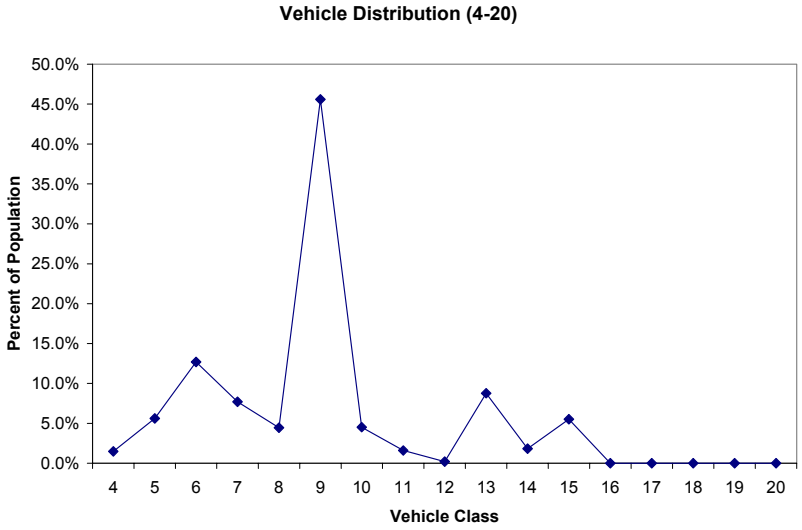


Figure 7-2 Expected vehicle distribution - 390200 - 16 April 2004

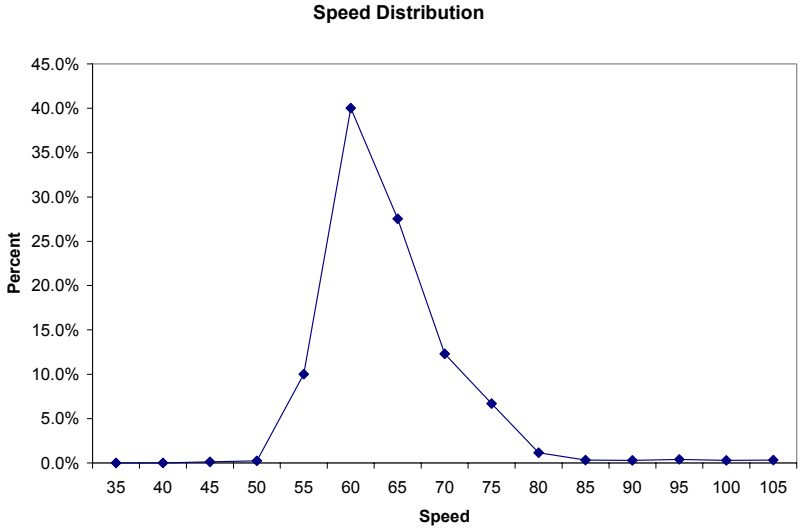


Figure 7-3 Expected speed distribution - 390200 - 16 April 2004

8 Data Sheets

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

Sheet 19 – Truck 1 – Class 9 fully loaded (4 pages)
Sheet 19 – Truck 2 – Class 9 partially loaded (4 pages)
Sheet 19 – Truck 3 – Class 9 empty (4 pages)

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

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

Sheet 21 – Pre-validation (6 pages)
Sheet 21 – Calibration Iteration 1/ Post-validation – (6 pages)

Pre and post validation analysis of the A-file data – 3 pages

9 Updated handout guide and Sheet 17

A copy of the handout has been included following page 27. It includes a current Sheet 17 with all applicable maps and photographs. There are only minor 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 at the very end of the report.

HANDOUT GUIDE FOR SPS WIM FIELD PERFORMANCE EVALUATION AND CALIBRATION

STATE: Ohio

SHRP ID: 0200

Figures

1. General Information

SITE ID: *390200*

LOCATION: *US 23 North (Mile Post: 19.7) at Delaware*

VISIT DATE: *April 14 and 15, 2004*

VISIT TYPE: *Field Performance Evaluation and Calibration*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *Steven Jessberger, 614-752-4057, steven.jessberger@dot.state.oh.us*

Roger Green, 614-995-5993, roger.green@dot.state.oh.us

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

FHWA Division Office Liaison: *Herman Rodrigo, 614-280-6850, herman.rodrigo@fhwa.dot.gov*

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

3. Agenda

BRIEFING DATE: *No Briefing Requested*

ONSITE PERIOD: *April 14 and 15, 2004*

TRUCK ROUTE CHECK: *Completed at Assessment Visit (See Truck Route)*

4. Site Location/ Directions

NEAREST AIRPORT: *Port Columbus International Airport, Columbus, OH*

DIRECTIONS TO THE SITE: *7.6 miles North of SR 37*

MEETING LOCATION: *On site*

WIM SITE LOCATION: *US 23North, Milepost 19.7*

WIM SITE LOCATION MAP:*See Figure 4.1*

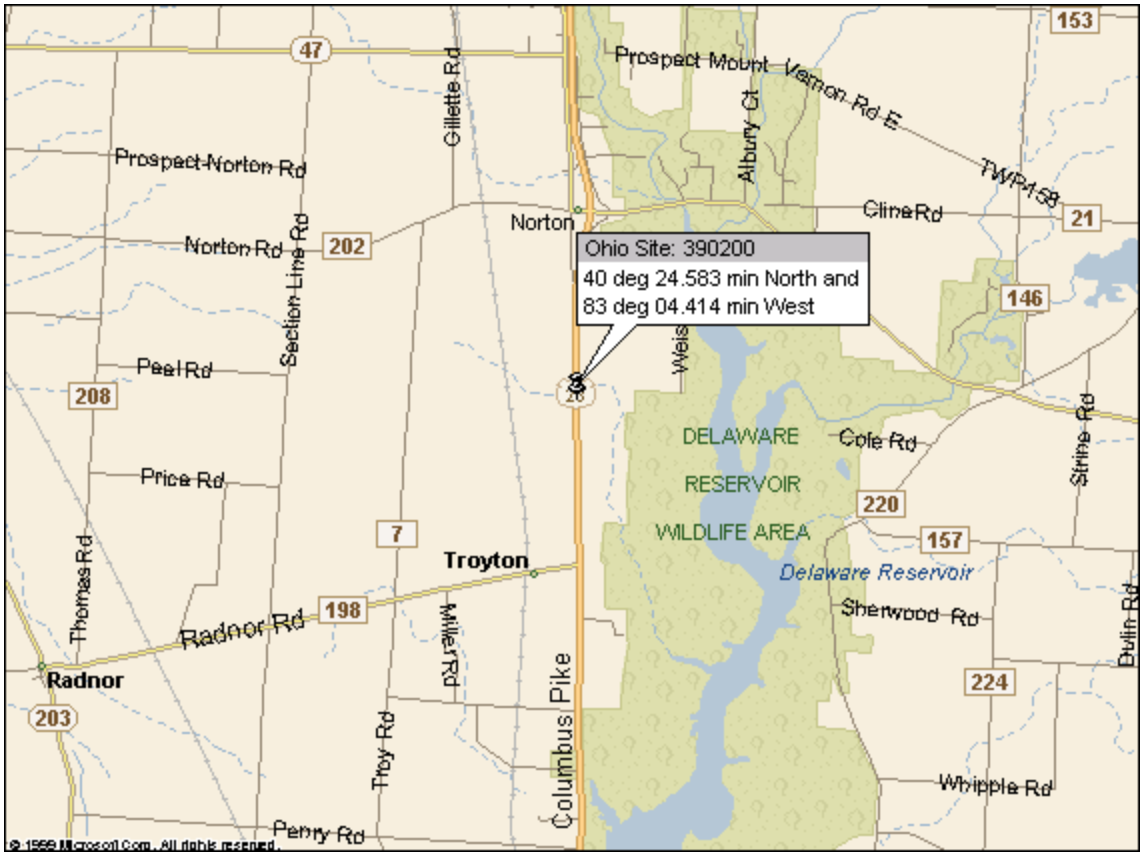


Figure: 4.1: Section 390200 near Delaware, Ohio

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: I71 *Milepost 129, Hours: 7:00 a.m.-3:00 p.m. and 8:00 p.m.-4:00 a.m. Contact: Don Brane, Phone: (740) 965-3105.*

TRUCK ROUTE:

- *Northbound Turnaround –1.678 miles from site at SR 229 (40^0 26.035' North and 83^0 04. 363' West)*
- *Southbound Turnaround –1.424 miles from site at Irwin Road (40^0 23. 356' North and 83^0 04.459' West)*

