Preliminary Validation Report

Colorado, SPS-2

Task Order 14, CLIN 2
June 27 and 28, 2006

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1 Executive Summary

A visit was made to the Colorado SPS-2 beginning on June 27 and continuing through June 28, 2006 for the purposes of conducting a validation of the WIM system located on Interstate 76 at milepost 39.7. The LTPP lane is the northbound, right hand lane of a four-lane highway. Only the LTPP lane is instrumented. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This site was installed as part of the SPS WIM Phase II contract from April 25 to 27, 2006. It is located 19.5 miles east of the original installation. The site was initially calibrated by the installation contractor.

The site is instrumented with IRD/PAT Traffic bending plate WIM sensors and an IRD iSINC WIM controller. The sensors are installed in newly ground Portland concrete cement. Grinding was performed by Concrete Coring in April, 2006 and was verified by Rich Quinley utilizing a 20 ft. straight edge.

The agency uses the LTPP ETG version 2 algorithm to classify vehicles in the FHWA 13-bin classification scheme at this site. The classification scheme includes a Class 15 for unclassified vehicles.

This site meets LTPP precision requirements for weight, speed and spacing.

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

All of the vehicles that were misclassified were Class 3 and 5 vehicles. They were being misidentified within the category of light single unit vehicles, i.e. Class 3 identified as Class 5 and Class 5 being identified as Class 3 vehicles.

The validation used the following trucks:

1) 3S2 with a tractor having air suspension tandem and a trailer with a standard tandem and air suspension loaded to 75,560 lbs.
2) 3S2 with a tractor having air suspension tandem and a trailer with a standard tandem and air suspension loaded to 63,130 lbs.

The validation speeds ranged from approximately 55 to 75 miles per hour. The site is currently posted with a speed limit of 75 miles per hour.

The pavement temperatures ranged from approximately 75 to 110 degrees Fahrenheit.

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.

Table 1-1 Post-Validation results – 080200 – 28-Jun-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.2% ± 6.6%	Pass
Tandem axles	±15 percent	-0.5% ± 6.2%	Pass
GVW	±10 percent	-0.6% ± 3.6%	Pass
Speed	±1 mph [2 km/hr]	-0.1 mph ± 0.8 mph	Pass
Axle spacing	± 0.5 ft [150mm]	-0.2 ft ± 0.0 ft	Pass

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

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

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

2 Corrective Actions Recommended

The system algorithm needs to be reviewed to determine the cross-misclassification of Class 3 and 5 vehicles. No other corrective actions are required at this time.

3 Post Calibration Analysis

This final analysis is based on test runs conducted June 28, 2006 from mid-morning to late afternoon at test site 080200 on Interstate 76. This SPS-2 site is at milepost 39.7 on the northbound, right hand lane of a four-lane highway. No auto-calibration was used during test runs. The two trucks used for initial calibration and for the subsequent testing included:

1. 3S2 with a tractor having air suspension tandem and a trailer with a standard tandem and air suspension loaded to 75,560 lbs.
2. 3S2 with a tractor having air suspension tandem and a trailer with a standard tandem and air suspension loaded to 63,130 lbs.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 55 to 75 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 75 to 110 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

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

Table 3-1 Post-Validation Results - 080200 – 28-Jun-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.2% ± 6.6%	Pass
Tandem axles	±15 percent	-0.5% ± 6.2%	Pass
GVW	±10 percent	-0.6% ± 3.6%	Pass
Speed	±1 mph [2 km/hr]	-0.1 mph ± 0.8 mph	Pass
Axle spacing	± 0.5 ft [150mm]	-0.2 ft ± 0.0 ft	Pass

The test runs were conducted primarily during the mid-morning to late afternoon hours, resulting in wide range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into 3 speed groups and 2 temperature groups. The distribution of runs by speed and temperature is illustrated in Figure 3-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs. Although a wide range of pavement temperatures was recorded overall, a significant increase in temperatures in a short period resulted in a low number of samples for the low and medium temperatures. There were not enough to support dividing those runs into a low and medium group.

The speed groups were divided as follows: Low speed – 55 to 60 mph, Medium speed – 61 to 69 mph and High speed - 70+ mph. The two temperature groups were created by splitting the runs between those at 75 to 95 degrees Fahrenheit for Low temperature and 96 to 110degrees Fahrenheit for High temperature.

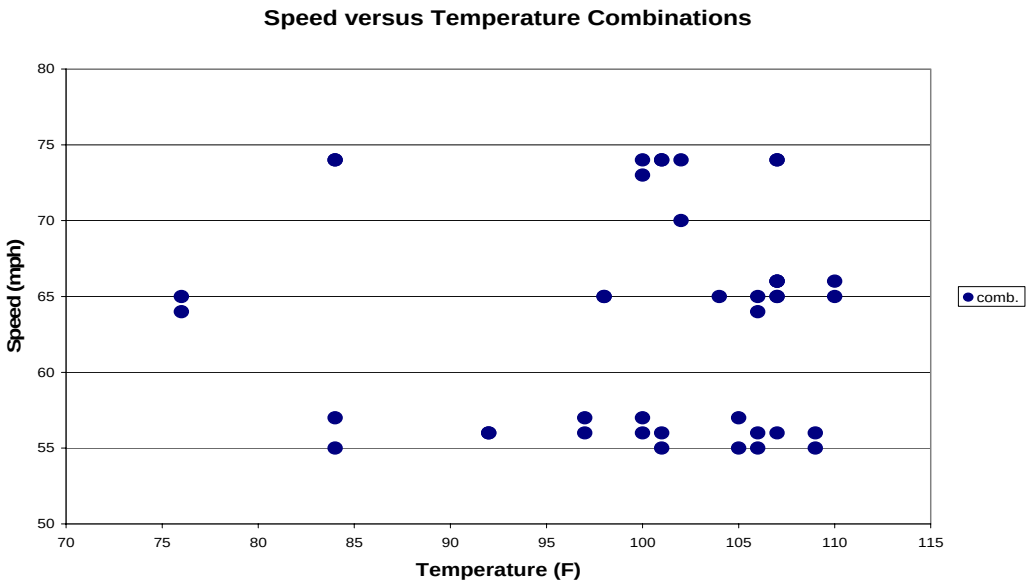


Figure 3-1 Post-Validation Speed-Temperature Distribution – 080200 – 28-Jun-2006

A series of graphs was developed to investigate visually any sign of a relationship between speed or temperature and the scale performance. Figure 3-2 shows the GVW Percent Error vs. Speed graph for the population as a whole.

From Figure 3-2, it can be seen that the GVW is generally estimated accurately by the WIM equipment over the entire speed range, with a slight underestimation at the higher speeds. The scatter of error is consistent over the entire speed range.

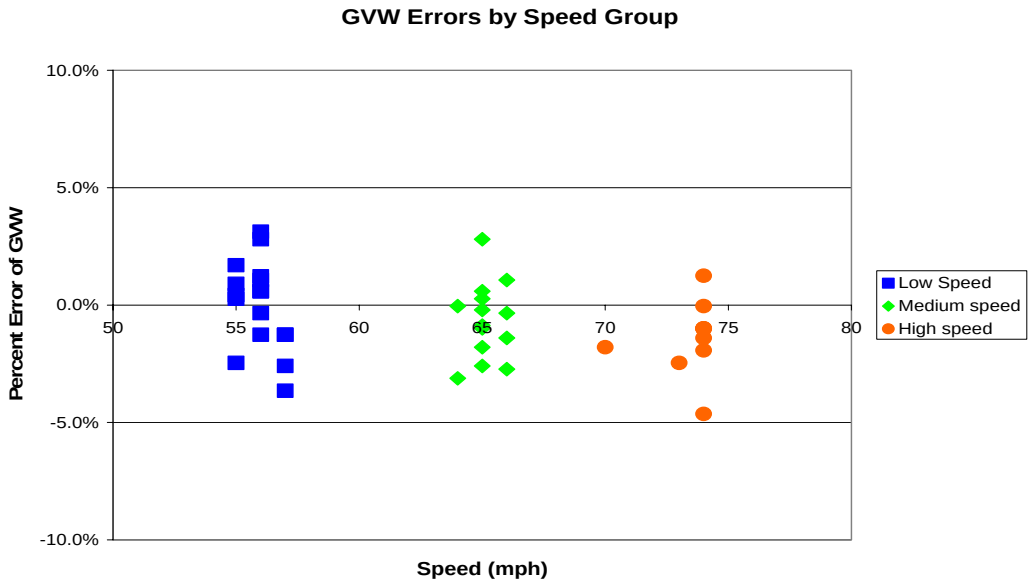


Figure 3-2 Post-Validation GVW Percent Error vs. Speed– 080200 –28-Jun-2006

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

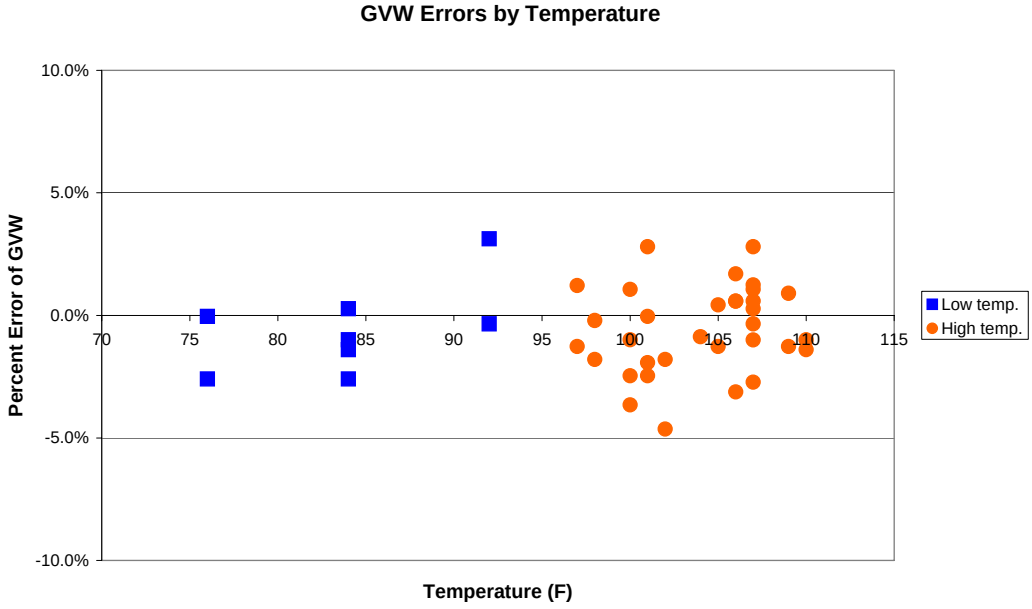


Figure 3-3 Post-Validation GVW Percent Error vs. Temperature– 080200 – 28-Jun-2006

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.

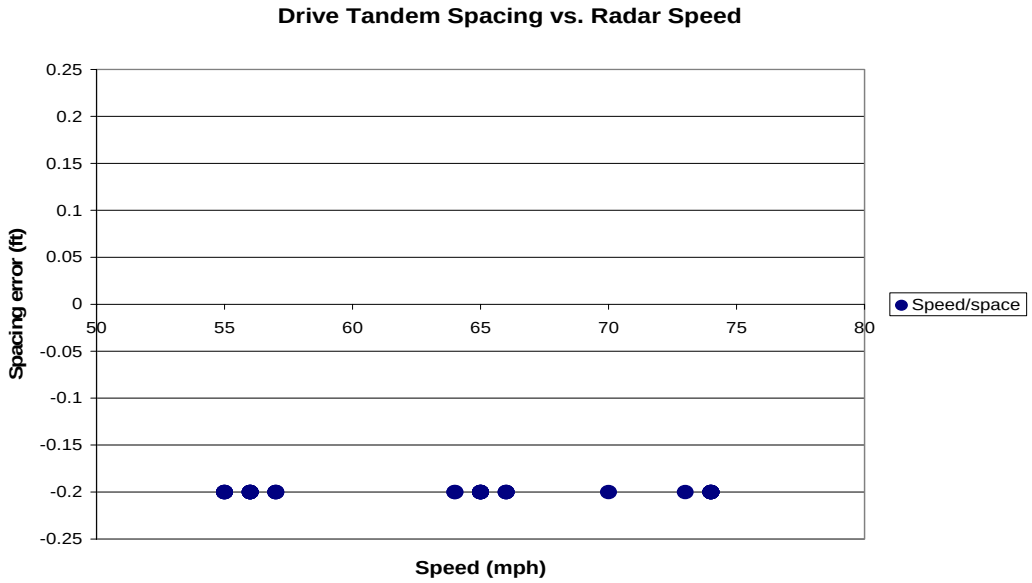


Figure 3-4 Post-Validation Spacing vs. Speed - 080200 – 28-Jun-2006

Axle spacing errors appear to be consistent throughout the test truck speed range and are limited to about 2.4 inches (0.2 feet). Vehicle speeds appear to have no effect on the error of measured axle spacing.

3.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 75 to 95 degrees Fahrenheit for Low temperature and 96 to 110 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 080200 –28-Jun-2006

Element	95% Limit	Low Temperature 75-95 °F	High Temperature 96-110 °F
Steering axles	±20 %	0.2% ± 5.1%	-1.4% ± 7.0%
Tandem axles	±15 %	-0.6% ± 7.6%	-0.5% ± 6.1%
GVW	±10 %	-0.6% ± 4.4%	-0.6% ± 3.6%
Speed	±1 mph	-0.0 mph ± 0.0 mph	-0.1 mph ± 0.8 mph
Axle spacing	± 0.5 ft	-0.2 ft ± 0.0 ft	-0.2 ft ± 0.0 ft

From Table 3-2, it appears that changes in temperature do not significantly affect mean errors of weight estimates, with only a slight underestimation of steering axles at the

higher temperatures. The scatter of GVW errors appears to remain consistent throughout the entire temperature range.

Figure 3-5 shows the distribution of GVW errors versus temperature by truck. Although GVW estimation appears to be consistent over the entire temperature range for the population as a whole, the GVW results for the Golden Truck (squares) and the partially loaded truck (diamonds) indicate that the heavier "Golden Truck" GVW was generally overestimated by same amount that the lighter truck was underestimated.

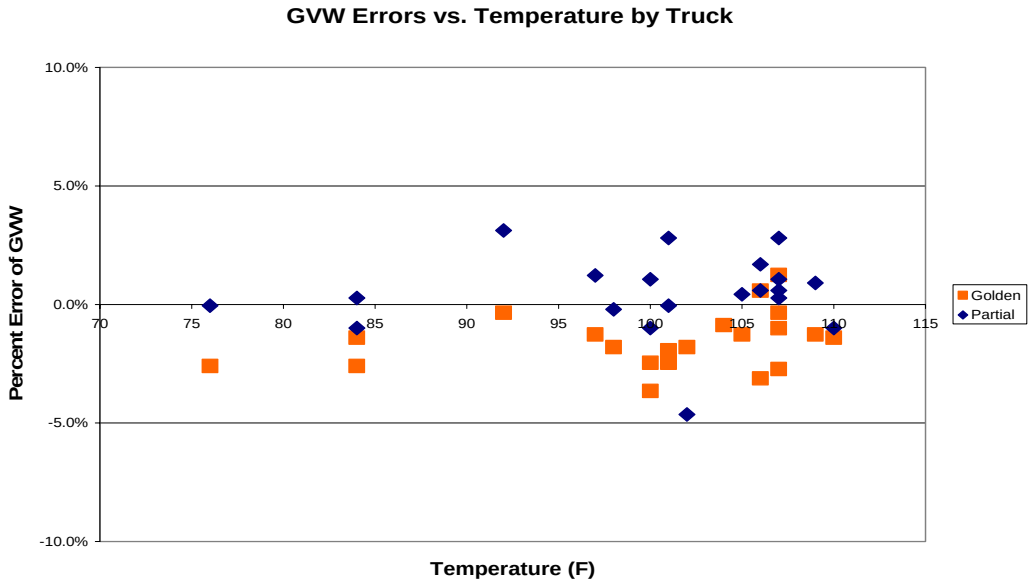


Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 080200 – 28-Jun-2006

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. The figure illustrates a slight tendency to underestimate weights of steering axles at the higher pavement temperatures.

