Validation Report

Virginia, SPS-1
Task Order 21, CLIN 2
July 24 to 26, 2007

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1 Executive Summary

A visit was made to the Virginia 0100 on July 24 to 26, 2007 for the purposes of conducting a validation of the WIM system located on US 29 approximately 8 miles north of Danville on the US 29 Bypass. The SPS-1 is located in the righthand, southbound lane of a four-lane divided facility. The posted speed limit at this location is 65 mph. The LTPP lane is one of 2 lanes instrumented at this site. Both lanes are in the southbound direction. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This site is located approximately 500 feet downstream from a previous location. This is the first validation visit to this location. The site was installed November 1 to 4, 2006 by IRD.

This site meets all LTPP precision requirements except speed which is not considered sufficient to disqualify the site as having research quality data. The classification data is also of research quality for Traffic Monitoring Guide Classes.

The site is instrumented with bending plate and iSINC electronics. It is installed in a portland cement concrete section 424 feet in length. The WIM sensors are 313 feet from the pavement transition.

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 74,610 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 9 tapered steel leaf and then a rocker bar suspension for the trailer axle loaded to 64,880 lbs., the "partial" truck.

The validation speeds ranged from 53 to 65 miles per hour. The pavement temperatures ranged from 71 to 96 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was not achieved.

Table 1-1 Post-Validation results – 510100 – 25-Jul-2007

SPS-1, -2, -5, -6 and -8	95 % Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-2.7 ± 10.3%	Pass
Tandem axles	±15 percent	0.9 ± 9.0%	Pass
GVW	±10 percent	0.1 ± 6.1%	Pass
Speed	**±1 mph [2 km/hr]**	**0.3 ± 1.4 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.2 ft	Pass

Prepared: djw *Checked: bko*

The pavement condition was satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area. The effects of the transition from asphalt to concrete approximately 313 feet prior to the site reported during the last validation were not obvious at this validation.

No profile data has been collected at this site since installation. It is not known when a visit is scheduled to collect it. 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: djw *Checked: bko*

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

2 Corrective Actions Recommended

No corrective actions are required at this site at this time.

The recommendation to replace the loop lead-ins shielded two-conductor to address a problem existing in the adjacent lane at the last validation has apparently been implemented.

3 Post Calibration Analysis

This final analysis is based on test runs conducted July 25, 2007 during the late morning and early afternoon hours and continuing during the late morning and early afternoon hours of July 26, 2007 at test site 510100 on US 29. This SPS-1 site is at milepost 12.8 on the southbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for the validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and air suspension loaded to 74,610 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 9 tapered steel leaf and then a rocker bar suspension loaded to 64,880 lbs., the "partial" truck.

Each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 53 to 65 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 71 to 96 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

As shown in Table 3-1, this site meets all LTPP precision requirements except speed which is not considered sufficient to disqualify the site as having research quality data.

Table 3-1 Post-Validation Results – 510100 – 25-Jul-2007

SPS-1, -2, -5, -6 and -8	95 % Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-2.7 ± 10.3%	Pass
Tandem axles	±15 percent	0.9 ± 9.0%	Pass
GVW	±10 percent	0.1 ± 6.1%	Pass
Speed	**±1 mph [2 km/hr]**	**0.3 ± 1.4 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.2 ft	Pass

Prepared: djw *Checked: bko*

The test runs were conducted primarily during the late morning and early afternoon hours under partly cloudy weather conditions, resulting in a somewhat limited 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 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 not achieved for this set of validation runs. The range of temperatures was not achieved.

The three speed groups were divided as follows: Low speed – 53 to 56 mph, Medium speed – 57 to 61 mph and High speed – 62 + mph. The three temperature groups were created by splitting the runs between those at 71 to 80 degrees Fahrenheit for Low temperature, 81 to 89 degrees Fahrenheit for Medium temperature and 90 to 96 degrees Fahrenheit for High temperature.

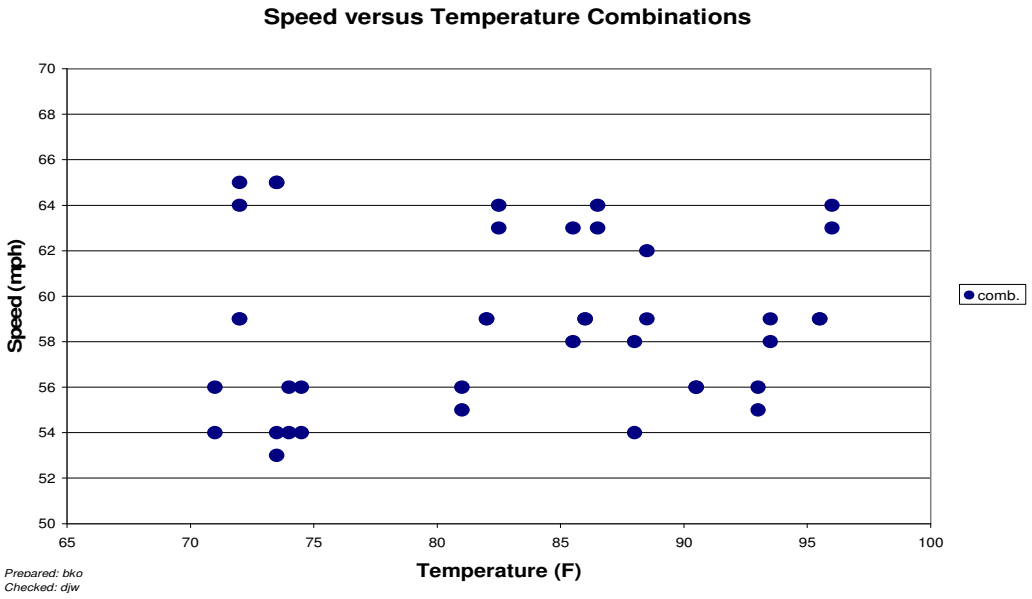

Figure 3-1 Post-Validation Speed-Temperature Distribution – 510100 – 25-Jul-2007

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 the figure, it appears that the equipment estimates GVW with reasonable accuracy at low and medium speeds. At high speeds, the equipment tends to overestimate GVW. Variability appears to greater at medium speeds.

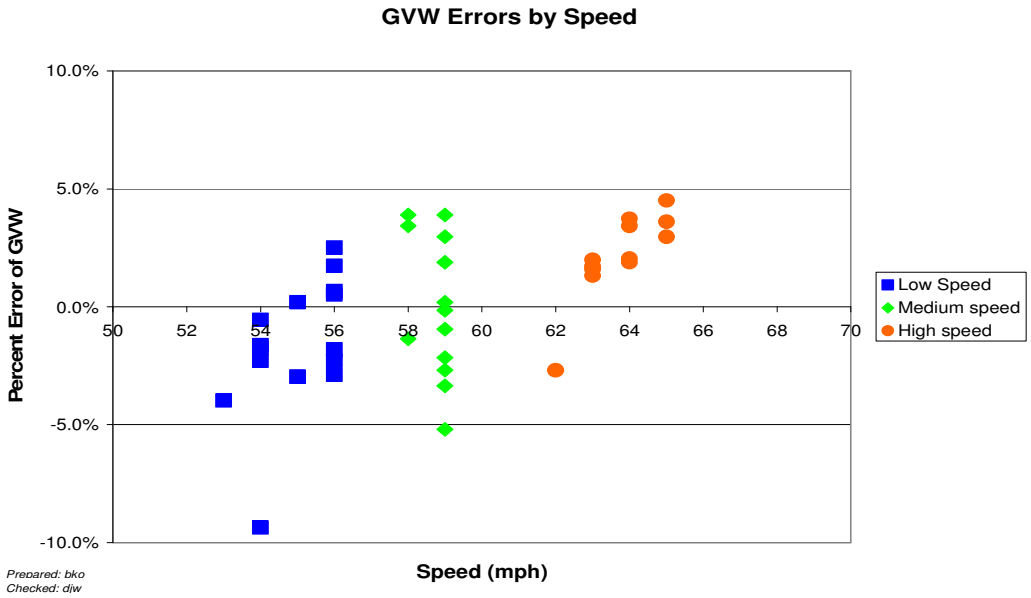

Figure 3-2 Post-validation GVW Percent Error vs. Speed – 510100 – 25-Jul-2007

Figure 3-3 shows the lack of relationship between temperature and GVW percentage error.

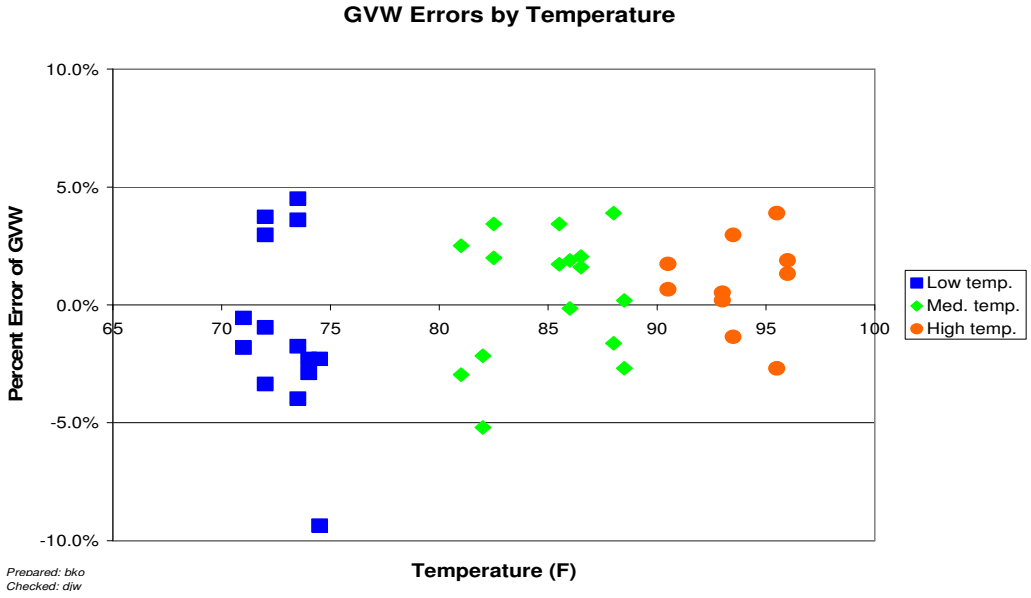

Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 510100 – 25-Jul-2007

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. The graph indicates that the errors in tandem spacings for the test trucks were not affected by changes in speed.