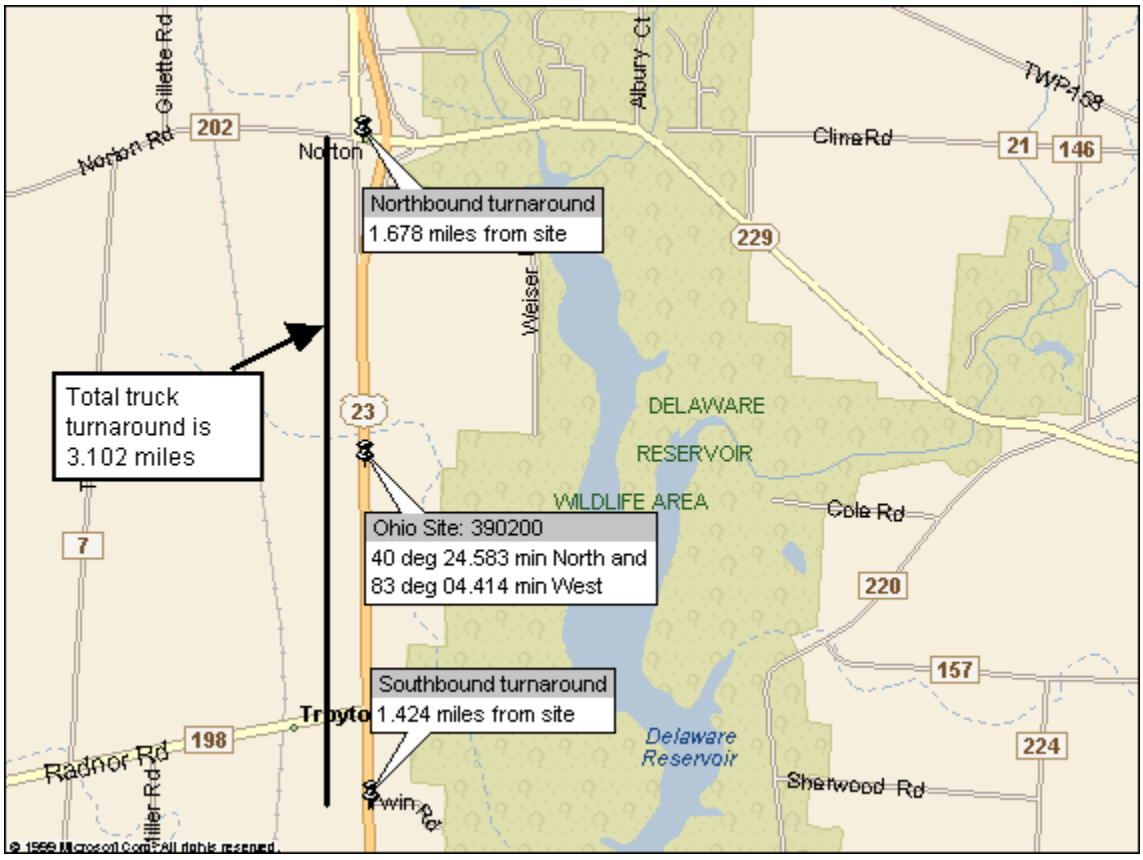


Figure 5.1: Truck Map at 390200

6. Sheet 17 – Ohio (390200)

1.* ROUTE ___US 23____ MILEPOST ___19.745__LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade __<_1_____ % Sag vertical Y / N
Nearest SPS section upstream of the site _0__ _2__ __6_ _1__
Distance from sensor to nearest upstream SPS Section ___ _4__ _0__ _5__ 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 _____ Cement Concrete_____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date _____11-12-03_____ Distress Photo Filename_
Downstream_1_TO_1_7A_39_0200_11_12_03.JPG_____
Date _____11-12-03_____ Distress Photo Filename
Downstream_2_TO_1_7A_39_0200_11_12_03.JPG _____
Date _____11-12-03_____ Distress Photo Filename
Upstream_1_TO_1_7A_39_0200_11_12_03.JPG _____

6. * SENSOR SEQUENCE _____Loop – Load Cell – Load Cell_

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 _5_ _4_ ft

Distance from system __ __ __ ft

TYPE ___Mettler - Toledo_____

CABINET ACCESS controlled by LTPP / STATE / JOINT?

Contact - name and phone number ___Steven Jessberger 614-752-4057__

Alternate - name and phone number ___Dave Gardner 614-752-5740____

11. * POWER

Distance to cabinet from drop ___ _1__ _0__ ft Overhead / underground / solar / AC in cabinet?

Service provider __Amer. Elec. Power_____ Phone number _____

12. * TELEPHONE

Distance to cabinet from drop _9__ _9__ _1__ ft Overhead / under ground / cell?

Service provider ____Verizon_____ Phone Number _____

13.* SYSTEM (software & version no.)- _____Mettler - Toledo_____

Computer connection – RS232 / Parallel port / USB / Other _____

14. * TEST TRUCK TURNAROUND time __10_____ minutes DISTANCE _6.2__ mi.

15. PHOTOS FILENAME

Power source _AC_Meter_Box_TO_1_7A_39_0200_11_12_03.JPG____

Phone source _Phone_Pedestal_1_TO_1_7A_39_0200_11_12_03.JPG_____

Cabinet exterior _Cabinet_Exterior_TO_1_7A_39_0200_11_12_03.JPG___

Cabinet interior _Cabinet_Interior_TO_1_7A_39_0200_11_12_03.JPG____

Weight sensors _Load_Cells_1_TO_1_7A_39_0200_11_12_03.JPG_____

Classification sensors _Loop_Sensors_1_TO_1_7A_39_0200_11_12_03.JPG____

Other sensors _____

Description _____

Downstream direction at sensors on LTPP lane

_Downstream_1_TO_1_7A_39_0200_11_12_03.JPG_____

Upstream direction at sensors on LTPP lane

_Upstream_1_TO_1_7A_39_0200_11_12_03.JPG_____

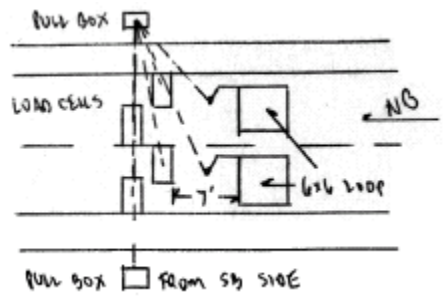
COMMENTS

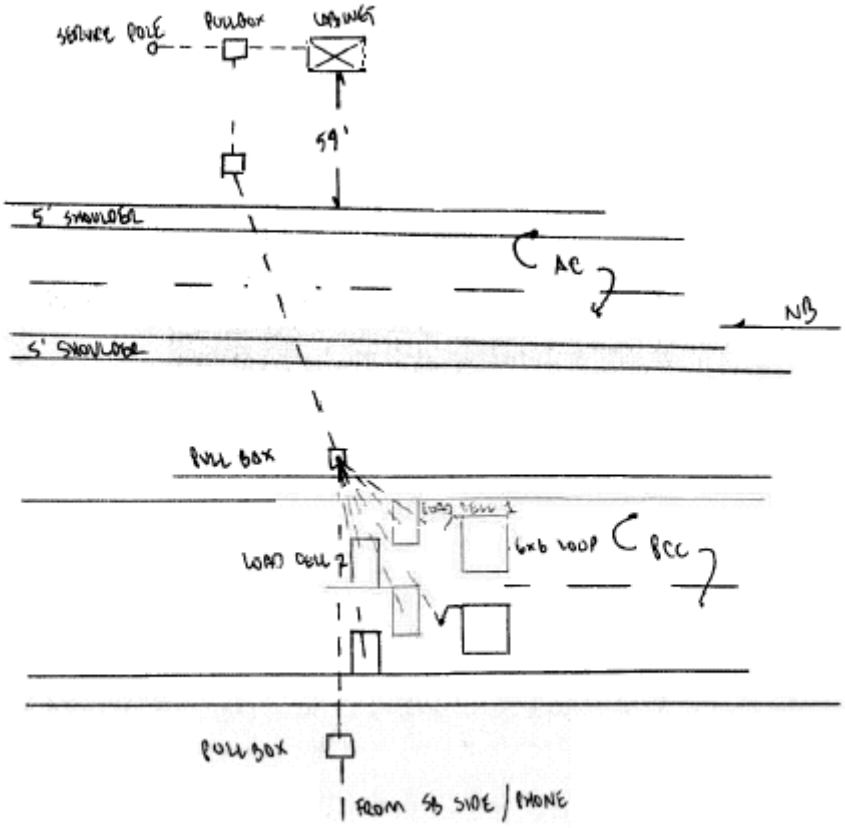
_____
_____GPS Coordinates for site: 40^0 24.583' North and 83^0 04.414' West_____
_____
_____Amenities_-_5.5_miles_ south_of_site_____
_____Food_-Wendy's & Mc Donald's_____
_____Gas_-_Citgo, Sunoco, mini-mart_____
_____Miscelleaneous_-_84 Lumber_____
_____Hotel_-_Travel Lodge _____
_____
_____10.0_miles south of site_____
_____
_____Food_-_Damon's, Wendy's, Taco Bell, Kroger's_____
_____Hotel_-_Super 8, Ameri Host_____
_____Miscellaneous_- Banks, Wal-Mart, Sears Hardware_____
_____
_____Contact for Lane Switch -__Dave Zurbe – 740-363-1251_(ext 266) - Striping___
_____Roger Green – LTPP Division Liaison (Ohio)_____
_____Delaware County Garage – Bob Lloyd 740-369-1569_____
_____
_____ Types of Trucks: Three Class 9s_____
_____
____Expected Weight Ranges: Truck 1 –72,000 to 80,000 legal limit on gross and axles, air suspension;_____
Truck 2 – partially loaded 28,000 – 50,000 lbs no suspension requirements;_____
Truck 3 – Empty with no suspension requirements; _____
_____
Speeds to be run: 45 to 55 mph_(Posted Speed Limit is 55 mph) _____
_____Corrective actions recommended: Controller classification firmware should be updated to facilitate the use of weights in the classification process. Grinding or replacement of the travel lane pavement._____
_____
_____
_____
_____
_____