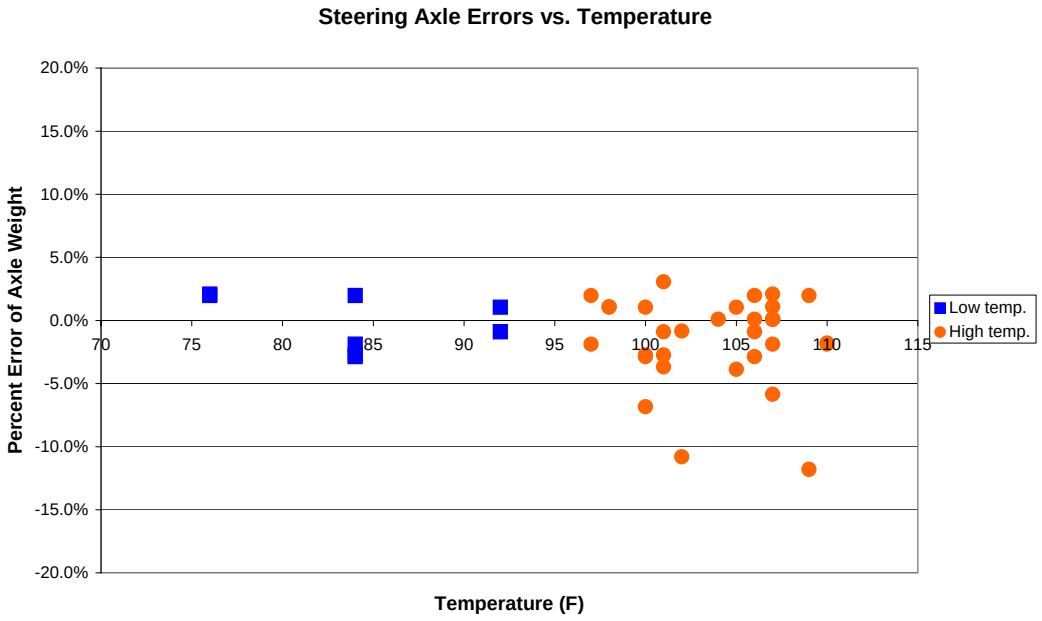


Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group - 080200 –28-Jun-2006

3.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 55 to 60 mph, Medium speed – 61 to 69 mph and High speed - 70+ mph.

Table 3-3 Post-Validation Results by Speed Bin – 080200 – 28-Jun-2006

Element	95% Limit	Low Speed 55 to 60 mph	Medium Speed 61 to 69 mph	High Speed 70+ mph
Steering axles	±20 %	-1.3% ± 8.0%	0.2% ± 3.1%	-3.0%±7.7%
Tandem axles	±15 %	0.2% ± 6.4%	-1.2% ± 4.9%	-0.9%±7.9%
GVW	±10 %	0.0% ± 4.0%	-0.7% ± 3.5%	-1.4%±3.5%
Speed	±1 mph	-0.1 mph ± 0.9 mph	-0.2 mph ± 0.9 mph	-0.0 mph ± 0.0 mph
Axle spacing	± 0.5 ft	-0.2 ft ± 0.0 ft	-0.2 ft ± 0.0 ft	-0.2 ft ± 0.0 ft

From Table 3-3, it appears that the mean error for all weights is generally larger at the High Speed. Error scatter for all weights appears to be lower at Medium Speed when compared to Low and High Speeds.

Figure 3-7 illustrates the slight tendency of the WIM equipment to overestimate GVW for the partially loaded truck (diamonds) at Low and Medium speeds, underestimate GVW for the fully loaded Golden truck (squares) at Low and Medium speeds, and underestimate GVW for both trucks at High speeds.

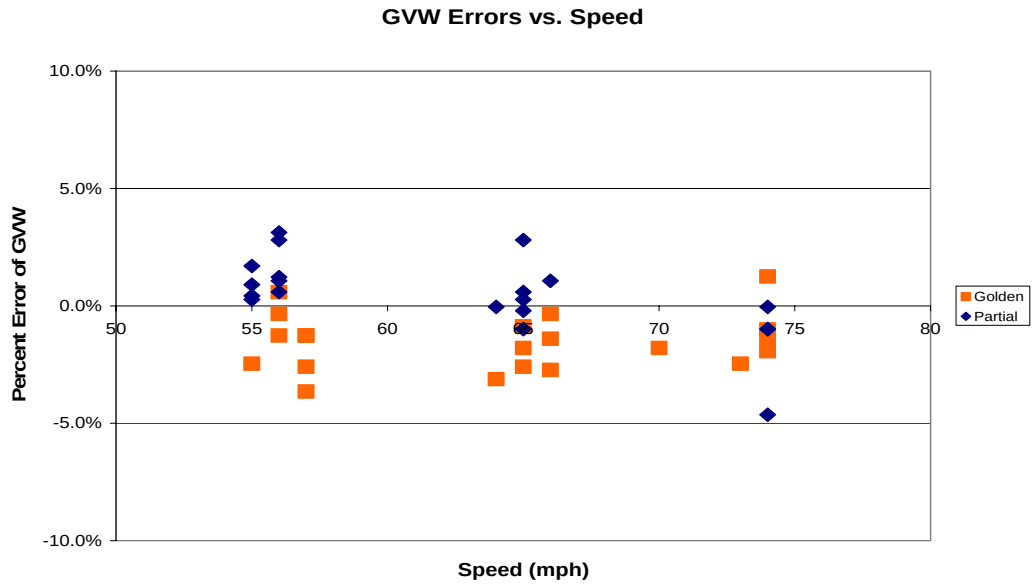


Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 080200 – 28-Jun-2006

Figure 3-8 shows the relation between steering axle errors and speed. This graph is included due to the frequent use of steering axle weights of Class 9 vehicles for calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. Figure 3-8 shows how the WIM equipment generally underestimates steering axle weights at Low and High speeds.

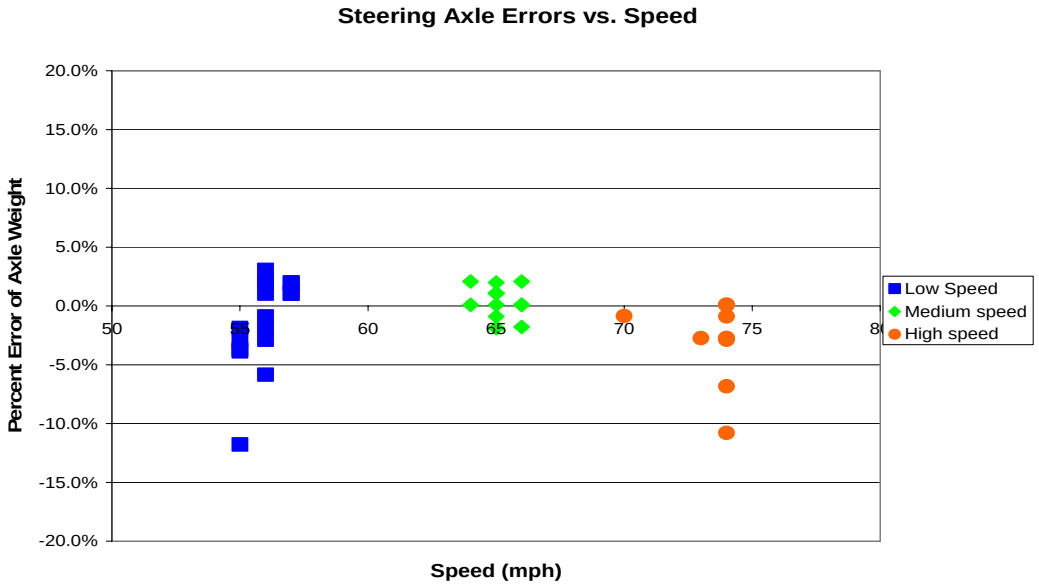


Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group- 080200 – 28-Jun-2006

3.3 Classification Validation

The agency uses the LTPP ETG version 2 algorithm to classify vehicles in the FHWA 13-bin classification scheme at this site. The classification scheme includes a class 15 for unclassified vehicles.

A sample of 100 trucks and 8 hours of data was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 percent unknown vehicles and 1 percent unclassified vehicles. The unclassified vehicle was a recreational vehicle towing a car.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 3-4 has the classification error rates by class. The overall misclassification rate is 2.9% and is driven by Class 5 and Class 3 cross-misclassifications.

Table 3-4 Truck Misclassification Percentages for 080200 - 28-Jun-2006

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	N/A	5	38	6	0
7	N/A				
8	0	9	0	10	0
11	0	12	N/A	13	N/A

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

Table 3-5 Truck Classification Mean Differences for 080200 - 28-Jun-2006

Class	Mean Difference	Class	Mean Difference	Class	Mean Difference
4	N/A	5	27	6	0
7	N/A				
8	0	9	0	10	0
11	0	12	N/A	13	N/A

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

population. N/A means no vehicles of the class recorded by either the equipment or the observer.

The Class 3 and 5 misclassification problem is not significant enough to fail the site as providing research quality data.

3.4 Evaluation by ASTM E-1318 Criteria

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

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

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

4 Pavement Discussion

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

4.1 Profile analysis

Profile data collected since the sensor installation were not available as of June 28, 2006. A site visit to collect profile data has not been scheduled yet. A revised 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.

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. Daylight cannot be seen between the tires and any of the sensors for the equipment.

5 Equipment Discussion

The traffic monitoring equipment at this location includes IRD/PAT Traffic bending plate WIM sensors and WIM Controller. These sensors are installed twelve feet apart in a staggered configuration in a Portland concrete cement pavement. The roadway outside this section is also concrete.

All equipment and sensors were installed from April 25 to April 27, 2006 as part of the SPS WIM Phase II contract.

5.1 Pre-Evaluation Diagnostics

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

5.2 Calibration Process

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

Although all weight mean errors were within research quality limits, a distinct bias was evident for all speed and temperature combinations was observed. Weight error compensation factors were adjusted in an attempt to minimize these errors.

5.2.1 Calibration Iteration 1

There are 5 speed designated weight compensation factors that are adjusted to directly affect the weight reported by the WIM equipment. To reduce overestimation of weights these factors are reduced by the same percentage of the overestimation, and if the weights are underestimated, these factors are increased by the same percentage as the mean error.

For this equipment, the original compensation factors were:

- 55 mph – 3675
- 60 mph – 3675
- 65 mph – 3695
- 70 mph – 3755
- 75 mph – 3770

As a result of the pre-validation runs, where all weights were generally overestimated, the compensation factors were adjusted as follows:

- 55 mph – remained at 3675
- 60 mph – decreased 2% to 3600
- 65 mph – decreased 4% to 3550
- 70 mph – decreased 3.8% to 3615
- 75 mph – decreased 3.8% to 3630

The computations for the changes were made by the Phase II Contractor. Mr. Bruce Myers was contacted by phone and subsequently dialed into the site to view the data, compute the factors and make the factor changes. There were no agency personnel on-site to review or execute the modifications.

Results of the first iteration are shown in Table 5-1.

Table 5-1 Calibration Iteration 1 Results - 080200 – 28-Jun-2006 (beginning at 8:56 am)

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-1.8% ± 4.4%	Pass
Tandem axles	±15 percent	-1.4% ± 7.0%	Pass
GVW	±10 percent	-1.4% ± 3.7%	Pass
Speed	±1 mph	-0.0 mph ± 0.0 mph	Pass
Axle spacing	± 0.5 ft	-0.2 ft ± 0.0 ft	Pass

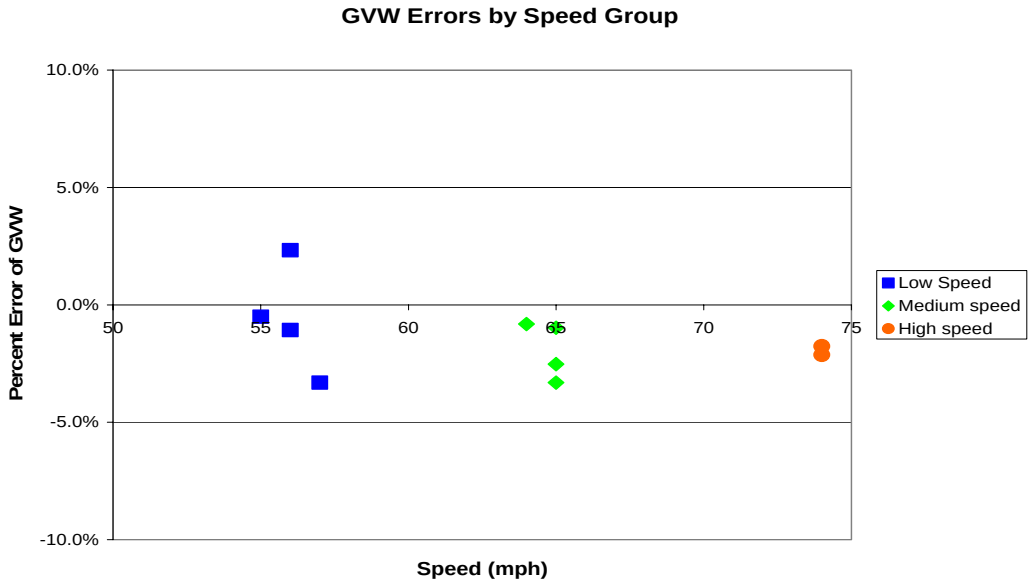


Figure 5-1 Calibration Iteration 1 GVW Percent Error vs. Speed Group - 080200 –28-Jun-2006 (beginning at 8:56 am)

5.3 Summary of Traffic Sheet 16s

This site has no validation information from previous visits. The information collected from the assessment at the abandoned site is not considered applicable to this location. Table 5-2 has the information to be entered in TRF_CALIBRATION_AVC for the current visit.

Table 5-2 Classification Validation History - 080200 –28-Jun-2006

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
06/28/06	Manual	0.0	0.0			1%
06/27/06	Manual	0.0	0.0			0%

Table 5-3 has the information to be entered in TRF_CALIBRATION_WIM for the current visit.

Table 5-3 Weight Validation History - 080200 –28-Jun-2006

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
06/28/06	Test Trucks	-0.6 (1.8)	-1.2 (3.2)	-0.5 (3.1)
06/27/06	Test Trucks	3.3 (2.4)	3.1 (2.8)	3.3 (3.2)

5.4 Projected Maintenance/Replacement Requirements

The system algorithm needs to be reviewed to determine the cross-misclassification of Class 3 and 5 vehicles. No other corrective actions are required at this time.

Under a separate contract with the Phase II Contractor, this site is to be visited semi-annually for routine preventive equipment diagnostics and inspection.

6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted June 27, 2006 from mid-morning to late afternoon at test site 080200 on Interstate 76. This SPS-2 site is at milepost 39.7 on the northbound, right hand lane of a 4-lane highway. No auto-calibration was used during test runs. The two trucks used for initial validation and for the subsequent testing included:

1. 3S2 with a tractor having air suspension tandem and a trailer with a standard tandem and air suspension loaded to 75,080 lbs.
2. 3S2 with a tractor having air suspension tandem and a trailer with a standard tandem and air suspension loaded to 62,760 lbs.

For the initial validation each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 54 to 75 miles per hour. Pavement surface temperatures were recorded during the test runs ranging from about 91 to 115 degrees Fahrenheit. The computed values of 95% confidence limits of each statistic for the total population are within Table 6-1.

As shown in Table 6-1, this site met all LTPP requirements for research quality loading data except speed.

Table 6-1 Pre-Validation Results - 080200 – 27-Jun-2006

SPS-1, -2, -5, -6 and -8	95 %Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	3.1% ± 5.7%	Pass
Tandem axles	±15 percent	3.3% ± 6.5%	Pass
GVW	±10 percent	3.3% ± 4.8%	Pass
Speed	**±1 mph [2 km/hr]**	**-0.1 mph ± 1.5 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	-0.2 ft ± 0.0 ft	Pass

The test runs were conducted primarily during the mid-morning to late afternoon hours, resulting in a narrow range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into 3 speed groups and 2 temperature groups. The distribution of runs within these groupings is illustrated in Figure 6-1. The figure indicates that the desired distribution of speed and temperature combinations was not achieved for this set of validation runs. Due to consistent ambient temperatures during the test period, pavement temperatures did not vary much.

The speed groups were divided as follows: Low speed – 54 to 60 mph, Medium speed – 61 to 69 mph and High speed - 70+ mph. The two temperature groups were created by splitting the runs between those at 91 to 105 degrees Fahrenheit for Low temperature and 106 to 115 degrees Fahrenheit for High temperature.

