Validation Report

New Mexico, SPS-5
Task Order 25, CLIN 2
August 18 to 19, 2008

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1 Executive Summary

A visit was made to the New Mexico 0500 on August 18 to 19, 2008 for the purposes of conducting a validation of the WIM system located on Interstate 10 at milepost 50.2 . The SPS-5 is located in the righthand, eastbound lane of a four-lane divided facility. The posted speed limit at this location is 75 mph. The LTPP lane is the only lane that is instrumented at this site. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This is a sensor relocation at the original site. The new sensors are upstream of the location visited for the site assessment by the Phase I contractor. This is the first validation visit to this location. The site was installed April 3 to 30, 2008 by International Road Dynamics Inc. The installation calibration was performed on May 15, 2008.

This site demonstrates the ability to produce research quality loading data under the observed conditions. The classification data is also of research quality for Traffic Monitoring Guide Classes based on the validation results. However, the post visit download data indicates an unacceptable percentage of unclassified and unknown vehicles.

The site is instrumented with quartz piezo WIM and iSINC electronics. It is installed in asphalt concrete.

The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 76,290 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 66,770 lbs., the "partial 1" truck.
3) 5-axle tractor semi-trailerwith a tractor having an air suspension and a trailer with a standard rear tandemand an air suspension loaded to 57,920 lbs., the "partial 2" truck.

The validation speeds ranged from 61 to 75 miles per hour. The pavement temperatures ranged from 80 to 127 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was also achieved.

Table 1-1 Post-Validation results – 350500 – 19-Aug-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	0.3 ± 4.5%	Pass
Tandem axles	±15 percent	-0.3 ± 7.3%	Pass
GVW	±10 percent	-0.2 ± 5.1%	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

Prepared: bko *Checked:jrn*

The pavement condition appeared to be satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area. No profile data is provided from which WIMIndex values can be calculated. When profile data becomes available WIMIndex values will be computed and an amended report submitted.

If this site had been evaluated using ASTM E-1318-02 it would have met the conditions for a Type I site exclusive of wheel loads. LTPP does not validate WIM performance with respect to wheel loads.

Table 1-2 Results Based on ASTM E-1318-02 Test Procedures

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

Prepared: bko Checked:jrn

This site needs five years of data to meet the goal of five years of research quality data.

2 Corrective Actions Recommended

The right side of the trailing sensor is operating properly, but electronic measurements indicate low capacitance values. Attention should be paid to drift in left/right wheel load comparisons. Additionally this sensor should be carefully evaluated on each maintenance visit.

The post-validation download of records for August 28, 2008 had 2.6 percent unknown and unclassified vehicles. This clearly exceeds the 2 percent threshold for research quality classification data. The unclassifeds should be investigated and the necessary algorithm modifications considered.

3 Post Calibration Analysis

This final analysis is based on test runs conducted August 19, 2008 mid-morning and mid-afternoon at test site 350500 on Interstate 10. This SPS-5 site is at milepost 50.2 on the eastbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The three trucks used for the calibration and for the subsequent validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and air suspension loaded to 76,290 lbs., the “golden” truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 66,770 lbs., the “partial 1” truck.
3. 5-axle tractor semi-trailerwith a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 57,920 lbs., the “partial 2” truck.

Each truck made a total of 14 passes over the WIM scale at speeds ranging from approximately 61 to 75 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 80 to 127 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was also achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

The results of the validation left the equipment reporting essentially unbiased estimates for the observed validation conditions.

Table 3-1 Post-Validation Results – 350500 – 19-Aug-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	0.3 ± 4.5%	Pass
Tandem axles	±15 percent	-0.3 ± 7.3%	Pass
GVW	±10 percent	-0.2 ± 5.1%	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass
		Prepared: bko	Checked:jrn

The validation period stretched from mid-morning to mid-afternoon resulting in a range of temperatures. The runs were conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the data set was split into three speed groups and three temperature groups. The distribution of runs by speed and temperature is illustrated in Figure 3-1. The figure indicates that the desired distribution of speed and temperature combinations was nearly achieved for this set of validation runs. There was a lack of low temperature; high speed runs due to the length of the turn-around time and the rate of temperature rise.

The three speed groups were divided as follows: Low speed – 61 to 65 mph, Medium speed – 66 to 70 mph and High speed – 71 + mph. The three temperature groups were created by splitting the runs between those at 80 to 100 degrees Fahrenheit for Low temperature, 101 to 114 degrees Fahrenheit for Medium temperature and 115 to 127 degrees Fahrenheit for High temperature.

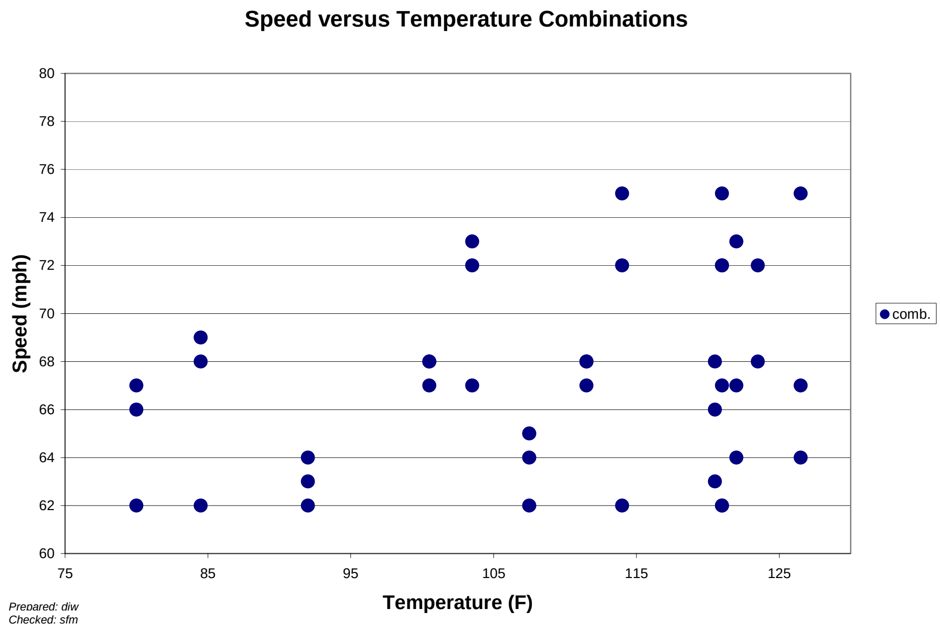

Figure 3-1 Post-Validation Speed-Temperature Distribution – 350500 – 19-Aug-2008

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

Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. While the overall results indicate unbiased estimates, the low speed group indicates some degree of underestimation. It would appear that the factor adjustments based on the calibration did not have similar impacts on each speed bin. This speed range is about the 35th percentile.

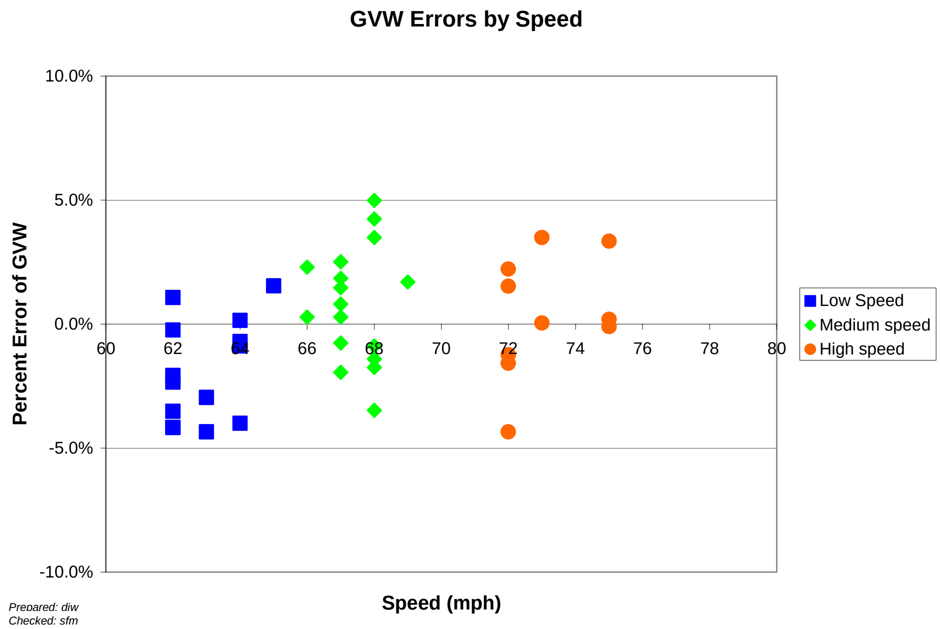

Figure 3-2 Post-validation GVW Percent Error vs. Speed – 350500 – 19-Aug-2008

Figure 3-3 shows the relationship between temperature and GVW percentage error. There is no apparent trend in GVW error with temperature.

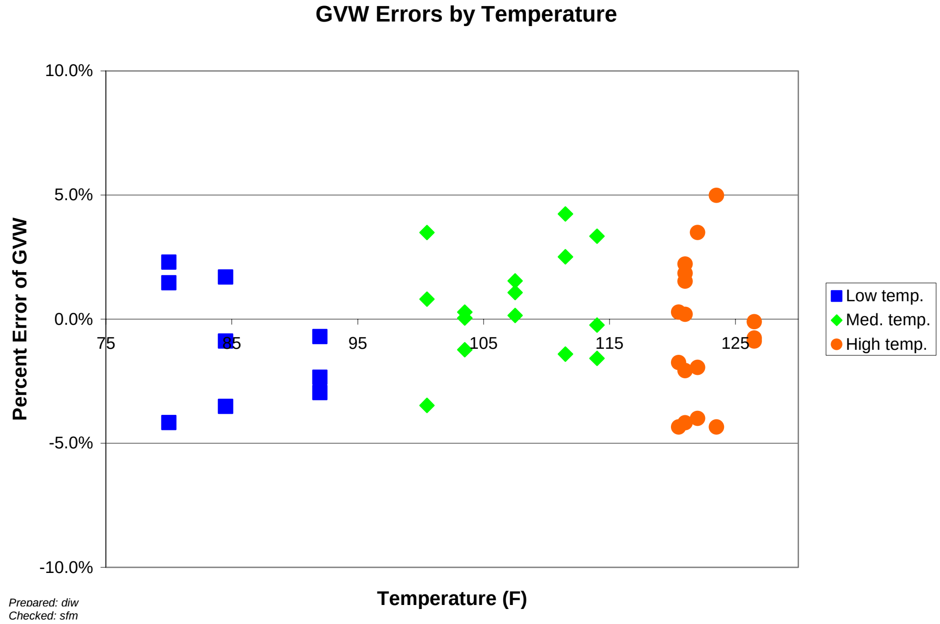

Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 350500 – 19-Aug-2008

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

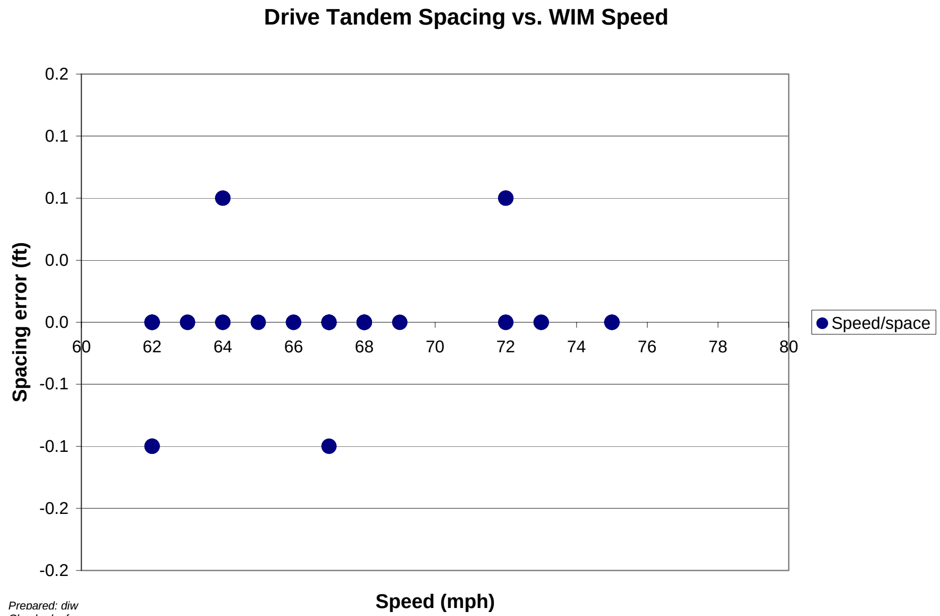

Figure 3-4 Post-Validation Spacing vs. Speed – 350500 – 19-Aug-2008

3.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 80 to 100 degrees Fahrenheit for Low temperature, 101 to 114 degrees Fahrenheit for Medium temperature and 115 to 127 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 350500 – 19-Aug-2008

Element	95% Limit	Low Temperature 80 to 100 °F	Medium Temperature 101 to 114 °F	High Temperature 115 to 127 °F
Steering axles	±20 %	1.7 ± 6.8%	0.5 ± 2.7%	-0.6 ± 4.7%
Tandem axles	±15 %	-1.5 ± 6.1%	0.6 ± 6.7%	-0.5 ± 8.6%
GVW	±10 %	-1.0 ± 5.5%	0.6 ± 4.6%	-0.6 ± 5.9%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: bko Checked:jrn

Table 3-2 indicates that at low temperatures loading statistics are generally underestimated. The loading statistics at medium temperature tend to be overestimated. The variability is similar for all temperatures for GVW errors.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. There are no apparent differences in truck responses with temperature.