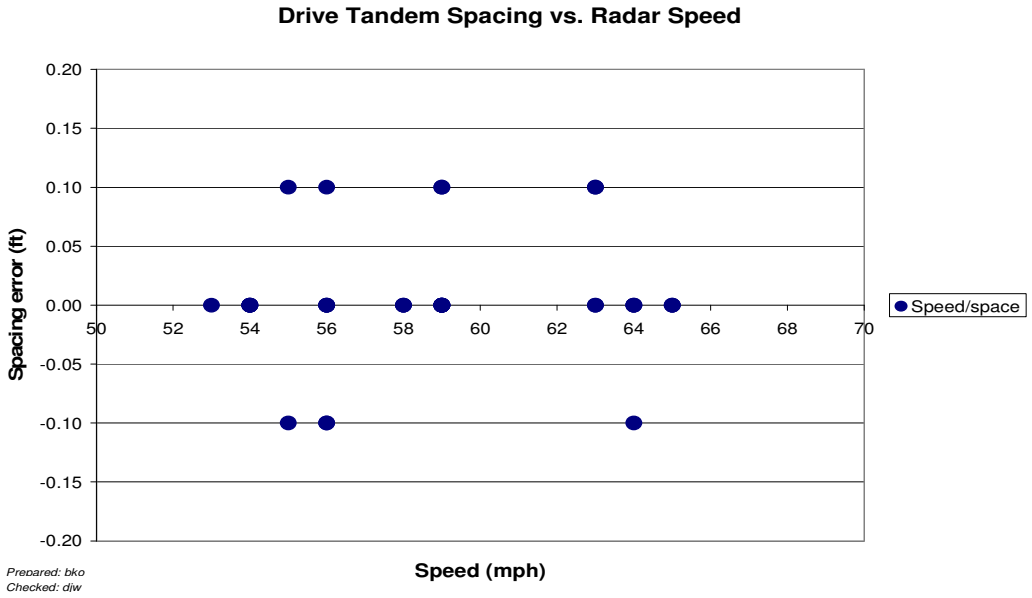

Figure 3-4 Post-Validation Spacing vs. Speed – 510100 – 25-Jul-2007

3.1 Temperature-based Analysis

The three temperature groups were created by splitting the runs between those at 71 to 80 degrees Fahrenheit for Low temperature, 81 to 89 degrees Fahrenheit for Medium temperature and 90 to 96 degrees Fahrenheit for High temperature.

Table 3-2 Post-Validation Results by Temperature Bin – 510100 – 25-Jul-2007

Element	95% Limit	Low Temperature 71-80 °F	Medium Temperature 81-89 °F	High Temperature 90-96 °F
Steering axles	±20 %	-4.8 ± 11.5%	-1.5 ± 9.4%	-1.5 ± 12.0%
Tandem axles	±15 %	0.1 ± 11.4%	1.0 ± 7.5%	1.7 ± 8.7%
GVW	±10 %	-1.0 ± 8.1%	0.5 ± 5.7%	0.9 ± 4.4%
Speed	±1 mph	0.4 ± 1.6 mph	0.3 ± 1.3 mph	-0.1 ± 1.7 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.4 ft	0.0 ± 0.1 ft

Prepared: djw *Checked: bko*

From Table 3-2, it appears that the equipment underestimates steering axle weights at all temperatures and estimates all other weights with reasonable accuracy. Variability in steering and tandem axle error is greater at the low and high temperatures when compared with medium temperatures. GVW variability decreases as temperatures increases.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. From the figure it can be seen that GVW for the truck population as a whole is estimated with reasonable accuracy. Individually, GVW for the partial truck (diamonds) is overestimated at medium and high temperatures while GVW for the golden truck (squares) is slightly underestimated. Variability for the golden truck is greater than the variability in partial truck GVW estimations at the medium and higher temperatures. At low temperatures both trucks' GVW is reasonably estimated and variability is greater.

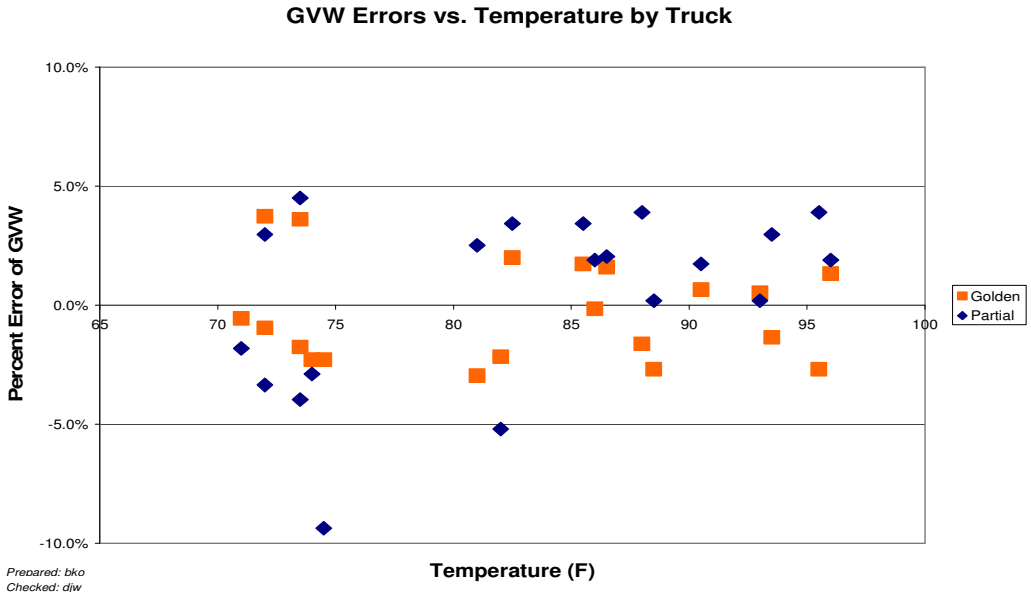

Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 510100 – 25-Jul-2007

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.

From the figure, it can be seen that the equipment underestimates steering axle weights at all temperatures. With the exception of a couple of outliers, variability in error is greater at the lower temperatures.

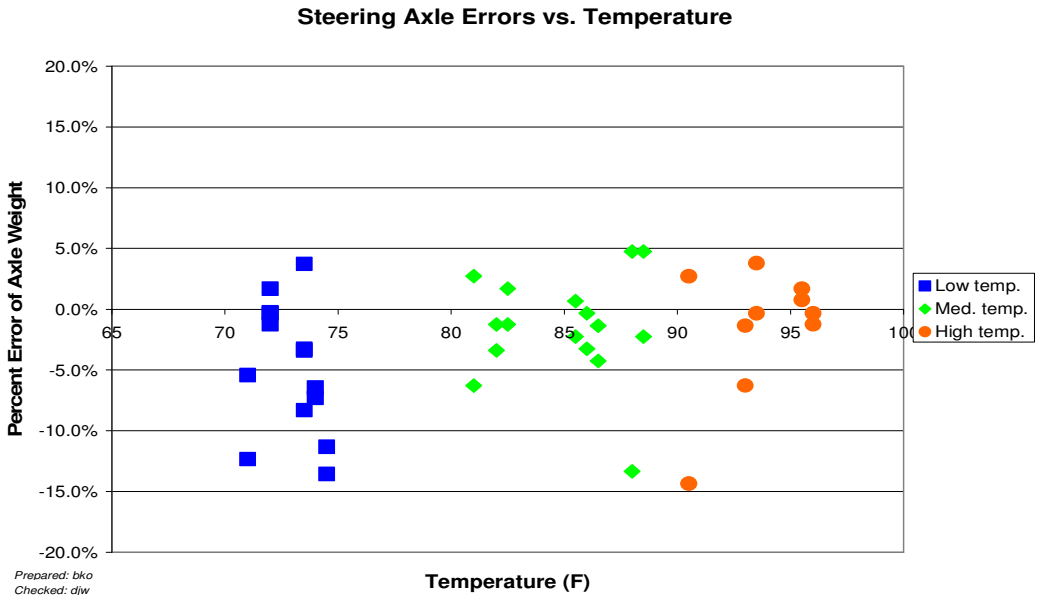

Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 510100 – 25-Jul-2007

3.2 Speed-based Analysis

The three speed groups were divided using 53 to 56 mph for Low speed, 57 to 61 mph for Medium speed and 62+ mph for High speed.

Table 3-3 Post-Validation Results by Speed Bin – 510100 – 25-Jul-2007

Element	95% Limit	Low Speed 53 to 56 mph	Medium Speed 57 to 61 mph	High Speed 62+ mph
Steering axles	±20 %	-7.0 ± 11.8%	0.6 ± 5.8%	-1.0 ± 4.7%
Tandem axles	±15 %	-0.1 ± 11.1%	0.3 ± 9.1%	2.7 ± 5.4%
GVW	±10 %	-1.6 ± 6.1%	0.0 ± 6.5%	2.2 ± 4.1%
Speed	±1 mph	0.3 ± 1.7 mph	0.2 ± 1.6 mph	0.3 ± 1.4 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.5 ft

Prepared: djw *Checked: bko*

From Table 3-3, it can be seen that the equipment underestimates all weights at the lower speeds, estimates with reasonable accuracy at medium speeds, and generally overestimates at higher speeds. Variability in error appears greater at the low and medium speeds.

Figure 3-7 illustrates the tendency for the equipment to underestimate GVW for both trucks at low speeds, estimate with reasonable accuracy at medium speeds and overestimate at high speeds. Variability for the partial truck (diamonds) appears to be greater than variability for the golden truck (squares) at the low and medium speeds.

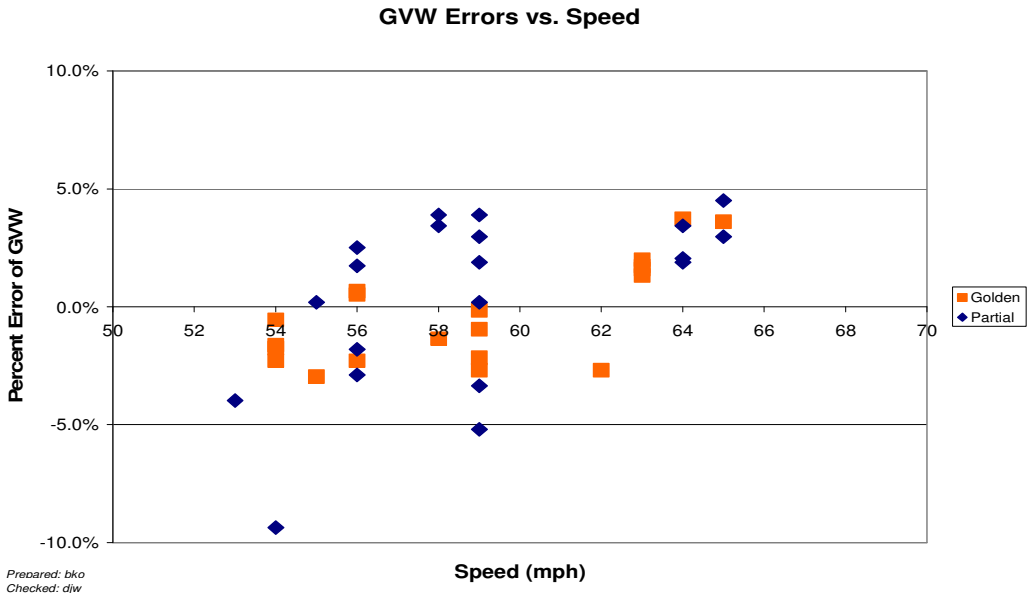

Figure 3-7 Post-Validation GVW Percent Error vs. Speed by Truck – 510100 – 25-Jul-2007

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 auto-calibration. This site does not use auto-calibration. The steering axles in this graph are associated only with Class 9 vehicles.

The figure illustrates how the WIM equipment underestimates steering axle weights at the low speeds. The variability in error appears to be greater at low speeds.