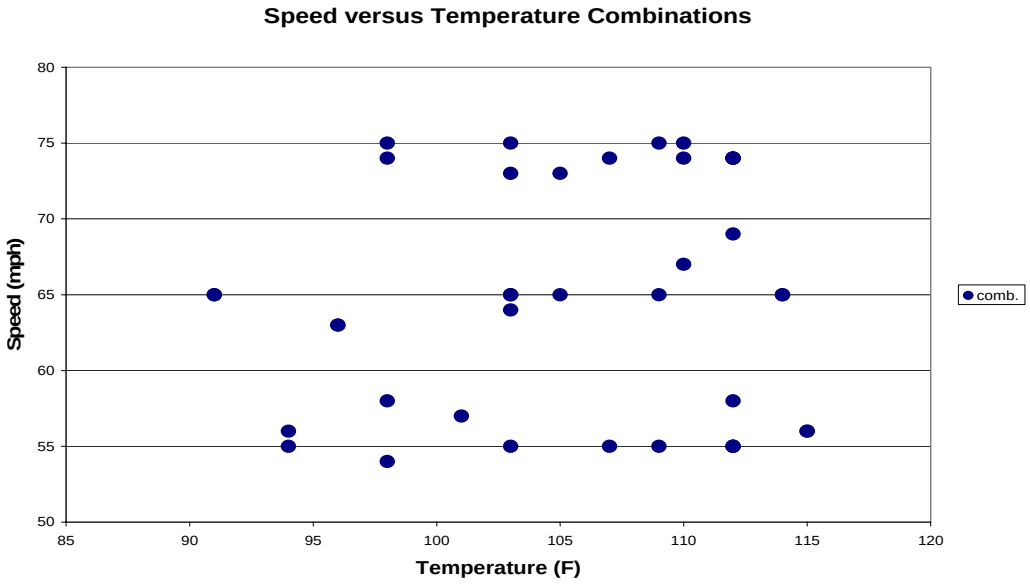


Figure 6-1 Pre-Validation Speed-Temperature Distribution – 080200 – 27-Jun-2006

A series of graphs was developed to investigate visually 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 equipment appears to overestimate GVW at all speeds, with greater overestimation at Medium and High speeds. Variability in error appears to be consistent at all speeds.

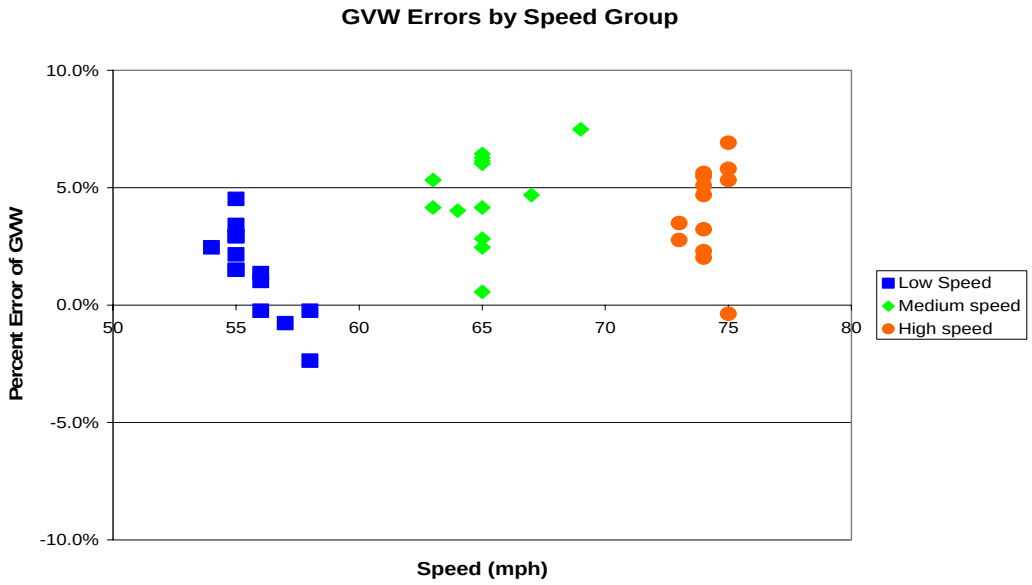


Figure 6-2 Pre-Validation GVW Percent Error vs. Speed – 080200 – 27-Jun-2006

Figure 6-3 shows the relationship between temperature and GVW percentage error. From the figure it appears that the equipment has a slight tendency to increasingly overestimate GVW as pavement temperature increases.

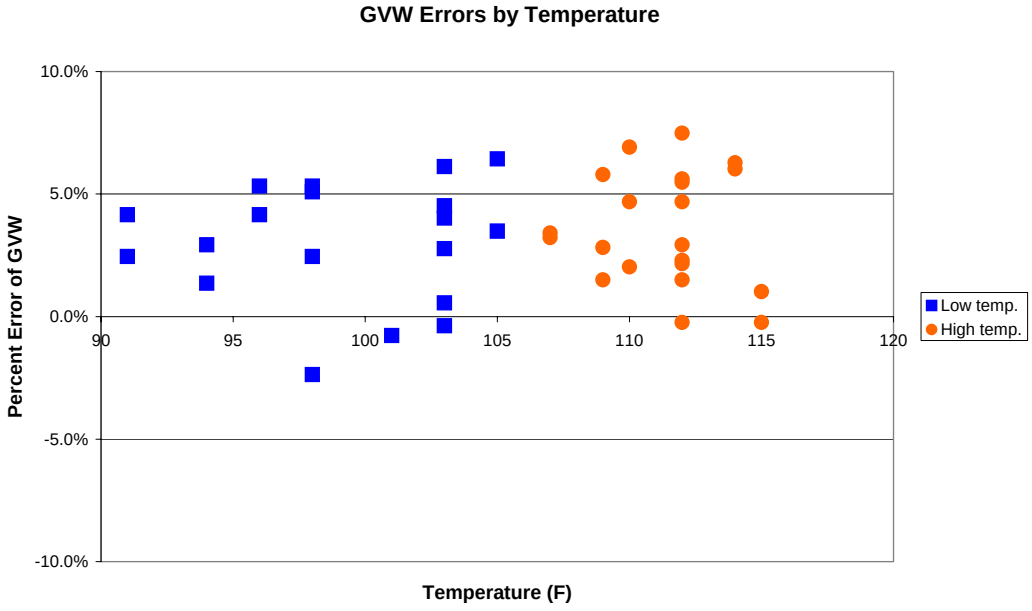


Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 080200 – 27-Jun-2006

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

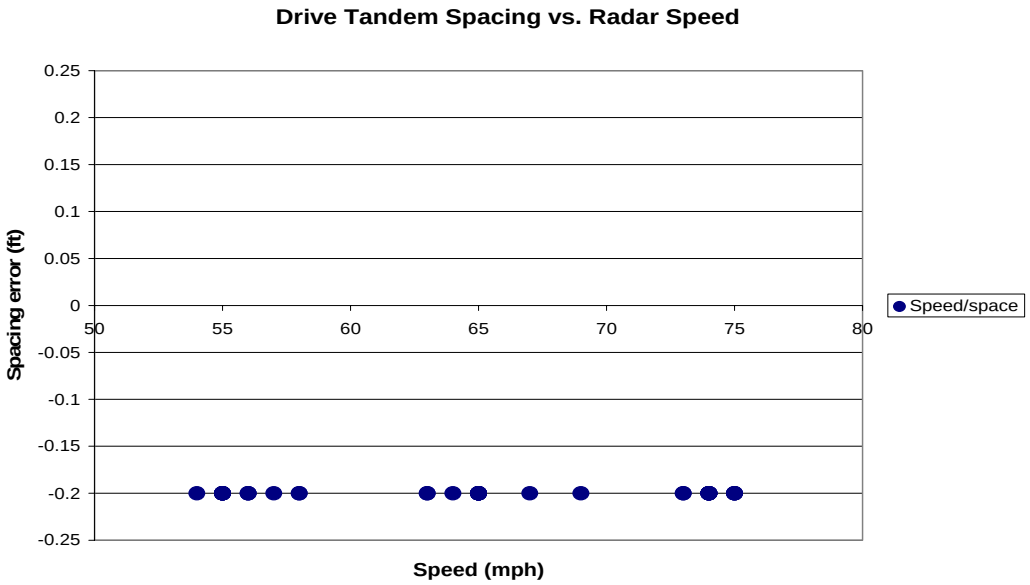


Figure 6-4 Pre-Validation Spacing vs. Speed - 080200 – 27-Jun-2006

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 91 to 105 degrees Fahrenheit for Low temperature and 106 to 115 degrees Fahrenheit for High temperature.

Table 6-2 Pre-Validation Results by Temperature Bin - 080200 –27-Jun-2006

Element	95% Limit	Low Temperature 91-105 °F	High Temperature 106-115 °F
Steering axles	±20 %	2.8% ± 6.6%	3.4% ± 5.2%
Tandem axles	±15 %	2.9% ± 6.4%	3.7% ± 6.7%
GVW	±10 %	3.0% ± 5.1%	3.6% ± 4.8%
Speed	**±1 mph**	**-0.3 mph ± 1.5 mph**	**-0.3 mph ± 1.4 mph**
Axle spacing	± 0.5 ft	-0.2 ft ± 0.0 ft	-0.2 ft ± 0.0 ft

As shown in Table 6-2, mean error and variability in error remain constant throughout the temperature range, with only a slight increase in mean error at the high temperatures.

Figure 6-5 shows the distribution of GVW errors versus Temperature by Truck.
The WIM equipment appears to generally overestimate GVW for both trucks over the course of the entire temperature range.

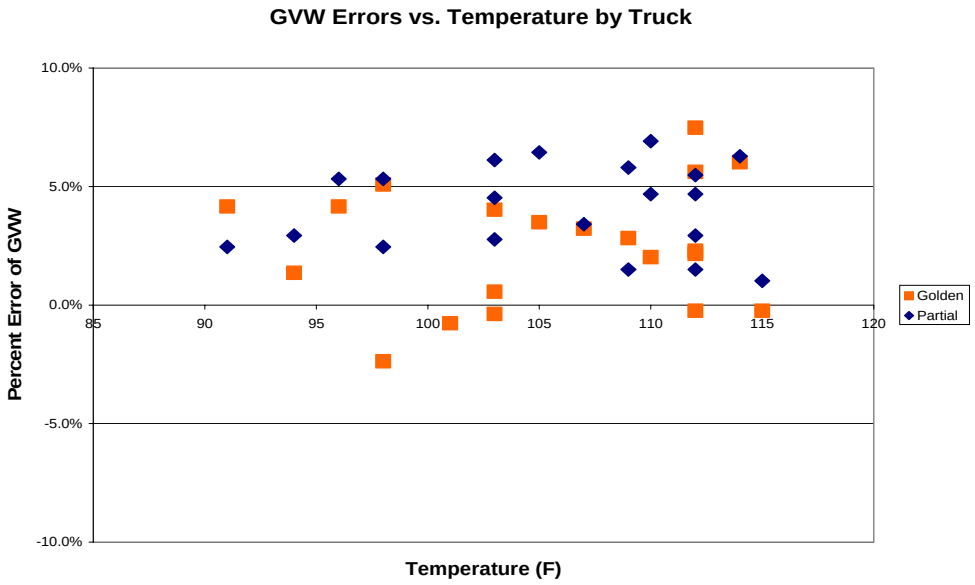


Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 080200 – 27-Jun-2006

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 calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles. From the figure it can be seen that the equipment consistently overestimates steering axle weights at all temperatures. Variability in error appears to be slightly greater at the low temperatures.

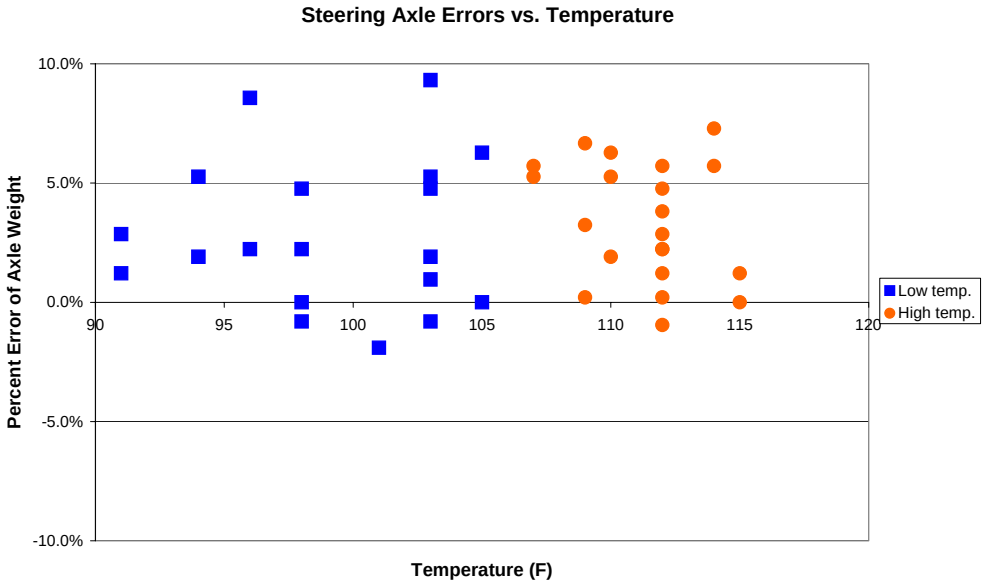


Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group - 080200 – 27-Jun-2006

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 54 to 60 mph, Medium speed – 61 to 69 mph and High speed - 70+ mph.

Table 6-3 Pre-Validation Results by Speed Bin - 080200 – 27-Jun-2006

Element	95% Limit	Low Speed 54-60 mph	Medium Speed 61-69 mph	High Speed 70+ mph
Steering axles	±20 %	2.0% ± 5.2%	5.2% ± 5.5%	2.3% ± 5.2%
Tandem axles	±15 %	1.4% ± 5.3%	4.5% ± 6.4%	4.2% ± 6.5%
GVW	±10 %	1.4% ± 4.0%	4.7% ± 4.2%	4.0% ± 4.4%
Speed	**±1 mph**	**-0.2 mph ± 0.9 mph**	**-0.0 mph ± 2.5 mph**	**-0.1 mph ± 1.1 mph**
Axle spacing	± 0.5 ft	-0.2 ft ± 0.0 ft	-0.2 ft ± 0.0 ft	-0.2 ft ± 0.0 ft

From Table 6-3, it appears that for the truck population as a whole, errors in weight estimates are greater at Medium and High speeds when compared with errors at Low speeds. For steering axle weights, the error is significantly higher at Medium speeds. Variability in errors for all weights is consistent throughout the entire speed range.

Figure 6-7 illustrates the tendency for the equipment to overestimate GVW at all speeds for the partially loaded truck (diamonds), and overestimate GVW for both trucks by a larger degree at Medium and High speeds. Variability in error appears to be consistent over the entire speed range.

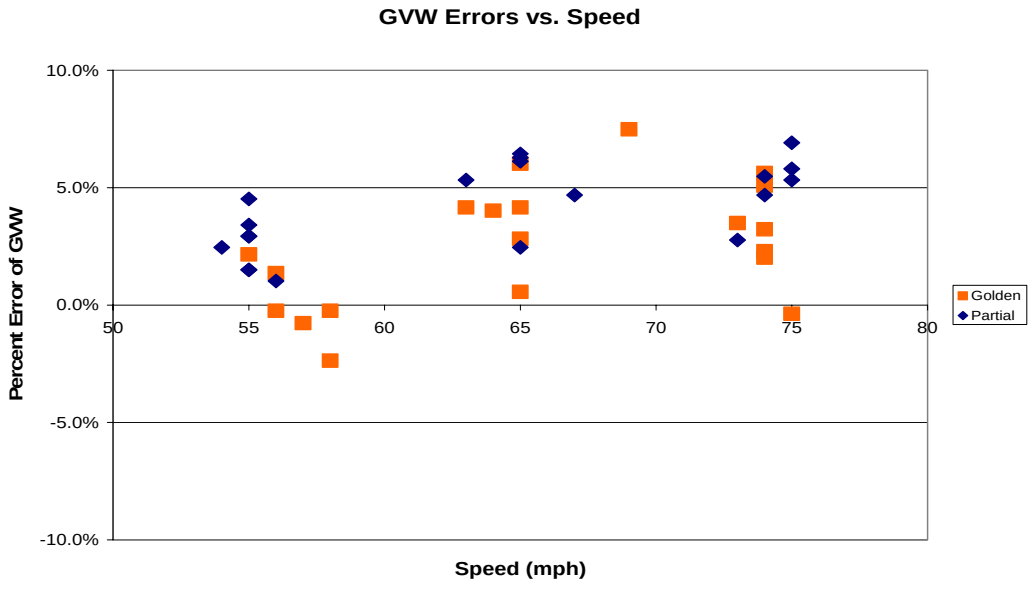


Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 080200 – 27-Jun-2006

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. . From the figure it can be seen that the equipment overestimates steering axle weights at all speeds, with a slight increase in overestimation at medium speeds. Scatter of error appears to be consistent over the entire speed range.