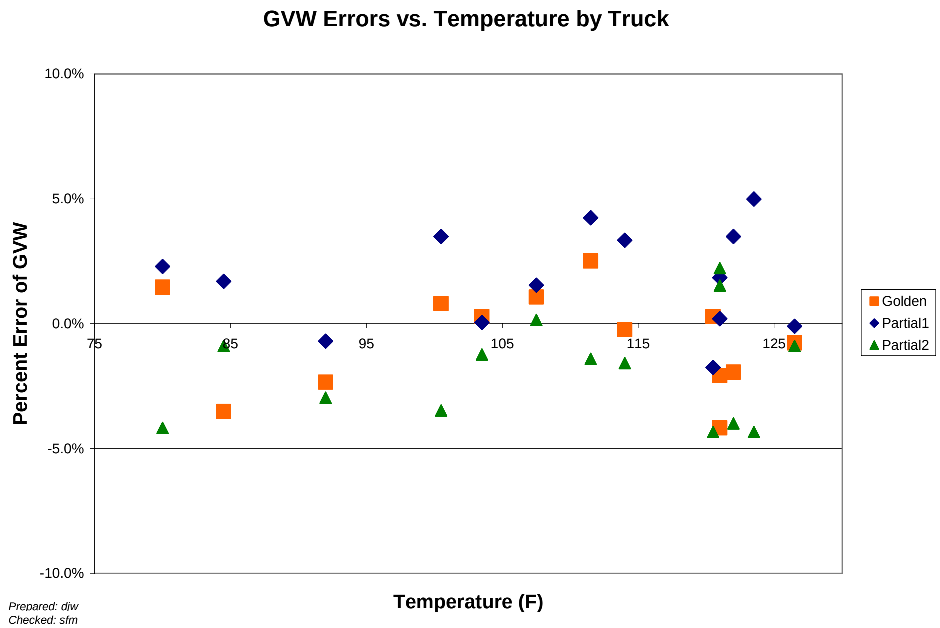

Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 350500 – 19-Aug-2008

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

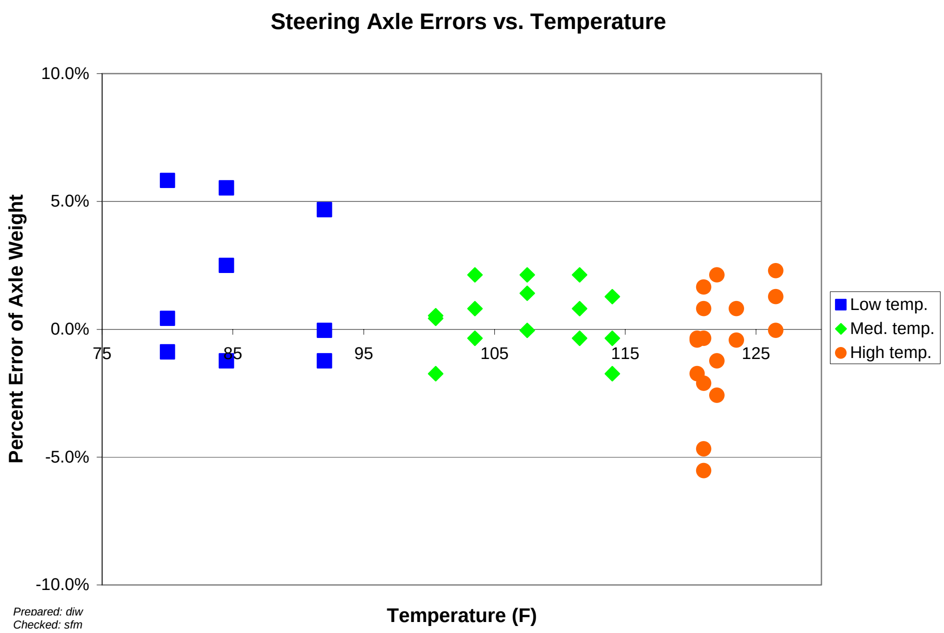

Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 350500 – 19-Aug-2008

3.2 Speed-based Analysis

The three speed groups were created using 61 to 65 mph for Low speed, 66 to 70 mph for Medium speed and 71+ mph for High speed.

Table 3-3 Post-Validation Results by Speed Bin – 350500 – 19-Aug-2008

Element	**95% Limit**	**Low Speed 61 to 65 mph**	**Medium Speed 66 to 70 mph**	**High Speed 71+ mph**
Steering axles	±20 %	-0.2 ± 4.1%	0.6 ± 5.6%	0.4 ± 4.8%
Tandem axles	±15 %	-2.2 ± 5.6%	0.8 ± 6.3%	0.5 ± 9.9%
GVW	±10 %	-1.9 ± 4.4%	0.8 ± 4.9%	0.4 ± 5.5%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: bko Checked:jrn

Table 3-3 indicates very little difference in the errors of estimates with speed for medium and high speed. The low speed group however tends to have underestimates of all loading statistics.

Figure 3-7 illustrates the trends with speed by truck. The golden truck (squares) only ran at low and medium speed due to a speed governor on the engine. The golden truck exhibited an upward trend in error estimates with increasing speed. The partial 1 (diamonds) and partial 2 (triangles) trucks show little if any tendency for a trend in GVW errors with increasing speed. The partial 1 truck (diamonds) tended to overestimate at all speeds. The partial 2 truck (triangles) tended to underestimate at all speeds. This divergence in estimates contributed to the overall scatter observed.

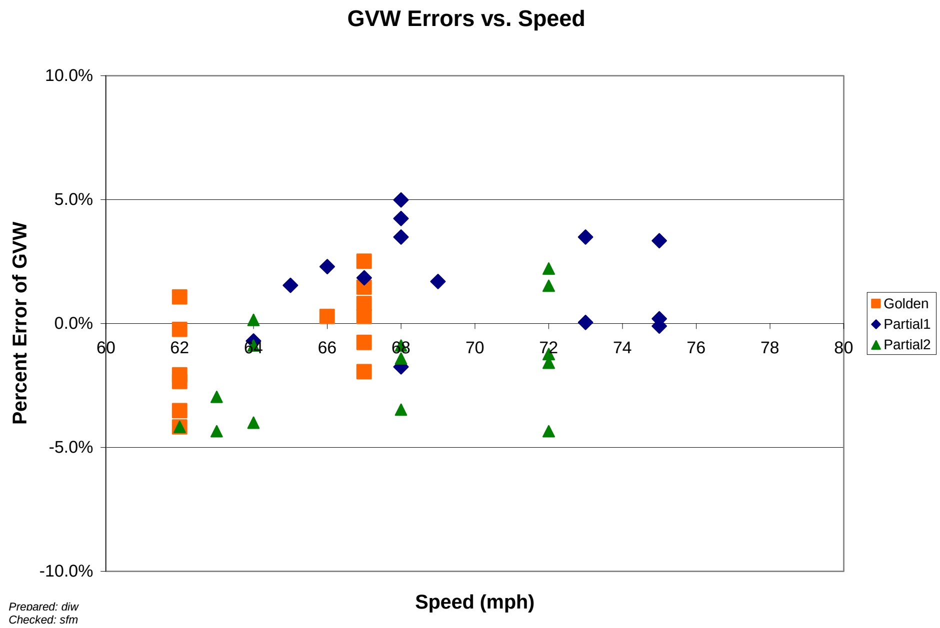

Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 350500 – 19-Aug-2008

Figure 3-8 shows the relationship between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. There is no apparent trend in steering axle error with speed.

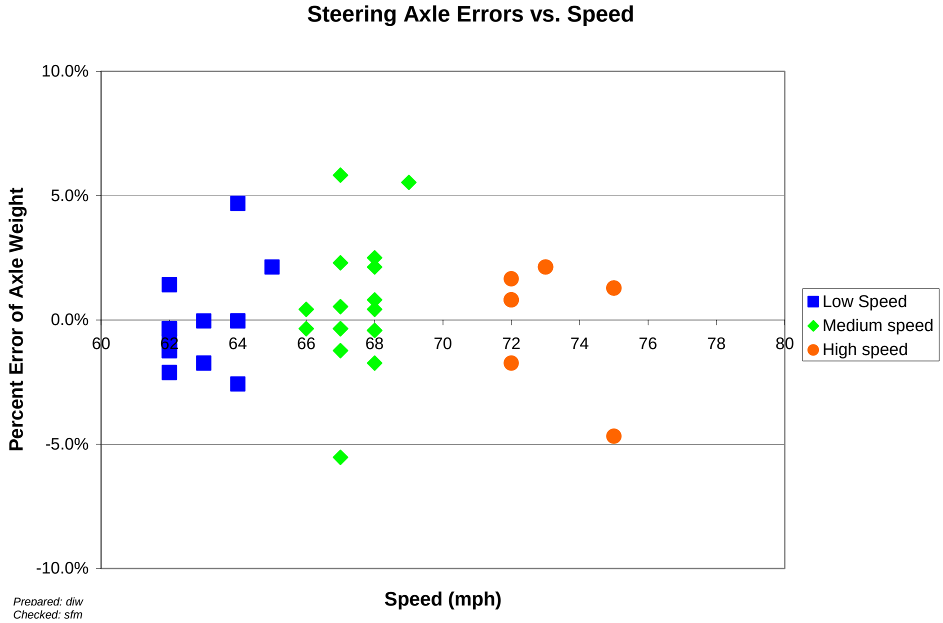

Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group – 350500 – 19-Aug-2008

3.3 Classification Validation

This LTPP installed site uses the FHWA 13-bin classification scheme and the LTPP ETG mod 3 classification algorithm. Classification 15 has been added to define unclassified vehicles. Classification 14 has been added to define unknown vehicles.

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on the sample it was determined that there are zero percent unknown vehicles and zero percent unclassified vehicles. **This is not however consistent with data downloaded after the validation was complete.**

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 3-4 has the classification error rates by class. The large values for Classes 5 and 8 are a reflection of the small number observed in the validation sample. The overall misclassification rate is 2.0 percent.

Table 3-4 Truck Misclassification Percentages for 350500 – 19-Aug-2008

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	N/A	5	50	6	N/A
7	N/A				
8	33	9	0	10	N/A
11	0	12	0	13	N/A

Prepared: bko *Checked:jrn*

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. There were less than five Class 5 and Class 8 vehicles observed. The mean difference reflects the equipment reporting Class 5 vehicles as Class 8 vehicles.

Table 3-5 Truck Classification Mean Differences for 350500 – 19-Aug-2008

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	N/A	5	- 50	6	N/A
7	N/A				
8	50	9	0	10	N/A
11	0	12	0	13	N/A

Prepared: bko Checked:jrn

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

A limited investigation of the precision and bias of the speeds reported by the equipment was undertaken. The values were not within the expected tolerances. The observed bias and variability are thought to be more strongly related to radar speed precision than errors in the WIM equipment.

3.4 Evaluation by ASTM E-1318 Criteria

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

Table 3-6 Results of Validation Using ASTM E-1318-02 Criteria

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

Prepared: bko Checked:jrn

4 Pavement Discussion

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

4.1 Profile Analysis

Profile data collected since the site installation do not exist. An amended report will be submitted when the data is available.

4.2 Distress Survey and Any Applicable Photos

During a visual survey of the pavement no distresses that would influence truck movement across the WIM scales were noted. The prior sensor installation downstream did not appear to influence truck movement.

4.3 Vehicle-pavement Interaction Discussion

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

5 Equipment Discussion

The traffic monitoring equipment at this location includes quartz piezo WIM sensors and iSINC electronics. The sensors are installed in an asphalt concrete pavement.

Between the installation of the site and the beginning of the validation the pavement sank around the WIM sensors. This produced a bump in the pavement that required grinding the WIM sensors to make them once again flush with the pavement surface.

Photo 5-1 Results of Grinding Leading WIM Sensor - 350500 - 18-Aug-2008

The grinding was done along the entire width of the lane for both sensors. Photo 5-1 shows the aftermath of grinding the leading WIM sensor. Traffic has dispersed the dust left after grinding from the wheelpath. Photo 5-2 shows the results of the same activity for the trailing sensor. This photograph shows that the grinding extends into the edge line for the shoulder.

Photo 5-2 Grinding of Trailing Center at Shoulder - 350500 - 18-Aug-2008

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 except the right side trailing sensor and system components were found to be within operating parameters.

The right side of the trailing sensor is operating but electronic measurements indicate low capacitance values. Attention should be paid to drift in left/right wheel load comparisons.

5.2 Calibration Process

The equipment required one-iteration of the calibration process between the initial 40 runs and the final 40 runs. The calibration was undertaken to remove the observed underestimation of loading statistics.

The operating system weight compensation parameters that were in place prior to the Pre-Validation as a result of installation calibration are in Table 5-1.

Table 5-1 Initial System Parameters - 350500 - 18-Aug-2008

Speed Bin	Sensor 1	Sensor 2
88 kph	3760	2997
96 kph	3691	2942
105 kph	3549	2829
112 kph	3694	2944
120 kph	3623	2888

Prepared: bko Checked:jrn

5.2.1 Calibration Iteration 1

As a result of the Pre-Validation, where loading statistics where consistently underestimated, the compensation factors were adjusted as shown in Table 5-2.

Table 5-2 Calibration 1 - Change in Parameters - 350500 - 19-Aug-2008

Speed Bins	Sensor 1	Change	Sensor 2	Change
88 kph	3760		2997	
96 kph	3691		2942	
105 kph	3742	5.4%	2982	5.4%
112 kph	3816	3.3%	3041	3.3%
120 kph	3788	4.5%	3019	4.5%

Prepared: bko Checked:jrn

The outcome of the calibration runs after factor adjustment is shown in Table 5-3. The improvement in the estimates particularly at the medium and high speeds as shown in Figure 5-1 was considered sufficient to end calibration iterations.

Table 5-3 Calibration Iteration 1 Results – 350500 – 19-Aug-2008 (08:25 AM)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	0.1 ± 5.1%	Pass
Tandem axles	±15 percent	-1.3 ± 6.6%	Pass
GVW	±10 percent	-1.1 ± 4.9%	Pass
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	Pass

Prepared: bko Checked:jrn

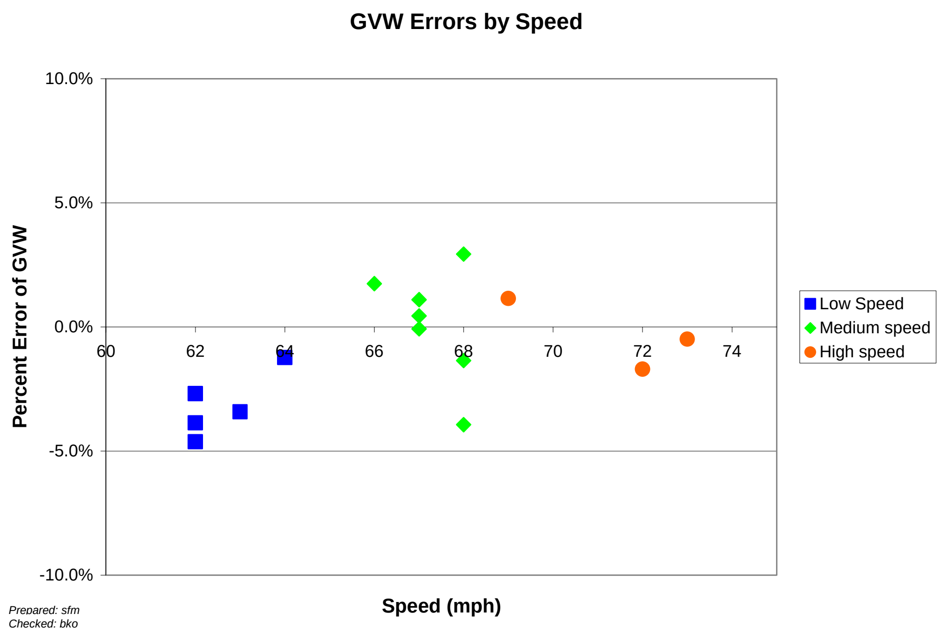

Figure 5-1 Calibration Iteration 1 GVW Percent Error vs. Speed Group – 350500 – 19-Aug-2008 (08:25 AM)

5.3 Summary of Traffic Sheet 16s

This site has no prior validation information, and only the current visit is shown in the tables below. Table 5-4 has the information for TRF_CALIBRATION_AVC for Sheet 16s submitted for this validation. The Sheet 16s available reflect only this contractor's validation visit. The Sheet 16 for the assessment applies to a different sensor installation and is not included here.