COMPLETED BY ____Dean J. Wolf_____

PHONE _301-210-5105_____DATE COMPLETED _0_ 4_ /_1_ 5_ / _2_ 0_ 0_ 4_

Sketch of equipment layout





Site Map

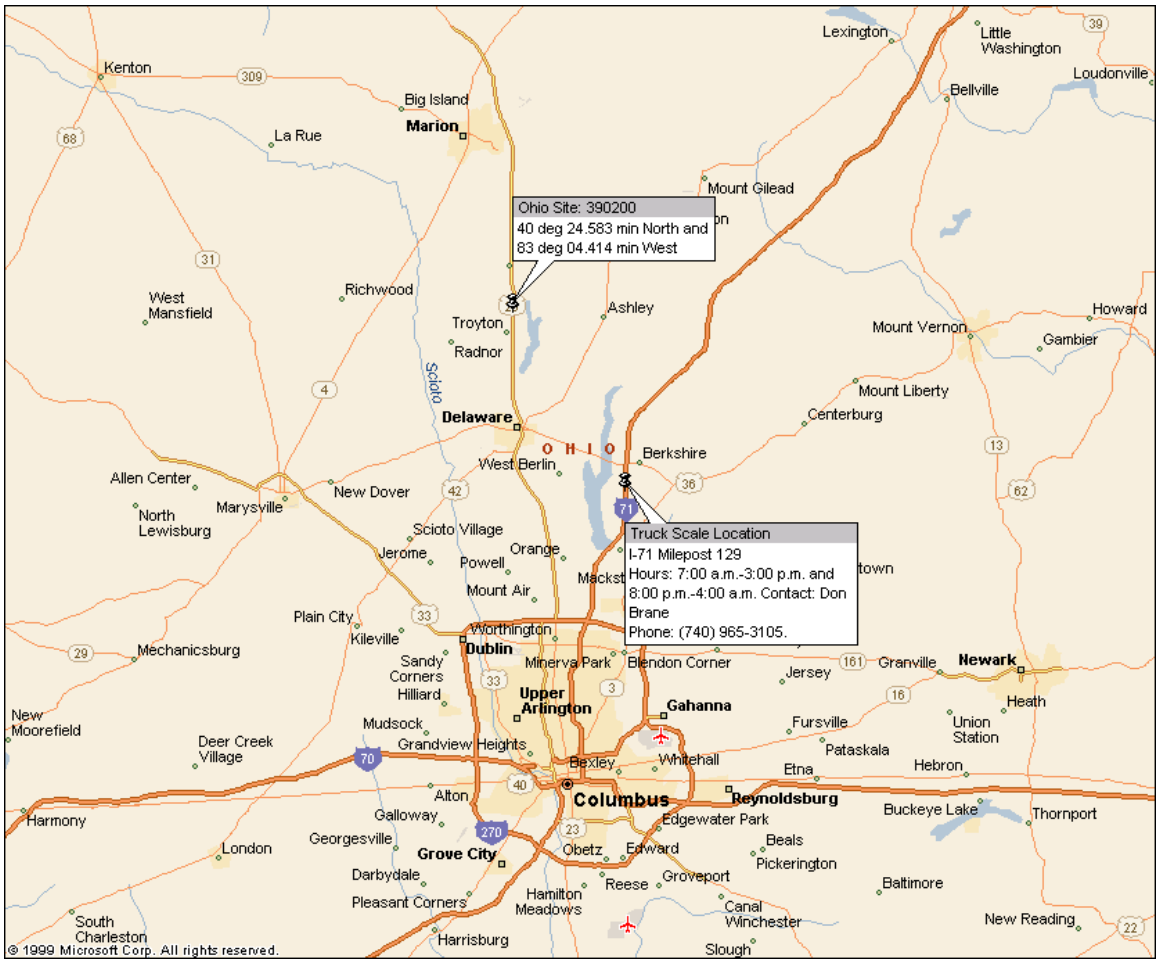


Figure 6.1: Site Map at 390200

Downstream_1_TO_1_7A_39_0200_11_12_03.JPG (Distress Photo 1)

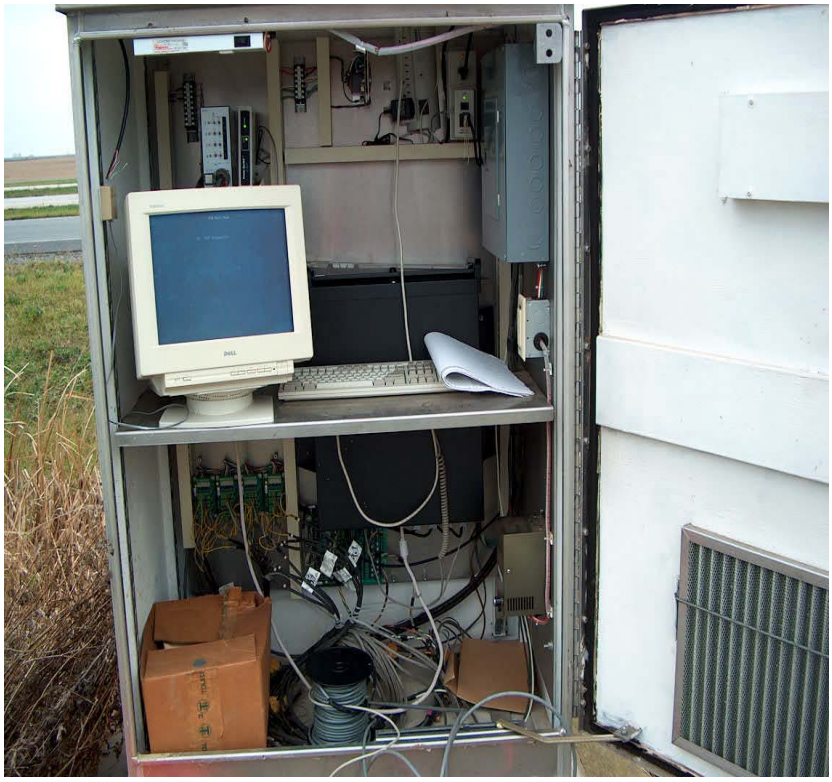
Downstream_2_TO_1_7A_39_0200_11_12_03.JPG (Distress Photo 2)

Upstream_1_TO_1_7A_39_0200_11_12_03.JPG (Distress Photo 3)