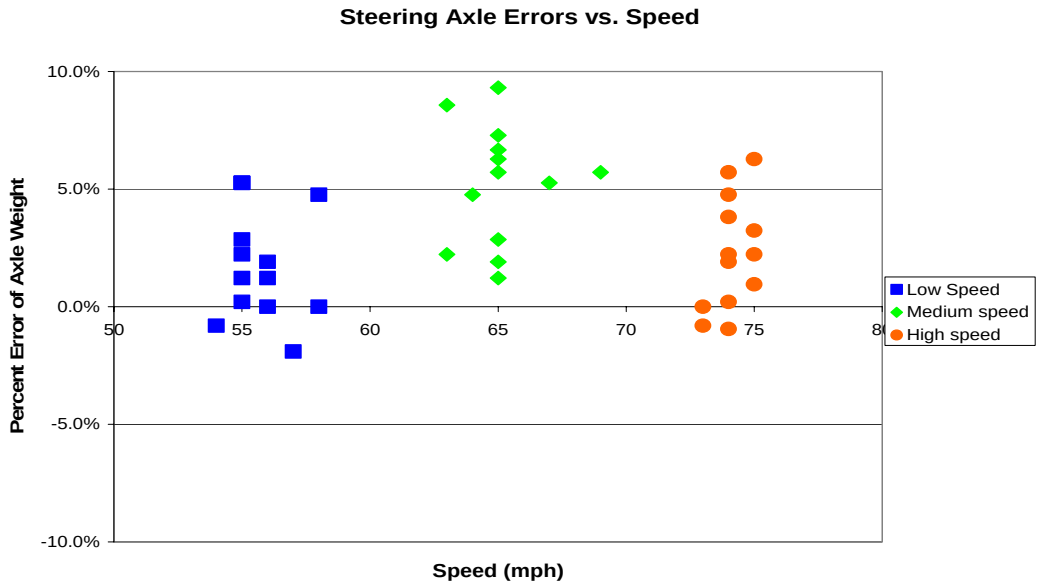


Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 080200 – 27-Jun-2006

6.3 Classification Validation

The agency uses the LTPP ETG version 2 algorithm to classify vehicles in the FHWA 13-bin classification scheme at this site. The classification scheme includes a class 15 for unclassified vehicles.

A sample of 100 trucks and 8 hours of data was collected at the site during the initial validation phase. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 percent unknown vehicles and 0 percent unclassified vehicles.

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications.

Table 6-4 has the classification error rates by class. The overall misclassification rate is 3% and is driven by Class 5 and Class 3 cross-misclassifications.

Table 6-4 Truck Misclassification Percentages for 080200 - 27-Jun-2006

Class	Percent Error	Class	Percent Error	Class	Percent Error
4	0	5	30	6	0
7	N/A				
8	0	9	0	10	N/A
11	0	12	0	13	N/A

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

Table 6-5 Truck Classification Mean Differences for 080200 - 27-Jun-2006

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

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

The Class 3 and 5 misclassification problem is not significant enough to fail the site as providing research quality data.

6.4 Evaluation by ASTM E-1318 Criteria

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

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

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

7 Data Availability and Quality

As of June 28, 2006, 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.

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

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

Table 7-1 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 7-1 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 7-1 GVW Characteristics of Major sub-groups of Trucks - 080200 – 28-Jun-2006

Characteristic	Class 9
Percentage Overweights	1.0%
Percentage Underweights	0.0%
Unloaded Peak	36,000 lbs
Loaded Peak	84, 000 lbs

The expected percentage of unclassified vehicles is 3.5%. This is based on the percentage of unclassified vehicles in the post-validation data download.

The graphical screening comparison figures are found in Figure 7-1 through Figure 7-3. These are based on data collected immediately after the validation and may not be wholly representative of the population at the site. They should however provide a sense of the statistics expected when SPS comparison data is computed for the post-validation Sheet 16.

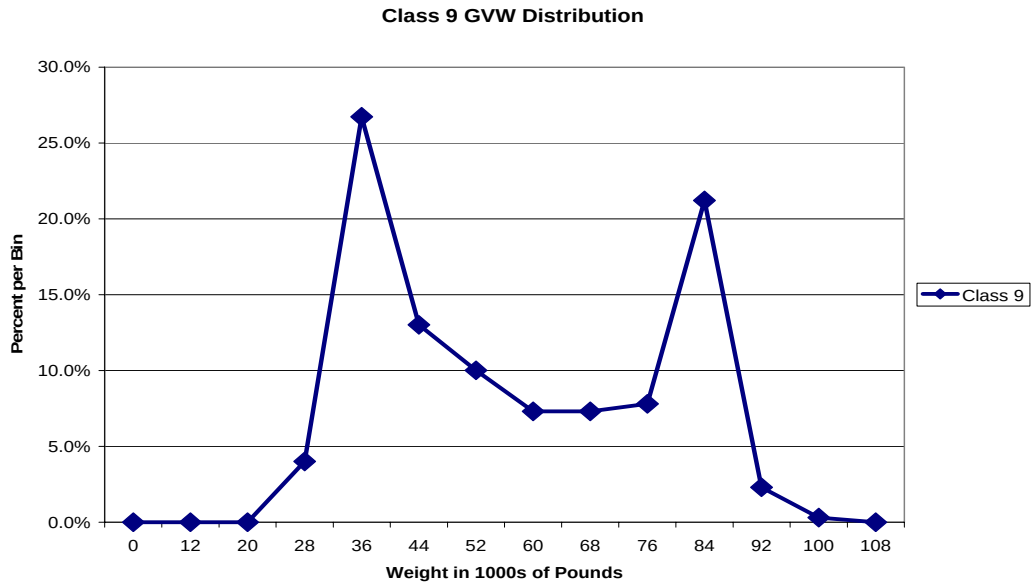


Figure 7-1 Expected GVW Distribution Class 9 – 080200 – 28-Jun-2006

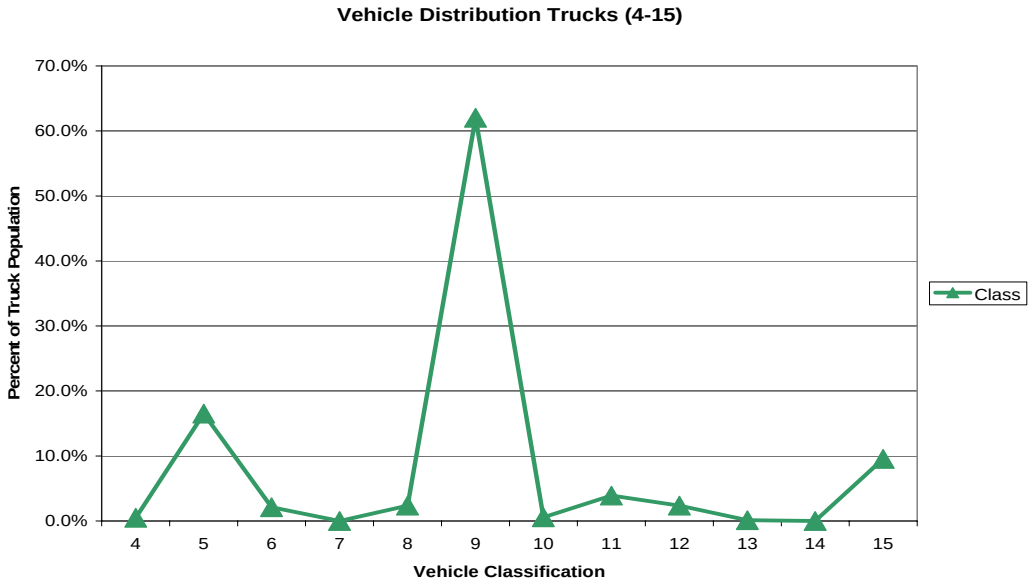


Figure 7-2 Expected Vehicle Distribution - 080200 – 28-Jun-2006

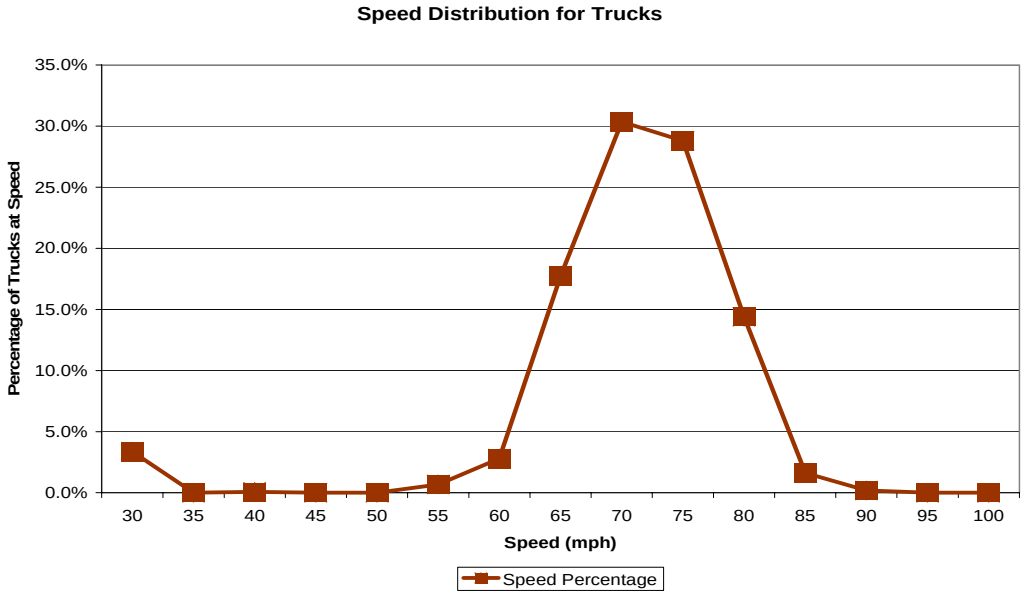


Figure 7-3 Expected Speed Distribution - 080200 – 28-Jun-2006

8 Data Sheets

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

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

Sheet 20 – Speed and Classification verification – Pre-Validation (3 pages)
Sheet 20 – Speed and Classification verification – Post-Validation (3 pages)

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

Test Truck Photographs (7 pages)

Calibration Iteration 1 Worksheets – (1 page)

Site Controller Algorithm (10 pages)

Final Site Factors (1 page)

9 Updated Handout Guide and Sheet 17

A copy of the handout has been included following page 25. 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: Colorado

SHRP ID: 0200

Figures

1. General Information

SITE ID: *080200*

LOCATION: *Interstate 76 East at M.P. 39.7*

VISIT DATE: *June 27, 2006*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

Joey Comer, 301-210-5105, wjcomer@mactec.com

Highway Agency: *Skip Outcalt, 303-757-9984, skip.outcalt@dot.state.co.us*

George Ventura, 303- 757-9495, george.ventura@dot.state.co.us

Dave Smith, 303-757-9816, david.e.smith@dot.state.co.us

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

FHWA Division Office Liaison: *Donna Harmelink, 720-963-3021, donna.harmelink@fhwa.dot.gov*

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

3. Agenda

BRIEFING DATE: *No briefing not requested for this visit.*

ON SITE PERIOD: *June 27, 2006 through June 28, 2006*

TRUCK ROUTE CHECK: *See truck route*

4. Site Location/ Directions

NEAREST AIRPORT: *Denver International Airport, Denver, Colorado*

DIRECTIONS TO THE SITE: *I-76, approximately 1.0 mile East of Exit 39*

MEETING LOCATION: *On site June 27, 2006 beginning at 9.00 a.m.*

WIM SITE LOCATION: *Interstate 76 East at M.P. 39.7 (Latitude: N 40.1183^0 and Longitude: W -104.5083^0)*

WIM SITE LOCATION MAP: *See Figure 4.1*

Figure 4-1 - Site 080200 in Colorado

5. Truck Route Information

ROUTE RESTRICTIONS: *None.*

SCALE LOCATION: *Tomahawk Truck Stops, 12060 Sable Blvd, Brighton, CO, I-76, exit 17; Latitude: 39.9154^0, Longitude: -104.8181^0; Phone No: (303) 659-0810, open 24 hours and 7days a week, $8.00 per weight.*

TRUCK ROUTE:

North to Exit 48, approximately 8.3 miles from the site
South to Exit 34, approximately 5.4 miles from the site

Total miles = 27.4

Total time = 25 minutes

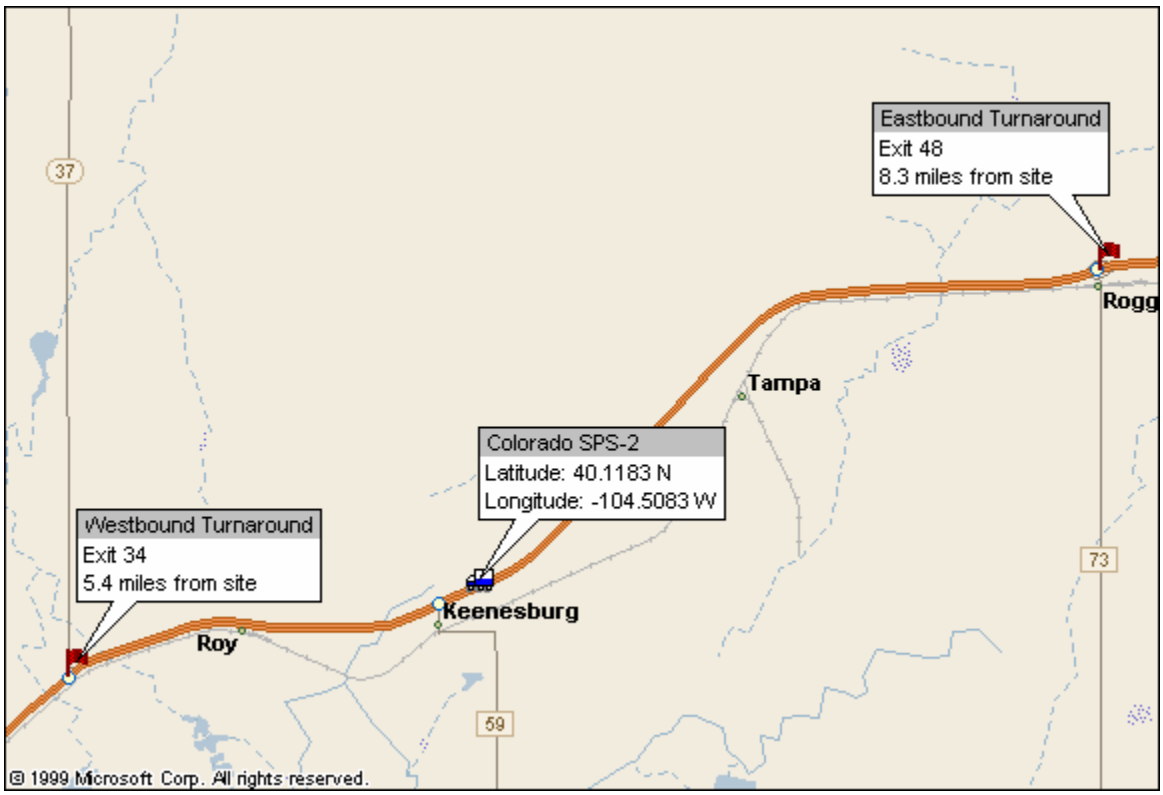


Figure 5-1 - Truck Route for 080200 in Colorado

6. Sheet 17 – Colorado (080200)

1.* ROUTE ___I-76___MILEPOST _93.7____LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade ___<1___ % Sag vertical Y / N
Nearest SPS section upstream of the site __0_8_0_2_2_3__
Distance from sensor to nearest upstream SPS Section __1_9_._2__ miles

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 ____PCC_____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date _06/27/06_ Photo Downstream_TO_14_08_2.62_0200_06_27_06.jpg_
Date _06/27/06_ Photo Upstream_TO_14_08_2.62_0200_06_27_06.jpg_____
Date _____Distress Photo Filename _____

6. * SENSOR SEQUENCE _____Loop – Bending Plate – Bending Plate - Loop_____

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

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

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

Clearance under plate ___ __ 4.0 ___ 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 _4_5__ ft

Distance from system _5_5_ __ ft

TYPE ____M_____

CABINET ACCESS controlled by LTPP / STATE / JOINT?