Table 5-4 Classification Validation History – 350500 – 19-Aug-2008

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
19-Aug-2008	Manual	0	50			0.0
18-Aug-2008	Manual	0	100			0.0

Prepared: bko Checked:jrn

Table 5-5 has the information for TRF_CALIBRATION_WIM for Sheet 16s submitted for this validation. The Sheet 16s available reflect only this contractor's validation visits.

Table 5-5 Weight Validation History – 350500 – 19-Aug-2008

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
19-Aug-2008	Test Trucks	-0.2 (2.5)	0.3 (2.3)	-0.3 (3.7)
18-Aug-2008	Test Trucks	-4.3 (2.3)	-2.1 (2.3)	-4.7 (3.1)

Prepared: bko Checked:jrn

5.4 Projected Maintenance/Replacement Requirements

The right side of the trailing sensor is operating but electronic measurements indicate low capacitance values. Attention should be paid to drift in left/right wheel load comparisons. Additionally this sensor should be carefully evaluated on each maintenance visit.

This site is scheduled for semi-annual maintenance under the installation contract.

6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted August 18, 2008 from late morning to late afternoon at test site 350500 on Interstate 10. This SPS-5 site is at milepost 50.2 on the eastbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The three trucks used for initial validation included:

1. 5-axle tractor semi-trailer combination with a tractor having an air suspension and trailer with standard rear tandem and an air suspension loaded to 76,800 lbs., the “golden” truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 66,440 lbs., the “partial 1” truck.
3. 5-axle tractor semi-trailer with a tractor having a an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 57,400 lbs., “partial 2” truck.

For the initial validation each truck made a total of 14 passes over the WIM scale at speeds ranging from approximately 61 to 75 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 93 to 127 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was also achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 6-1.

Table 6-1 indicates that the various loading statistics are underestimated. The GVW is sufficiently underestimated that a slight increase in underestimation or variability would result in a failure of the site.

Table 6-1 Pre-Validation Results – 350500 – 18-Aug-2008

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-2.1 ± 4.6%	Pass
Tandem axles	±15 percent	-4.7 ± 6.2%	Pass
GVW	±10 percent	-4.3 ± 4.6%	Pass
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

Prepared: bko *Checked:jrn*

The runs were conducted from late morning through the late afternoon. The runs were conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed groups and two temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The figure indicates that the desired distribution of speed and temperature combinations was nearly achieved for this set of validation runs. A midday break resulted in a gap in temperatures that resulted in only two temperature groups for evaluation rather than the three the range would suggest.

The three speed groups were divided into 61 to 65 mph for Low speed, 66 to 70 mph for Medium speed and 71+ mph for High speed. The two temperature groups were created by splitting the runs between those at 93 to 110 degrees Fahrenheit for Low temperature, and 111 to 127 degrees Fahrenheit for High temperature.

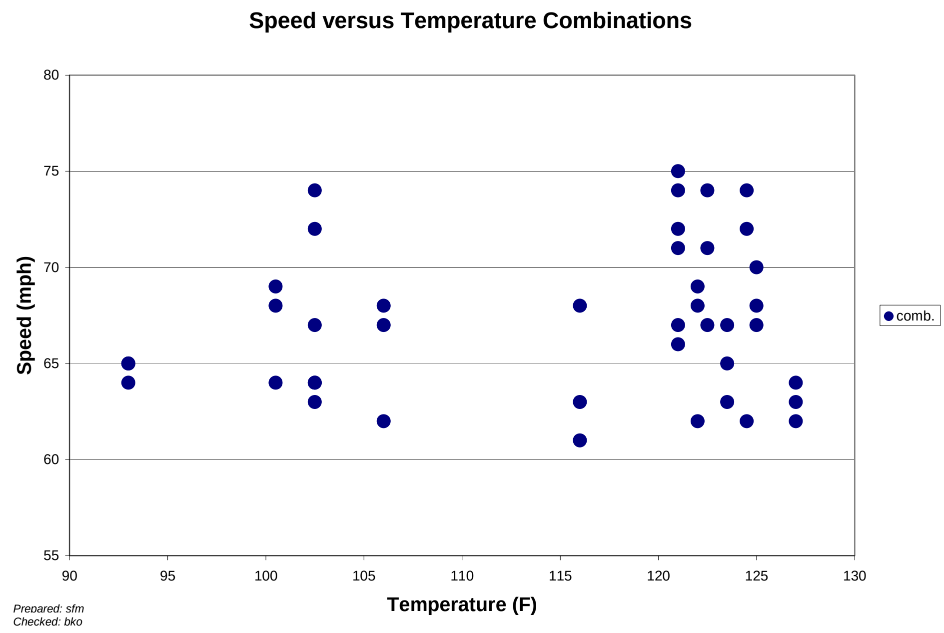

Figure 6-1 Pre-Validation Speed-Temperature Distribution – 350500 – 18-Aug-2008

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

Figure 6-2 shows the GVW Percent Error vs. Speed graph for the population as a whole. The GVW is consistently underestimated at all speeds. There appears to be slightly less underestimation at medium speed. The scatter is similar for all speed groups.

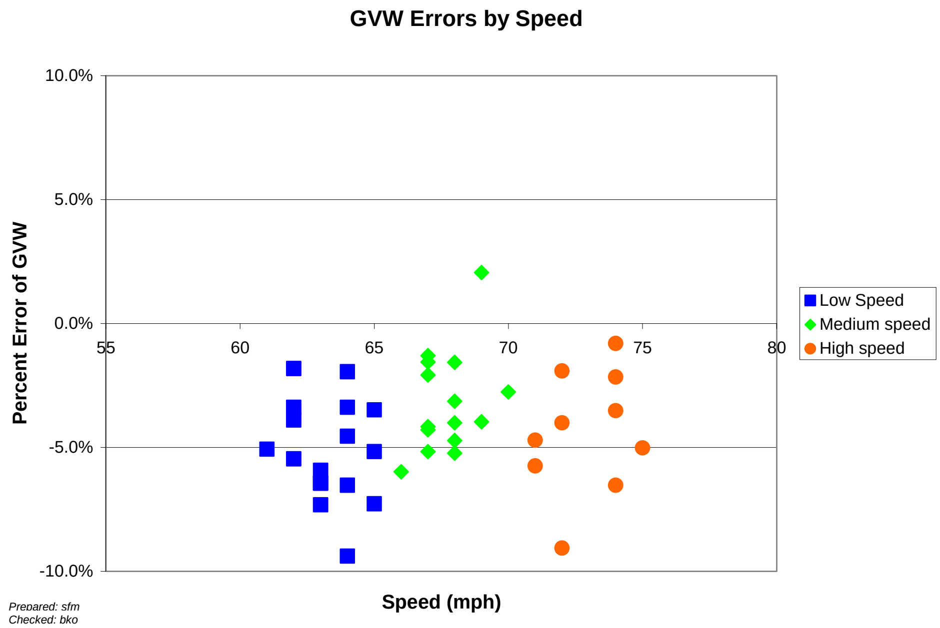

Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 350500 – 18-Aug-2008

Figure 6-3 shows the relationship between temperature and GVW percentage error. There is no apparent trend in error with increasing temperature. The slightly greater scatter at high temperature is more likely related to the number of observations than an actual temperature effect.

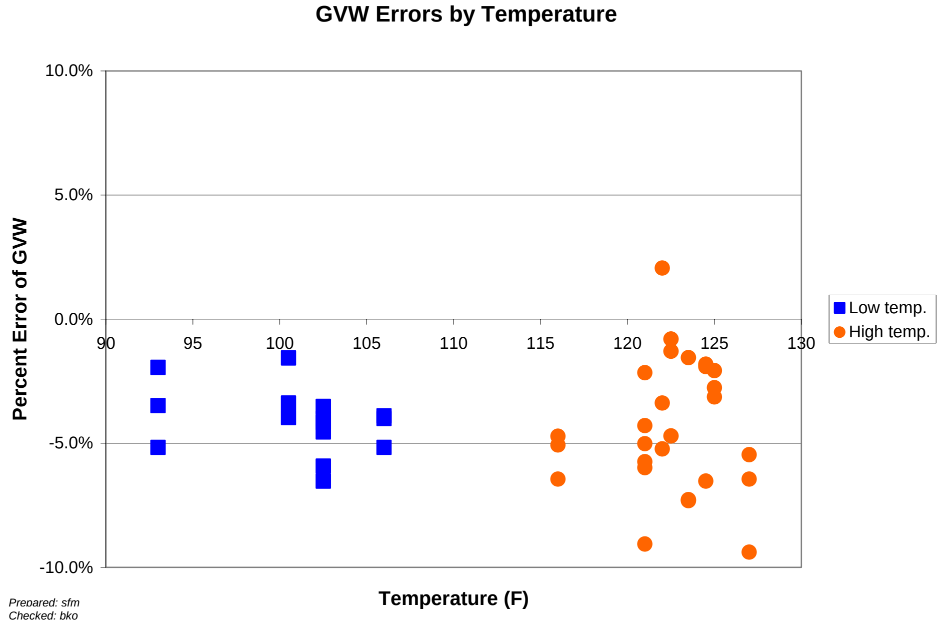

Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 350500 – 18-Aug-2008

Figure 6-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. There is no apparent influence of speed on spacing errors.

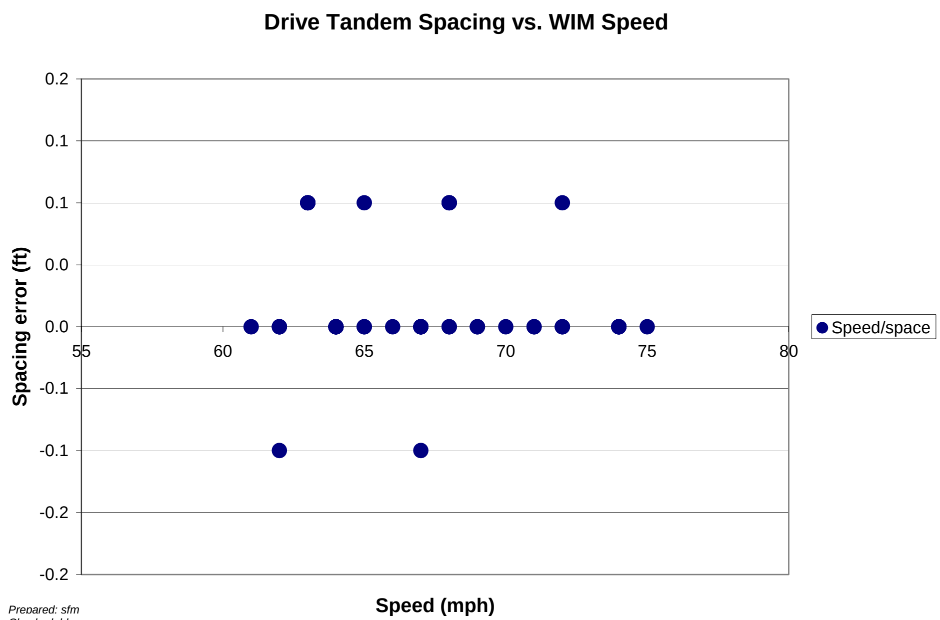

Figure 6-4 Pre-Validation Spacing vs. Speed - 350500 – 18-Aug-2008

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 93 to 110 degrees Fahrenheit for Low temperature and 111 to 127 degrees Fahrenheit for High temperature.

Table 6-2 Pre-Validation Results by Temperature Bin – 350500 – 18-Aug-2008

Element	95% Limit	Low Temperature 93 to 110 °F	High Temperature 111 to 127 °F
Steering axles	±20 %	-1.4 ± 5.4%	-2.6 ± 4.2%
Tandem axles	±15 %	-4.6 ± 5.1%	-4.8 ± 6.9%
GVW	±10 %	-4.1 ± 2.8%	-4.4 ± 5.5%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: bko Checked:jrn

Table 6-2 shows the results by temperature bin. There is no major difference in the underestimation of loading statistics with temperature. The variability in GVW error at high temperature is about twice that of the low temperature group.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. There is no indication that temperature affects the individual trucks differently.

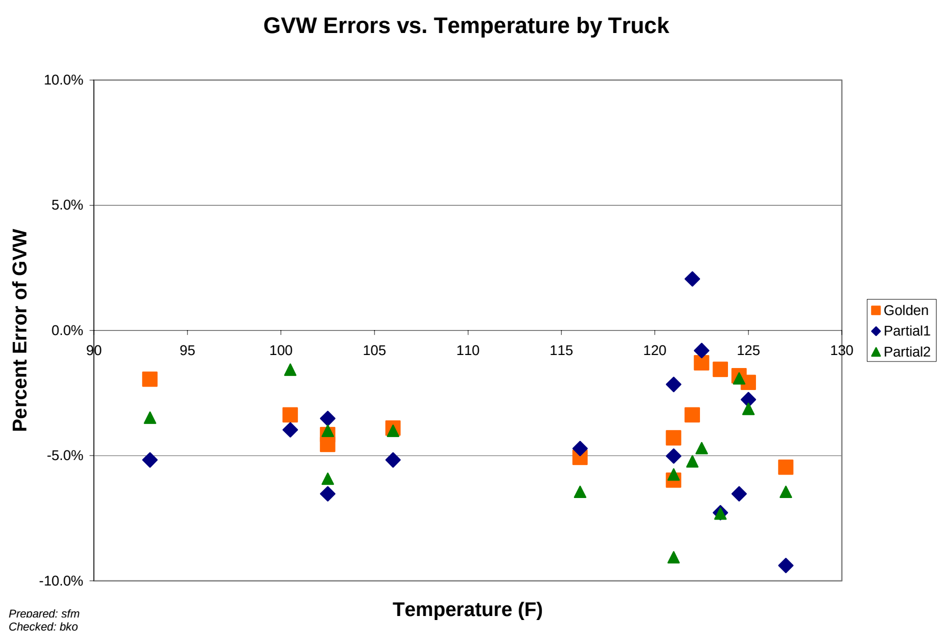

Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 350500 – 18-Aug-2008

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

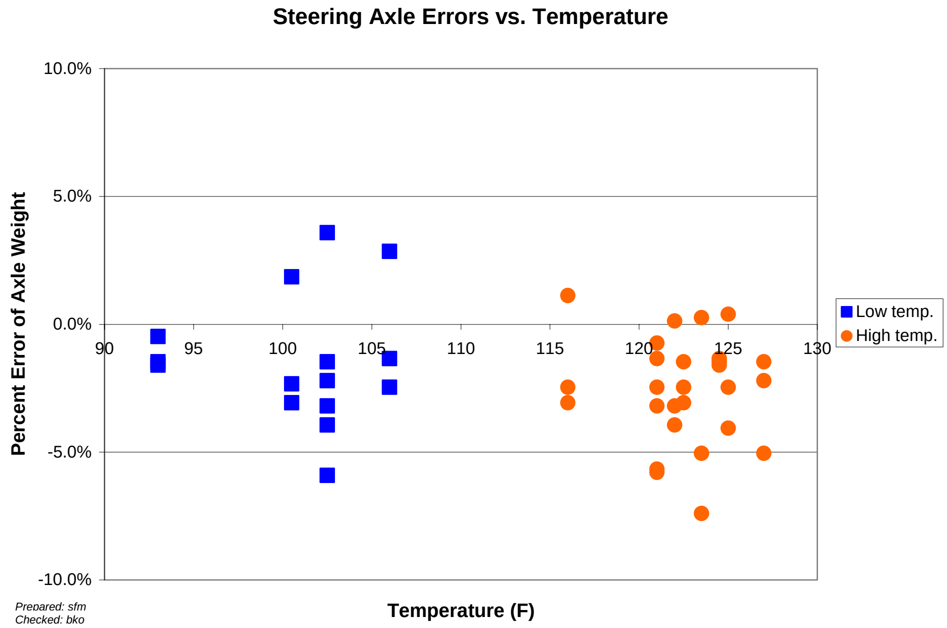

Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group – 350500 – 18-Aug-2008

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 61 to 65 mph, Medium speed – 66 to 70 mph and High speed – 71+ mph.