AC_Meter_Box_TO_1_7A_39_0200_11_12_03.JPG

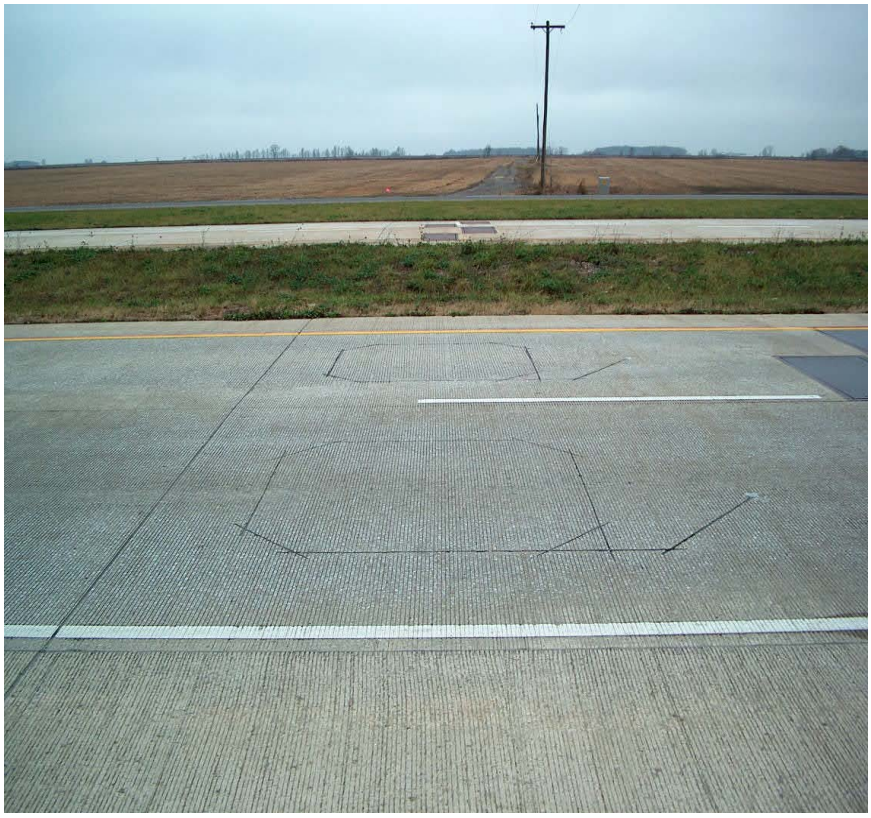
Phone_Pedestal_1_TO_1_7A_39_0200_11_12_03.JPG

Cabinet_Exterior_TO_1_7A_39_0200_11_12_03.JPG



Cabinet_Interior_TO_1_7A_39_0200_11_12_03.JPG

Load_Cells_1_TO_1_7A_39_0200_11_12_03.JPG



Loop_Sensors_1_TO_1_7A_39_0200_11_12_03.JPG

Downstream_1_TO_1_7A_39_0200_11_12_03.JPG

Upstream_1_TO_1_7A_39_0200_11_12_03.JPG

Sheet 18 STATE_CODE **3 9**

LTPP Traffic Data

WIM SITE COORDINATION SPS Project_ID 0 2 0 0

1. Equipment –
   - Maintenance – contract with purchase / separate contract LTPP / separate contract State / state personnel
     Contact: Steven Jessberger 614-752-4057

   - Purchase by LTPP / State
     Constraints on specifications (sensor, electronics, warranties, maintenance, installation)

   - Installation – Included with purchase / separate contract by State / state personnel / LTPP contract

   - Calibration – Vendor / State / LTPP

   - Manuals and software – State / LTPP

   - Pavement PCC/AC – always new / replacement as needed / grinding and maintenance as needed / maintenance only / no remediation

   - Power - overhead / underground / solar billed to State / LTPP / N/A

   - Communication - Landline / Cellular / Other billed to State / LTPP / N/A

2. Site visits – Evaluation

   - WIM Validation Check - advance notice required 14 days / weeks

   - Trucks – air suspension 3S2 State / LTPP
     2nd common State / LTPP
     3rd common State / LTPP
     4th common State / LTPP
     Loads State / LTPP
     Contact _____

     Drivers State / LTPP
     Contact _____

     Contractors with prior successful experience in WIM calibration in state:
     _____
     Nearest static scale (commercial or enforcement)
     _____

   - Profiling – short wave -- permanent / temporary site marking
     -- long wave – permanent / temporary site marking

WIM SITE COORDINATION SPS Project_ID 0 2 0 0

- Pre-visit data
  - Classification and speed: Contact Steven Jessberger
  --Typical operating conditions (congestion, high truck volumes)
  Contact Steven Jessberger
  -- Equipment operational status: Contact Steven Jessberger

- Access to cabinet
  State only / Joint / LTPP Key / Combination

- State personnel required on site Y / N
Contact information Steven Jessberger

- Enforcement Coordination required Y / N
Contact information _____

- Traffic Control Required Y/ N
Contact information _____

- Maximum number of personnel on site 4
  Invitees _____

- Authorization to calibrate site -- State only / LTPP

- Special conditions _____

3. Data Processing
- Down load State only / LTPP read only / LTPP download / LTPP download and copy to state
- Data Review State per LTPP guidelines / State weekly / LTPP
- Data submission for QC State - weekly; twice a month; monthly / LTPP

4. Site visits – Validation

- WIM Validation Check - advance notice required 14 days / weeks
  LTPP Semi-annually / Sate per LTPP protocol semi-annually / State other

- Trucks – air suspension 3S2 State / LTPP
  2nd common State / LTPP
  3rd common State / LTPP
  4th common State / LTPP
  Loads State / LTPP
  Contact _____

  Drivers State / LTPP

WIM SITE COORDINATION SPS Project_ID 0 2 0 0

Contact _____

Contractors with prior successful experience in WIM calibration in state:
_____

- Profiling – short wave -- permanent / temporary site marking
  -- long wave – permanent / temporary site marking

- Pre-visit data
  – Classification and speed: Contact Steven Jessberger
  -- Equipment operational status: Contact Steven Jessberger

- Access to cabinet
  State only / Joint / LTPP Key / Combination

- State personnel required on site Y / N
  Contact information Steven Jessberger

- Enforcement Coordination required Y / N
  Contact information _____

- Traffic Control Required Y/ N
  Contact information _____

- Authorization to calibrate site -- State only / LTPP

- Special conditions _____

5. Site visit – Construction

- Construction schedule and verification – Contact _____

- Notice for straightedge and grinding check - _____ days / weeks
  On site lead to direct / accept grinding – State / LTPP

- WIM Calibration - advance notice required _____ days / weeks
  Number of lanes -- _____
  LTPP / State per LTPP protocol / State Other _____

- 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:

WIM SITE COORDINATION SPS Project_ID 0 2 0 0

_____

- Profiling – straight edge -- permanent / temporary site marking
  -- long wave – permanent / temporary site marking

- Pre-visit data
  – Classification and speed: Contact _____
  -- Equipment operational status: Contact _____

- Access to cabinet
  State only / Joint / LTPP Key / Combination

- State personnel required on site Y / N
  Contact information _____

- 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 [__ _7_ _2_ _1_] *STATE CODE [_3_ _9_] *SHRP SECTION ID [0__ _2_ _0_ _0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_ _4_ / _1_ _5_ / _2_ _0_ _0_ _4_]

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
   _X___ OTHER (SPECIFY) ____ SITE EVALUATION AND CALIBRATION_____

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 __X__ LOAD CELLS ____ QUARTZ PIEZO
   ____ CHANNELIZED FLAT PIEZO __X__ INDUCTANCE LOOPS ____ CAPACITANCE PADS
   ____ OTHER (SPECIFY) _____

5. EQUIPMENT MANUFACTURER _____Mettler Toledo_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

   __ _3_ __ NUMBER OF TRUCKS COMPARED __ _3_ __ NUMBER OF TEST TRUCKS USED

   __ 13__ __ 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 ___ _-0.8 %__ ___ __ STANDARD DEVIATION __ _3.6 %_ __
   DYNAMIC AND STATIC SINGLE AXLES ___ _-4.6 %__ _____ STANDARD DEVIATION __ _4.1 %_ __
   DYNAMIC AND STATIC DOUBLE AXLES ___ __-1.5 %_ ___ __ STANDARD DEVIATION __ _5.0 %_ __

8. __3_ ____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____ _____ __43-45, 46-50, 51.0-59.0 mph_ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) __7.9800 (P4) ___ ___ ___ ___