Contact - name and phone number _Dave Price (303) 757-9976_____

Alternate - name and phone number_George Ventura (303) 757-9495 ___

11. * POWER

Distance to cabinet from drop _2_8_7_ ___ ft Overhead / underground / solar / AC in cabinet?

Service provider _____ Phone number_____

12. * TELEPHONE

Distance to cabinet from drop __2_2_8___ ft Overhead / underground / cell?

Service provider _____ Phone Number_____

13.* SYSTEM (software & version no.)-___iSINC_____

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

14. * TEST TRUCK TURNAROUND time __25__ minutes DISTANCE _28_ mi.

15. PHOTOS FILENAME

Power source __ Power_Box_TO_14_08_2.62_0200_06_27_06.jpg_____

Phone source __ Phone_Box_TO_14_08_2.62_0200_06_27_06.jpg_____

Cabinet exterior __ Cabinet_Exterior_TO_14_08_2.62_0200_06_27_06.jpg_____

Cabinet interior __ Cabinet_Interior_Front_TO_14_08_2.62_0200_06_27_06.jpg

__ Cabinet_Interior_Rear_TO_14_08_2.62_0200_06_27_06.jpg

Weight sensors __ Lead_Weighpad_TO_14_08_2.62_0200_06_27_06.jpg_____

__ Trail _Weighpad_TO_14_08_2.62_0200_06_27_06.jpg_____

Other sensors __ Lead_Loop_TO_14_08_2.62_0200_06_27_06.jpg_____

__ Trail_Loop_TO_14_08_2.62_0200_06_27_06.jpg_____

Description __Loop Sensors_____

Downstream direction at sensors on LTPP lane:

_____Downstream_TO_14_08_2.62_0200_06_27_06.jpg_____

Upstream direction at sensors on LTPP lane:

_____Upstream_TO_14_08_2.62_0200_06_27_06.jpg_____

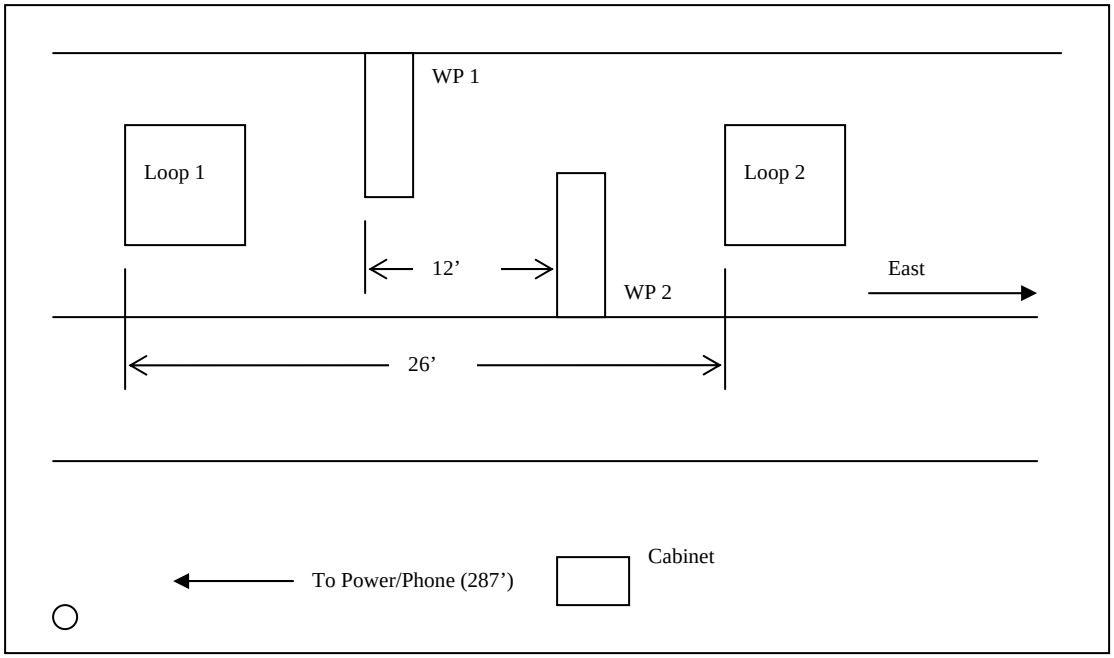
COMMENTS __

_____Gas/Restaurants at exit 93, approximately 1 mile west of site_____

COMPLETED BY _____Dean J. Wolf_____

PHONE __301-210-5105__DATE COMPLETED _0_6_ /_2_7_ / _2_0_0_6_ __

Sketch of equipment layout



Site Map

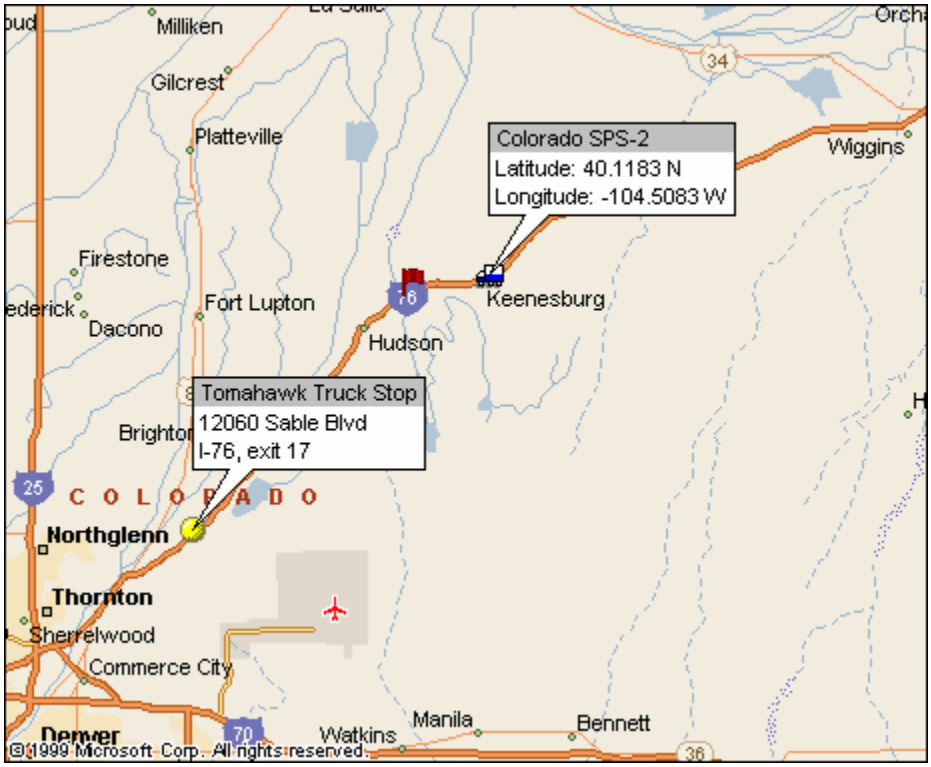


Figure 6-1 - Site Map for 080200 in Colorado

Figure 6-2 – Downstream_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-3 – Upstream_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-4 – Power_Box_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-5 – Phone_Box_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-6 – Cabinet_Exterior_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-7 – Cabinet_Interior_Front_TO_14_08_2.62_0200_06_27_06.jpg

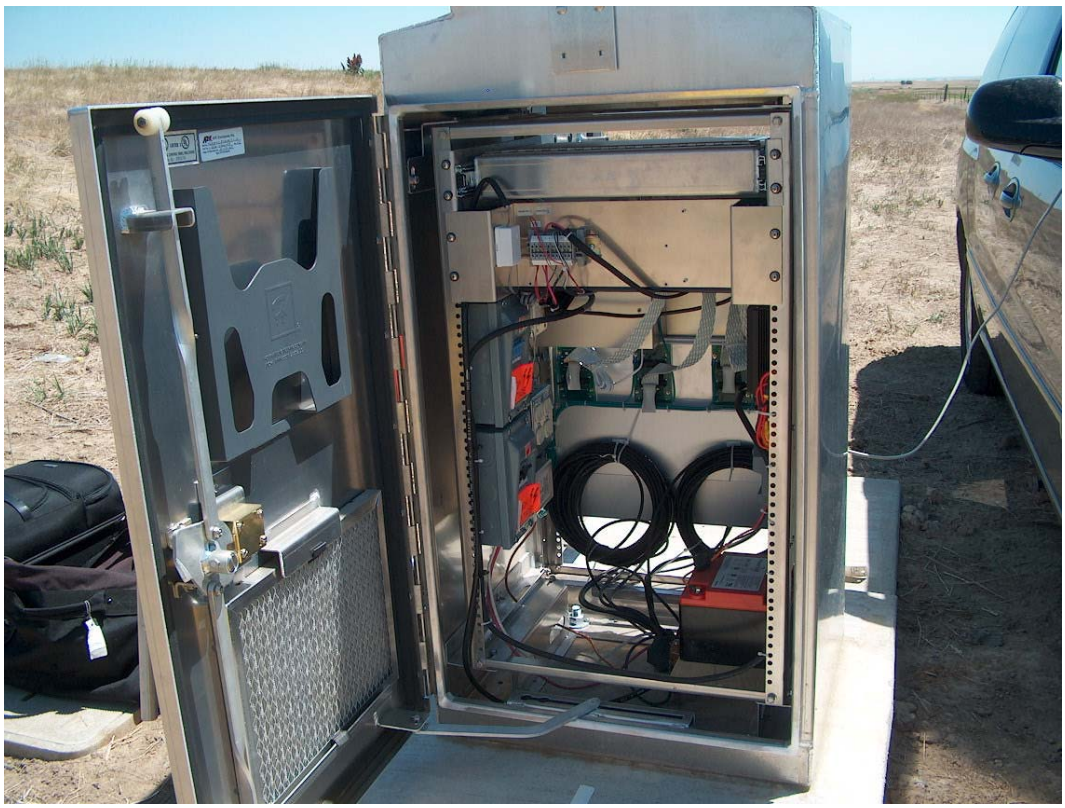


Figure 6-8 – Cabinet_Interior_Rear_TO_14_08_2.62_0200_06_27_06.jpg

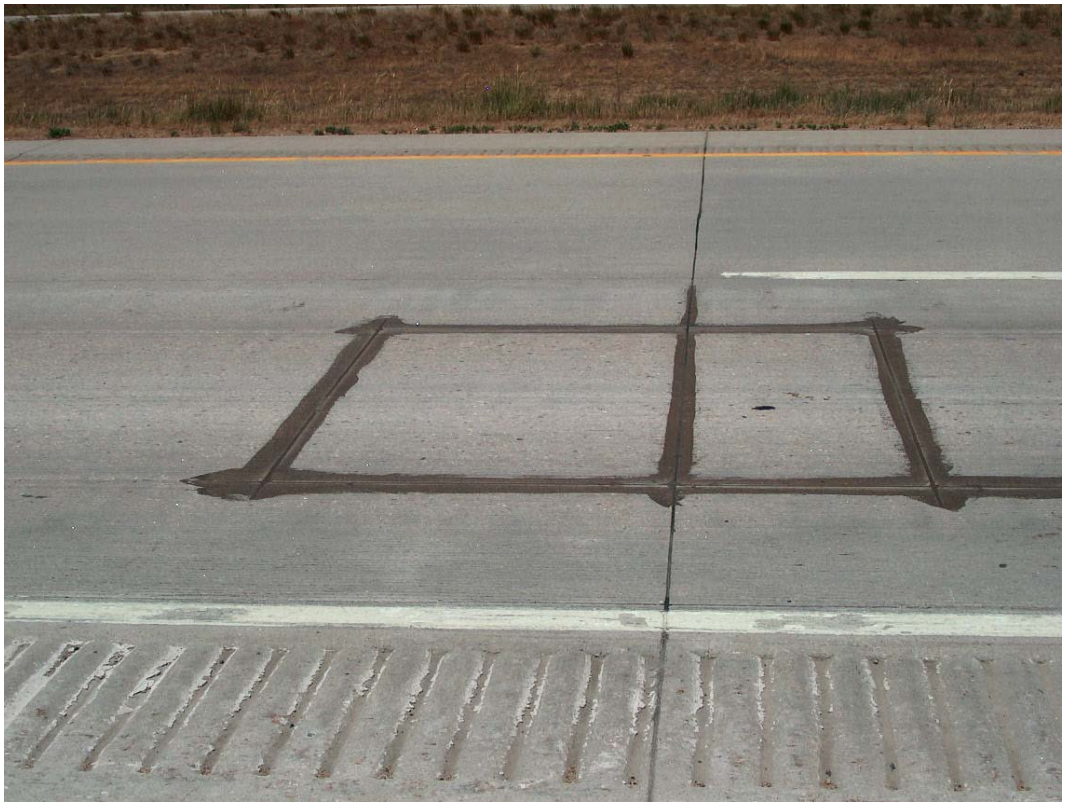


Figure 6-9 – Lead_Loop_TO_14_08_2.62_0200_06_27_06.jpg

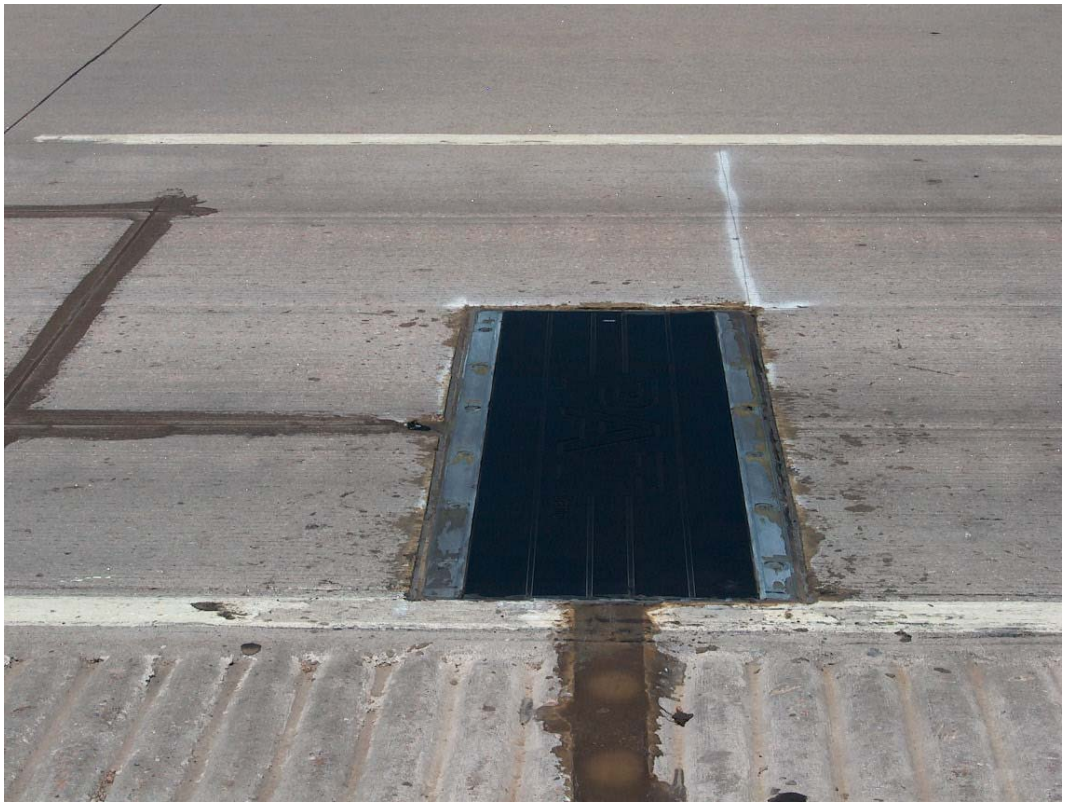


Figure 6-10 – Lead_Weighpad_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-11 – Trail_Weighpad_TO_14_08_2.62_0200_06_27_06.jpg