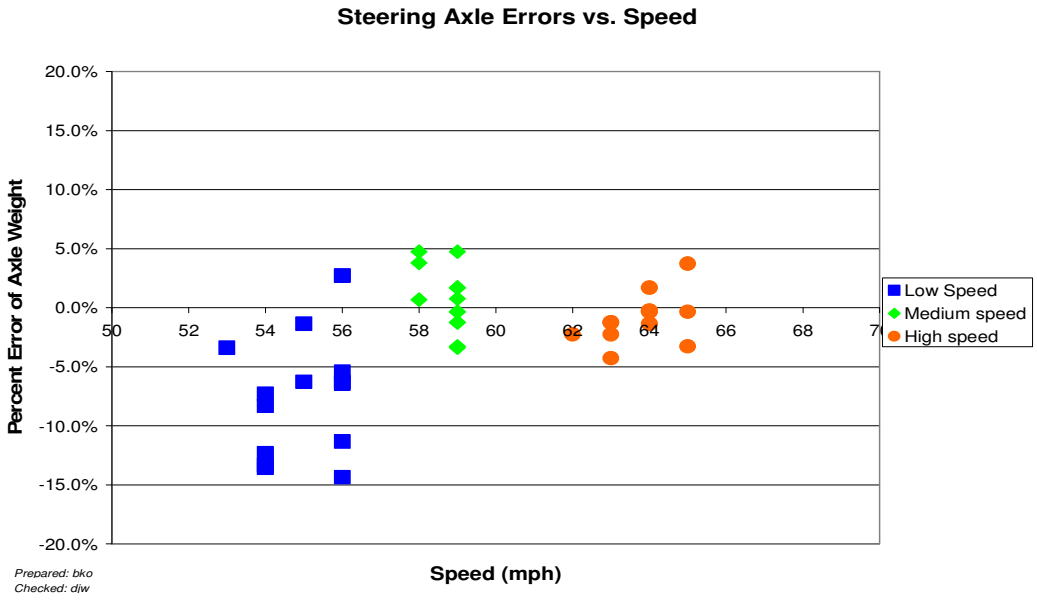

Figure 3-8 Post-Validation Steering Axle Percent Error vs. Speed by Group – 510100 – 25-Jul-2007

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 account for unclassified 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 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 3-4 has the classification error rates by class. The overall misclassification rate is zero percent.

Table 3-4 Truck Misclassification Percentages for 510100 – 25-Jul-2007

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

Prepared: djw *Checked: bko*

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

Table 3-5 Truck Classification Mean Differences for 510100 – 25-Jul-2007

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

Prepared: djw *Checked: bko*

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

seen by the observer. There is no way to tell how many vehicles of that type might actually exist. N/A means no vehicles of the class were recorded by either the equipment or the observer.

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: djw *Checked: bko*

4 Pavement Discussion

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

4.1 Profile Analysis

Profile data collected in the year prior to the site visit do not exist. A site visit to collect profile data has been scheduled for / has not been scheduled yet. 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.

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 of any of the sensors for the equipment.

The effects of the transition from asphalt to concrete approximately 313 feet prior to the site reported during the last validation were not obvious at this validation.

5 Equipment Discussion

The traffic monitoring equipment at this location includes bending plate and iSINC. These sensors are installed in a portland cement concrete pavement section about 424 ft in length. The roadway outside this short section is asphalt.

There were no changes in basic equipment operating condition since the validation on February 1, 2007.

5.1 Pre-Evaluation Diagnostics

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

5.2 Calibration Process

The equipment required no iterations of the calibration process between the initial 40 runs and the final 40 runs.

5.3 Summary of Traffic Sheet 16s

This site has validation information from previous visits as well as the current one in the tables below. Table 5-1 has the information for TRF_CALIBRATION_AVC for Sheet 16s submitted prior to this validation as well as the information for the current visit

Table 5-1 Classification Validation History – 510100 – 25-Jul-2007

Date	Method	Mean Difference				Percent Unclassified
		Class 9	Class 8	Other 1	Other 2	
26-Jul-07	Manual	0	0			0.0
24-Jul-07	Manual	0	0			0.0
30-Jan-07	Manual	0	0			0.0

Prepared: djw *Checked: bko*

Table 5-2 has the information for TRF_CALIBRATION_WIM for Sheet 16s submitted prior to this validation as well as the information for the current visit.

Table 5-2 Weight Validation History – 510100 – 25-Jul-2007

Date	Method	Mean Error and (SD)		
		GVW	Single Axles	Tandem Axles
25-Jul-07	Test Trucks	0.1 (3.0)	-2.7 (5.1)	0.9 (4.5)
24-Jul-07	Test Trucks	-0.4 (3.1)	-0.5 (4.2)	0.4 (5.5)
31-Jan-07	Test Trucks	-0.8 (2.7)	-4.7 (2.6)	-0.1 (3.6)
30-Jan-07	Test Trucks	0.7 (2.7)	-2.6 (3.2)	1.3 (3.5)

Prepared: djw *Checked: bko*

5.4 Projected Maintenance/Replacement Requirements

Semi-annual preventive maintenance is to be performed at this site under provisions of the Phase II contract.

No other corrective maintenance actions required at this site at this time.

6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted July 24, 2007 during the morning and afternoon hours at 510100 located approximately 8 miles north of Danville on the US 29 Bypass. This SPS-1 site is at milepost 12.8 on US 29 in the southbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two 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 74,170 lbs.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and a 9 tapered steel leaf and then a rocker bar suspension for the trailer axle loaded to 64,430 lbs., the partial truck.

For the initial validation each truck made a total of 20 passes over the WIM scale at speeds ranging from approximately 53 to 65 miles per hour. The desired speed range was achieved during this validation. Pavement surface temperatures were recorded during the test runs ranging from about 67 to 85 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was not achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 6-1.

As shown in Table 6-1, this site meets all LTPP precision requirements except speed which is not considered sufficient to disqualify the site as having research quality data.

Table 6-1 Pre-Validation Results – 510100 – 24-Jul-2007

SPS-1, -2, -5, -6 and -8	95 % Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-0.5 ± 8.4%	Pass
Tandem axles	±15 percent	0.4 ± 10.9%	Pass
GVW	±10 percent	-0.4 ± 6.2%	Pass
Speed	**±1 mph [2 km/hr]**	**0.4 ± 1.5 mph**	**Fail**
Axle spacing	± 0.5 ft [150mm]	0.0 ± 0.1 ft	Pass

Prepared: djw *Checked: bko*

The test runs were conducted primarily during the morning and early afternoon hours under mostly cloudy weather conditions, resulting in a very narrow range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the data set 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 not achieved for this set of validation runs.

The three speed groups were divided into 53 to 56 mph for Low speed, 57 to 61 mph for Medium speed and 62+ mph for High speed. The two temperature groups were created by splitting the runs between those at 67 to 76 degrees Fahrenheit for Low temperature and 77 to 85 degrees Fahrenheit for High temperature.

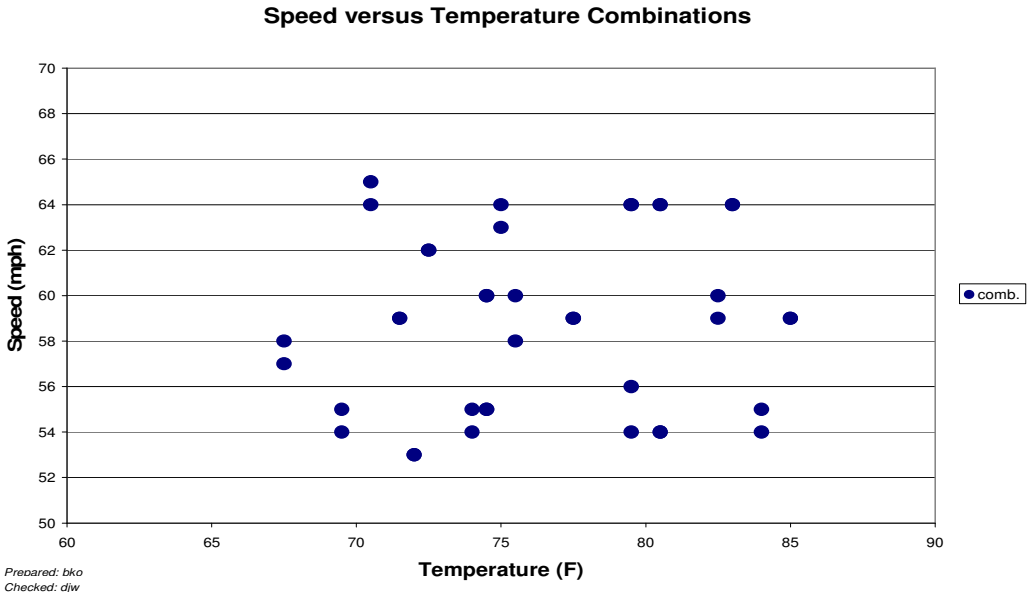

Figure 6-1 Pre-Validation Speed-Temperature Distribution – 510100 – 24-Jul-2007

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 figure illustrates the ability for the equipment to estimate GVW reasonably well at the medium and high speeds but shows a tendency to underestimate at the lower speeds. Variability in error appears greater at the medium speeds.

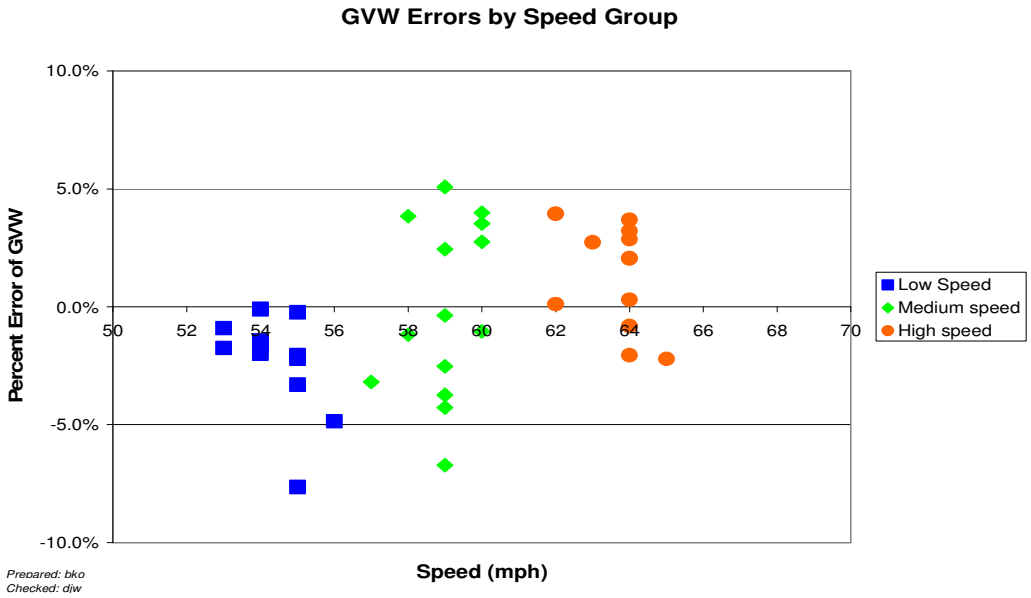

Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 510100 – 24-Jul-2007

Figure 6-3 shows the relationship between temperature and GVW percentage error. It appears that the equipment estimates GVW with reasonable accuracy at all temperatures. Variability in GVW error also appears to be fairly consistent over the entire temperature range.