Table 6-3 Pre-Validation Results by Speed Bin – 350500 – 18-Aug-2008

Element	95% Limit	Low Speed 61 to 65 mph	Medium Speed 66 to 70 mph	High Speed 71+ mph
Steering axles	±20 %	-2.5 ± 5.4%	-2.1 ± 4.4%	-1.7 ± 5.2%
Tandem axles	±15 %	-5.8 ± 5.6%	-3.5 ± 6.0%	-4.9 ± 7.1%
GVW	±10 %	-5.1 ± 4.3%	-3.2 ± 4.4%	-4.3 ± 5.5%
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: bko *Checked:jrn*

Table 6-3 shows that all loading statistics are underestimated for this truck population. The GVW estimates border on failure for low and high speed.

Figure 6-7 shows the GVW errors by truck. All of the trucks GVW are underestimated. The golden truck (squares) is limited to speeds below 68 mph due to an engine governor. The golden truck and the partial 2 truck (triangles) results do not appear to be influenced by speed. The partial 1 truck (diamonds) seems to have an upward trend in errors with speed.

Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 350500 –18-Aug-2008

Figure 6-8 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. There is no apparent trend in steering axle error with speed.

Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 350500 – 18-Aug-2008

6.3 Classification Validation

This LTPP installed site uses the FHWA 13-bin classification scheme and the LTPP ETG mod 3 classification algorithm. Classification 15 has been added to define unclassified vehicles. Classification 14 has been added to define unknown vehicles.

The classification validation is intended to find gross errors in vehicle classification, not to validate the installed algorithm. A sample of 100 trucks was collected at the site. The classification identification is to identify gross errors in classification, not validate the classification algorithm. Video was taken at the site to provide ground truth for the evaluation. Based on the sample it was determined that there are zero percent unknown vehicles and zero percent unclassified vehicles. **This is not however consistent with data downloaded after the validation was complete.**

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 6-4 has the classification error rates by class. The overall misclassification rate is 3.9 percent. This exceeds the allowable rate for research quality data. It is however influenced by the fact that only four vehicles contributed to this result, one Class 8 and three Class 5 vehicles.

Table 6-4 Truck Misclassification Percentages for 350500 – 18-Aug-2008

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	0	5	33	6	0
7	N/A				
8	50	9	0	10	0
11	0	12	0	13	N/A

Prepared: bko Checked:jrn

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations with at least one Class 9 and only six of them a re matches, the error rate is 25 percent. The percent error and the mean differences reported below do not represent the same statistic. It is possible to have error rates greater than 0 with a mean difference of zero. The large values for Class 5 and Class 8 reflect three Class 5 vehicles and one Class 8 vehicle in this validation sample.

Table 6-5 Truck Classification Mean Differences for 350500 – 18-Aug-2008

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	0	5	- 33	6	0
7	N/A				
8	100	9	0	10	0
11	0	12	0	13	N/A

Prepared: bko Checked:jrn

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

A limited investigation of the precision and bias of the speeds reported by the equipment was undertaken. The values were not within the expected tolerances. This may or may not be contributing to the misclassification observed.

6.4 Evaluation by ASTM E-1318 Criteria

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

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

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

Prepared: bko Checked:jrn

7 Data Availability and Quality

As of August 18, 2008 this site does not have at least 5 years of research quality data. Research quality data is defined to be at least 210 days in a year of data of known calibration meeting LTPP's precision requirements.

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

The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. Previously collected data for this SPS experiment is omitted due to a lack of validation data.

Table 7-1 Amount of Traffic Data Available 350500 – 18-Aug-2008

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
2008	65	4	Full Week	65	4	Full Week

Prepared: bko *Checked:jrn*

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

Only Class 9 vehicles constitute more than 10 percent of the truck population. Based on the data collected following this validation 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 Regional Support Contractor on receipt of the first 14 days of data after the successful validation. For sites that do not meet LTPP precision requirements, this period may still be used as a starting point from which to track scale changes.

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

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

There may be more than one bin identified for the unloaded or loaded peak due to the small sample size collected after validation. Where only one peak exists, the peak rather than a loaded or unloaded peak is identified. This may happen with single unit trucks. It is not expected to occur with combination vehicles.

Table 7-2 GVW Characteristics of Major sub-groups of Trucks – 350500 – 19-Aug-2008

Characteristic	Class 9
Percentage Overweights	0.1%
Percentage Underweights	0.0%
Unloaded Peak	40,000 lbs
Loaded Peak	80,000 lbs

Prepared: bko *Checked:jrn*

The expected percentage of unclassified vehicles is 2.6 percent. This is based on the percentage of unknown and unclassified vehicles in the post-validation data download.

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

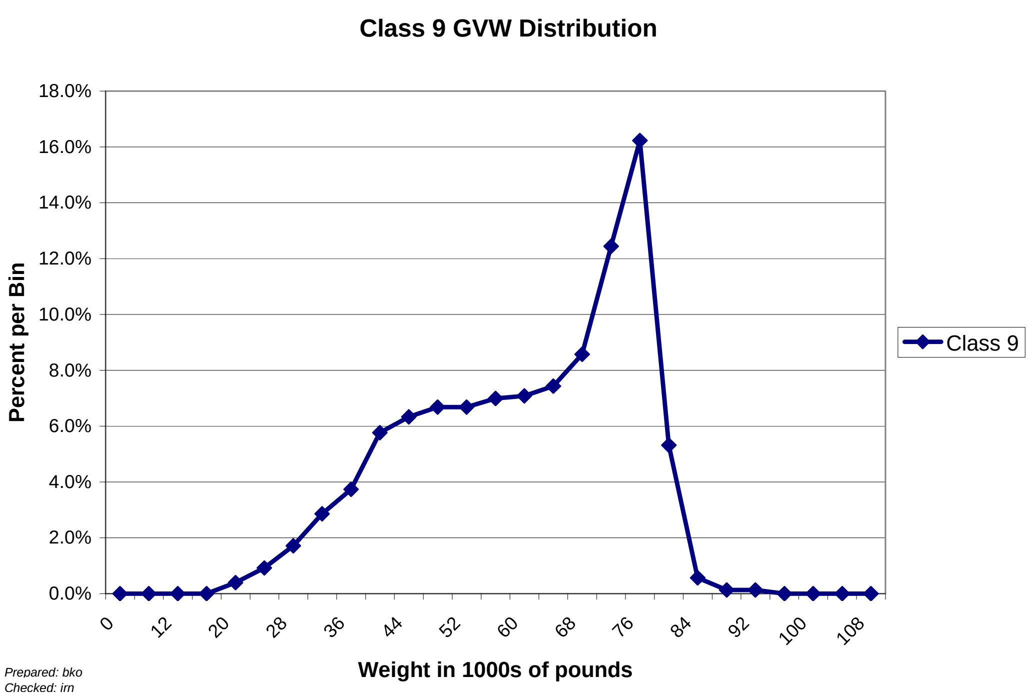

Figure 7-1 Expected GVW Distribution Class 9 – 350500 – 19-Aug-2008

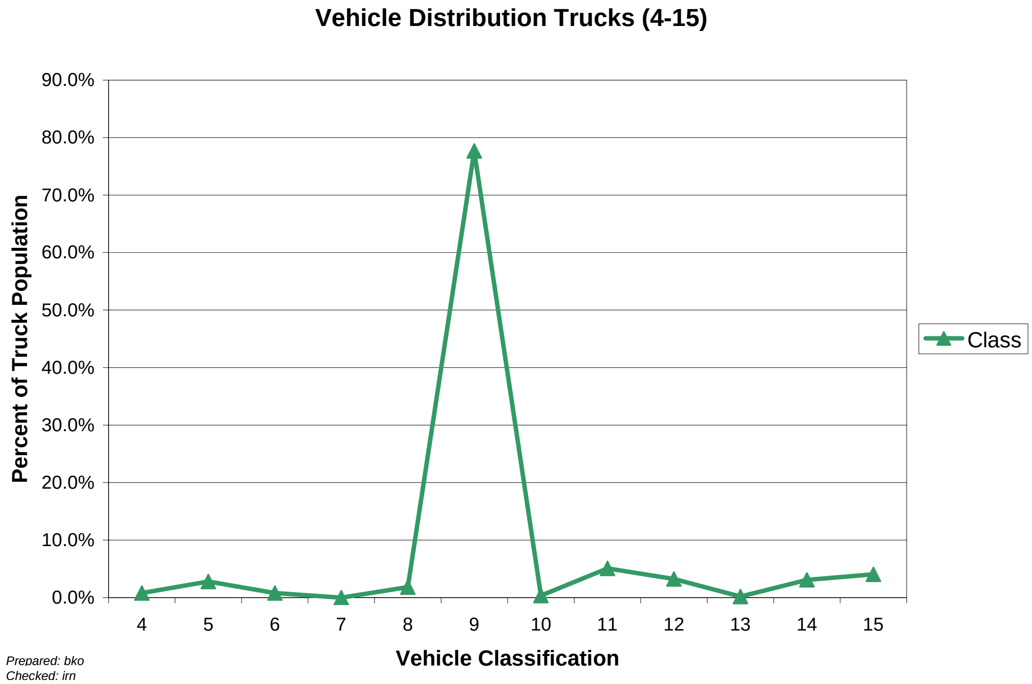

Figure 7-2 Expected Vehicle Distribution – 350500 – 19-Aug-2008

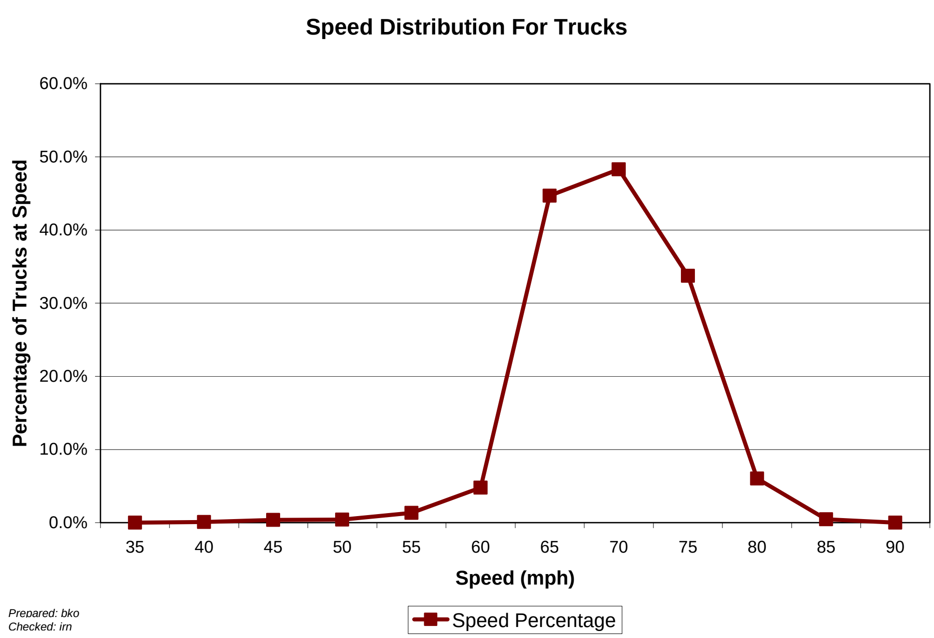

Figure 7-3 Expected Speed Distribution – 350500 – 19-Aug-2008

8 Data Sheets

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

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

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

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

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

Calibration Iteration 1 Worksheets – (1 page)

Test Truck Photographs (9 pages)

LTPP Mod 3 Classification Scheme (1 page)

Final System Parameters (1 page)

9 Updated Handout Guide and Sheet 17

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

10 Updated Sheet 18

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

11 Traffic Sheet 16(s)

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

POST-VISIT HANDOUT GUIDE FOR SPS WIM FIELD VALIDATION

STATE: New Mexico

SHRP ID: 0500

Figures

Photos

1. General Information

SITE ID: *350500*

LOCATION: *Interstate 10 East at M.P. 50.2*

VISIT DATE: *August 18, 2008*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *Bruce Bender, 505-827-5508, bruced.bender@state.nm.us*

Robert Meyers, 505-827-5466, robert.meyers@state.nm.us

Parveez Anwar, 505-827-5656, parveez.anwar@state.nm.us

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

FHWA Division Office Liaison: *Steven Von Stein, 505-820-2028, steven.von.stein@fhwa.dot.gov*

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

3. Agenda

BRIEFING DATE: *No briefing requested for this visit*

ON SITE PERIOD: *August, 18 and 19, 2008, beginning at 9:00 a.m.*

TRUCK ROUTE CHECK: *See Truck Route*

4. Site Location/ Directions

NEAREST AIRPORT: *El Paso International Airport, El Paso, Texas*

DIRECTIONS TO THE SITE: *Approx. 2 miles west of Grant/Luna County Line.*

MEETING LOCATION: *On site beginning at 9:00 a.m.*

WIM SITE LOCATION: *Interstate 10 East at M.P. 50.2 (Latitude: 32.1932^{0} and Longitude: -108.3015^{0})*