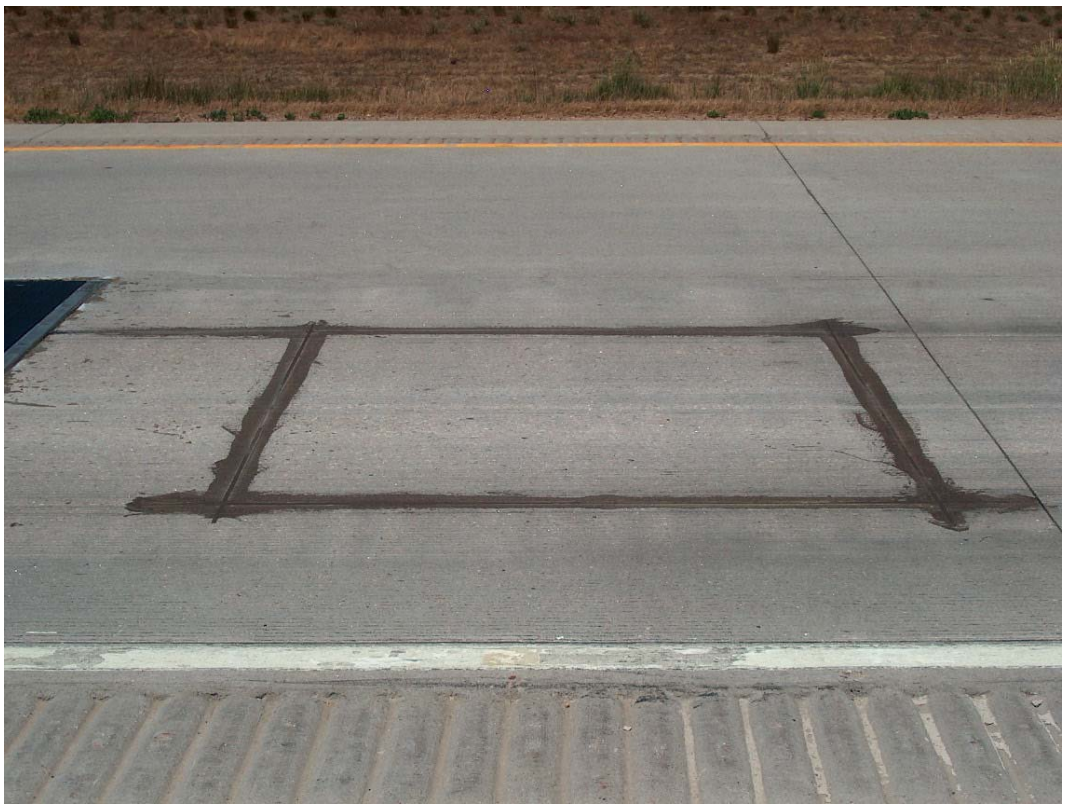


Figure 6-12 – Trail_Loop_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-13 – WIM_Site_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6-14 – Site_Marking_TO_14_08_2.62_0200_06_27_06.jpg

SHEET 18	STATE CODE [_0_8_]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [_0_2_0_0_]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) _ 0_6_ / _1_6_ / _2_0_0_6_

Rev. 05/25/04

1. DATA PROCESSING –

a. Down load –
- □ State only
- □ LTPP read only
- □ LTPP download
- ■ LTPP download and copy to state

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

c. Data submission –
- □ State – □ Weekly □ Twice a month □ Monthly □ Quarterly
- ■ LTPP

2. EQUIPMENT –

a. Purchase –
- □ State
- ■ LTPP

b. Installation –
- □ Included with purchase
- □ Separate contract by State
- □ State personnel
- ■ LTPP contract

c. Maintenance –
- □ Contract with purchase – Expiration Date _____
- ■ Separate contract LTPP – Expiration Date _5/31/2011_
- □ Separate contract State – Expiration Date _____
- □ State personnel

d. Calibration –
- □ Vendor
- □ State
- ■ LTPP

e. Manuals and software control –
- □ State
- ■ LTPP

f. Power –

i. Type –
- □ Overhead
- ■ Underground
- □ Solar

ii. Payment –
- ■ State
- □ LTPP
- □ N/A

g. Communication –

i. Type –
- ■ Landline
- □ Cellular
- □ Other

ii. Payment –
- ■ State
- □ LTPP
- □ N/A

3. PAVEMENT –

a. Type –
- ■ Portland Concrete Cement
- □ Asphalt Concrete

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

c. Profiling Site Markings –
- □ Permanent
- ■ Temporary

4. ON SITE ACTIVITIES –

a. WIM Validation Check - advance notice required ___7_ ■ 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 – _____

e. Test Vehicles

i. Trucks –

1st – Air suspension 3S2	□ State	■ LTPP
2nd – __3S2_____	□ 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: ____George Ventura ____ Phone:__303-757-9495___

Agency: ____Colorado DOT_____

b. Maintenance (equipment) –

Name: __Debbie Walker _____ Phone: __202-493-3068____

Agency: ___FHWA_____

c. Data Processing and Pre-Visit Data –

Name: __LTPP Customer Service___ e-mail: _ltppinfo@fhwa.dot.gov__

Agency: ____ FHWA _____

d. Construction schedule and verification –

Name: ___Dave Smith _____ Phone: __303-757-9816___

Name: ___Skip Outcalt_____ Phone: __303-757-9984___

Agency: ____Colorado DOT_____

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

Name: ___Jim Sweetman _____ Phone: _(303) 289-2152__

Agency: ____ Sweetman Enterprises, Inc _____

f. Traffic Control –

Name: ___N/A_____ Phone: _____

Agency: _____

g. Enforcement Coordination –

Name: ___N/A_____ Phone: _____

Agency: _____

h. Nearest Static Scale

Name: __Tomahawk Truck Stop__ Location: 12060 Sable Blvd, Brighton, __CO, I-76 exit 17, Latitude: 39.9154, Longitude: -104.8181 ____

Phone: ___(303) 659-0810__

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [_0_8_] *SHRP SECTION ID [_0_2 _0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_6_ / _2_7_ / _2_0_0_6__]

2. * TYPE OF EQUIPMENT CALIBRATED _x_ WIM __ CLASSIFIER ___ BOTH

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

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

5. EQUIPMENT MANUFACTURER _____IRD/PAT Traffic_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

   __ __ __ NUMBER OF TRUCKS COMPARED __ 2_ __ NUMBER OF TEST TRUCKS USED

   __ 2_0__ 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	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW ___ ___ __3 . 3_ STANDARD DEVIATION __ _2 . 4_
   DYNAMIC AND STATIC SINGLE AXLES ___ ___ __3 . 1_ STANDARD DEVIATION __ _2 . 8_
   DYNAMIC AND STATIC DOUBLE AXLES ___ ___ __3 . 3_ STANDARD DEVIATION __ _3 . 2_

8. ___3____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____50 - 60, _61 - 69, _70 +_____ _____ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___ ___3_6_7_5___ ___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:

*** FHWA CLASS 9	____ _0 . 0____	FHWA CLASS ____	____ ____ ____ ____
*** FHWA CLASS 8	____ ____ ____	FHWA CLASS ____	____ ____ ____ ____
		FHWA CLASS ____	____ ____ ____ ____
		FHWA CLASS ____	____ ____ ____ ____

*** PERCENT "UNCLASSIFIED" VEHICLES: ____ ___0 . 0___

PERSON LEADING CALIBRATION EFFORT: _Dean J. Wolf, MACTEC Engineering & Consulting, Inc._____
CONTACT INFORMATION: _301-210-5105_____ rev. November 9, 1999

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [_0_8_] *SHRP SECTION ID [_0_2 _0_0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_0_6_ / _2_8_ / _2_0_0_6__]

2. * TYPE OF EQUIPMENT CALIBRATED _x_ WIM __ CLASSIFIER ___ BOTH

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

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

5. EQUIPMENT MANUFACTURER _____IRD/PAT Traffic_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

   __ __ __ NUMBER OF TRUCKS COMPARED __ 2_ __ NUMBER OF TEST TRUCKS USED

   __ 2_0__ 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	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW ___ ___ _- 0 . 6_ STANDARD DEVIATION __ _1 . 8_
   DYNAMIC AND STATIC SINGLE AXLES ___ ___ _- 1 . 2_ STANDARD DEVIATION __ _3 . 2_
   DYNAMIC AND STATIC DOUBLE AXLES ___ ___ _- 0 . 5_ STANDARD DEVIATION __ _3 . 1_

8. ___3____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____50 - 60, _61 - 69, _70 +_____ _____ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___ ___3_6_7_5___ ___

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:

*** FHWA CLASS 9 ____ _0 . 0____	FHWA CLASS ____	____ ____ ____ ____
*** FHWA CLASS 8 ____ ____ ____	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____
	FHWA CLASS ____	____ ____ ____ ____

*** PERCENT "UNCLASSIFIED" VEHICLES: ____ ___0 . 0___

PERSON LEADING CALIBRATION EFFORT: _Dean J. Wolf, MACTEC Engineering & Consulting, Inc._____
CONTACT INFORMATION: __301-210-5105_____ rev. November 9, 1999

APPENDIX A

Sheet 19	* STATE_CODE	08
LTPP Traffic Data	* SPS PROJECT ID	0202
*CALIBRATION TEST TRUCK # 1	* DATE	06/27/06

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		10800	10393	D / C
B		15610	15273	D / C
C		15610	15273	D / C
D		17140	17030	D / C
E		17140	17030	D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 76310
*c) Post Test Loaded Weight 75006
*d) Difference Post Test – Pre-test 1310

GEOMETRY

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

9. a) * Make: Peterbilt b) * Model: 378

10.* Trailer Load Distribution Description:

Evenly distributed along trailer

Sheet 19	* STATE_CODE	08
LTPP Traffic Data	* SPS PROJECT ID	0200
*CALIBRATION TEST TRUCK # 1	* DATE	06/27/06

Rev. 08/31/01

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

A to B 17.8' B to C 4.5'' C to D 25.1''

D to E 4.1'' E to F _____

Wheelbased (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) 1' 1'' (_____)

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R24.5	2 leaf
B	11R24.5	air
C	11R24.5	air
D	11R24.5	air
E	11R24.5	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	08
LTPP Traffic Data	* SPS PROJECT ID	0200
*CALIBRATION TEST TRUCK # 1	* DATE	06/27/00

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	08
LTPP Traffic Data	* SPS PROJECT ID	0200
*CALIBRATION TEST TRUCK # 1	* DATE	06/27/06

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 - day 1 pm

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10700	15680	15680	17130	17130		76320
2	10820	15610	15610	17130	17130		76300
3	10880	15540	15540	17170	17170		76300
Average	10800	15610	15610	17140	17140		76310
day 1 post -	10500	15180	15190	17110	17110		75080

Table 6. Raw data – Axle scales – day 2 pre

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10920	15520	15520	17080	17080		76120
2	10720	15650	15650	17040	17040		76100
3	10720	15690	15690	17020	17020		76120
Average	10787	15626	15620	17047	17047		76120

Table 7. Raw data – Axle scales – post-test day 2 post

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10200	15420	15420	16980	16980		75000
2	10600	15120	15120	17080	17080		75000
3	10380	15280	15280	17030	17030		75000
Average	10393	15273	15273	17030	17030		75000

Measured By _____ Verified By _____

Sheet 19	* STATE_CODE	08
LTPP Traffic Data	* SPS PROJECT ID	0200
*CALIBRATION TEST TRUCK # 2	* DATE	6/27/06

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		10220	9900	D / C
B		12210	11870	D / C
C		12210	11870	D / C
D		14540	14500	D / C
E		14540	14500	D / C
F				D / C

GVW (same units as axles)

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 63730
*c) Post Test Loaded Weight 62640
*d) Difference Post Test – Pre-test 1090

GEOMETRY

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

9. a) * Make: Peterbilt b) * Model: 378

10.* Trailer Load Distribution Description:

Distributed evenly along trailer

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE CODE	09
LTPP Traffic Data	* SPS PROJECT ID	0200
*CALIBRATION TEST TRUCK # 2	* DATE	06/27/00

Rev. 08/31/01

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

A to B 17.9' B to C 4.5' C to D 24.5'

D to E 4.0' E to F _____

Wheelbased (measured A to last) 50' 10" Computed _____

13. *Kingpin Offset From Axle B (units) 1' 6" (_____)
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R24.5	2 leaf
B	11R24.5	air
C	11R24.5	air
D	11R24.5	air
E	11R24.5	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	09
LTPP Traffic Data	* SPS PROJECT ID	0200
*CALIBRATION TEST TRUCK # 2	* DATE	06/27/06

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	08
LTPP Traffic Data	* SPS PROJECT ID	0200
*CALIBRATION TEST TRUCK # 2	* DATE	06/27/06

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 - day 1

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10140	12270	12270	14530	14530		63740
2	10300	12160	12160	14550	14550		63720
3	10220	12210	12210	14540	14540		63720
Average	10220	12210	12210	14540	14540		63730
day 1 post -	9880	11900	11900	14540	14540		62760

Table 6. Raw data – Axle scales – day 2 pre

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10300	12110	12110	14550	14550		63620
2	10260	12140	12140	14540	14540		63620
3	10280	12120	12120	14550	14550		63620
Average	10280	12123	12123	14547	14547		63620

Table 7. Raw data – Axle scales – post-test - day 2 post

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9900	11870	11870	14500	14500		62640
2							
3							
Average	9900	11870	11870	14500	14500		62640

Measured By DJW Verified By _____

Sheet 20	* STATE_CODE 08
LTPP Traffic Data	*SPS PROJECT_ID 0200
Speed and Classification Checks * 1 of* 3	* DATE 06/29/2006

Rev. 08/31/2001....

pre-validation

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
70	9	22066	67	9	65	8	22334	65	8
67	9	22085	67	9	64	5	22342	64	5
75	9	22088	74	9	68	9	22456	68	9
65	3	22096	64	3	73	9	22786	73	9
65	9	22102	65	9	72	9	22791	72	9
70	9	22107	70	9	64	9	22792	64	9
68	9	22178	66	9	71	9	22795	71	9
70	9	22179	68	9	76	9	22903	76	9
79	9	22189	78	9	72	9	22904	72	9
63	9	22217	63	9	65	5	22908	64	5
65	9	22220	64	9	75	9	22912	75	9
62	9	22293	61	9	68	9	22915	68	9
65	9	22301	64	9	82	9	22919	81	9
72	9	22303	71	9	68	9	22926	68	9
68	9	22305	68	9	70	9	22931	70	9
70	9	22306	69	9	56	9	22936	56	9
64	12	22309	64	12	76	3	22946	75	3
65	9	22312	65	9	79	5	22943	78	3 *
69	9	22315	69	9	75	9	22955	75	9
76	9	22317	76	9	80	9	22959	80	9
70	9	22319	70	9	68	9	22969	68	9
65	5	22320	64	3 (2nd reader)	76	3	22976	78	3
72	9	22322	71	9	60	9	22978	60	9
76	9	22329	76	9	78	3	22992	78	3
72	9	22330	71	9	66	9	22993	66	9

Recorded by DJW Direction E Lane 1 Time from 10:45 to _____

* - 3/5
1 - 4/8

Sheet 20	* STATE_CODE 08
LTPP Traffic Data	*SPS PROJECT_ID 0200
Speed and Classification Checks * 2 of* 3	* DATE 06/27/2006

Rev. 08/31/2001….

pre-validation

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
74	9	22986	79	9	67	4	23312	69	4
62	5	23005	62	5	72	9	23318	72	9
75	9	23017	75	9	67	9	23323	67	9
63	9	23019	63	9	69	9	23325	69	9
67	9	23024	62	9	76	9	23332	76	9
68	9	23026	68	9	71	5	23333	71	5
75	9	23032	75	9	59	4	23342	59	4
70	5	23044	69	5	70	9	23348	69	9
74	6	23147	74	6	78	9	23351	77	9
72	9	23223	72	9	66	9	23386	66	9
75	9	23224	75	9	71	9	23426	70	9
64	9	23228	65	9	75	6	23427	75	6
77	3	23234	77	3	70	9	23428	70	9
* 76	3	23239	73	5	64	9	23430	64	9
69	9	23242	69	9	70	9	23431	70	9
72	9	23245	72	9	64	9	23438	64	9
77	9	23257	76	9	70	9	23440	70	9
77	3	23259	76	3	75	9	23441	74	9
72	9	23264	72	9	66	9	23449	66	9
70	9	23265	70	9	57	6	23453	56	6
72	6	23268	72	8	67	9	23456	68	9
69	5	23270	69	5	73	9	23461	74	9
69	9	23285	69	9	64	9	23463	64	9
79	9	23305	79	9	77	9	23483	78	9
77	9	23306	77	9	52	5	23478	52	5