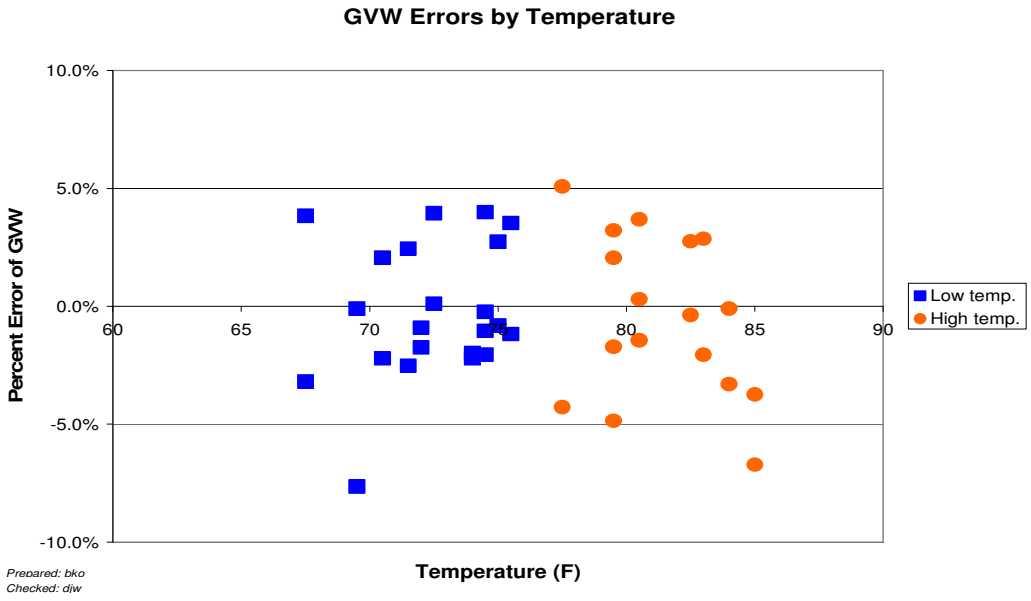

Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 510100 – 24-Jul-2007

Figure 6-4 shows the relation 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 graph indicates that the errors in tandem spacings for the test trucks were not affected by changes in speed.

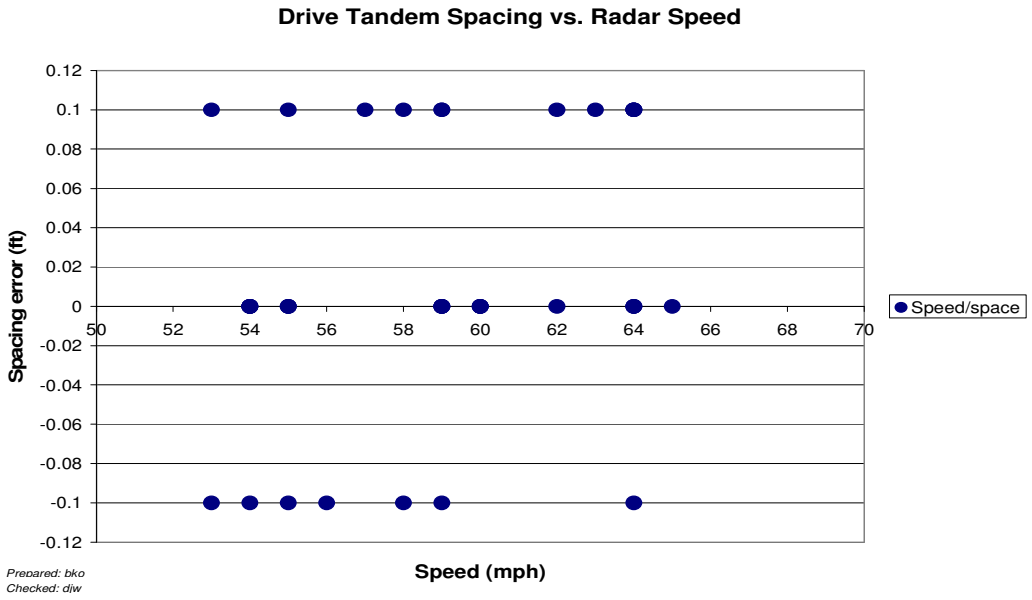

Figure 6-4 Pre-Validation Spacing vs. Speed - 510100 – 24-Jul-2007

6.1 Temperature-based Analysis

The two temperature groups were created by splitting the runs between those at 67 to 76 degrees Fahrenheit for Low temperature and 77 to 85 degrees Fahrenheit for High temperature.

Table 6-2 Pre-Validation Results by Temperature Bin – 510100 – 24-Jul-2007

Element	95% Limit	Low Temperature 67-76 °F	High Temperature 77-85 °F
Steering axles	±20 %	0.3 ± 9.7%	-1.6 ± 6.8%
Tandem axles	±15 %	0.5 ± 11.2%	0.3 ± 11.1%
GVW	±10 %	-0.2 ± 6.0%	-0.6 ± 7.0%
Speed	±1 mph	0.6 ± 1.8 mph	0.2 ± 1.1 mph
Axle spacing	± 0.5 ft	0.0 ± 0.2 ft	0.0 ± 0.1 ft

Prepared: djw *Checked: bko*

From Table 6-2, it appears that the equipment estimates all weights with reasonable accuracy at all temperatures. The variability in error for steering axle weights appears to

be greater at the lower temperatures. For all other weight variability appears to remain fairly consistent.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. The equipment appears to estimate GVW reasonably well for the population as a whole as well as for each truck individually at all temperatures. Variability in GVW error also appears to be reasonably similar over the entire temperature range.

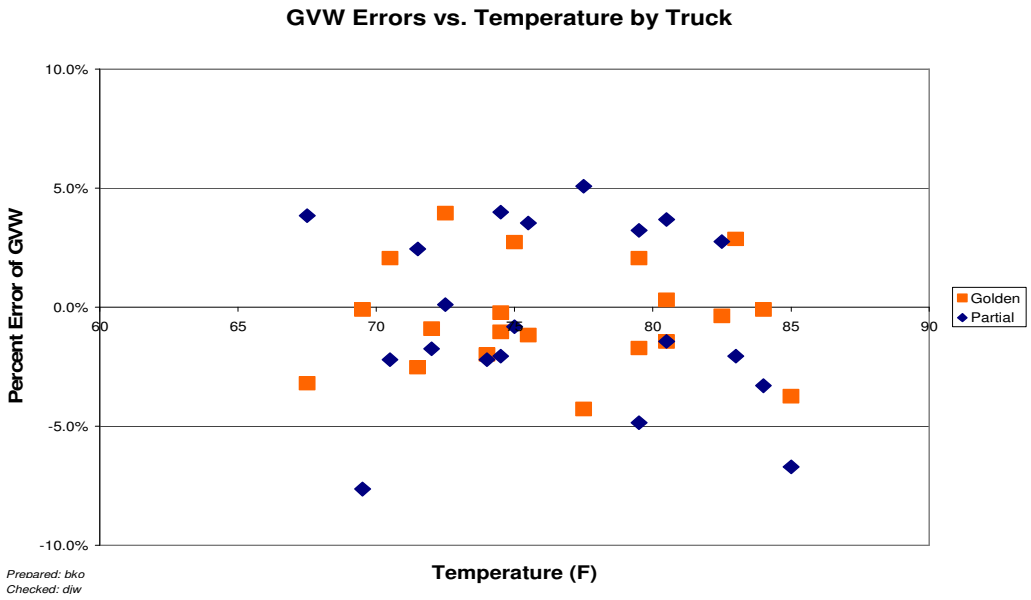

Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 510100 – 24-Jul-2007

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.

The figure shows that steering axle weights are generally estimated with reasonable accuracy at all temperatures. Variability in error appears to be greater at the lower temperatures when compared with the higher temperatures.

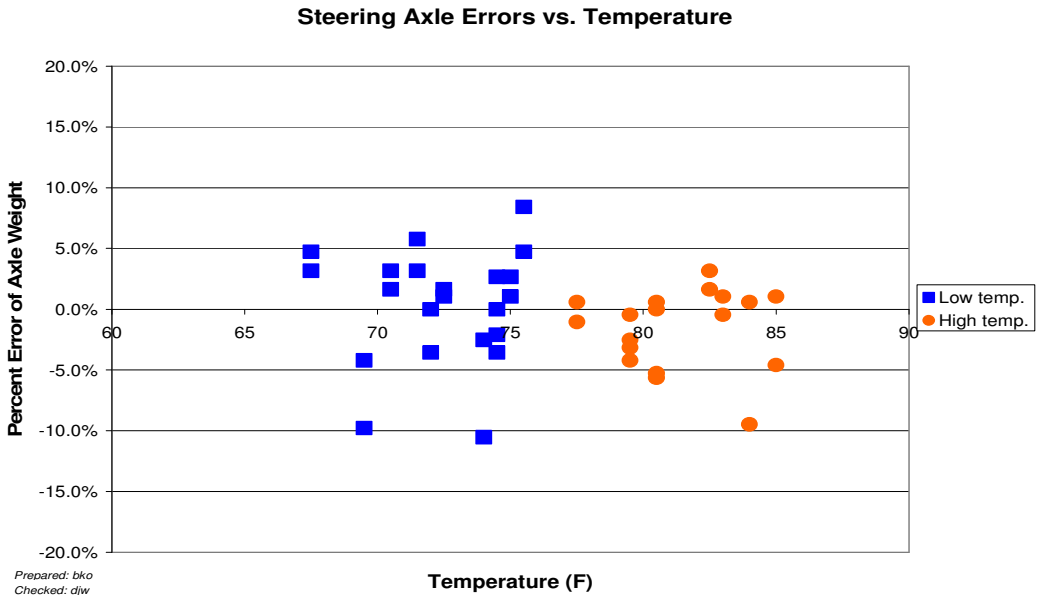

Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group – 510100 – 24-Jul-2007

6.2 Speed-based Analysis

The speed groups were divided as follows: Low speed – 53 to 56 mph, Medium speed – 57 to 61 mph and High speed – 62+ mph.

Table 6-3 Pre-Validation Results by Speed Bin – 510100 – 24-Jul-2007

Element	95% Limit	Low Speed 53 to 56 mph	Medium Speed 57 to 61 mph	High Speed 62+ mph
Steering axles	±20 %	-4.5 ± 7.4%	2.4 ± 6.9%	0.7 ± 3.6%
Tandem axles	±15 %	-0.6 ± 12.1%	0.5 ± 13.4%	1.5 ± 6.2%
GVW	±10 %	-2.1 ± 4.4%	-0.1 ± 8.0%	1.3 ± 4.8%
Speed	±1 mph	0.4 ± 1.4 mph	0.4 ± 1.8 mph	0.4 ± 1.7 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft

Prepared: djw *Checked: bko*

From Table 6-3, it can be seen that the equipment underestimates steering axle weights at low speeds and overestimates steering axle weights at medium speeds. The equipment appears to estimate GVW and tandem weights with reasonable accuracy at all speeds. Variability in steering axle error decreases as speed increases. For GVW and tandem weights, variability is greater at the medium speeds.

Figure 6-7 illustrates the ability of the equipment to estimate GVW with reasonable accuracy at the medium and high speeds and underestimate GVW at the low speeds for the truck population as a whole. Separately, the equipment underestimates the GVW for

the partial truck (diamonds) at low speeds and generally overestimates GVW at medium speeds. For the golden truck (squares) the equipment underestimates GVW at low and medium speeds, and overestimates GVW at the high speeds. Due to the opposing tendencies with regard to each trucks' GVW estimation at medium speeds, variability appears to greater at those speeds.