WIM SITE LOCATION MAP:*See Figure 4.1*

Figure 4-1 - Site Location for 350500 in New Mexico

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *Pilot Travel Center, Lordsburg, NM, I-10, exit 24, 505-542-3100, Latitude: 32.34621, Longitude: -108.6935*

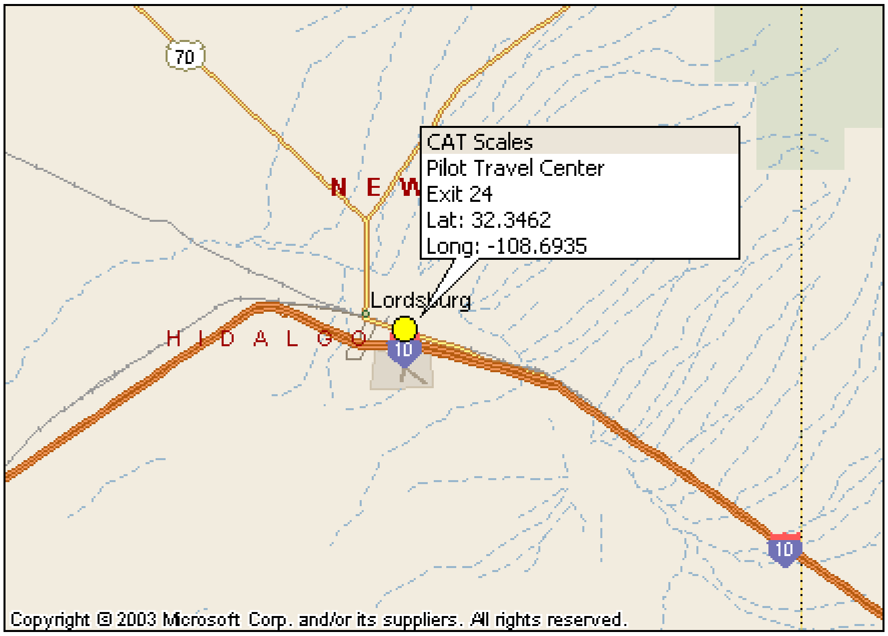

Figure 5-1 – Scale Location for 350500 in New Mexico

TRUCK ROUTE:

- *Eastbound to Exit 55 Interchange (5.4 miles from site)*
- *Westbound to Exit 42 Interchange (8.4 miles from site)*

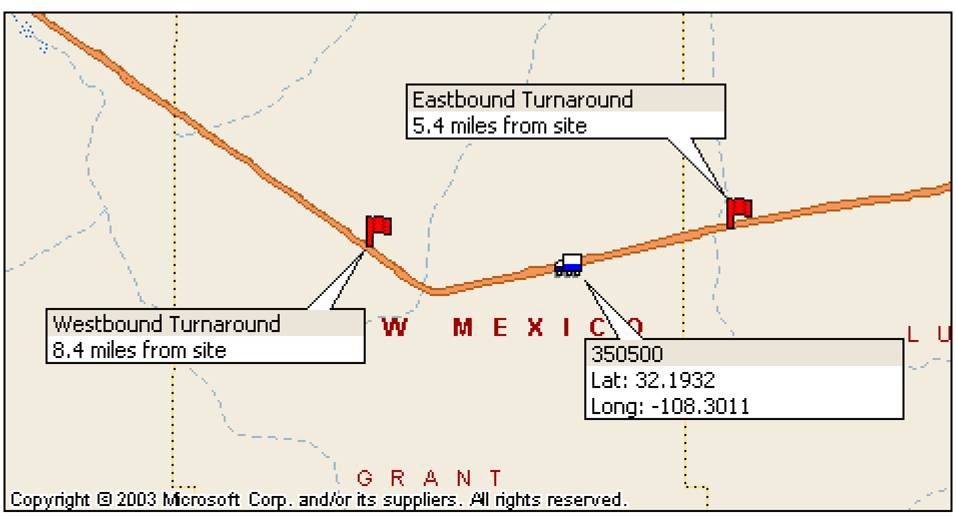

Figure 5-2 - Truck Route for 350500 in New Mexico

6. Sheet 17 – New Mexico (350500)

1.* ROUTE ___I-10_______MILEPOST __50.2___LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade __<1____ % Sag vertical Y / N
Nearest SPS section downstream of the site ___350501___
Distance from sensor to nearest upstream SPS Section ___1.1 miles____

3.* LANE CONFIGURATION
Lanes in LTPP direction __2__ Lane width _12_ 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 ___15.5___ ft

4.* PAVEMENT TYPE _______asphalt_________________

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date _8/18/2008_ Photo Filename 350500_Upstream_08_18_08.jpg________________
Date _8/18/2008_ Photo Filename 350500_Downstream_08_18_08.jpg______________
Date _______ Photo Filename ____

6. * SENSOR SEQUENCE ___Loop – Quartz – Quartz – Loop _________________

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

8. RAMPS OR INTERSECTIONS
Intersection/driveway within 300 m upstream of sensor location Y / N
distance _____________
Intersection/driveway within 300 m downstream of sensor location Y / N
distance __________
Is shoulder routinely used for turns or passing? Y / N

9. DRAINAGE (*Bending plate and load cell systems only)*
1 – Open to ground
2 – Pipe to culvert
3 – None

Clearance under plate ___ ___ . ___ 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 _52___ ft
Distance from system __58 __ ft
TYPE _____336S___________________

CABINET ACCESS controlled by LTPP / STATE / JOINT?
Contact - name and phone number __Robert Meyers (505) 827-5466 ____
Alternate - name and phone number ______________________________

11. * POWER
Distance to cabinet from drop ___ 12 ____ ft Overhead / underground / solar / AC in cabinet?
Service provider ______N/A_____________ Phone number ________________

12. * TELEPHONE
Distance to cabinet from drop ___ 137 ____ ft Overhead / under ground / cell?
Service provider _________ Phone Number _(575) 546-9131_

13.* SYSTEM (software & version no.)- ___iSINC_____________________
Computer connection – RS232 / Parallel port / USB / Other __________________

14. * TEST TRUCK TURNAROUND time ___27__ minutes DISTANCE _30 miles__

15. PHOTOS	FILENAME
Power source	350500_Solar_Panels_08_18_08.jpg
	350500_Service_Mast_08_18_08.jpg
Phone source	350500_Telephone_Service_Box_08_18_08.jpg
	350500_Modem_08_18_08.jpg
Cabinet exterior	350500_Cabinet_Exterior_08_18_08.jpg
Cabinet interior	350500_Cabinet_Interior_Front_08_18_08.jpg
	350500_Cabinet_Interior_Back_08_18_08.jpg
Weight sensors	350500_Leading_Quartz_08_18_08.jpg
	350500_Trailing_Quartz_08_18_08.jpg
Classification sensors	
Other sensors	350500_Leading_Loop_08_18_08.jpg
	350500_Trailing_Loop_08_18_08.jpg

Description ____Loops____
Downstream direction at sensors on LTPP lane
350500_Downstream_08_18_08.jpg
Upstream direction at sensors on LTPP lane
350500_Upstream_08_18_08.jpg

COMMENTS

GPS Coordinates: Latitude: 32.1932° and Longitude: -108.3015°

Closest Amenities in Deming, NM - Various Hotels, Restaurants, Gas Stations Etc., (31 miles) Exits 81, 82A & B, 85