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 _100__ NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   *** FHWA CLASS 9 ____ _-5__ ____ FHWA CLASS _6___ ____ _25___ ____ ____
   *** FHWA CLASS 8 ____ _20____ FHWA CLASS _5___ ____ _-33___ ____ ____
   FHWA CLASS ____ ____ ____ ____ ____
   FHWA CLASS ____ ____ ____ ____ ____
   *** PERCENT "UNCLASSIFIED" VEHICLES: ____ _0_____

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 [__ _7_ _2_ _1_] *STATE CODE [_3_ _9_] *SHRP SECTION ID [0__ _2_ _0_ _0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_ _4_ / _1_ _4_ / _2_ _0_ _0_ _4_]

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
   _X___ OTHER (SPECIFY) ____ SITE EVALUATION AND CALIBRATION_____

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 __X__ LOAD CELLS ____ QUARTZ PIEZO
   ____ CHANNELIZED FLAT PIEZO __X__ INDUCTANCE LOOPS ____ CAPACITANCE PADS
   ____ OTHER (SPECIFY) _____

5. EQUIPMENT MANUFACTURER _____Mettler Toledo_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

   __ _3_ __ NUMBER OF TRUCKS COMPARED __ _3_ __ NUMBER OF TEST TRUCKS USED

   __ 13__ __ 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 ___ _-2.7 %__ ___ __ STANDARD DEVIATION __ _3.6 %_ __
   DYNAMIC AND STATIC SINGLE AXLES ___ _-6.6 %__ _____ STANDARD DEVIATION __ _3.7 %_ __
   DYNAMIC AND STATIC DOUBLE AXLES ___ __0.0 %_ ___ __ STANDARD DEVIATION __ _5.4 %_ __

8. __3_ ____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____ _____ __42-45, 46-51, 52-59 mph_ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) __11.4900 (P4) ___ ___ ___ ___

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 _100__ NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:

*** FHWA CLASS 9 ____ _-6__ ____	FHWA CLASS _7___	____ _200___ ____ ____
*** FHWA CLASS 8 ____ _50____	FHWA CLASS _6___	____ _-67___ ____ ____
	FHWA CLASS _5___	____ _-17___ ____ ____
	FHWA CLASS ____	____ ____ ____ ____

   *** PERCENT "UNCLASSIFIED" VEHICLES: ____ _0_____

PERSON LEADING CALIBRATION EFFORT: ____Dean J. Wolf_____
CONTACT INFORMATION: _____301-210-5105_____ rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 1	* DATE	04/14/03 & 04/15/03

Rev. 08/31/01

Truck 1

PART I.

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

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight	5.* Post-Test Average Loaded Axle Weight	6.* Measured D)irectly or C)alculated?
A		11273	10933	(D) / C
B		15587	15297	(D) / C
C		15633	15403	(D) / C
D		17787	17993	(D) / C
E		18147	18057	(D) / C
F				(D) / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 78427
*c) Post Test Loaded Weight 77680
*d) Difference Post Test – Pre-test -747.0

GEOMETRY

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

9. a) * Make: freightliner b) * Model: FLD 120 Classic

10.* Trailer Load Distribution Description:

Lumber

11. a) Tractor Tare Weight (units): 16,000 lbs

b). Trailer Tare Weight (units): ( ) lbs

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 1	* DATE	4/14/04 & 4/15/04

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

A to B 19.5 B to C 4.3 C to D 28.9

D to E 10.2 E to F — 62.9

Wheelbased (measured A to last) 62.9 Computed _____

13. *Kingpin Offset From Axle B (units) + 10 inches (_____)

(+ 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 leaf Springs
B	295/75R 22.5	Air
C	295/75R 22.5	Air
D	11R 22.5	Air
E	11R 22.5	Air
F		

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 1 0200
*CALIBRATION TEST TRUCK # 1	* DATE	04/14/04 & 04/15/04

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PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 1	* DATE	4/14/04 & 4/15/04

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Table 4 . Axle and GVW computations -

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11320	15500	15640	17420	18140		78020
2	11240	15500	15500	17980	18160		78380
3	11260	15760	15760	17960	18140		78880
Average	11273	15587	15633	17787	18147		78427

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	15260	15380	17960	18080		77600
2	10880	15300	15400	17980	18060		77620
3	11000	15330	15430	18030	18030		77820
Average	10933	15297	15403	17990	18057		77680

Measured By KMA Verified By _____

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 2	* DATE	4/14/04 & 4/15/04

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight	5.* Post-Test Average Loaded Axle Weight	6.* Measured D)irectly or C)alculated?
A		10513	10210	(D) / C
B		9800	9685	(D) / C
C		9973	9805	(D) / C
D		10987	11000	(D) / C
E		11230	11150	(D) / C
F				(D) / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 52493
*c) Post Test Loaded Weight 51850
*d) Difference Post Test – Pre-test -643

GEOMETRY

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

9. a) * Make: Freight liner b) * Model: FLD120

10.* Trailer Load Distribution Description:

Dump trucks loaded just before axle # 4

11. a) Tractor Tare Weight (units): 16,000 lbs

b). Trailer Tare Weight (units): 24,000 lbs

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 2 0209
*CALIBRATION TEST TRUCK # 2	* DATE	04/14/04 & 04/15/04

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

A to B 19.6 B to C 4.3 C to D 36.0

D to E 4.5 E to F —

Wheelbased (measured A to last) 64.4 Computed _____

13. *Kingpin Offset From Axle B (units) +1 ft 8 inches (_____)
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11 R 22.5	2 reg. leaf springs
B	295/75 R 22.5	Air
C	11	Air
D	255/70 R 22.5	Air
E	11	Air
F		

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

Steering Axle	Axle B	Axle C	Axle D	Axle E

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 2	* DATE	4/14/04 & 4/15/04

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PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 2	* DATE	4/14/04 & 4/15/04

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Table 4 . Axle and GVW computations -

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10500	9740	10000	10940	11280		52460
2	10520	9740	10000	10900	11260		52420
3	10520	9920	9920	11120	11120		52600
Average	10513	9800	9973	10987	11220		52493

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	10220	9620	9860	10920	11220		51840
2	10200	9750	9750	11080	11080		51860
3							
Average							51850

Measured By KMR Verified By _____

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 3	* DATE	4/14/04 & 4/15/04

Rev. 08/31/01

PART I.

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

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight	5.* Post-Test Average Loaded Axle Weight	6.* Measured D)irectly or C)alculated?
A		10160	9910	(D) / C
B		6250	6235	(D) / C
C		6250	6225	(D) / C
D		4017	4095	(D) / C
E		5890	5835	(D) / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 32567

*c) Post Test Loaded Weight 32300

*d) Difference Post Test – Pre-test -267

GEOMETRY

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

9. a) * Make: MACK b) * Model: CH 613

10.* Trailer Load Distribution Description:

Empty

11. a) Tractor Tare Weight (units): 12,000 lbs

b). Trailer Tare Weight (units): 14,000 lbs

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0504 & 0505
*CALIBRATION TEST TRUCK # 3	* DATE	4/14/04 & 4/15/04

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

A to B 16.3 B to C 4.3 C to D 33.2

D to E 4.1 E to F —

Wheelbased (measured A to last) 58.2 Computed _____

13. *Kingpin Offset From Axle B (units) 2 ft 4 inches (_____)
(+ 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	3 reg leaf springs.
B	11R 22.5	Air
C	11R 22.5	"
D	295/75R 22.5	1 reg leaf spring & 1 Taper leaf spring
E	"	"
F	—	—

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

Steering Axle	Axle B	Axle C	Axle D	Axle E
_____	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
_____	_____	_____	_____	_____

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 3	* DATE	4/14/04 & 4/15/04

Rev. 08/31/01

PART II

Table 1. Axle and GVW computations - pre-test

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

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

Sheet 19	* STATE_CODE	39
LTPP Traffic Data	* SPS PROJECT ID	0100 & 0200
*CALIBRATION TEST TRUCK # 3	* DATE	4/14/04 & 4/15/04

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10160	6240	6200	3920	5780		32300
2	10200	6160	6200	4100	5980		32640
3	10120	6350	6350	4030	5910		32760
Average	10160	6250	6250	4017	5890		32567

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	9940	6220	6200	4100	5840		32300
2	9880	6250	6250	4090	5830		32300
3							
Average							32300

Measured By KMA Verified By _____

Sheet 20	* STATE_CODE	39
LTPP Traffic Data	*SPS PROJECT_ID	0200
Speed and Classification Checks * 1 of* 2	* DATE	04/14/2004