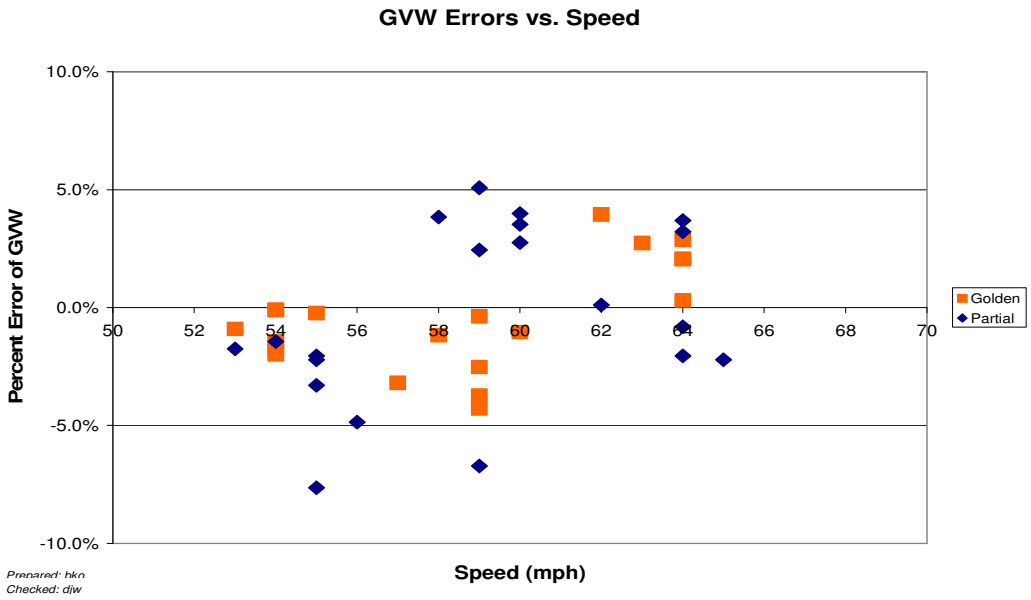

Figure 6-7 Pre-Validation GVW Percent Error vs. Speed Group - 510100 –24-Jul-2007

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.

From the figure, it appears that the equipment underestimates steering axle weights at low speeds. Variability in error appears to be greater at the low and medium speeds.

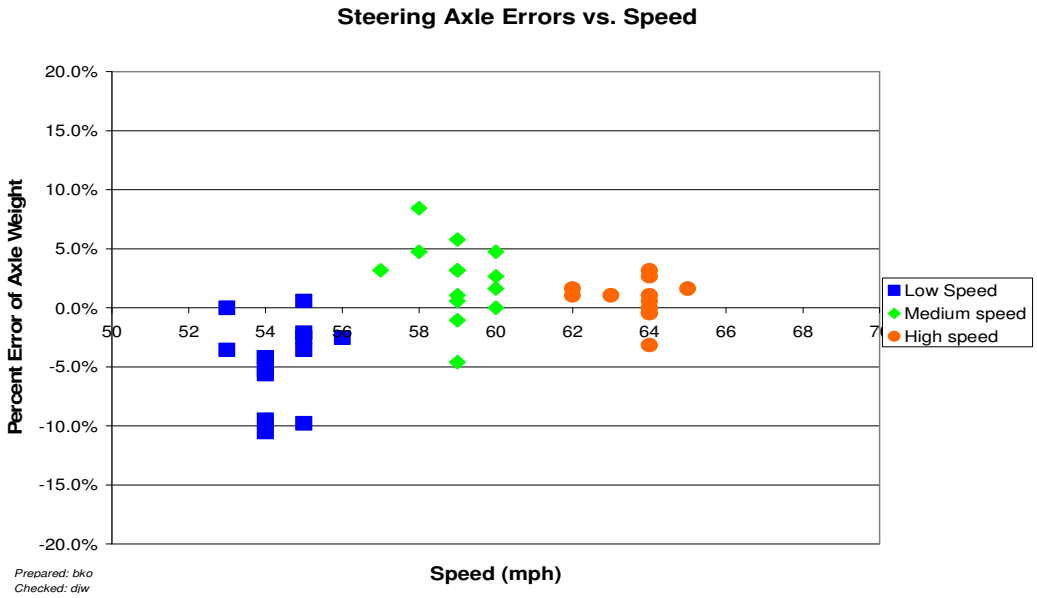

Figure 6-8 Pre-Validation Steering Axle Percent Error vs. Speed Group - 510100 – 24-Jul-2007

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 account for unclassified 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 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 zero percent.

Table 6-4 Truck Misclassification Percentages for 510100 – 24-Jul-2007

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

Prepared: djw *Checked: bko*

The misclassification percentage is computed as the probability that a pair containing the class of interest does NOT include a match. Thus if there are eight pairs of observations

with at least one Class 9 and only six of them a re matches, the error rate is 25 percent. The percent error and the mean differences reported below do not represent the same statistic. It is possible to have error rates greater than 0 with a mean difference of zero.

Table 6-5 Truck Classification Mean Differences for 510100 – 24-Jul-2007

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

Prepared: djw *Checked: bko*

These error rates are normalized to represent how many vehicles of the class are expected to be over- or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown 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.

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: djw *Checked: bko*

6.5 Prior Validations

The last validation for this site was done February 1, 2007. It was the first validation of the site. The site was producing research quality data. Figure 6-9 shows the GVW Percent Error vs. Speed for the post validation runs. The site was validated with two

trucks. The "Golden" truck was loaded to 75,750 lbs. The "partial" truck which had air suspension on the tractor tandem and tapered leaf/walking beam suspension on the trailer tandem was loaded to 65,310 lbs.

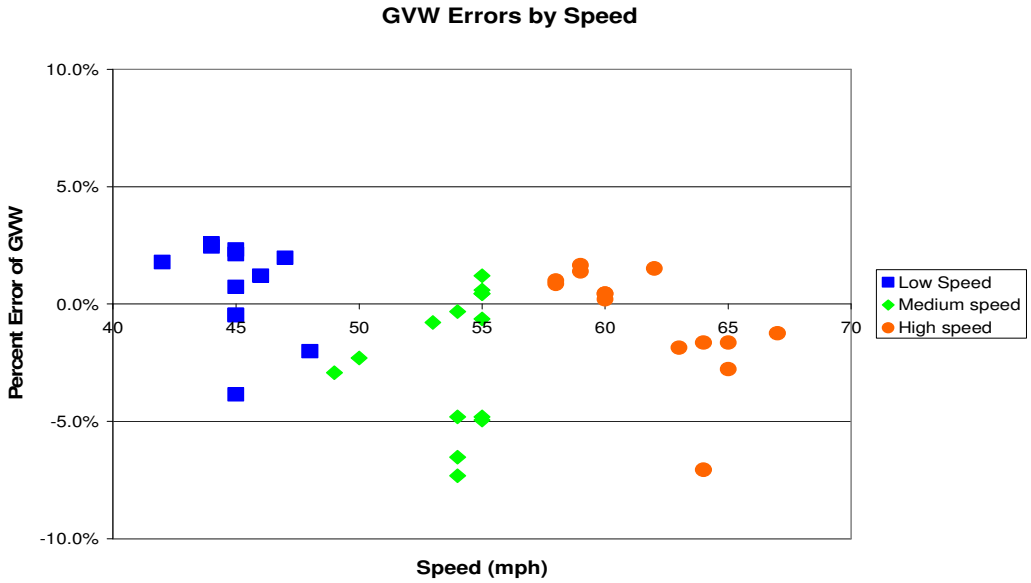

Figure 6-9 Last Validation GVW Percent Error vs. Speed – 510100 – 01-Feb-2007

Table 6-7 shows the overall results from the last validation which met all LTPP precision requirements except speed which is not considered sufficient to disqualify the site as having research quality data. In the six months since the last validation the variability has increased slightly. The tendency to under estimate steering axles diminished.

Table 6-7 Last Validation Final Results – 510100 – 01-Feb-2007

SPS-1, -2, -5, -6 and -8	95 % Confidence Limit of Error	Site Values	Pass/Fail
Steering axles	±20 percent	-4.7 ± 5.4%	Pass
Tandem axles	±15 percent	-0.1 ± 7.2%	Pass
Gross vehicle weights	±10 percent	-0.8 ± 5.5%	Pass
Speed	**±1 mph [2 km/hr]**	**0.1 ± 1.4 mph**	**Fail**
Axle spacing	± 0.5 ft [150 mm]	0.0 ± 0.1 ft	Pass

Prepared: djw *Checked: bko*

Table 6-8 has the results at the end of the last validation by temperature. Temperatures over the course of the test period did not fluctuate by a considerable amount, resulting in a modest range of pavement temperatures. Through this validation the equipment has been observed at temperatures from 27 to 96 degrees Fahrenheit.

Table 6-8 Last Validation Results by Temperature Bin – 510100 – 01-Feb-2007

Element	95% Limit	Low Temperature 27 - 34°F	High Temperature 35 – 45°F
Steering axles	±20 %	-4.3 ± 6.0%	-5.2 ± 5.1%
Tandem axles	±15 %	0.2 ± 7.2%	-0.4 ± 7.4%
GVW	±10 %	-0.5 ± 5.5%	-1.2 ± 5.8%
Speed	±1 mph	0.3 ± 1.5 mph	0.0 ± 1.4 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.0 ft

Prepared: djw *Checked: bko*

Table 6-9 has the results of the prior post validation by speed groups. It can be seen from the table that the equipment underestimates steering axle weights at all speeds. For tandem weights, the equipment underestimates at medium speeds. GVW weights are underestimated at medium speeds.

Table 6-9 Last Validation Results by Speed Bin – 510100 – 01-Feb-2007

Element	95% Limit	Low Speed 42 to 48 mph	Medium Speed 49 to 57 mph	High Speed 58+ mph
Steering axles	±20 %	-4.1 ± 6.4%	-6 ± 3.9%	-4.3 ± 6%
Tandem axles	±15 %	1.0 ± 6.7%	-1.4 ± 9.1%	0.1 ± 5.7%
GVW	±10 %	0.3 ± 5.4%	-2.1 ± 6.3%	-0.6 ± 5.1%
Speed	±1 mph	0.3 ± 1.4 mph	0.0 ± 1.2 mph	0.0 ± 1.8 mph
Axle spacing	± 0.5 ft	0.0 ± 0.1 ft	0.0 ± 0.1 ft	0.0 ± 0.0 ft

Prepared: djw *Checked: bko*

The current validation was conducted over a wider range of speeds than the current one. At the high end of the speed range, which is the same, the site has gone from underestimating to overestimating GVW.

7 Data Availability and Quality

As of July 24, 2007 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.

This site was installed in November, 2006. The site was selected by IRD and is located approximately 500 feet downstream of the original site. Therefore, there is no full year 2006 data for this site. **An additional 5 years of data is needed to meet the goal of a minimum of 5 years of research weight data.**

The amount and coverage for the site is shown in Table 7-1. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. As can be seen from the table only 1997 has a sufficient quantity to be considered a complete year of data. In the absence of previously gathered validation information it can be seen that at least 5 additional years of research quality data are needed to meet the goal of a minimum of 5 years of research weight data.

Table 7-1 Amount of Traffic Data Available 510100 – 24-Jul-2007

Year	Classification Days	Months	Coverage	Weight Days	Months	Coverage
1997	296	12	Full Week	286	11	Full Week
2004	7	1	Full Week			

Prepared: djw *Checked: bko*

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

Class 9s and Class 5s constitute more than 10 percent of the truck population. Based on the data collected from the end of the last calibration iteration the following are the expected values for these populations. The precise values to be used in data review will need to be determined by the 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 7-2 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.