Recorded by WLC Direction E Lane 1 Time from ________ to ________

1 5/3

7 extra not 3

Sheet 20	* STATE_CODE	08
LTPP Traffic Data	*SPS PROJECT_ID	0208
Speed and Classification Checks * 3 of* 3	* DATE	06/27/2006

Rev. 08/31/2001....

pre-validation

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
61	9	23482	61	9					
71	9	23483	71	9					
66	11	23487	66	11					
73	9	23490	73	9					
70	9	23491	70	9					
73	9	23492	73	9					
65	9	23505	65	9					

Recorded by WSE Direction E Lane 1 Time from _____ to _____

Sheet 20	* STATE CODE 08
LTPP Traffic Data	*SPS PROJECT ID 0200
Speed and Classification Checks * 1 of* 3	* DATE 06/28/2006

Rev. 08/31/2001....

post-validation

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	
73	6	26050	73	6	69	5	26485	68	5	
72	9	26052	72	9	75	5	26492	75	5	
65	9	26056	65	9	62	9	26501	62	9	
70	9	26100	70	9	72	9	26534	72	9	
65	9	26236	65	9	70	9	26535	71	9	
72	9	26256	72	9	75	9	26540	75	9	
67	9	26254	66	9	68	9	26541	68	9	
78	9	26264	78	9	68	9	26552	69	9	
75	9	26271	76	9	65	9	26556	65	9	
64	9	26274	64	9	65	5	26562	65	5	
71	9	26281	71	9	63	6	26570	64	6	
70	9	26285	70	9	61	5	26573	61	5	
67	10	26287	67	10	75	5	26579	75	5	
69	9	26331	69	9	81	5	26580	81	3	*
64	11	26335	64	11	65	9	26607	65	9	
69	9	26338	69	9	70	9	26618	69	9	
76	9	26339	75	9	74	5	26619	73	3	*
75	9	26342	75	9	70	9	26633	70	9	
65	9	26344	65	9	78	9	26639	78	9	—
64	9	26353	64	9	73	5	26682	73	5	
67	9	26375	68	9	71	9	26685	71	9	
64	9	26404	64	9	72	5	26689	76	3	*
73	9	26425	74	9	72	9	26892	72	9	
74	9	26433	74	9	76	9	26896	76	9	
75	9	26440	74	9	73	8	26900	73	8	

Recorded by WJC Direction E Lane 1 Time from 9:55 to

Sheet 20	* STATE_CODE	08
LTPP Traffic Data	*SPS PROJECT_ID	0208
Speed and Classification Checks * 2 of* 3	* DATE	06/28/2006

Rev. 08/31/2001....

post-validation

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
67	9	26912	67	9	71	9	114	71	9
64	9	26934	64	9	73	9	117	73	9
69	9	27004	69	9	67	5	124	66	5
76	16	27009	76	16	72	9	131	72	9
69	9	27015	70	9	72	10	144	72	10
70	9	27037	70	9	65	9	142	65	9
70	8	27038	71	8	86	3	154	86	3
72	9	27039	72	9	75	9	155	75	9
67	9	27043	67	9	73	9	16	74	9
70	3	27047	69	3	55	8	165	55	8
59	9	27050	59	9	73	9	174	72	9
68	15	27053	68	3	62	9	179	62	9
62	9	27056	62	9	64	9	186	64	9
70	9	27068	70	9	72	9	189	72	9
68	9	27071	68	9	66	9	193	66	9
62	9	27219	62	9	68	9	202	68	9
68	9	27224	68	9	75	9	209	75	9
69	9	27222	70	9	70	9	251	70	9
72	9	27224	72	9	60	5	254	60	5
72	9	27231	73	9	74	9	263	70	9
70	9	27235	70	9	75	9	276	75	9
74	9	27241	74	9	66	9	278	68	9
75	9	27242	74	9	67	9	280	67	9
65	9	27250	65	9	65	9	282	65	9
65	9	27256	65	9	73	9	284	73	9

Recorded by WDC Direction E Lane 1 Time from _____ to _____

Sheet 20	* STATE_CODE 08
LTPP Traffic Data	*SPS PROJECT_ID 0200
Speed and Classification Checks * 3 of* 3	* DATE 06/28/2006

Rev. 08/31/2001....

post-validation

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
62	9	285	63	9					
64	9	286	64	9					
70	9	287	70	9					
64	6	290	63	6					
81	9	471	80	9					
57	5	474	58	5					

Recorded by WSL Direction E Lane 1 Time from _____ to _____

Sheet 21	* STATE_CODE 08
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 1 of 3	* DATE 06/27/2006

Rev. 08/31/2001

pre-validation

76310 26.1
63730 24.5

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
94	56	1	1	10.14.18	21926	56	5.0/5.7	7.4/8.2	7.8/7.9	8.4/9.1	7.5/8.0		76.1	17.8	4.3	24.8	4.1	
94	55	2	1	10.14.37	21929	55	4.9/5.5	6.5/6.5	6.2/6.1	7.3/7.0	6.9/7.7		64.6	17.8	4.3	24.2	4.0	
96	63	1	2	10.39.37	22056	65	5.4/6.0	7.4/8.4	7.0/8.5	8.8/9.0	9.1/8.6		78.2	17.8	4.3	24.8	4.1	
96	63	2	2	10.51.57	22111	63	5.9/5.1	6.4/6.5	6.1/6.5	7.9/7.4	7.3/8.0		66.1	17.7	4.3	24.2	3.9	
98	74	1	3	11:04:35	22161	74	5.7/5.3	8.4/7.6	8.3/6.7	9.1/7.9	10.7/8.4		78.9	17.7	4.3	24.8	4.0	
98	75	2	3	11.17.06	22227	75	4.9/5.2	5.8/6.9	5.4/7.0	7.8/7.2	7.7/8.3		66.1	17.7	4.3	24.2	3.9	
101	57	1	4	11.21.00	22254	57	5.5/4.8	7.7/7.2	7.8/7.0	9.9/7.9	9.1/8.4		74.5	17.8	4.3	24.9	4.1	
103	55	2	4	11:42:47	22359	55	4.9/5.5	6.5/6.6	6.3/6.0	7.3/7.7	6.9/7.9		65.6	17.8	4.3	24.2	3.9	
103	64	1	5	11:46:18	22374	66	5.4/5.8	7.8/8.2	7.0/8.6	8.8/9.1	9.4/8.7		78.1	17.8	4.3	24.8	4.1	
105	65	2	5	12:08:08	22480	65	4.9/5.6	6.5/6.4	6.1/6.3	8.0/7.7	7.2/8.1		64.8	17.8	4.3	24.2	3.9	
105	73	1	6	12:10.51	22494	74	5.1/5.4	7.4/8.3	6.7/8.9	8.9/10.2	8.3/8.5		77.7	17.8	4.3	24.9	4.1	
109	75	2	6	12:35:31	22576	75	5.0/5.2	5.9/6.7	5.9/6.4	8.1/7.7	7.2/8.2		66.4	17.7	4.3	24.3	4.0	
109	65	1	7	12:57:39	22694	65	5.4/5.8	7.6/8.5	7.0/8.7	8.6/9.9	8.6/8.2		77.2	17.8	4.3	24.8	4.1	
109	55	2	7	12:59:58	22703	55	4.4/5.3	6.8/6.1	6.1/6.1	7.4/7.2	7.1/7.6		63.7	17.8	4.3	24.2	3.9	
110	74	1	8	13:22:19	22797	74	5.3/5.4	9.1/9.3	7.9/8.5	8.3/9.4	8.1/10.4		76.6	17.8	4.3	24.8	4.1	
110	75	2	8	13:26:24	22811	74	5.1/5.4	6.0/7.1	5.9/6.9	7.8/7.7	7.8/8.2		67.1	17.8	4.3	24.2	3.9	

Recorded by DJW　　　Checked by ____________

Sheet 21	* STATE_CODE 08
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 2 of 3	* DATE 06/22/2005

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
112	58	1	9	13:39:13	22[illegible]	57	5.3/5.7	2.7/3.7	2.1/3.9	2.2/4.4	3.1/4.2		74.9	12.8	4.3	24.9	4.1	
112	55	2	9	13:52:14	22[illegible]	55	4.4/5.6	6.4/6.2	4.2/5.9	3.2/4.2	3.0/4.2		63.7	12.8	4.3	24.2	3.9	
114	65	1	10	14:04:[illegible]	22[illegible]	65	5.4/5.9	7.3/8.5	7.0/8.4	6.5/7.5	9.1/9.2		79.6	12.7	4.3	24.9	4.1	
114	65	2	10	14:12:[illegible]	22[illegible]	65	4.8/5.7	6.5/6.5	6.5/6.4	3.3/3.5	3.2/3.6		66.7	12.8	4.3	24.2	3.9	
112	74	1	11	14:29:[illegible]	2230[illegible]	74	5.3/5.2	7.4/7.6	5.6/8.0	5.4/8.3	9.5/10.3		89.3	12.8	4.3	24.2	4.0	
112	74	2	11	14:43:[illegible]	2231[illegible]	74	4.7/5.2	6.7/7.3	5.7/7.2	3.9/3.6	3.0/3.0		65.9	12.9	4.3	24.3	3.9	
112	55	1	12	15:[illegible]	22[illegible]	55	5.8/5.8	7.2/8.0	7.0/8.1	7.9/8.5	8.3/9.4		76.8	12.8	4.3	24.9	4.1	
112	55	2	12	15:09:[illegible]	22[illegible]	55	4.9/5.2	6.3/7.3	6.1/7.3	7.3/7.5	7.4/8.4		64.6	12.8	4.3	24.2	3.9	
112	69	1	13	15:[illegible]	2328[illegible]	69	5.5/5.6	7.4/8.3	6.6/7.5	9.3/9.8	9.6/10.2		80.8	12.8	4.3	24.9	4.0	
112	74	1	14	15:56:[illegible]	2234[illegible]	74	4.8/5.0	7.1/8.2	7.0/8.1	8.2/10.2	8.3/8.2		76.6	12.8	4.3	24.9	4.1	
112	75	2	13	15:42:[illegible]	2233[illegible]	74	4.9/5.2	6.2/6.9	6.0/6.4	8.1/8.8	7.1/7.4		64.2	12.8	4.3	24.3	3.9	
115	56	1	15	15:57:[illegible]	22[illegible]	56	4.3/5.8	2.2/3.8	2.2/3.9	2.9/3.5	2.2/3.2		24.9	12.8	4.3	24.9	4.1	
115	56	2	14	16:[illegible]	22[illegible]	55	4.6/5.4	6.2/5.9	6.0/6.0	2.4/3.3	3.4/3.6		63.4	12.8	4.3	24.9	3.9	
110	69	2	15	16:24:[illegible]	2362[illegible]	65	4.2/5.2	6.4/6.5	6.3/6.2	2.6/3.3	2.1/3.1		65.9	12.8	4.3	24.2	3.9	
107	74	1	16	16:44:[illegible]	23[illegible]	74	5.5/5.6	7.6/8.3	7.6/8.5	8.2/9.2	6.3/8.3		77.5	12.7	4.3	24.9	4.1	
107	55	2	16	16:59:[illegible]	2375[illegible]	55	5.0/5.4	6.5/6.4	6.1/6.0	8.2/9.4	7.1/7.2		64.9	12.8	4.3	24.3	3.9	

Recorded by _____ Checked by _____

36 75 - Cal Factor

Sheet 21	* STATE_CODE	08
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 3 of 3	* DATE	06/22/2006

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
103	65	1	17	[illegible]	[illegible]	65	5.6/5.7	7.9/8.8	6.9/7.2	8.8/8.8	8.3/8.3		75.5	17.9	4.3	24.8	4.1	
103	65	2	17	18:17:21	23254	65	5.1/[illegible]	6.4/6.9	[illegible]/16.4	7.[illegible]/[illegible]	[illegible]/7.7		66.6	17.9	4.3	24.2	3.9	
103	75	1	18	17:51:15	23384	75	4.9/5.9	7.3/7.8	6.8/8.0	8.9/8.3	7.7/8.3		74.8	17.8	4.3	24.8	4.1	
103	73	2	18	17:44:19	22921	74	4.8/5.1	5.6/6.9	5.9/6.6	7.9/8.2	[illegible]/7.2		61.[illegible]	17.5	4.3	24.2	4.0	
98	54	2	19	18:04:[illegible]	24082	54	5.5/4.3	6.1/6.3	6.2/6	7.6/7.5	8/6.9		64.3	17.8	4.3	24.3	3.9	
98	58	1	19	18:09:[illegible]	17462	58	4.9/[illegible]	7.9/8.7	[illegible]	8.9/8.1	[illegible]		72.[illegible]	[illegible]	[illegible]	[illegible]	4.1	
98	65	1	20	18:33:[illegible]	24176	65	5/[illegible]	7.5/8.2	[illegible]/7.4	[illegible]/9.[illegible]	8.5/9.9		78.2	17.8	4.3	24.8	4.1	
98	65	2	20	18:36:[illegible]	24186	65	4.5/5.5	5.9/6.3	5.3/[illegible]	7.3/[illegible]	7.2/7.9		64.3	17.8	4.3	24.1	3.9	

Recorded by ______________ Checked by ______________

Sheet 21	* STATE_CODE	0 6
LTPP Traffic Data	*SPS PROJECT_ID	0 2 6 0
WIM System Test Truck Records 1 of 1	* DATE	0 6 / 2 6 / 2 0 0 6

Rev. 08/31/2001

calibration iteration 1 / post validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
84	57	1	1	09:26:36	2603	58	5.2 / 5.6	7.0 / 9.1	8.4 / 7.8	2.8 / 3.9	7.5 / 6.6		73.6	17.9	4.3	24.7	4.1	
84	55	2	1	09:26:[illegible]	[illegible]	55	4.6 / 5.3	6.2 / 6.1	6.6 / 6.8	7.5 / 7.4	6.3 / 7.5		63.3	18.8	4.3	24.2	4.0	
72	65	1	2	09:27:24	2622	65	5.2 / 5.6	7.0 / 7.9	6.5 / 6.5	8.3 / 8.4	9.4 / 7.9		83.6	19.5	4.3	24.9	4.1	
72	64	2	2	09:27:33	2629	64	4.4 / 5.5	6.0 / 6.2	6.0 / 5.6	7.6 / 7.9	6.1 / 7.1		63.1	19.8	4.3	24.6	3.7	
84	74	1	3	09:46:32	2670	74	5.1 / 6.1	8.1 / 8.5	6.4 / 7.4	8.9 / 6.8	8.8 / 10.1		74.5	17.3	4.3	24.9	4.0	
84	74	2	3	09:46:[illegible]	2674	74	4.6 / 5.8	6.3 / 6.5	5.5 / 6.4	7.3 / 8.0	8.2 / 8.3		62.5	17.7	4.3	24.4	3.9	
92	56	1	4	10:03:[illegible]	2644	56	4.8 / 5.9	7.5 / 7.6	8.2 / 8.3	8.3 / 7.1	6.3 / 8.7		75.3	18.8	4.3	24.8	4.1	
92	56	2	4	10:03:[illegible]	2645	56	4.2 / 5.2	6.3 / 6.3	6.6 / 6.6	7.6 / 9.2	7.3 / 8.9		65.1	17.9	4.3	24.1	3.9	
98	65	1	5	10:39:[illegible]	2666	65	5.1 / 5.4	7.3 / 7.6	6.3 / 6.4	8.8 / 8.6	8.1 / 8.2		74.2	17.6	4.3	24.6	4.1	
98	65	2	5	10:39:[illegible]	2655	66	4.3 / 5.4	6.3 / 6.8	6.1 / 6.4	7.8 / 7.9	6.5 / 7.2		63.0	17.6	4.3	24.2	3.9	

Recorded by _____ Checked by _____

Sheet 21	* STATE_CODE	09
LTPP Traffic Data	*SPS PROJECT_ID	0200
WIM System Test Truck Records 1 of 2	* DATE	06/28/2006