Rev. 08/31/2001.... Pre calibration

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
54	12		55	12	63	9		63	9
57	9		57	9	58	4		57	4
55	9		55	9	59	9		59	9
58	5		57	5	58	9		58	9
59	9		58	9	61	9		61	9
54	5		54	5	59	9		59	9
56	5		56	5	54	9		54	9
60	9		59	9	54	7		54	7
62	9		62	9	59	9		59	9
53	5		53	5	58	9		58	9
55	9		55	9	60	9		59	9
53	9		53	9	58	6		58	6
55	5		55	5	56	9		56	9
64	8		64	8	58	9		57	9
58	9		57	9	56	5		56	5
62	9		62	9	52	3		52	5 *
59	9		59	9	58	9		58	9
56	9		56	9	55	8		55	8
55	9		55	9	60	9		59	9
55	5		55	5	56	9		56	9
58	9		58	9	60	4		60	4
54	9		53	9	62	5		62	5
53	9		52	9	54	9		54	9
58	9		59	9	61	9		60	9
58	9		58	9	58	9		58	9

Recorded by DJW Direction N Lane 1 Time from 8:05 to 8:36

MISSING = 1

Sheet 20	* STATE_CODE	39
LTPP Traffic Data	*SPS PROJECT_ID	0200
Speed and Classification Checks * 2 of* 2	* DATE	04/14/2004

Rev. 08/31/2001....

Pre calibration

	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
*	58	3		58	5	56	9		56	9
	62	9		62	9	58	9		58	9
	54	4		54	4	59	9		59	9
*(1)	62	7		57	6	58	9		58	9
	60	9		59	9	55	9		55	9
	58	9		58	9	56	5		55	5
	57	9		57	9	54	9		54	9
	54	9		54	9	53	5		53	5
	59	9		58	9	55	9		55	9
	55	5		55	5	60	5		59	5
	60	9		60	9	59	9		59	9
	55	8		56	3+2T	56	11		56	11
	52	9		52	9	56	9		56	9
	58	9		58	9	59	9		59	9
	61	9		59	9	58	9		58	9
	61	9		61	9	57	5		57	5
	70	13		61	9	47	5		47	5
*(1)	70	7		62	6	63	10		57	9 *
	58	9		58	9	57	9		57	9
*	54	4		54	5	67	13		58	9 *
	58	9		58	9	53	9		52	9
	60	9		60	9	53	9		53	9
	61	9		60	9	53	5		53	5
	63	9		63	9	52	9		52	9
	55	9		55	9	64	13		62	9

Recorded by DJW Direction N Lane 1 Time from 8:37 to 9:11

(1) System added axle, weights, class etc (manually) - trucks did not go on scales

MISCLASS: 6

Sheet 20	* STATE_CODE	35
LTPP Traffic Data	*SPS PROJECT_ID	0200
Speed and Classification Checks * 1 of* 2	* DATE	04/15/2004

Rev. 08/31/2001.... Post Calibration

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
	9			9		9			9
	9			9		9			9
	9			9		8			8
	9			9		7			3
	9			9		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	6			6		5			5
	8			8		9			9
	9			9		5			5
	9			9		6			6
	9			9		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	13			9		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	13			9		9			9
	9			9		9			9
	9			9		9			9

Recorded by KMA / DSU Direction N Lane 1 Time from 3:29 to 4:40

Sheet 20	* STATE_CODE	39
LTPP Traffic Data	*SPS PROJECT_ID	0200
Speed and Classification Checks * 2 of* 2	* DATE	04 / 15 / 2004

Rev. 08/31/2001....

Post calibration

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
	10			10		8			3
	9			9		9			9
	9			9		11			11
	3			5		9			9
	6			6		9			9
	13			9		9			9
	9			9		6			5
	6			6		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	9			9		8			8
	5			5		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	13			9		9			9
	5			5		9			9
	8			8		9			9
	9			9		9			9
	9			9		9			9
	9			9		9			9
	8			8		9			9
	9			9		9			9

Recorded by DJW/MA Direction N Lane 1 Time from 4:40 to 5:20

Sheet 21	* STATE_CODE	39
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 1 of 6	* DATE	04/19/2004

Rev. 08/31/2001

WIM Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
63.5		1	1	12:01	8790	43	5360 6130	6660 8140	7460 7060	7140 9100	8220 8700		72.7	19.8	4.2	29.0	19.7	
63.5		2	2	12:02	9810	44	4960 5000	4460 5280	4780 5400	6100 6540	5220 6260		52.1	20.2	4.3	36.3	1.4	
63.5		3	3	12:03	8825	49	4740 5040	3140 3520	3620 3980	2260 2820	2260 2630		32.0	16.7	4.3	32.6	4.0	
66.5		1	4	12:16	9145	49	5280 5640	6660 7920	7840 6880	8040 9000	8060 9320		73.8	19.8	4.2	28.9	10.2	
66.5		2	5	12:17	9159	51	4960 5280	4380 5160	5120 4720	4580 6480	2860 3280		54.3	23.2	4.3	42.4	14.8	
66.5		3	6	12:23	9302	52	4340 5060	2820 3880	2930 3280	2700 2780	2720 3280		32.9	14.5	4.3	33.1	3.9	
71.5		1	7	12:31	9448	54	5100 5500	6740 8580	7420 7980	8140 9260	7640 9440		75.2	19.8	4.2	29.4	10.4	
71.5		2	0 0	12:33	9537	55	4660 5200	4440 5320	4940 5240	4720 6640	5140 5940		52.2	20.1	4.3	36.6	4.5	

Recorded by DW

Checked by

Sheet 21	* STATE_CODE	35
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 2 of 6	* DATE	04/14/2004

Rev. 08/31/2001

Pre calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
71.5		3	9	12:39	9585	52	4340 5120	2940 3160	2960 3220	2480 2880	2200 2260		32.6	16.8	4.4	32.9	3.9	
78.5		1	10	12:53	10029	43	5210 5180	6740 6440	7760 7160	9220 8800	8410 9080		76.1	19.6	4.1	28.5	10.0	
78.5		2	11	12:54	10050	44	4800 5050	4560 5460	5180 5140	4760 6460	5580 6080		53.1	20.0	4.2	36.1	4.4	
[illegible]	10	~~3~~	~~12~~	12:55	10052	52	4640 5360	2900 3220	3170 3360	2020 2900	2360 2740	2340 2480	37.4	17.8	4.5	36.0	–	
81.5		1	~~13~~ 12	1:13	10507	51	4930 4720	6870 7880	7820 6640	8160 8300	7960 9160		71.8	20.4	4.2	30.0	12.5	
81.5		2	~~14~~ 13	1:14	10562	51	4820 4640	4380 5080	4480 4420	4540 6480	5200 6060		50.4	20.5	4.3	36.1	4.4	
81.5		3	~~15~~ 14	1:17	10595	52	4420 5260	2800 3520	2740 3300	2640 2780	1960 3240		32.6	16.7	4.2	33.1	3.9	
82.0		1	~~16~~ 15	1:35	11073	52	4640 4620	6600 7320	7340 6280	8780 8460	8260 8520		70.7	20.1	4.2	20.9	10.5	

Recorded by DJW

Checked by _____

Sheet 21	* STATE_CODE	39
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 3 of 6	* DATE	04/14/2004

Rev. 08/31/2001

Pre calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
82.0		2	16 ~~17~~	1:36	11092	58	4580 4360	4580 4520	5200 4220	4940 5620	5880 5140		47.8	20.8	4.3	37.1	4.5	
82.0		3	17 ~~18~~	1:37	11118	59	4200 4300	4920 2620	2900 2680	2520 2120	2300 2520		29.1	17.5	4.5	35.1	4.2	
76.5		1	18 ~~19~~	1:56	11603	43	5040 5300	6680 8160	7740 6960	7300 9540	8560 6800		74.1	19.6	4.1	37.7	10.1	
76.5		2	19 ~~20~~	1:57	11631	44	4720 4980	4360 5500	5120 5060	4940 6440	5300 6480		52.9	19.8	4.2	35.5	4.4	
76.5		3	20 ~~21~~	1:58	11661	48	4460 5200	5180 3460	2900 3440	2260 2560	2300 2580		32.3	16.8	4.3	33.3	3.7	
74.5		1	21 ~~22~~	2:08	11875	49	5240 5520	6540 7860	7620 6760	7840 9020	8280 8440		73.1	20.0	4.2	29.0	10.3	
74.5		2	22 ~~23~~	2:09	11925	49	4960 5440	4540 5340	5000 5120	4560 4840	4980 6760		53.0	20.2	4.3	35.9	4.5	
74.5		3	23 ~~24~~	2:10	11949	53	4560 5060	2900 3340	3140 3460	2340 2900	2000 3300		33.0	16.6	4.3	33.1	3.9	