- For all other trucks the typical axle configuration is used to determine the maximum allowable weight based on 18,000 pounds for single axles and 34,000 pounds for tandem axles. A ten percent cushion above that maximum is used to set the overweight threshold.
- For all other trucks in the absence of site specific information the computation of under weights assumes the power unit weighs 10,000 pounds and each axle on a trailer 5,000 pounds. Ninety percent of the total for the unloaded configuration is the value below which a truck is considered under weight.
- For all trucks other than class 9s that have a bi-modal distribution the unloaded peak is defined to be in a bin less than or equal to half of the allowable maximum weight.
- For all trucks other than class 9s that have a bi-modal distribution the loaded peak is defined to be in a bin greater than or equal to half of the allowable maximum weight.

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 – 510100 – 25-Jul-2007

Characteristic	Class 9	Class 5
Percentage Overweights	0.3%	0.0%
Percentage Underweights	0.0%	3.0%
Unloaded Peak	36,000 lbs	
Loaded Peak	80,000 lbs	
Peak		12,000 lbs

Prepared: djw *Checked: bko*

The expected percentage of unclassified vehicles is 1.4%. This is based on the percentage of unclassified vehicles in the post-validation data download.

The graphical screening comparison figures are found in Figure 7-2 through Figure 7-4. 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.

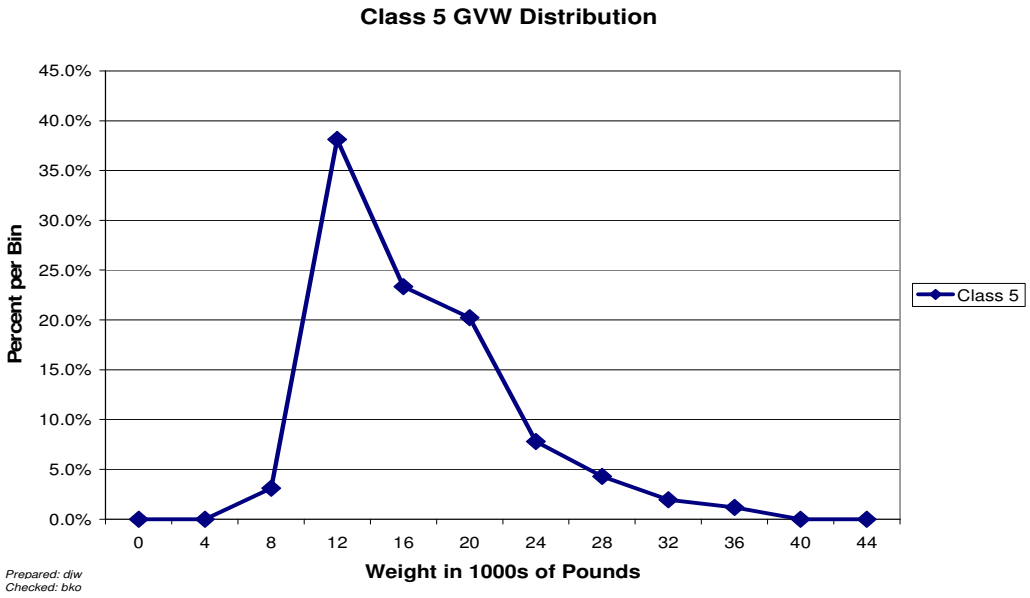

Figure 7-1 Expected GVW Distribution Class 5 – 510100 – 25-Jul-2007

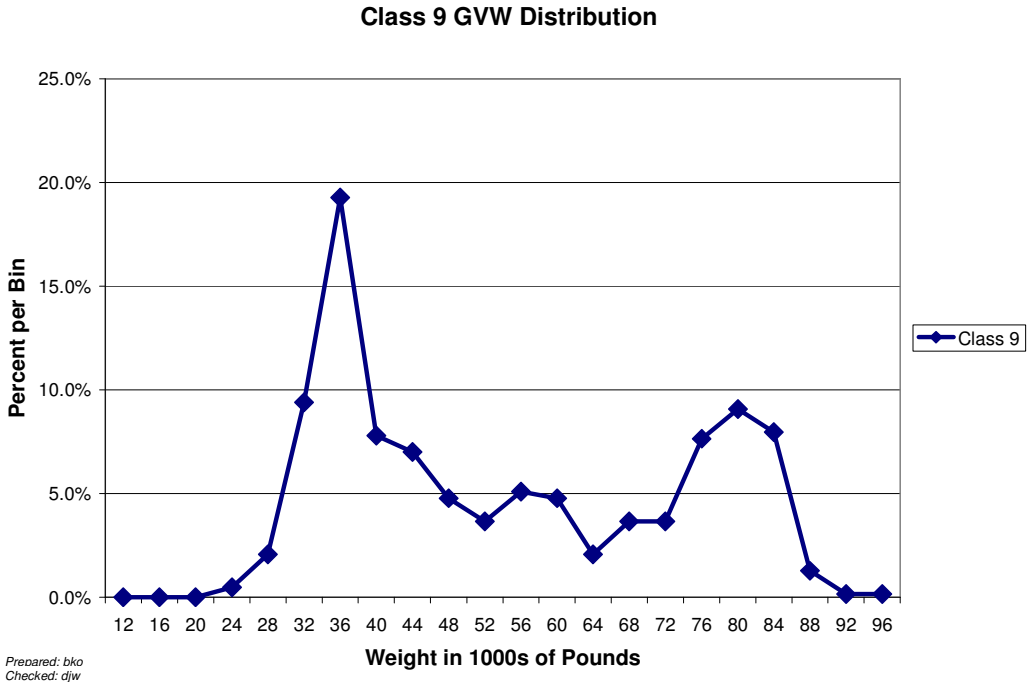

Figure 7-2 Expected GVW Distribution Class 9 – 510100 – 25-Jul-2007

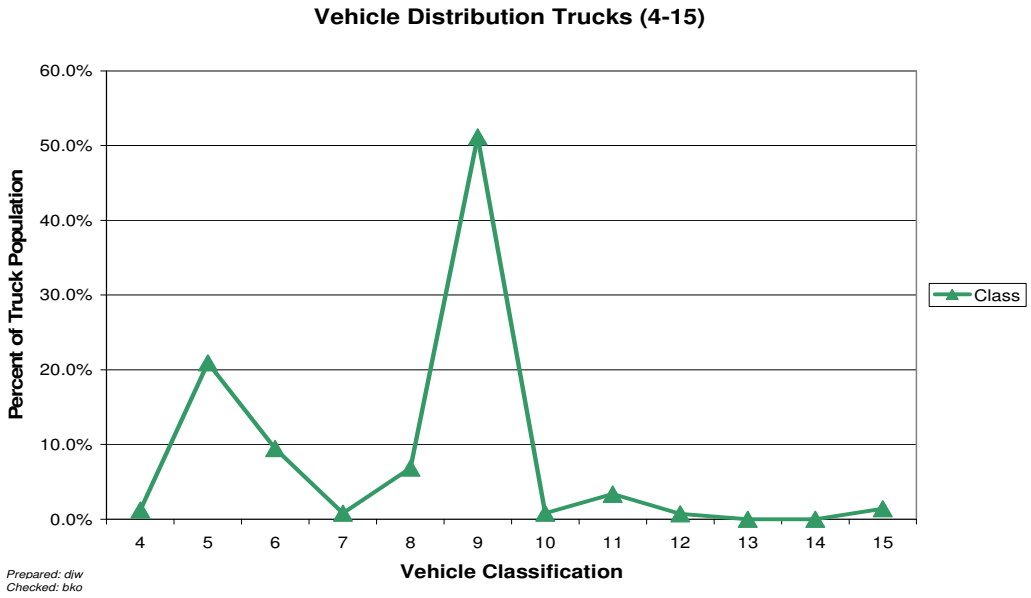

Figure 7-3 Expected Vehicle Distribution – 510100 – 25-Jul-2007

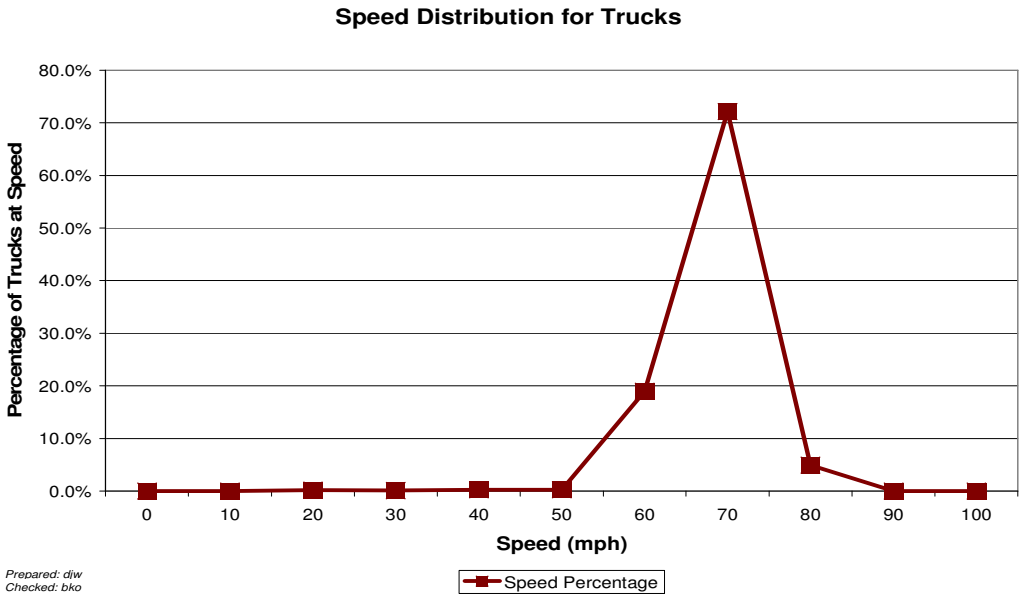

Figure 7-4 Expected Speed Distribution – 510100 – 25-Jul-2007

8 Data Sheets

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

Sheet 19 – Truck 1 – 3S2 loaded air suspension (6 pages)
Sheet 19 – Truck 2 – 3S2 partially loaded with air tractor suspension and mechanical trailer suspension (6 pages)

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

Sheet 21 – Pre-validation (3 pages)
Sheet 21 – Post-validation (3 pages)

Test Truck Photographs (6 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 page 28. 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: Virginia

SHRP ID: 510100

Figures

1. General Information

SITE ID: *510100*

LOCATION: *US-29 Bypass, milepost 12.8, near Danville*

VISIT DATE: *July 24, 2007*

VISIT TYPE: *Validation*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *Mohamed Elfino, 804-328-3173, mohamed.elfino@vdot.virginia.gov*

Richard Bush, 804-786-7006, Richard.bush@vdot.virginia.gov

Hamlin Williams, 804-786-0134, hamlin.williams@vdot.virginia.gov

Tom Schinkel, 804-255-3123, tom.schinkel@vdot.virginia.gov

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

FHWA Division Office Liaison: *Lorenzo Casanova, 804-775-3362, lorenzo.casanova@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: *July 24 to 26, 2007.*