Speed Limit – 75 mph

Communications Software – ProComm Plus

COMPLETED BY Dean J. Wolf

PHONE 301-210-5105 DATE COMPLETED 8/18/2008

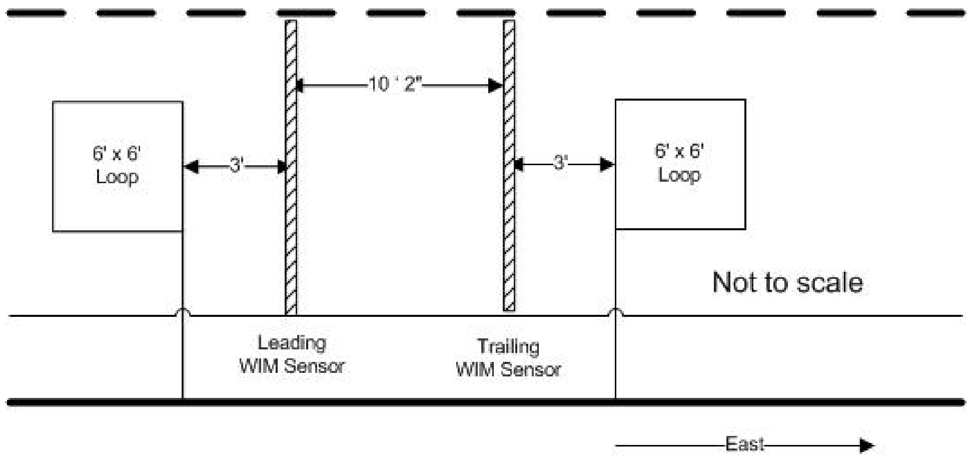

Figure 6-1 Sketch of Equipment Layout - 350500 - 18-Aug-2008

Figure 6-2 - Site Map for 350500 in New Mexico

Photo 6-1 - 350500_Upstream_08_18_08.jpg

Photo 6-2 - 350500_Downstream_08_18_08.jpg

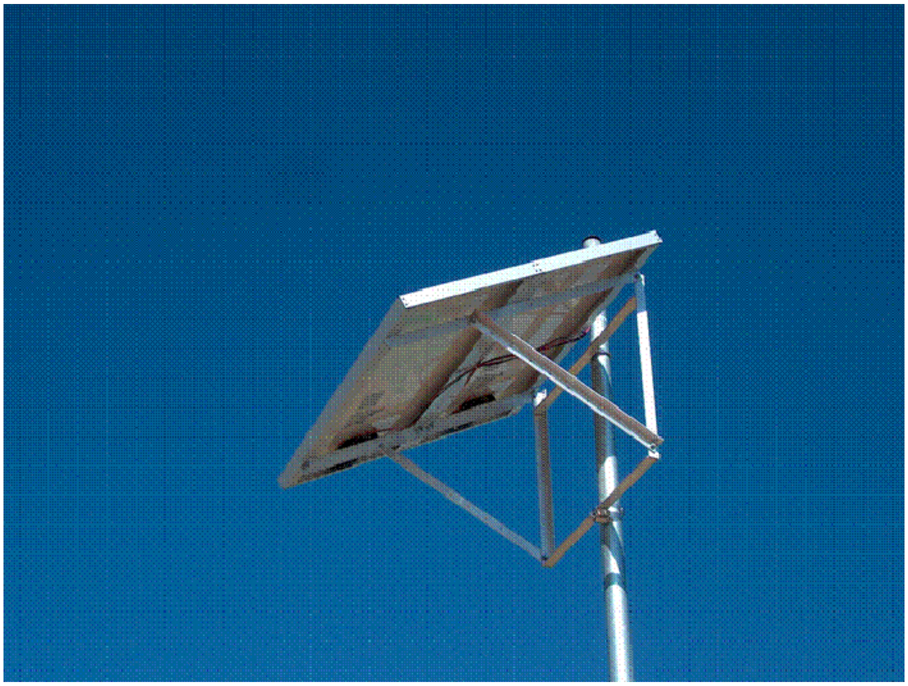

Photo 6-3 - 350500_Solar_Panels_08_18_08.jpg

Photo 6-4 - 350500_Service_Mast_08_18_08.jpg

Photo 6-5 - 350500_Telephone_Service_Box_08_18_08.jpg

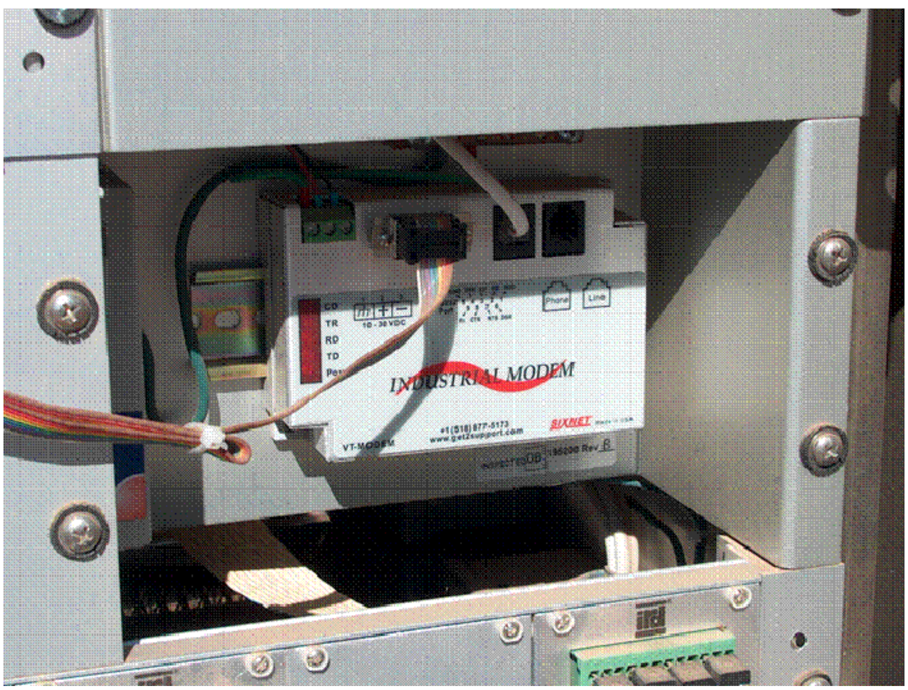

Photo 6-6 - 350500_Modem_08_18_08.jpg

Photo 6-7 - 350500_Cabinet_Exterior_08_18_08.jpg

Photo 6-8 - 350500_Cabinet_Interior_Front_08_18_08.jpg

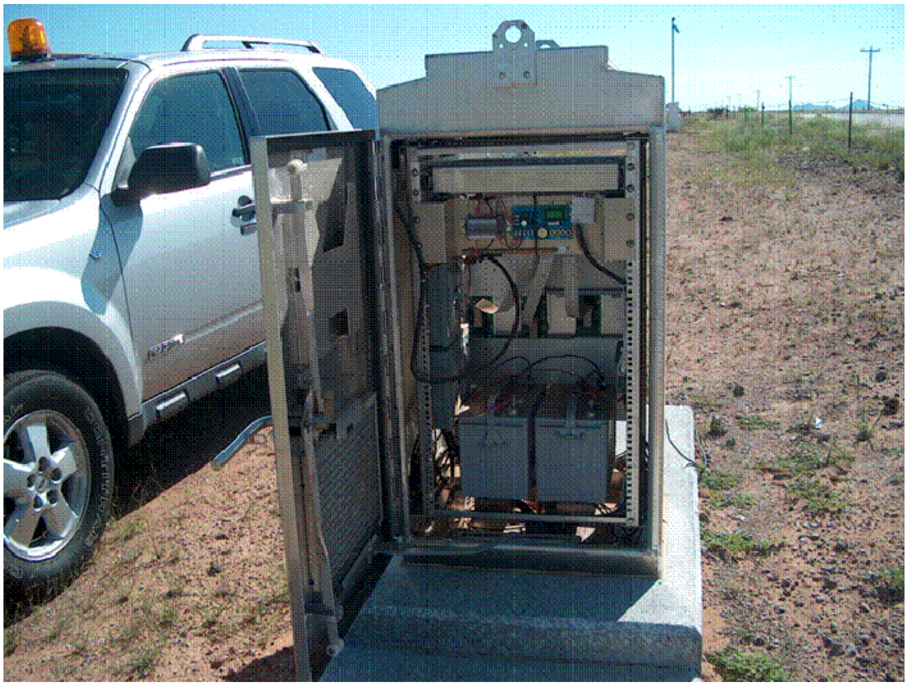

Photo 6-9 - 350500_Cabinet_Interior_Back_08_18_08.jpg

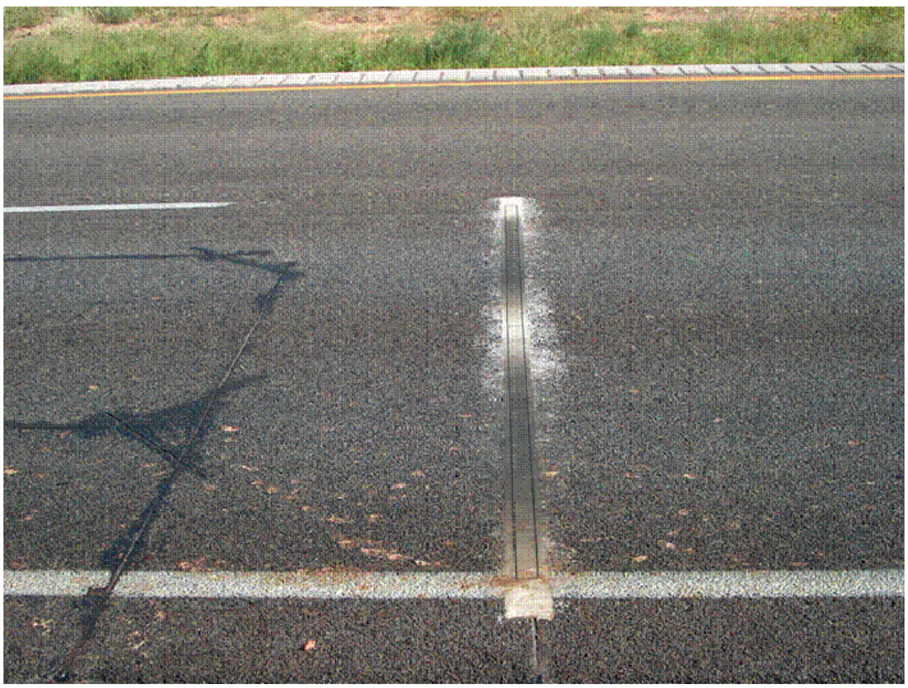

Photo 6-10 - 350500_Leading_Quartz_08_18_08.jpg

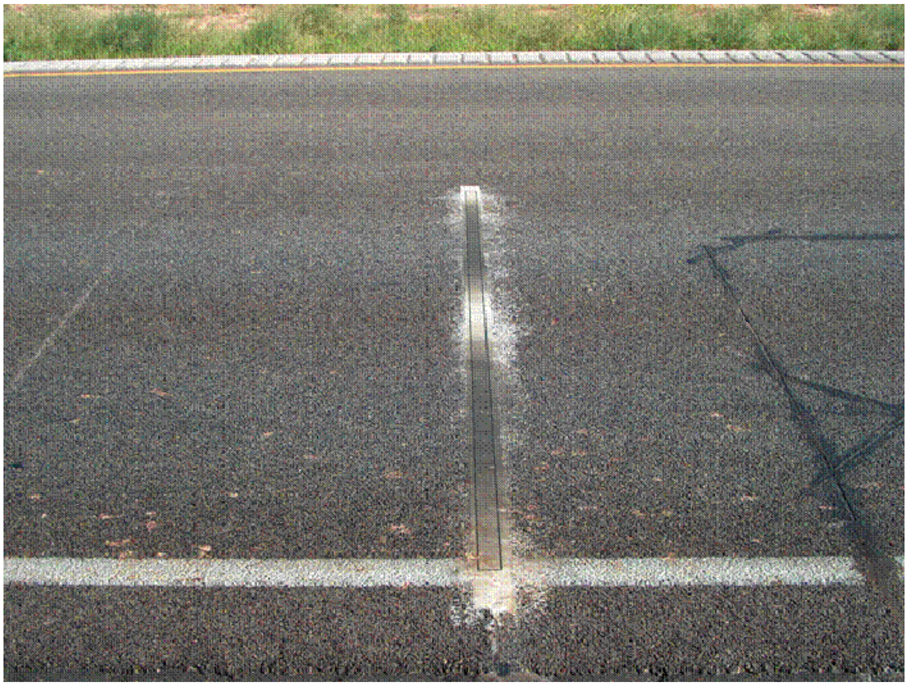

Photo 6-11 - 350500_Trailing_Quartz_08_18_08.jpg

Photo 6-12 - 350500_Leading_Loop_08_18_08.jpg

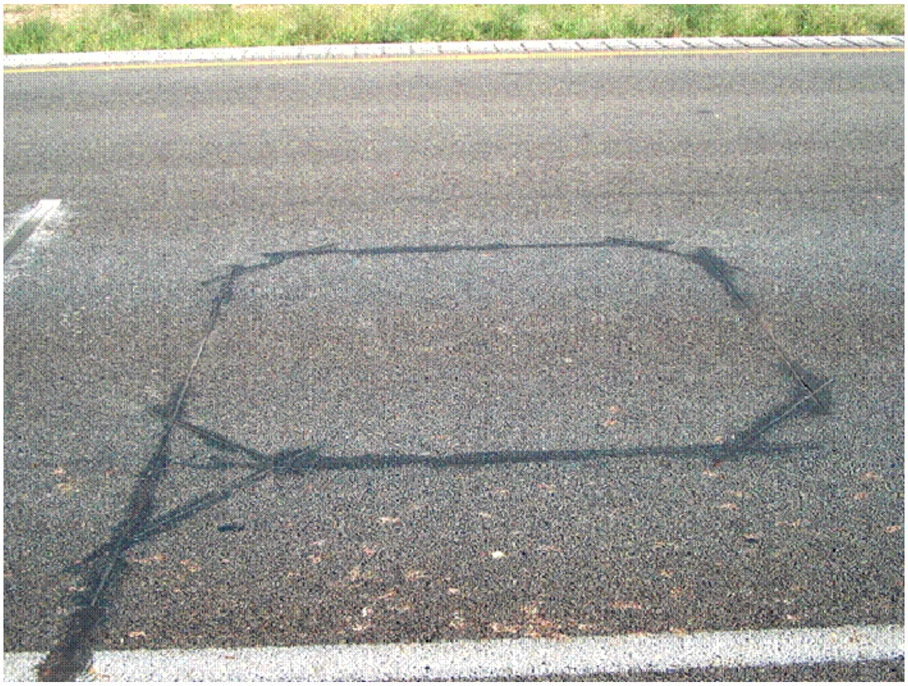

Photo 6-13 - 350500_Trailing_Loop_08_18_08.jpg

SHEET 18	STATE CODE [35]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0100]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 8/20/2008

Rev. 05/15/07

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

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

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

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

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

   c. Maintenance –
      - ☒ Contract with purchase – Expiration Date _5 years from installation_
      - ☐ Separate contract LTPP – Expiration Date _______
      - ☐ Separate contract State – Expiration Date _______
      - ☐ State personnel

   d. Calibration –
      - ☒ Vendor
      - ☐ State
      - ☐ LTPP

   e. Manuals and software control –
      - ☐ State
      - ☒ LTPP

   f. Power –
      i. Type –
         - ☐ Overhead
         - ☐ Underground
         - ☒ Solar

      ii. Payment –
         - ☐ State
         - ☐ LTPP
         - ☒ N/A

SHEET 18	STATE CODE [35]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0100]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 8/20/2008

Rev. 05/15/07

g. Communication –

i. Type –
- ☒ Landline
- ☐ Cellular
- ☐ Other

ii. Payment –
- ☒ State
- ☐ LTPP
- ☐ N/A

3. PAVEMENT –

a. Type –
- ☐ Portland Concrete Cement
- ☒ Asphalt Concrete

b. Allowable rehabilitation activities –
- ☒ Always new
- ☐ Replacement as needed
- ☐ Grinding and maintenance as needed
- ☐ Maintenance only
- ☐ No remediation

c. Profiling Site Markings –
- ☐ Permanent
- ☒ Temporary

4. ON SITE ACTIVITIES –

a. WIM Validation Check - advance notice required _2__ ☐ days ☒ weeks

b. Notice for straightedge and grinding check - __2_ ☐ days ☒ weeks

i. On site lead –
- ☐ State
- ☒ LTPP

ii. Accept grinding –
- ☐ State
- ☒ LTPP

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

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

SHEET 18	STATE CODE [35]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0100]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 8/20/2008

Rev. 05/15/07

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

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

   ______

g. Access to cabinet
   i. Personnel Access –
      ☐ State only
      ☒ Joint
      ☐ LTPP
   ii. Physical Access –
      ☒ Key
      ☐ Combination

h. State personnel required on site – ☐Yes ☒No

i. Traffic Control Required – ☐Yes ☒No

j. Enforcement Coordination Required – ☐Yes ☒No

5. SITE SPECIFIC CONDITIONS –
   a. Funds and accountability – ______
   b. Reports – _______
   c. Other – ________
   d. Special Conditions – ________

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

      Name: Roy Czinku Phone:(306) 653-6627

      Agency: IRD

b. Maintenance (equipment) –

Name: Roy Czinku Phone:(306) 653-6627

Agency: IRD

c. Data Processing and Pre-Visit Data –

Name: Roy Czinku Phone:(306) 653-6627

Agency: IRD

d. Construction schedule and verification –

Name: _____ Phone:_____

Agency: _____

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

Name: _____ Phone:_____

Agency: ________________________________ 480-641-3500

f. Traffic Control –

Name: _____ Phone:_____

Agency: _____

g. Enforcement Coordination –

Name: _____ Phone:_____

Agency: _____

h. Nearest Static Scale

Name: Pilot Travel Center Location:Lordsburg NM Exit 24

Phone: 505-542-3100

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [35] *SHRP SECTION ID [0500]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [8/18/2008]

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

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

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

5. EQUIPMENT MANUFACTURER ___IRD/ PAT Traffic___

WIM SYSTEM CALIBRATION SPECIFICS**

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

___ NUMBER OF TRUCKS COMPARED __3__ NUMBER OF TEST TRUCKS USED

__14__ PASSES PER TRUCK

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

TRUCK	TYPE	SUSPENSION
1	9	1
2	9	1
3	9	1

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
MEAN DIFFERENCE BETWEEN ---

DYNAMIC AND STATIC GVW	-4.3	STANDARD DEVIATION	2.3
DYNAMIC AND STATIC SINGLE AXLES	-2.1	STANDARD DEVIATION	2.3
DYNAMIC AND STATIC DOUBLE AXLES	-4.7	STANDARD DEVIATION	3.1

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

9. DEFINE THE SPEED RANGES USED (MPH) ______ _65_ __70__ __75_ __ __ __ __ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___3694 / 2944___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
*** FHWA CLASS 9 ____ 0 FHWA CLASS ____ ____ ____ _____
*** FHWA CLASS 8 ____ 100 FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
*** PERCENT "UNCLASSIFIED" VEHICLES: ____ 0.0

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

SHEET 16 LTPP MONITORED TRAFFIC DATA SITE CALIBRATION SUMMARY	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [35] *SHRP SECTION ID [0500]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [8/19/2008]

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

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

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

5. EQUIPMENT MANUFACTURER ___IRD/ PAT Traffic___

WIM SYSTEM CALIBRATION SPECIFICS**

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

___ NUMBER OF TRUCKS COMPARED __ 3 __ NUMBER OF TEST TRUCKS USED

__ 14 __ PASSES PER TRUCK

	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	1

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
MEAN DIFFERENCE BETWEEN ---
DYNAMIC AND STATIC GVW ___-0.2 STANDARD DEVIATION ___2.5
DYNAMIC AND STATIC SINGLE AXLES ___0.3 STANDARD DEVIATION ___2.3
DYNAMIC AND STATIC DOUBLE AXLES ___-0.3 STANDARD DEVIATION ___3.7

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

9. DEFINE THE SPEED RANGES USED (MPH) ______ _65_ __70__ __75_ ______ ______ ______
______ ______ ______ ______ ______ ______ ______ ______ ______ ______

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___3816 / 3041___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
*** FHWA CLASS 9 ____ 0 FHWA CLASS ____ ____ ____ _____
*** FHWA CLASS 8 ____ 50 FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
FHWA CLASS ____ ____ ____ _____
*** PERCENT “UNCLASSIFIED” VEHICLES: ____ 0.0

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

APPENDIX A

Sheet 19	* STATE_CODE	3 5
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 1	* DATE 8/18/08	8/18/08

Rev. 08/31/01

PART I.

DRIVER-ALBERT
480-694-6833

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

AXLES - units (lbs) / 100s lbs / kg

TRUCK 626
TRAILER 8468

GEOMETRY

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

9. a) * Make: INTERNATIONAL b) * Model: 9400 i

10.* Trailer Load Distribution Description:
PALLETIZED SUPER SACKS OF TIRE BUFFINGS
LOADED EVENLY ALONG TRAILER

11. a) Tractor Tare Weight (units): ______
b). Trailer Tare Weight (units): ______

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

A to B 17.4 B to C ~~4.3~~ 4.4 C to D 33.2

D to E 4.1 E to F ______

Wheelbase (measured A to last) ______ Computed 59.1

13. *Kingpin Offset From Axle B (units) +1.8 (______)
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	75R 22.5	2 FULL SPRING LEAF
B	75R 22.5	AIR
C	75R 22.5	AIR
D	75R 22.5	AIR
E	75R 22.5	AIR
F		

Sheet 19	* STATE_CODE	3 5
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 1	* DATE	8/18/08

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 77110
*c) Post Test Loaded Weight 76480
*d) Difference Post Test – Pre-test -630

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11700	16580	16580	16130	16130		77120
2	11700	16570	16570	16130	16130		77100
3							
Average	11700	16575	16575	16130	16130		77110

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	11440	16430	16430	16100	16100		76500
2	11440	16420	16420	16090	16090		76460
3							
Average	11440	16425	16425	16095	16095		76480

Measured By D.W. Verified By G.M. Weight date 8/18/08

Sheet 19	* STATE CODE 3 5
LTPP Traffic Data	* SPS PROJECT ID 0 5 0 0
*CALIBRATION TEST TRUCK # 1	* DATE

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 76560
*c) Post Test Loaded Weight 76010
*d) Difference Post Test – Pre-test -550

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11440	16430	16430	16130	16130		76560
2	11440	16430	16430	16130	16130		76560
3							
Average	11440	16430	16430	16130	16130		76560

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11280	16220	16220	16140	16140		76000
2	11200	16290	16290	16120	16120		76020
3							
Average	11240	16255	16255	16130	16130		76010

Measured By djw Verified By 8/AM Weight date 8/12/08

Sheet 19	* STATE_CODE	3 5
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 2	* DATE 8/18/08	8/18/08

Rev. 08/31/01

JERRY
701-412-8657

PART I.