Recorded by DSU

Checked by _____

Sheet 21	* STATE_CODE 39
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 4 of 6	* DATE 04/14/2004

Rev. 08/31/2001

Pre Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
68.5		1	24	3:54	12910	49	5520 5660	6500 8020	7700 6620	8260 9100	8340 8540		74260	20	4.2	28.8	10.3	
68.5		2	25	3:56	12980	53	4360 5040	2700 3380	2720 3280	2220 2840	1980 3140		31580	16.7	4.2	32.7	3.9	
67.5		1	26	4:09	13349	54	4960 5040	6880 8160	7540 7140	8000 9340	7660 9580		74580	19.9	4.3	29.5	10.4	
67.5		2	27	4:10	13395	55	4680 5020	4720 5840	4980 4840	4880 6520	5480 6140		52640	20.2	4.2	36.4	4.5	
67.5		3	28	4:11	13414	56	4260 5120	2940 3020	3040 3080	2680 2740	2340 3220		32520	17.0	4.3	33.8	4.0	
66.5		1	29	4:27	13943	42	5140 5120	6720 7940	7820 7140	8640 8540	8800 8760		74560	19.7	4.1	28.8	10.1	
66.5		2	30	4:28	13973	44	4960 4630	4680 5020	5240 4860	5020 5820	5640 5720		51640	20.0	4.3	35.9	4.4	
66.5		3	31	4:29	14010	49	4560 4930	2880 3260	2940 3040	2620 2840	2220 2820		32200	16.9	4.4	33.1	3.7	

Recorded by Kurt Ibsen

Checked by _____

Sheet 21	* STATE_CODE	39
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 5 of 6	* DATE	04/14/2004

Rev. 08/31/2001

After Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
72.0		1	32	4:40	14365	44	5180 5020	6780 7940	7560 7040	6980 9420	9260 8760		73540	19.7	4.2	29.3	10.3	
72.0		2	33	4:43	14469	44	4760 4740	4540 5280	5000 5270	5580 6300	6580 5860		52980	19.9	4.3	35.9	4.3	
72.0		3	34	4:44	144988	49	4620 5140	3080 8460	7490 5260	7720 2900	2490 2820		33060	16.8	4.4	33.6	3.8	
65.5		1	35	4:55	14871	52	4720 5600	6260 8440	7320 7040	8240 9000	7640 9100		73360	19.7	4.2	28.7	10.2	
65.5		2	36	4:56	14894	52	4520 4960	4580 5440	5000 4960	5000 6800	5420 6180		52360	20.1	4.2	26.3	4.4	
65.5		3	37	4:57	14910	52	4380 5120	3000 3420	2820 3340	2600 2840	2280 3300		33100	16.7	4.3	32.9	3.9	
64.0		1	38	5:10	15331	49	4340 5620	6440 8160	7660 6840	7720 9160	7880 8920		73740	20.0	4.2	28.7	10.2	
64.0		3	39	5:12	15405	51	4360 5480	2520 3380	2760 3220	2760 2680	1900 3480		32740	16.9	4.2	32.3	3.8	

Recorded by KMS/DJW

Checked by _____

Sheet 21	* STATE_CODE 39
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 6 of 6	* DATE 04/14/2004

Rev. 08/31/2001

Pre Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
64.0		1	40	5:30	16046	54	4980 5400	6660 8460	7260 7340	8380 9300	7880 9380		75040	19.7	4.2	29.2	10.3	
64.0		2	41	5:31	16091	55	4320 4920	4240 5360	5160 4960	4860 6440	5560 6120		51,940	20.0	4.2	35.9	4.2	
64.0		3	42	5:32	16138	55	4220 4980	2980 3340	3020 3360	2600 2840	2240 3360		32,940	16.6	4.3	33.2	4.0	

Recorded by MA/DJ

Checked by _____

Sheet 21	* STATE_CODE 39
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 1 of 6	* DATE 04/15/2004

Rev. 08/31/2001

Iteration #1 & Post calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
37.5		2	1	7:57	4459	55	4800 4700 9500	4680 5200 9880	5320 4500 9820	4700 6240 10940	5600 5960 11560		51,700	20.1	4.2	35.9	4.4	
37.5		1	2	8:00	4532	55	5160 5380 10,540	7100 8240 15,340	7740 6840 14580	8640 9400 18040	7840 9660 17500		76,000	19.8	4.2	29.1	10.2	
37.5		2	3	8:09	4759	55	4720 4720	4660 5180	5000 4920	5020 6240	5680 5860		51,840	19.9	4.2	36.3	4.4	
38.5		1	4	8:22	5107	43	5460 5120	7060 8300	8020 7100	8320 7980	8700 9280		75340	19.7	4.1	28.9	10.3	
38.5		2	5	8:24	5142	45	5080 4740	4720 5240	5380 4860	5280 6100	5580 6100		53180	20.1	4.3	36.0	4.4	
38.5		1	6	8:36	5432	49	5600 5620	6660 7980	7860 6800	7900 8960	7700 9020		74100	19.7	4.1	28.6	10.2	
38.5		2	7	8:39	5521	50	5160 5140	4700 5100	5240 4720	4300 7000	5220 6280		52860	20.2	4.3	35.8	4.5	
38.5		3	8	8:40	5537	54	4820 5180	3060 3100	3680 3200	2200 3580	2400 2920		33240	17.6	4.6	35.4	4.0	*

Recorded by DJ

Checked by _____

Sheet 21	* STATE_CODE 39
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 2 of 6	* DATE 04/15/2004

Rev. 08/31/2001

Iteration #1 2 Point Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
42.5		1	9	8:50	5817	57	4960 5040	7260 8160	8080 6740	8760 8660	6340 9160		75160	19.9	4.2	29.3	10.2	
42.5		2	10	8:52	5839	54	4980 5020	4880 5080	5000 4960	5000 6500	5860 6020		53240	20.1	4.3	36.2	4.5	
42.5		3	11	8:52	5857	52	4540 4980	3100 3140	3080 3180	2740 2720	2140 3360		32980	16.6	4.3	32.9	3.9	

Recorded by DJW

Checked by

Sheet 21	* STATE_CODE 39
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 3 of 6	* DATE 04/15/2004

Rev. 08/31/2001

PVR Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
56.0		1	12	9:37	6635	43	5440 5920	6940 8260	7420 6860	8200 9020	8520 9120		75740	19.7	4.2	28.6	10.1	
56.0		2	13	9:38	6648	44	5060 5000	4540 5340	5060 5320	4960 6460	5620 5860		53140	19.9	4.2	36.0	4.4	
56.0		3	14	9:39	6672	48	4600 5260	3140 3120	3140 3340	2660 2480	2520 2920		33180	16.7	4.3	33.8	3.9	
58.5		1	15	9:49	6913	49	4800 5400	6680 7780	7800 6560	8440 8900	8280 8820		74460	19.6	4.1	28.6	10.3	
58.5		2	16	9:51	6947	49	5040 5000	4640 4240	5060 4880	4700 6880	5540 6140		53140	19.3	4.2	34.9	4.2	
58.5		3	17	9:52	6959	51	4800 5220	3020 3100	3180 3100	2720 2840	2120 3200		35300	16.8	4.3	32.8	3.7	
60.5		1	18	10:03	7215	54	5140 5240	6960 8360	7540 6960	8680 9160	7980 9800		75820	19.6	4.2	29.1	10.2	
60.5		2	19	10:04	7244	54	4620 4840	4600 5280	4460 5000	4560 6400	5520 5740		51520	19.9	4.2	35.8	4.4	

Recorded by DJW

Checked by _____

Sheet 21	* STATE_CODE 39
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 4 of 6	* DATE 04/15/2004