TRUCK ROUTE CHECK: *Completed at previous validation visit.*

4. Site Location/ Directions

NEAREST AIRPORT: *Piedmont Triad International Airport, Greensboro, NC*

DIRECTIONS TO THE SITE: *US-29 Bypass, approximately 8 miles north of Danville.*

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

WIM SITE LOCATION: *US-29 bypass, milepost 12.8; GPS = 36.6599° N, -79.3656° W.*

WIM SITE LOCATION MAP: *See Figure 4.1*

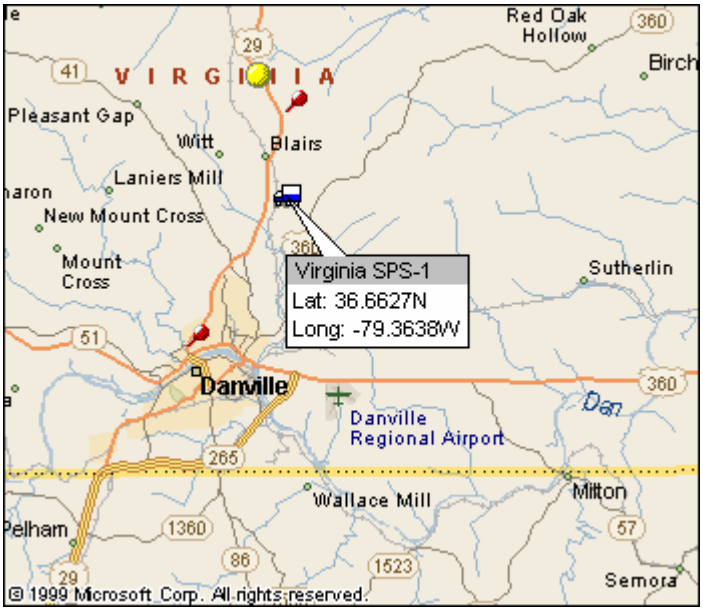

Figure 4-1 – Site 510100 in Virginia

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *9181 US-29, Blairs, VA; approximately 4 miles north of the site; GPS = 36.7163° N, -79.3793° W.*

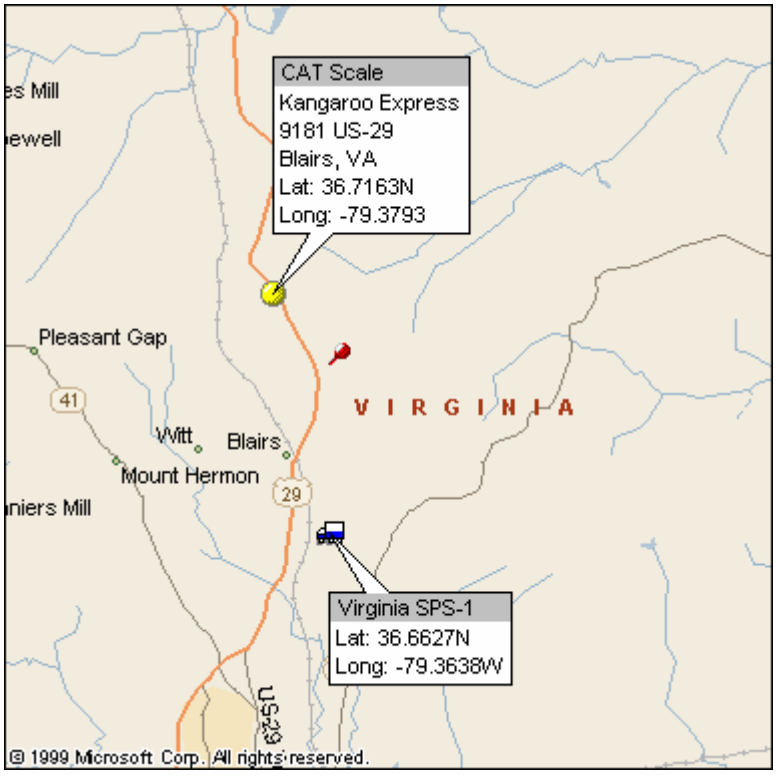

Figure 5-1 – Truck Scale Location for 510100 in Virginia

TRUCK ROUTE: *See Figure 5.1*

NB on US-29 to Blairs/Danville exit (2.7 miles)
SB on US-29 to Halifax exit (3.1 miles)

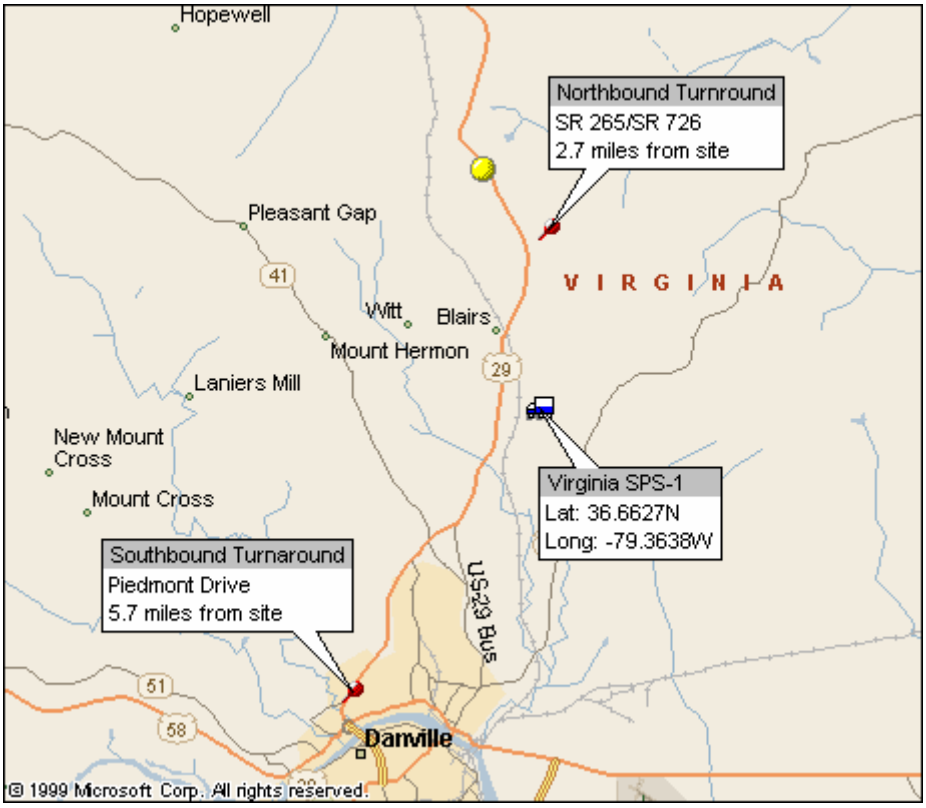

Figure 5-2 – Truck Route at 510100 in Virginia

SB distance = 3.1 miles
NB distance = 2.7 miles

Total distance = 11.6 miles (14 minutes)

6. Sheet 17 – Virginia (510100)

1.* ROUTE _US-29 Bypass__ MILEPOST __12.8__ LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade ___<1___ % Sag vertical Y / N
Nearest SPS section upstream of the site _5_1_0_1_4__
Distance from sensor to nearest upstream SPS Section __3 _9_5___ ft

3.* LANE CONFIGURATION
Lanes in LTPP direction __2_ Lane width _1 _2 _ ft

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

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

Shoulder width __1_1___ ft

4.* PAVEMENT TYPE ___PCC_____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date _____ Photo Filename: 51_0100_Downstream_07_24_2007.jpg
Date _____ Photo Filename: 51_0100_Upstream_07_24_2007.jpg
Date _____ 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 __2_7___ ft
Distance from system __3_3___ ft
TYPE _____336 Short_____

CABINET ACCESS controlled by LTPP / STATE / JOINT ?
Contact - name and phone number _Hamlin Williams__804-786-7006___
Alternate - name and phone number __Roy Czinku__306-653-6627___

11. * POWER

Distance to cabinet from drop __ 4_____ ft Overhead / underground / solar /
AC in cabinet?
Service provider _____ Phone number _____

12. * TELEPHONE

Distance to cabinet from drop __4_____ ft Overhead / under ground / cell?
Service provider _____ Phone Number _____

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

14. * TEST TRUCK TURNAROUND time __14_minutes__Distance _11.6__ mi.

15. PHOTOS	FILENAME
Power source	51_0100_Power_Box_07_24_2007.jpg
	51_0100_Power_Station_07_24_2007.jpg
Phone source	51_0100_Telephone_Box_07_24_2007.jpg
Cabinet exterior	51_0100_Cabinet_Exterior_07_24_2007.jpg
Cabinet interior	51_0100_Cabinet_Interior_Back_07_24_2007.jpg
	51_0100_Cabinet_Interior_Front_07_24_2007.jpg
Weight sensors	51_0100_Leading_WIM_Sensor_07_24_2007.jpg
	51_0100_Trailing_WIM_Sensor_07_24_2007.jpg
Classification sensors	_____
Description	Loops
Other sensors	51_0100_Leading_Loop_07_24_2007 .jpg
	51_0100_Trailing_Loop_07_24_2007.jpg