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

AXLES - units - lbs / 100s lbs / kg

TRUCK 118
TRAILER 503

GEOMETRY

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

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

10.* Trailer Load Distribution Description:

PALLETIZED SUPER SACKS OF TIRE BUFFINGS
LOADED EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): ____

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

A to B ~~__~~ 20.0 B to C 4.~~3~~ C to D 32.0

D to E 4.1 E to F ____

Wheelbase (measured A to last) ____ Computed 61.1

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

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	75R 24.5	2 FULL SPRING LEAF
B	75R 24.5	AIR
C	75R 24.5	AIR
D	11 R 22.5	AIR
E	11R 22.5	AIR
F		

Sheet 19	* STATE_CODE	3 5
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 2	* DATE	8/18/08

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 66770

*c) Post Test Loaded Weight 66100

*d) Difference Post Test – Pre-test - 670

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11720	15620	15620	11900	11900		66760
2	11720	15630	15630	11900	11900		66780
3							
Average	11720	15625	15625	11900	11900		66770

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	11440	15640	15640	11690	11690		66100
2	11460	15630	15630	11690	11690		66100
3							
Average	11450	15635	15635	11690	11690		66100

Measured By KW Verified By ajm Weight date 8/18/08

Sheet 19	* STATE_CODE 35
LTPP Traffic Data	* SPS PROJECT ID 0500
*CALIBRATION TEST TRUCK # 2	* DATE

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 67130
*c) Post Test Loaded Weight 66410
*d) Difference Post Test – Pre-test -720

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11900	15880	15880	11740	11740		67140
2	11920	15880	15880	11720	11720		67120
3							
Average	11910	15880	15880	11730	11730		67130

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11600	15730	15730	11650	11650		66360
2	11580	15750	15750	11690	11690		66460
3							
Average	11590	15740	15740	11670	11670		66410

Measured By AW Verified By SJM Weight date 8/19/08

Sheet 19	* STATE_CODE	3 5
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 3	* DATE 8/18/08	8/18/08

Rev. 08/31/01

DANA
701-219-9937

PART I.

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

AXLES - units - lbs / 100s lbs / kg

TRUCK 622
TRAILER 837

GEOMETRY

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

9. a) * Make: INTERNATIONAL b) * Model: 9900 iX

10.* Trailer Load Distribution Description:

PALLETIZED SUPER SACKS OF TIRE BUFFINGS
LOADED EVENLY ALONG TRAILER

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

b). Trailer Tare Weight (units): ____

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

A to B 19.6 B to C 4.3 C to D 32.7

D to E 4.1 E to F ____

Wheelbase (measured A to last) ____ Computed 60.7

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

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R 22.5	2 FULL LEAF
B	11R 22.5	AIR
C	11R 22.5	AIR
D	75R 22.5	AIR
E	75R 22.5	AIR
F		

Sheet 19	* STATE_CODE	3 5
LTPP Traffic Data	* SPS PROJECT ID	0 5 0 0
*CALIBRATION TEST TRUCK # 3	* DATE	8/18/08

Rev. 08/31/01

PART II

Day 1

*b) Average Pre-Test Loaded weight 57690

*c) Post Test Loaded Weight 57110

*d) Difference Post Test – Pre-test -580

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11680	11690	11690	11320	11320		57700
2	11660	11700	11700	11310	11310		57680
3							
Average	11670	11695	11695	11315	11315		57690

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	11380	11550	11550	11300	11300		57080
2	11500	11490	11490	11330	11330		57140
3							
Average	11440	11520	11520	11315	11315		57110

Measured By [illegible] Verified By [illegible] Weight date 8/18/08

Sheet 19	* STATE_CODE 3 5
LTPP Traffic Data	* SPS PROJECT ID 0 5 0 0
*CALIBRATION TEST TRUCK # 3	* DATE

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 58190
*c) Post Test Loaded Weight 57640
*d) Difference Post Test – Pre-test - 550

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11920	11800	11800	11330	11330		58180
2	11920	11810	11810	11330	11330		58200
3							
Average	11920	11805	11805	11330	11330		58190

Table 6.2. Raw data – Axle scales –

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

Table 7.2 Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11700	11640	11640	11320	11320		57620
2	11680	11650	11650	11340	11340		57660
3							
Average	11690	11645	11645	11330	11330		57640

Measured By djw Verified By SJM Weight date 8/19/08

Sheet 20	* STATE_CODE 3 5
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
Speed and Classification Checks * 1 of* 2	* DATE 8/18/08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
75	9	8879	74	9	73	9	8985	74	9
75	9	8880	74	9	64	11	8998	64	11
62	9	8888	63	9	66	9	9001	65	9
70	9	8889	71	9	66	9	9002	66	9
75	9	8897	74	9	69	9	9004	68	9
73	9	8898	73	9	56	8	9009	56	5 *
62	9	8900	62	9	73	9	9015	74	9
59	9	8903	60	9	71	11	9019	72	11
72	8	8906	72	8	68	9	9020	67	9
63	9	8909	62	9	66	11	9030	66	11
57	9	8915	56	9	60	5	9035	60	5
73	5	8916	73	5	66	9	9037	66	9
64	9	8917	64	9	63	9	9044	63	9
73	5	8918	73	5	63	9	9046	63	9
66	9	8923	65	9	65	9	9047	65	9
67	9	8925	67	9	73	9	9048	72	9
70	9	8927	70	9	68	9	9054	68	9
65	5	8957	66	5	60	9	9055	60	9
68	9	8958	67	9	70	9	9062	69	9
65	8	8959	66	8	67	9	9064	67	9
73	9	8961	73	9	61	9	9071	60	9
67	9	8965	68	9	74	9	9074	74	9
75	9	8975	74	9	73	9	9075	73	9
68	9	8978	67	9	75	10	9077	74	10
66	9	8981	66	9	62	9	9079	61	9

Recorded by MARK Z Direction E Lane 1 Time from 11:00AM to 12:02PM

6420070022_SPSWIM_TO_25_35_2.106_0500_Pre-Validation_Sheet_20.doc

DJ

Sheet 20	* STATE_CODE 3 5
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
Speed and Classification Checks * 2 of* 2	* DATE 8 / 18 / 08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
73	9	8646	72	9	60	9	8752	61	9
72	9	8648	72	9	68	9	8787	68	9
71	9	8659	71	9	73	9	8789	71	9
63	9	8660	63	9	75	9	8792	75	9
77	9	8663	77	9	77	9	8800	77	9
64	9	8664	63	9	63	9	8803	63	9
62	9	8682	62	9	75	6	8807	74	6
* 57	8	8687	57	5	61	9	8808	60	9
66	11	8690	66	11	67	9	8812	69	9
69	9	8696	70	9	72	9	8813	73	9
62	9	8697	62	9	68	9	8816	67	9
75	9	8698	75	9	72	9	8818	71	9
68	9	8699	70	9	72	9	8819	71	9
62	9	8703	62	9	73	9	8820	70	9
73	12	8704	73	12	64	9	8821	65	9
68	9	8715	68	9	64	9	8822	64	9
68	4	8719	69	4	70	12	8824	70	12
78	6	8727	81	6	74	9	8826	73	9
68	9	8730	69	9	70	9	8831	71	9
71	9	8731	72	9	65	9	8835	64	9
73	9	8741	72	9	65	9	8857	66	9
74	9	8744	73	9	58	9	8861	59	9
73	9	8745	73	9	72	9	8864	71	9
64	9	8747	64	9	70	9	8869	70	9
74	6	8750	74	6	74	9	8876	75	9

Recorded by MARK Z Direction E Lane 1 Time from 9:50 AM to 10:59 AM

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Sheet 20	* STATE_CODE 3 5
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
Speed and Classification Checks * 1 of* 2	* DATE 8 / 19 / 08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
73	9	471	76	9	76	9	522	75	9
71	9	474	71	9	70	9	523	70	9
60	9	479	59	9	64	9	524	64	9
68	9	481	70	9	68	9	525	70	9
74	9	483	73	9	65	9	528	68	9
72	9	484	71	9	72	9	529	73	9
72	8	485	71	8	63	9	531	64	9
66	11	486	66	11	72	5	532	74	5
71	9	487	71	9	69	9	534	70	9
65	9	489	65	9	60	9	536	61	9
68	9	490	69	9	67	12	538	68	12
70	9	494	72	9	68	9	541	69	9
70	9	499	70	9	62	9	543	63	9
72	9	501	71	9	62	9	544	61	9
75	9	503	76	9	68	9	545	66	9
* 62	8	506	62	5	68	9	581	68	9
72	9	509	73	9	65	9	591	65	9
71	9	510	70	9	64	9	592	64	9
75	9	511	73	9	67	9	594	67	9
60	9	512	60	9	73	9	596	74	9
74	9	513	74	9	67	11	597	66	11
67	9	514	69	9	58	9	598	58	9
68	9	516	69	9	70	9	600	71	9
72	8	518	73	8	66	9	601	67	9
67	9	519	68	9	69	9	604	71	9

Recorded by MARK Z Direction E Lane 1 Time from 11:15 AM to 11:48 AM

6420070022_SPSWIM_TO_25_35_2.106_0500_Post-Validation_Sheet_20.doc

Sheet 20	* STATE_CODE 3 5
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
Speed and Classification Checks * 2 of* 2	* DATE 8 / 19 / 08

Rev. 08/31/2001

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
63	9	606	63	9	74	9	638	74	9
64	9	607	64	9	70	9	640	70	9
59	9	609	59	9	67	9	642	67	9
69	9	610	67	9	67	9	644	66	9
66	11	611	67	11	66	9	645	66	9
67	9	613	68	9	68	9	646	68	9
75	9	614	76	9	64	9	653	65	9
67	9	615	67	9	73	9	656	72	9
68	9	616	69	9	73	9	657	73	9
69	9	617	70	9	72	9	659	72	9
63	9	618	65	9	63	9	661	66	9
65	12	620	65	12	65	9	662	65	9
65	9	621	67	9	72	9	663	73	9
75	9	622	76	9	72	9	688	70	9
70	9	623	70	9	71	9	691	71	9
62	9	624	65	9	62	9	693	62	9
63	9	625	64	9	72	9	694	70	9
68	9	627	69	9	73	9	695	74	9
66	11	628	65	11	67	9	696	69	9
65	9	629	66	9	73	9	697	73	9
62	9	631	62	9	69	9	698	68	9
70	9	633	70	9	73	9	699	73	9
70	9	634	69	9	64	11	700	64	11
64	9	635	63	9	78	9	702	78	9
69	9	637	69	9	64	9	704	66	9

Recorded by MARK Z Direction E Lane 1 Time from 11:48 AM to 12:12 PM

6420070022_SPSWIM_TO_25_35_2.106_0500_Post-Validation_Sheet_20.doc

Sheet 21	* STATE_CODE 3 5
LTPP Traffic Data	*SPS PROJECT_ID 0 5 0 0
WIM System Test Truck Records 1 of 3	* DATE 8/18/08

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
93	63	1	1	9:49	8664	64	58/56	80/87	83/78	77/78	74/80		75.3	17.4	4.4	33.1	4.1	
93	64	2	1	9:49	8665	65	64/50	79/72	76/70	46/51	62/60		63.0	19.9	4.3	32.8	4.0	
93	65	3	1	9:49	8666	65	59/56	53/61	55/54	57/54	56/51		55.4	19.7	4.4	32.6	4.1	
100.5	64	1	2	10:16	8747	64	58/55	80/84	78/77	78/78	79/82		74.2	17.4	4.4	33.1	4.0	
100.5	68	2	2	10:17	8755	69	60/58	75/81	76/75	39/45	56/72		63.8	19.8	4.3	32.8	4.0	
100.5	68	3	2	10:17	8756	68	57/55	56/62	59/57	64/58	55/51		56.5	19.6	4.4	32.3	4.0	
102.5	63	1	3	10:43	8833	64	59/55	56/81	75/77	74/80	74/80		73.3	17.4	4.4	33.2	4.1	
102.5	74	2	3	10:44	8837	74	62/58	72/72	72/74	48/52	66/64		64.1	19.9	4.3	32.6	3.9	
102.5	71	3	3	10:45	8839	72	57/56	53/61	54/56	56/54	52/51		55.1	19.5	4.4	32.4	4.0	
102.5	67	1	4	11:10	8925	67	58/54	76/82	78/78	75/79	76/82		73.6	17.4	4.4	33.1	4.0	
102.5	66	2	4	11:13	8935	~~66~~	55/54	73/76	70/70	41/52	63/67		62.1	19.8	4.3	32.6	4.0	
102.5	64	3	4	11:13	8937	~~64~~	58/53	53/58	53/52	53/52	55/53		54.0	19.5	4.4	32.4	4.0	
106	61	1	5	11:37	9021	62	60/59	82/86	80/80	55/78	80/78		73.8	17.5	4.4	33.4	4.1	
106	68	2	5	11:42	9039	67	57/56	72/76	73/74	46/52	61/65		63.0	19.7	4.3	32.6	4.0	
106	69	3	5	11:42	9040	68	58/56	52/59	53/56	52/58	53/54		55.1	19.5	4.4	32.4	4.1	
121	66	1	6	12:05	9104	67	60/52	82/80	85/78	80/70	79/70		73.5	17.4	4.3	33.2	4.1	

Recorded by MARK Z Checked by [signature]

6420070022_SPSWIM_TO_25_35_2.106_0500_Pre-Validation_Sheet_21.doc

Sheet 21	* STATE_CODE 35
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 2 of 3	* DATE 8/18/08