Rev. 08/31/2001

Post Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
60.5		3	20	10:05	7252	54	4640 4860	7120 8160	3140 3380	2540 2940	2260 3320		33360	16.6	4.3	33.4	4.0	
64.5		1	21	10:53	7455	44	5200 5300 10500	7020 8420 15440	7840 7220	8520 8820	8480 9100		75920	20.0	4.2	29.3	10.9	
64.5		2	22	10:54	7478	45	5100 4560	4600 5120	5380 4740	5720 6060	5680 5940		52900			36.2	4.4	
64.5		3	23	10:55	7501	47	4900 4620 9520	3080 2960	3040 2960	2160 2460	2500 2340		31020	17.1	4.4	33.7	3.9	
64.5		1	24	11:12	7917	50	5440 5600	6860 7880	6040 6720	8640 9240	7740 9240		75200	20.0	4.2	29.0	10.3	
64.5		2	25	11:13	7934	45	5100 5160	4760 5420	5060 5400	5180 6700	5840 6320		54940	20.1	4.2	35.9	4.3	
64.5		3	26	11:14	7959	51	4620 5140	2940 3440	3000 3360	2040 2860	2060 3020		32480	16.6	4.3	32.7	3.9	
66.5		1	27	11:26	8231	58	5220 4280	7080 7540	7620 6300	8460 7820	8320 8480		71320	20.6	4.3	29.9	10.5	

Recorded by DJA

Checked by _____

Sheet 21	* STATE_CODE 39
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 5 of 6	* DATE 04/15/2004

Rev. 08/31/2001

Post Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
86.5		3	28	11:28	8304	59	4340 4220	2860 2720	3040 2540	2610 2280	2340 2080		29660	17.5	4.5	35.5	4.2	
73		2	29	11:42	8611	46	5060 4540	4740 5100	5460 4800	5800 6040	6140 5700		53400	20.7	4.3	36.1	4.4	
78.0		1	30	11:55	10955	43	5140 4260	6860 8520	7840 7400	9200 9860	9760 9780		78820	19.5	4.1	28.2	9.9	
78.0		2	31	1:56	10997	44	4960 4900	4660 5390	5240 4980	5240 6740	5740 6080		53920	19.7	4.2	35.5	14.4	
78.0		3	32	1:58	11061	48	4760 5380	2820 3220	3080 3340	2020 2720	2280 2740		32360	16.8	4.3	38.9	3.9	
00 00		3	33	2:12	11147	51	4540 5040	2920 3240	3020 3460	2080 2880	2140 3060		32380	16.8	4.3	38.1	3.9	
88		1	34	2:23	11454	50	5400 5580	6860 8240	7940 6860	8680 9360	8380 9280		76580	19.9	4.2	28.8	10.3	
88		2	35	2:26	11533	49	4760 5240	4440 5540	5260 5160	6160 6720	5620 6700		55600	20.1	4.2	36.0	4.5	

Recorded by BSS Checked by

Sheet 21

LTPP Traffic Data

WIM System Test Truck Records 6 of 6

Rev. 08/31/2001

* STATE_CODE	39
*SPS PROJECT_ID	0200
* DATE	04/15/2004

Post Calibration

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
91.5		3	36	2:27	11560	52	4800 5300	2940 3320	3080 3460	2200 2980	2160 3100		33340	16.9	4.4	33.3	4.0	
91.5		1	37	2:44	11391	55	4880 5580	6820 8680	7820 7420	8380 9000	7820 9940		76340	19.9	4.2	29.2	10.3	
91.5		2	38	2:45	11418	49	4820 5520	4460 5460	5020 5120	4820 6740	5340 6380		53680	20.1	4.2	35.9	4.4	
91.5	*	3	39	2:46	11483	54	4740 5440	3020 3520	3120 3040	2200 3320	2380 2920		34100	17.6	4.6	35.3	3.9	
91.5		1	39	2:58	11795	54	5060 5460	7600 8900	7820 7300	8420 9500	8200 10260		77920	19.9	4.2	29.5	10.3	
91.5		2	40	2:59	11833	49	4900 5040	4760 5580	5140 5300	4620 7340	5120 6780		54580	20.0	4.2	35.8	4.4	
91.5		3	41	3:00	11854	55	4260 5260	3080 3580	2880 3420	2660 2800	2260 3480		33680	16.7	4.3	33.6	4.1	

Recorded by _____

Checked by _____

SPS 1

After reviewing the native format files (A-files) both pre validation and post validation, it was observed that in the data collected by the equipment, approximately twelve percent of the left wheel weights and one percent of the right wheel weights were being reported as zero before validation. After validation twenty percent of the left wheel weights and almost zero percent of the right wheel weights were reported as zero. Therefore, it is assumed that calibration of the equipment has not changed the data reporting. The cause of the preponderance of zero valued wheel loads in the left wheel path is unknown.

SPS 2

After reviewing the native format files (A-files) both pre validation and post validation, it was observed that in the data collected by the equipment, approximately seven percent of the left wheel weights and one percent of the right wheel weights were being reported as zero before validation. After validation forty nine percent of the left wheel weights and thirteen percent of the right wheel weights were reported as zero. It is not known whether calibration of the equipment has resulted in increase in reporting of zero weight wheels.

April 14, 2004 (SPS 1)

Class	Total veh	A left	A right	B left	B right	C left	C right	D left	D right	E left	E right	F left	F right	G left	G ri
4	7	0	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
5	90	0	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
6	62	2	0	2	0	39	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
7	20	1	0	1	0	9	2	11	2	0	1	N/A	N/A	N/A	N/
8	54	0	0	0	0	0	1	0	0	N/A	N/A	N/A	N/A	N/A	N/
9	623	5	1	5	1	6	1	9	1	10	1	N/A	N/A	N/A	N/
10	9	0	0	0	0	0	0	0	0	0	0	1	0	1	0
11	32	1	0	1	0	1	0	1	0	1	0	0	0	0	0
12	2	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
13	10	0	0	0	0	0	0	0	0	0	0	7	0	8	3

N/A - Not applicable
Class 13 ignored

	Left Wheel	Right Wheel
Percentage reporting zero axle weights	12%	1%

April 16, 2004 (SPS 1)

Class	Total veh	A left	A right	B left	B right	C left	C right	D left	D right	E left	E right	F left	F right	G left	G ri
4	19	0	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
5	202	1	0	1	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
6	267	4	0	0	0	190	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
7	130	2	0	2	0	89	2	94	2	N/A	N/A	N/A	N/A	N/A	N/
8	160	0	0	0	0	0	0	10	0	N/A	N/A	N/A	N/A	N/A	N/
9	1533	7	0	7	0	13	0	23	0	28	0	N/A	N/A	N/A	N/
10	56	0	0	0	0	1	0	3	0	4	0	8	0	N/A	N/
11	41	0	0	0	0	0	0	0	0	1	0	0	0	N/A	N/
12	4	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
13	40	0	0	0	0	1	0	1	0	2	0	34	1	34	1

N/A - Not applicable
Class 13 ignored

	Left Wheel	Right Wheel
Percentage reporting zero axle weights	20%	0%

April 14, 2004 (SPS 2)

Class	Total veh	A left	A right	B left	B right	C left	C right	D left	D right	E left	E right	F left	F right	G left	G ri
4	14	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
5	82	1	0	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
6	29	0	0	0	1	15	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
7	24	0	0	0	1	5	0	7	1	N/A	N/A	N/A	N/A	N/A	N/
8	44	1	0	1	0	1	0	1	1	N/A	N/A	N/A	N/A	N/A	N/
9	685	2	0	2	0	2	1	4	1	4	2	N/A	N/A	N/A	N/
10	17	0	0	0	0	0	0	0	0	1	0	9	0	N/A	N/
11	18	1	0	1	0	1	0	1	0	1	0	N/A	N/A	N/A	N/
12	5	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
13	12	0	0	1	0	1	0	1	0	1	0	6	4	7	4

N/A - Not applicable
Class 13 ignored

	Left Wheel	Right Wheel
Percentage reporting zero axle weights	7%	1%

April 16, 2004 (SPS 2)

Class	Total veh	A left	A right	B left	B right	C left	C right	D left	D right	E left	E right	F left	F right	G left	G ri
4	37	1	0	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
5	140	1	0	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
6	317	7	0	10	18	240	26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
7	192	5	0	7	6	121	16	131	17	9	0	2	0	1	0
8	111	1	0	1	1	1	4	3	2	N/A	N/A	N/A	N/A	N/A	N/
9	1138	7	0	14	20	81	31	87	42	91	44	N/A	N/A	N/A	N/
10	113	2	0	6	7	35	10	39	10	49	10	68	12	3	0
11	40	1	0	1	0	1	0	1	0	1	1	N/A	N/A	N/A	N/
12	5	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/
13	219	2	0	6	33	37	40	44	51	61	57	97	106	99	10

N/A - Not applicable
Class 13 ignored

	Left Wheel	Right Wheel
Percentage reporting zero axle weights	49%	13%