Rev. 08/31/2001

post validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
101	74	1	6	10:50:14	26730	74	5.0 / 5.5	7.4 / 7.7	6.5 / 7.8	8.7 / 8.9	9.3 / 8.4		74.1	17.8	4.3	24.8	4.0	
101	74	2	6	11:05:51	26801	74	4.3 / 5.3	5.8 / 6.6	5.4 / 6.6	7.7 / 9.1	6.8 / 8.3		67.1	17.8	4.3	24.3	4.0	
100	58	1	7	11:11:59	26831	58	5.0 / 5.4	6.9 / 7.6	6.3 / 7.6	7.4 / 8.9	6.5 / 6.4		72.8	18.6	4.3	24.9	4.0	
100	56	2	7	11:18:18	26845	56	4.3 / 5.1	6.5 / 7.0	6.1 / 7.8	7.3 / 8.0	7.4 / 8.8		63.8	17.8	4.3	24.3	3.9	
104	65	1	8	11:36:34	26894	65	5.1 / 5.5	7.4 / 8.9	6.5 / 8.1	8.2 / 8.7	8.4 / 7.6		74.9	17.8	4.3	24.8	4.1	
107	65	2	8	12:00:49	27104	65	4.3 / 5.5	5.4 / 6.4	5.3 / 6.4	7.6 / 9.2	6.9 / 8.9		64.9	17.8	4.3	24.2	3.9	
107	74	1	9	12:10:15	27105	74	5.3 / 5.3	8.1 / 8.7	6.2 / 7.9	8.5 / 8.3	8.3 / 8.8		74.8	17.7	4.3	24.8	4.1	
101	56	2	9	12:18:09	27181	55	4.9 / 5.5	6.6 / 6.3	6.5 / 6.0	7.2 / 7.2	7.9 / 7.8		64.9	17.8	4.3	24.2	3.9	
101	55	1	10	12:38:46	27192	56	4.6 / 5.6	7.2 / 8.6	6.7 / 8.2	8.1 / 8.3	8.2 / 8.9		73.9	17.8	4.3	24.8	4.0	
107	65	2	10	12:48:18	27196	65	4.5 / 5.4	5.8 / 6.6	5.8 / 7.1	7.5 / 9.3	6.6 / 7.6		68.3	17.8	4.3	24.2	3.9	
102	66	1	11	12:43:22	27297	66	4.9 / 5.7	7.4 / 8.8	6.5 / 8.1	8.3 / 8.8	8.2 / 8.0		73.5	17.8	4.3	24.8	4.1	
105	55	2	11	13:34:48	27507	55	5.2 / 5.5	6.4 / 6.8	6.2 / 5.9	7.1 / 7.3	7.9 / 7.4		63.4	17.8	4.3	24.1	3.9	
105	57	1	12	13:35:10	27530	57	5.5 / 5.2	7.2 / 7.7	7.5 / 8.5	8.8 / 8.5	9.6 / 8.1		74.6	17.7	4.3	24.8	4.0	
107	66	2	12	13:59:52	27 67	66	4.8 / 5.5	6.1 / 6.0	6 / 6.0	7.5 / 7.2	6.8 / 6.9		63.9	17.8	4.3	24.2	3.9	
104	66	1	13	14:00:15	27	65	5.1 / 5.5	7.9 / 7.9	6.8 / 8.5	8.4 / 9.1	8.2 / 6.5		75.3	17.8	4.3	24.8	4.1	
107	56	2	13	14:25:54	214	56	4.2 / 4.6	6.9 / 6.1	6.3 / 6.0	7.4 / 7.8	7.4 / 6.3		63.5	17.7	4.3	24.2	3.9	

Recorded by _____ Checked by _____

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Sheet 21	* STATE_CODE 06
LTPP Traffic Data	*SPS PROJECT_ID 0200
WIM System Test Truck Records 3 of 3	* DATE 06/28/2006

Rev. 08/31/2001

post-validation

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A right / left weight.	Axle B right / left weight.	Axle C right / left weight.	Axle D right / left weight.	Axle E right / left weight.	Axle F right / left weight.	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
107	74	1	14	14:12:04	216	74	5.3 / 5.3	3.4 / 3.6	6.3 / 6.0	8.1 / 8.1	9.5 / 9.8		76.5	12.8	4.3	24.8	4.0	
106	55	2	14	14:14:46	295	53	4.6 / 5.12	6.4 / 6.6	6.2 / 6.1	7.6 / 7.0	7.3 / 7.2		67.2	12.8	4.3	24.1	3.7	
106	56	1	15	14:44:28	297	56	5.8 / 5.0	3.4 / 3.9	8.5 / 8.5	8.1 / 8.1	9.5 / 8.6		76	12.7	4.3	24.8	4.1	
106	65	2	15	15:09:34	424	65	4.6 / 5.4	6.1 / 6.1	6.4 / 5.9	7.6 / 7.0	7.5 / 7.2		63.5	12.8	4.3	24.2	3.9	
106	64	1	16	15:19:18	426	64	5.4 / 5.5	3.9 / 3.8	6.8 / 6.1	8.1 / 8.5	8.0 / 7.9		73.2	12.8	4.3	24.9	4.1	
102	74	2	16	15:35:29	549	74	4.3 / 4.7	5.8 / 6.1	5.4 / 5.0	7.2 / 7.1	6.9 / 7.6		60.2	12.8	4.3	24.2	4.0	
102	70	1	17	15:50:59	598	70	5.3 / 5.2	3.5 / 3.7	6.5 / 6.0	8.3 / 8.4	9.6 / 8.9		74.2	12.7	4.3	24.2	4.1	
109	55	2	17	15:56:21	649	55	4.4 / 4.5	6.4 / 6.1	6.0 / 5.9	7.3 / 7.2	7.2 / 7.4		63.8	12.8	4.3	24.2	3.9	
109	56	1	18	15:59:10	631	56	4.9 / 5.9	7.3 / 8.7	8.4 / 8.4	8.1 / 8.9	8.2 / 8.5		74.6	12.8	4.3	24.8	4.1	
110	65	2	18	16:27:26	801	65	4.6 / 5.3	6.3 / 6.6	6.3 / 5.8	7.5 / 8.9	6.3 / 6.2		62.5	12.8	4.3	24.2	3.7	
110	66	1	19	16:18:34	783	65	5.1 / 5.3	3.0 / 3.2	8.9 / 8.0	8.5 / 8.4	6.9 / 7.0		74.5	12.8	4.3	24.8	4.1	
100	74	2	19	16:42:50	945	74	4.3 / 4.7	5.8 / 5.8	5.8 / 5.8	8.0 / 7.8	7.3 / 7.2		62.5	12.7	4.3	24.2	3.9	
100	73	1	20	16:49:02	920	73	5.2 / 5.1	3.3 / 3.4	7.9 / 8.1	8.9 / 9.2	8.5 / 8.5		73.9	12.9	4.3	24.3	4.1	
97	56	2	20	17:05:58	1041	55	4.9 / 5.0	6.5 / 6.8	6.3 / 5.9	7.4 / 7.2	7.5 / 7.4		69.9	12.8	4.3	24.2	4.0	
97	57	1	21	17:22:39	1016	57	5.3 / 5.5	2.4 / 2.3	7.6 / 7.5	7.8 / 7.1	8.0 / 8.0		74.6	12.8	4.3	24.9	4.1	

Recorded by _____ Checked by _____

TEST TRUCK PHOTOS FOR SPS WIM FIELD VALIDATION

STATE: Colorado

SHRP ID: 0200

Figures

Figure 1 – Truck_1_TO_14_08_2.62_0200_06_27_06.jpg

Figure 2 – Truck_1_Front_Suspension_TO_14_08_2.62_0200_06_27_06.jpg

Figure 3 – Truck_1_T1_Suspension_TO_14_08_2.62_0200_06_27_06.jpg

Figure 4 – Truck_1_T2_Suspension_TO_14_08_2.62_0200_06_27_06.jpg

Figure 5 – Truck 1_Trailer_TO_14_08_2.62_0200_06_27_06.jpg

Figure 6 – Truck_1_Tractor_TO_14_08_2.62_0200_06_27_06.jpg

Figure 7 – Truck_2_TO_14_08_2.62_0200_06_27_06.jpg

Figure 8 – Truck_2_Front_Suspension_TO_14_08_2.62_0200_06_27_06.jpg

Figure 9 – Truck_2_T1_Suspension_TO_14_08_2.62_0200_06_27_06.jpg

Figure 10 – Truck_2_T2_Suspension_TO_14_08_2.62_0200_06_27_06.jpg

Figure 11 – Truck_2_Tractor_TO_14_08_2.62_0200_06_27_06.jpg

Figure 12 – Truck_2_Trailer_TO_14_08_2.62_0200_06_27_06.jpg

Calibration Worksheet

	old			new
55	3675	cal factor 1		3675
60	3675	2	↓ 2%	3600
65	3695	3	↓ 4%	3550
70	3755	4	↓ 3.8%	3615
75	3770	5	↓ 3.8%	3630

```
#
#
#          The following lines are required by RCS
#             Do not modify or delete them !!!
#
#     $Revision: 1.1 $
#     $Id: ltpp_etg.typ,v 1.1 2006-02-23 15:05:09-06 ianm Exp $
#
# Revision History
# 12/06/2005 AJP Created
#
# CLASSIFICATION DATA FILE
#
# Revision: 2.0
#
# DATA FORMAT OF THE .typ FILE:
#
#
# HEADER (each file has only one header)
#
# flag of compliance data
# tandem spacing
# tridem spacing
# tridem equal spacing tolerance
# quadrem spacing
# quadrem equal spacing tolerance
# number of vehicle classes (maximum 75)
# undefinable vehicle classes
# error vehicle classes
# autocalibration vehicle type
# number of vehicle types (maximum 60)
#
# DATA SECTION (each file can have more than one data section)
#
# vehicle classification
# number of axles
# list of minimum axles spacings
# list of maximum axles spacings
# list of axle markings
# list of minimum axle weights
# list of maximum axle weights
# minimum gvw
# maximum gvw
# minimum vehicle length
# maximum vehicle length
# minimum distance of front bumper and first axle, and of rear and last axle
# maximum distance of front bumper and first axle, and of rear and last axle
# compliance data table
#
# THE ACTUAL DATA IS STARTED HERE

1
192
384
10
0
0
```

```
16
15
15
21
29

# Default Vehicles
2
2
60
540
s s
332 332
333 333
664
666
120
600
0 0
0 0
0

#1. Motorcycle
1
2
1
183
x x
1 1
32767 32767
45
590
0
32767
0 0
32767 32767
0

#2. Car
2
2
1
308
x x
1 1
32767 32767
454
3628
0
32767
0 0
32767 32767
0

#3. OPV
3
2
```

```
308
488
x x
1 1
32767 32767
454
3628
0
32767
0 0
32767 32767
0

#4. Bus
4
2
704
1219
x x
1 1
32767 32767
5443
100000
0
32767
0 0
32767 32767
1

#5. 2D
5
2
244
704
x x
1 1
32767 32767
3629
100000
0
32767
0 0
32767 32767
1

#6. Car / 1 Axle Trailer
2
3
183 183
308 762
x x x
1 1 1
32767 32767 32767
454
5443
0
32767
```

```
0 0
32767 32767
0

#7. OPV / 1 Axle Trailer
3
3
308 183
488 762
x x x
1 1 1
32767 32767 32767
454
5443
0
32767
0 0
32767 32767
0

#8. 3 Axle Bus
4
3
704 91
1219 213
x x x
1 1 1
32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#9. 2D / 1 Axle Trailer
5
3
244 192
704 762
x x x
1 1 1
32767 32767 32767
5443
9071
0
32767
0 0
32767 32767
1

#10. 3 Axle Single Unit
6
3
183 76
704 192
```

```
x x x
1 1 1
32767 32767 32767
5443
100000
0
32767
0 0
32767 32767
1

#11. Semi 2-1
8
3
183 335
704 1219
x x x
1 1 1
32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#12. Car / 2 Axle Trailer
2
4
183 183 30
308 762 365
x x x x
1 1 1 1
32767 32767 32767 32767
454
5443
0
32767
0 0
32767 32767
0

#13. OPV / 2 Axle Trailer
3
4
308 183 30
488 762 365
x x x x
1 1 1 1
32767 32767 32767 32767
454
5443
0
32767
0 0
32767 32767
```

0

#14. 2D / 2 Axle Trailer
5
4
244 192 30
704 762 365
x x x x
1 1 1 1
32767 32767 32767 32767
5443
9071
0
32767
0 0
32767 32767
1

#15. 4 Axle Single Unit
7
4
183 76 76
704 192 396
x x x x
1 1 1 1
32767 32767 32767 32767
5443
100000
0
32767
0 0
32767 32767
1

#16. Semi 3-1
8
4
183 76 396
704 192 1372
x x x x
1 1 1 1
32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#17. Semi 2-2
8
4
183 335 91
704 1372 365
x x x x
1 1 1 1

```
32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#18. OPV / 3 Axle Trailer
3
5
308 183 30 30
488 762 365 365
x x x x x
1 1 1 1 1
32767 32767 32767 32767 32767
454
5443
0
32767
0 0
32767 32767
0

#19. 2D / 3 Axle Trailer
5
5
244 192 30 30
704 548 365 365
x x x x x
1 1 1 1 1
32767 32767 32767 32767 32767
5443
100000
0
32767
0 0
32767 32767
1

#20. 5 axle Single Unit
7
5
183 76 76 76
704 192 192 192
x x x x x
1 1 1 1 1
32767 32767 32767 32767 32767
5443
100000
0
32767
0 0
32767 32767
1
```

#21. Semi 3-2
9
5
183 76 192 76
792 192 1372 365
x x x x x
1 1 1 1 1
32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#22. Semi 2-1-2
11
5
183 335 183 335
792 792 610 792
x x x x x
1 1 1 1 1
32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#23. Trk Trailer(3-2)
9
5
183 76 192 366
792 192 701 823
x x x x x
1 1 1 1 1
32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#24. Semi 2-3
9
5
183 549 76 76
792 1372 192 192
x x x x x
1 1 1 1 1
32767 32767 32767 32767 32767
9072

```
100000
0
32767
0 0
32767 32767
1

#25. Semi 3-3
10
6
183 76 186 76 76
792 192 1372 365 335
x x x x x x
1 1 1 1 1 1
32767 32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#26. Semi 3-1-2
12
6
183 76 335 183 335
792 192 792 732 792
x x x x x x
1 1 1 1 1 1
32767 32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#27. Semi 3-*-*
13
7
183 91 91 91 91 91
1372 1372 1372 1372 1372 1372
x x x x x x x
1 1 1 1 1 1 1
32767 32767 32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#28. Semi 3-*-*
13
```

```
8
183 91 91 91 91 91 91
1372 1372 1372 1372 1372 1372 1372
x x x x x x x
1 1 1 1 1 1 1
32767 32767 32767 32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1

#29. Semi 3-*-*
13
9
183 91 91 91 91 91 91
1372 1372 1372 1372 1372 1372 1372 1372
x x x x x x x x
1 1 1 1 1 1 1 1
32767 32767 32767 32767 32767 32767 32767 32767 32767
9072
100000
0
32767
0 0
32767 32767
1
```

Time of Change : 6-28-2006 8:15 am

Site Parameters

Lane **1**

Upstream Loop

Loop State **Enabled**
Module ID **9**
Channel ID **0**
Polarity **Active Low**
Width (cm) **285**

Downstream Loop

Loop State **Enabled**
Module ID **9**
Channel ID **1**
Polarity **Active Low**
Width (cm) **285**
Distance (cm) **720**

Axle Sensors

Axle **1**
Axle State **Enabled**
Module ID **5**
Channel ID **0**
Polarity Active **High**
Type **Bending Plate**
Distance (cm) **270**

Axle **2**
Axle State **Enabled**
Module ID **5**
Channel ID **1**
Polarity **Active High**
Type **Bending Plate**
Distance (cm) **640**

Calibration

Lane **1**

Axle Sensor **1**
Threshold **40**
WIM Calib Factors

Speed Bin **1**
Max Speed **88 kph (55 mph)**
Calibration Factor **3675**
Speed Bin **2**
Max Speed **96 kph (60 mph)**
Calibration Factor **3600**
Speed Bin **3**
Max Speed **105 kph (65 mph)**
Calibration Factor **3550**
Speed Bin **4**
Max Speed **112 kph (70 mph)**
Calibration Factor **3615**
Speed Bin **5**
Max Speed **120 kph (75 mph)**
Calibration Factor **3630**

Axle Sensor **2**
Threshold **40**
WIM Calib Factors

Speed Bin **1**
Max Speed **88 kph (55 mph)**
Calibration Factor **3675**
Speed Bin **2**
Max Speed **96 kph (60 mph)**
Calibration Factor **3600**
Speed Bin **3**
Max Speed **105 kph (65 mph)**
Calibration Factor **3550**
Speed Bin **4**
Max Speed **112 kph (70 mph)**
Calibration Factor **3615**
Speed Bin **5**
Max Speed **120 kph (75 mph)**
Calibration Factor **3630**