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
121	73	2	6	12:09	9123	74	59/56	76/78	77/78	45/49	61/73		65.0	19.9	4.3	32.7	4.0	
121	71	3	6	12:09	9124	72	58/56	50/58	52/52	49/52	46/48		52.2	19.5	4.3	32.3	4.0	
116	61	1	7	12:32	9200	61	58/59	76/83	77/74	73/75	78/76		72.9	17.3	4.4	33.1	4.1	
116	68	2	7	12:36	9214	68	57/56	74/75	76/74	33/52	67/68		63.3	19.9	4.3	32.7	4.0	
116	62	3	7	12:36	9215	63	57/55	48/61	49/54	52/51	56/54		53.7	19.6	4.4	32.3	4.0	
122.5	66	1	8	12:59	9287	67	58/56	78/86	80/81	81/79	77/82		75.8	17.4	4.4	33.1	4.1	
122.5	75	2	8	13:04	9298	74	57/56	81/78	77/75	50/52	67/65		65.9	19.9	4.3	32.8	4.0	
122.5	72	3	8	13:04	9299	71	56/56	51/60	54/54	55/56	52/53		54.7	19.4	4.3	32.2	4.0	
127	61	1	9	14:26	42	62	58/56	75/83	77/76	75/73	75/79		72.6	17.4	4.4	33.0	4.1	
127	61	2	9	14:26	43	64	57/53	71/73	73/71	25/53	59/66		60.2	19.9	4.3	32.7	4.0	
127	61	3	9	14:26	44	63	58/55	48/59	51/56	49/54	52/54		53.7	19.5	4.4	32.4	4.1	
125	67	1	10	14:52	136	67	56/55	83/83	80/82	80/79	75/79		75.2	17.5	4.4	33.2	4.1	
125	70	2	10	14:54	144	70	57/56	71/79	74/75	44/56	67/67		64.6	19.8	4.3	32.8	4.0	
125	68	3	10	14:54	145	68	59/57	52/64	53/53	52/57	54/55		55.6	19.6	4.4	32.3	4.1	
124.5	61	1	11	15:20	249	62	58/56	80/82	79/75	79/84	75/84		75.4	17.4	4.4	33.1	4.1	
124.5	73	2	11	15:22	258	74	57/57	69/80	71/73	26/53	66/71		62.1	19.9	4.3	32.7	4.0	

Recorded by MARK Z

Checked by [illegible]

Sheet 21	* STATE_CODE 35
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 3 of 3	* DATE 8/18/08

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
124.5	70	3	11	15:22	259	72	56/58	50/64	51/57	54/56	59/59		56.3	19.6	4.3	32.2	4.0	
123.5	65	1	12	15:47	352	67	59/57	80/84	78/75	81/79	82/81		75.6	17.5	4.4	33.2	4.1	
123.5	63	2	12	15:49	360	65	57/53	73/75	70/70	45/46	61/66		61.6	19.8	4.3	32.6	4.0	
123.5	61	3	12	15:50	361	63	55/52	51/57	52/52	50/53	53/55		53.2	19.5	4.4	32.3	4.1	
122	63	1	13	16:15	471	62	62/50	84/79	82/72	82/76	79/76		74.2	17.4	4.3	33.0	4.1	
122	69	2	13	16:16	479	69	60/56	81/81	82/79	52/56	64/67		67.8	19.9	4.3	32.8	4.0	
122	68	3	13	16:17	480	68	56/55	49/62	54/57	48/58	52/52		54.4	19.5	4.3	32.4	4.0	
121	67	1	14	16:42	586	66	57/52	77/79	81/71	79/73	71/84		72.2	17.3	4.4	32.9	4.0	
121	74	2	14	16:44	593	75	58/55	75/78	75/74	35/54	66/67		63.1	19.9	4.3	32.9	4.0	
121	70	3	14	16:44	595	71	54/53	50/59	55/51	56/54	53/54		54.1	19.4	4.3	32.1	4.0	

Recorded by MARK Z Checked by [signature]

6420070022_SPSWIM_TO_25_35_2.106_0500_Pre-Validation_Sheet_21.doc

Sheet 21	* STATE_CODE 35
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 1 of 2	* DATE 8/19/08

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
80	67	1	1	8:25	2647	67	58/62	82/88	83/80	78/82	81/80		77.4	17.4	4.4	33.2	4.0	
80	66	2	1	8:26	2648	66	59/55	82/83	79/81	54/53	62/71		68.3	19.8	4.3	32.7	4.0	
80	61	3	1	8:26	2649	62	58/59	51/63	52/53	53/57	52/58		55.5	19.5	4.3	32.3	4.0	
84.5	62	1	2	8:52	2724	62	56/56	76/83	79/74	74/79	79/80		73.6	17.3	4.3	33.1	4.1	
84.5	68	2	2	8:53	2726	69	63/61	79/79	81/76	49/54	66/72		67.9	19.8	4.3	32.7	4.0	
84.5	67	3	2	8:53	2727	68	61/60	51/60	59/55	55/59	59/54		57.4	19.5	4.3	32.1	4.0	
		[illegible]	[illegible]															
		[illegible]	[illegible]				MISSED PASSES											
		[illegible]	[illegible]				THAT COULD											
~~88~~	~~64~~	~~1~~	~~3~~				NOT BE											
~~88~~	~~73~~	~~2~~	~~3~~				RECOVERED.											
~~88~~	~~62~~	~~3~~	~~3~~															
92	62	1	3	9:46	99	62	58/54	81/81	81/74	80/80	78/79		74.5	17.3	4.4	33.1	4.1	
92	64	2	3	9:46	100	64	63/60	75/78	77/73	48/56	64/67		66.3	19.8	4.3	32.7	4.0	
92	61	3	3	9:47	101	63	60/58	51/61	56/56	55/58	54/55		56.2	19.4	4.3	32.3	4.0	
100.5	64	1	4	10:13	204	67	58/56	81/83	85/78	83/82	83/79		76.9	17.4	4.3	33.1	4.1	

Recorded by MARK Z

Checked by [illegible]

6420070022_SPSWIM_TO_25_35_2.106_0500_Cal 2 Sheet_21.doc

Sheet 21	* STATE_CODE 35
LTPP Traffic Data	*SPS PROJECT_ID 0500
WIM System Test Truck Records 2 of 2	* DATE 8/19/08

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
100.5	66	2	4	10:14	209	68	60/58	82/85	84/83	43/54	69/72		69.1	19.8	4.3	32.9	4.0	
100.5	68	3	4	10:14	212	68	59/57	55/59	56/57	55/53	53/54		55.9	19.5	4.3	32.3	4.1	
103.5	65	1	5	10:42	319	67	57/56	80/86	81/78	83/79	80/85		76.5	17.5	4.4	33.1	4.1	
103.5	72	2	5	10:42	322	73	61/59	80/76	89/76	47/54	62/72		66.8	19.9	4.3	32.6	4.0	
103.5	72	3	5	10:43	325	72	60/59	50/63	50/55	53/58	61/62		57.2	19.6	4.4	32.4	4.0	

Recorded by MARK Z Checked by [illegible]

6420070022_SPSWIM_TO_25_35_2.106_0500_Cal_1_Sheet_21.doc

Sheet 21	* STATE_CODE	3 5
LTPP Traffic Data	*SPS PROJECT_ID	0 5 0 0
WIM System Test Truck Records 1 of 2	* DATE	8 / 19 / 08

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
107.5	68	1	6	11:09	437	62	57/58	84/86	83/79	84/78	88/76		77.1	17.4	4.4	33.3	4.1	
107.5	65	2	6	11:09	443	65	62/58	83/82	81/77	43/52	69/71		67.8	19.8	4.3	32.8	4.0	
107.5	62	3	6	11:10	444	64	60/58	52/62	54/58	54/59	65/58		58.0	19.6	4.4	32.3	4.0	
111.5	~~66~~	1	7	11:36	545	67	59/54	86/87	85/78	83/85	83/84		78.2	17.4	4.4	33.0	4.1	m3 67
111.5	68	2	7	11:36	547	68	62/58	81/81	82/81	59/57	70/75		69.6	19.9	4.3	32.9	4.0	
111.5	68	3	7	11:36	550	68	61/58	53/61	57/59	59/57	52/52		57.1	19.6	4.3	32.3	4.1	
114	62	1	8	12:03	664	62	57/56	78/86	82/79	80/81	82/80		76.1	17.4	4.3	33.2	4.1	
114	74	2	8	12:03	668	75	60/59	83/84	79/78	45/57	71/74		69.0	19.9	4.3	32.9	4.0	
114	72	3	8	12:04	669	72	58/58	53/59	59/59	57/58	54/54		57.0	19.6	4.4	32.3	4.0	
120.5	67	1	9	13:08	942	66	64/49	87/80	87/75	87/75	87/75		76.5	17.3	4.4	33.1	4.0	
120.5	68	2	9	13:09	944	68	69/57	76/81	77/77	51/54	54/62		65.6	19.8	4.3	32.6	4.0	
120.5	63	3	9	13:09	945	63	60/56	52/62	55/52	51/56	56/53		55.4	19.5	4.3	32.1	4.0	
		1	10				MIS	SE	D									
123.5	68	2	10	13:36	1066	68	61/56	84/87	83/82	48/57	69/72		70.1	19.9	4.3	33.0	4.0	
123.5	72	3	10	13:36	1069	72	[illegible]	[illegible]	58/57	55/56	53/43		55.4	19.6	4.3	32.2	4.1	
126.5	67	1	10	14:03	1191	67	62/57 61/55	54/59 82/82	85/75	77/79	85/76		75.7	17.4	4.4	33.0	4.1	

Recorded by MARK Z Checked by [signature]

Sheet 21	* STATE CODE 35
LTPP Traffic Data	*SPS PROJECT ID 0500
WIM System Test Truck Records 2 of 2	* DATE 8/19/08

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
126.5	75	2	11	14:03	1193	75	61/58	78/78	81/77	51/52	61/70		66.7	19.9	4.3	32.7	4.0	
126.5	62	3	11	14:03	1195	64	62/56	55/60	56/56	59/58	58/55		57.4	19.5	4.3	32.3	4.1	
121	62	1	11	14:31	1322	62	62/51	84/79	84/72	83/75	82/77		74.7	17.3	4.4	33.0	4.1	
121	73	2	12	14:31	1323	75	59/53	80/71	83/74	48/54	79/69		66.9	19.8	4.3	32.7	4.0	
121	72	3	12	14:31	1326	72	61/58	60/68	60/61	57/59	54/50		58.8	19.6	4.4	32.5	4.1	
122	67	1	12	14:58	1446	67	57/55	78/84	80/76	78/83	76/81		74.8	17.4	4.4	33.2	4.1	
122	71	2	13	14:58	1447	73	62/58	80/79	81/78	47/56	78/73		69.1	19.9	4.3	32.8	3.9	
122	62	3	13	14:59	1450	64	59/56	52/63	52/54	52/53	58/58		55.6	19.5	4.4	32.4	4.0	
121	62	1	13	15:26	1577	62	57/54	77/83	76/74	66/85	76/83		73.1	17.4	4.4	33.1	4.1	
121	65	2	14	15:26	1578	67	56/55	82/82	82/79	45/57	75/67		68.0	19.8	4.3	32.7	4.0	
121	70	3	14	15:26	1579	72	62/58	53/62	58/55	60/57	66/61		59.2	19.5	4.3	32.2	4.0	
		~~4~~	~~15~~															

Recorded by MARK Z Checked by [signature]

Calibration Worksheet

Site: __350500___

Calibration Iteration ___1___ Date ___8/19/08___

Beginning factors:

Speed Point (mph)	**Name**	**Left Sensor 1 / 3**	**Right Sensor 2 / 4**
Overall			
Front Axle			
Distance	distance (cm)	274	
1 – (55)	88 kph	3760	2997
2 – (60)	96 kph	3691	2942
3 – (65)	105 kph	3549	2829
4 – (70)	112 kph	3694	2944
5 – (75)	120 kph	3623	2888

Errors:

	Speed Point 1 ( )	Speed Point 2 ( )	Speed Point 3 (65)	Speed Point 4 (70)	Speed Point 5 (75)
F/A			-2.7	-1.8	-1.7
Tandem			-5.8	-3.3	-4.9
GVW			-5.2	-3.0	-4.3

Adjustments:

	Raise	Lower	Percentage
Overall	☐	☐	
Front Axle	☐	☐	
Speed Point 1	☐	☐	
Speed Point 2	☐	☐	
Speed Point 3	☒	☐	5.4
Speed Point 4	☒	☐	3.3
Speed Point 5	☒	☐	4.5

End factors:

Speed Point (mph)	**Name**	**Left Sensor 1 / 3**	**Right Sensor 2 / 4**
Overall			
Front Axle			
Distance	distance (cm)	272	
1 – (55)		3760	2997
2 – (60)		3691	2942
3 – (65)		3742	2982
4 – (70)		3816	3045
5 – (75)		3788	3019

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

August 18, 2008

STATE: New Mexico

SHRP ID: 350500

Photo 1 - 35_0500_Truck_1_Tractor_08_18_08.jpg

Photo 2 - 35_0500_Truck_1_Trailer_08_18_08.jpg

Photo 3 - 35_0500_Truck_1_Suspension_1_08_18_08.jpg

Photo 4 - 35_0500_Truck_1_Suspension_2_08_18_08.jpg

Photo 5 - 35_0500_Truck_1_Suspension_3_08_18_08.jpg

Photo 6 - 35_0500_Truck_2_Tractor_08_18_08.jpg

Photo 7 - 35_0500_Truck_2_Trailer_08_18_08.jpg

Photo 8 - 35_0500_Truck_2_Suspension_1_08_18_08.jpg

Photo 9 - 35_0500_Truck_2_Suspension_2_08_18_08.jpg

Photo 10 - 35_0500_Truck_2_Suspension_3_08_18_08.jpg

Photo 11 - 35_0500_Truck_3_Tractor_08_18_08.jpg

Photo 12 - 35_0500_Truck_3_Trailer_08_18_08.jpg

Photo 13 - 35_0500_Truck_3_Suspension_1_08_18_08.jpg

Photo 14 - 35_0500_Truck_3_Suspension_2_08_18_08.jpg

Photo 15 - 35_0500_Truck_3_Suspension_3_08_18_08.jpg

ETG LTPP CLASS SCHEME, MOD 3

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

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

System Operating Parameters

New Mexico SPS-5 (Lane 1)

Calibration Factors for Sensor #1

Validation Visit	August 19, 2008	Installation Calibration	May 15,2008
Distance	272	Distance	274
88 kph	3760	88 kph	3760
96 kph	3691	96 kph	3691
105 kph	3742	105 kph	3549
112 kph	3816	112 kph	3694
120 kph	3788	120 kph	3623

Calibration Factors for Sensor #2

Validation Visit	August 19, 2008	Installation Calibration	May 15,2008
Distance	---	Distance	
88 kph	2997	88 kph	2997
96 kph	2942	96 kph	2942
105kph	2982	105 kph	2829
112 kph	3041	112 kph	2944
120 kph	3019	120 kph	2888