Downstream direction at sensors on LTPP lane
510100_Downstream_07_24_2007.jpg

Upstream direction at sensors on LTPP lane
_0100_Upstream_07_24_2007.jpg

COMMENTS _____

_____concrete section = 425 feet_____

_____leading edge of leading loop is 313 feet from approaching transition_____

COMPLETED BY ____Dean J. Wolf_____

PHONE _301-210-5105_____ DATE COMPLETED _0_7_ /_ 2 4 / _2_0_0_7__

Sketch of equipment layout

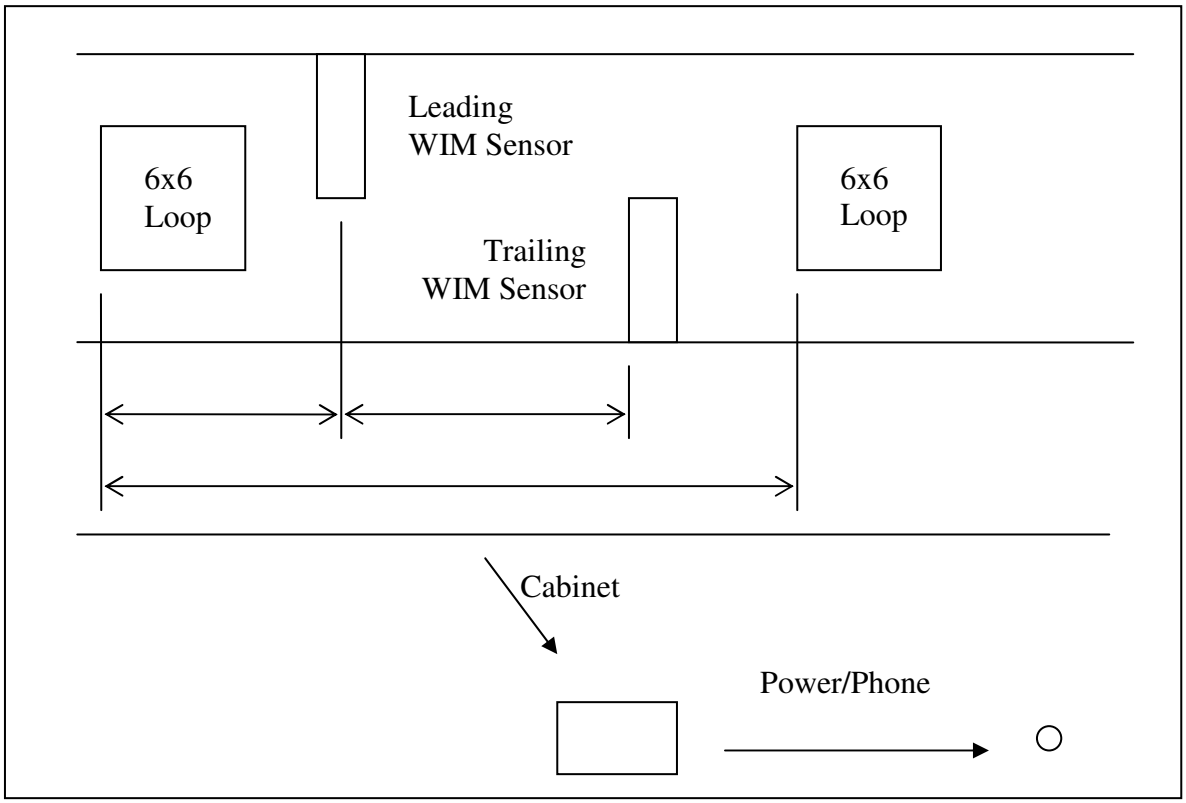

Figure 6-1 - Site Equipment Layout for 510100 in Virginia

Site Map

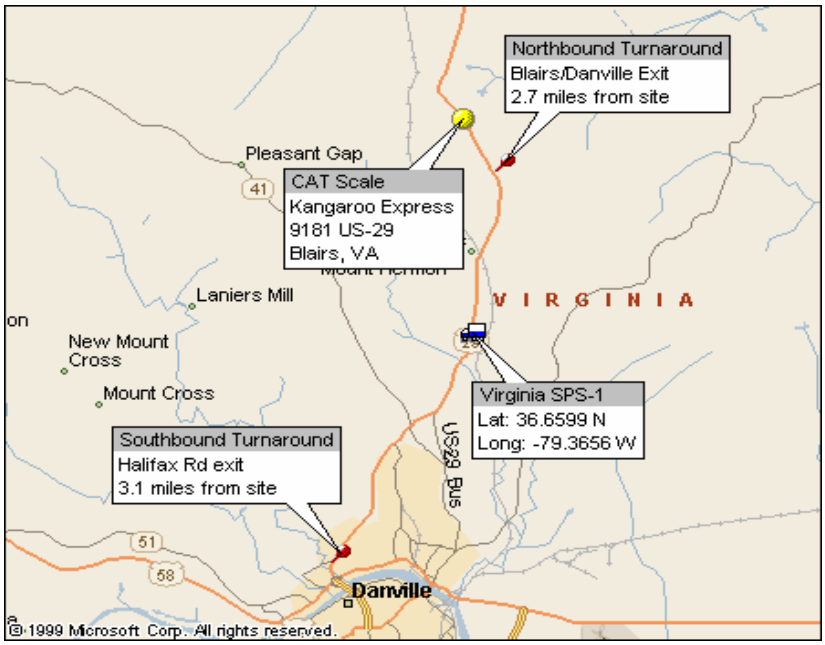

Figure 6-2 - Site Map for 510100 in Virginia

Figure 6-3 51_0100_ Downstream_07_24_2007.jpg

Figure 6-4 51_0100_ Upstream_07_24_2007.jpg

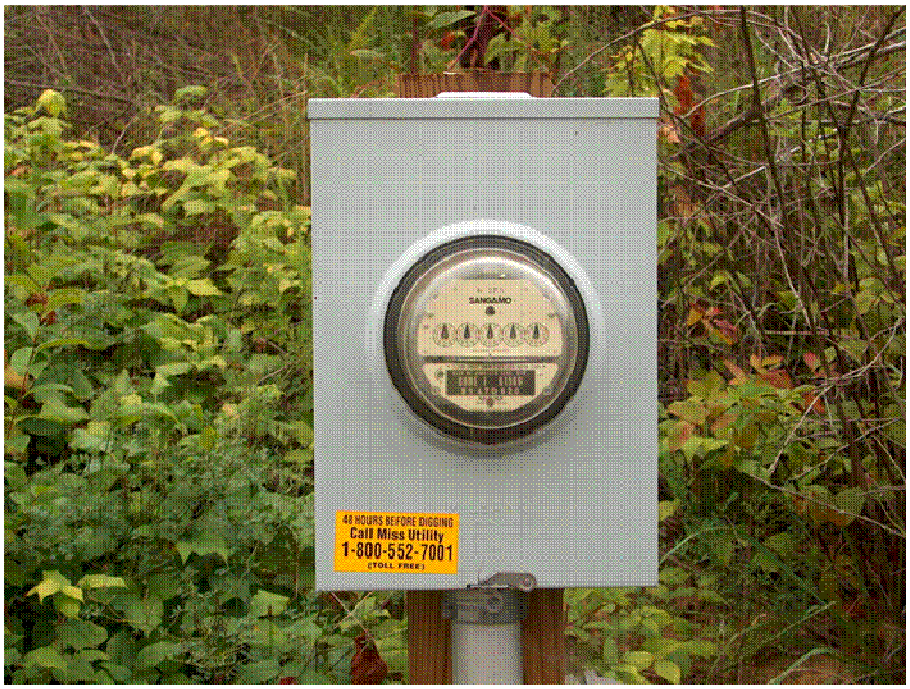

Figure 6-5 51_0100_Power_Box_07_24_2007. JPG

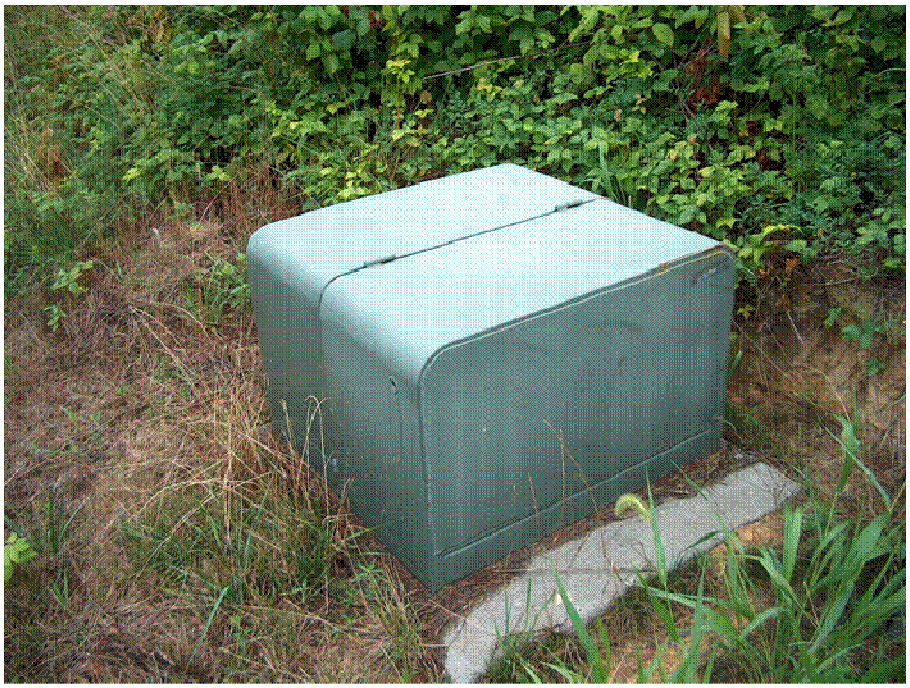

Figure 6-6 51_0100_Power_Station_07_24_2007.jpg

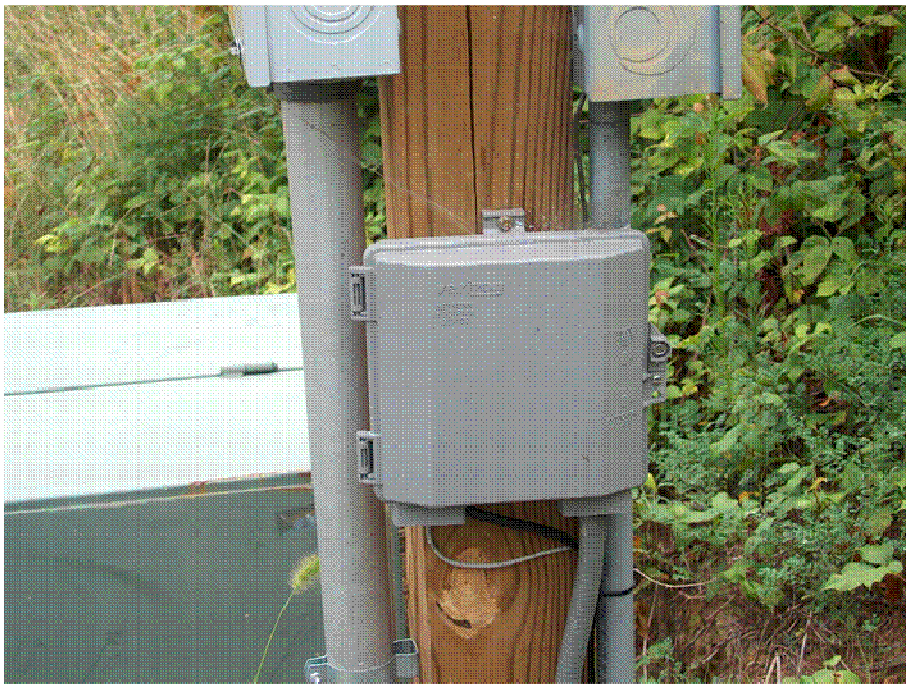

Figure 6-7 51_0100_ Telephone Box _07_24_2007.jpg

Figure 6-8 51_0100_ Cabinet_Exterior_07_24_2007.jpg

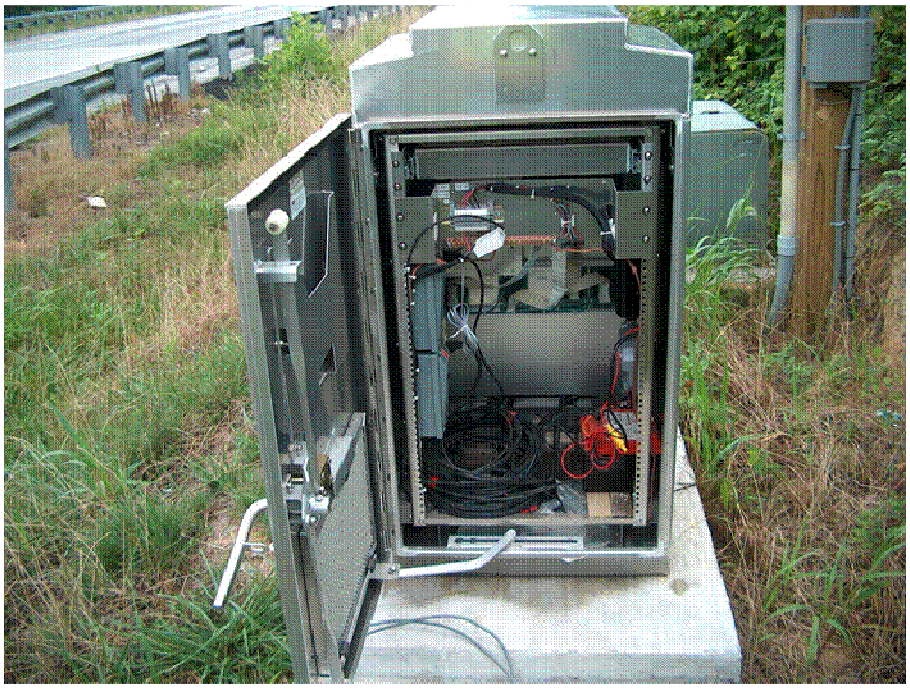

Figure 6-9 51_0100_ Cabinet_Interior_Back_07_24_2007.jpg

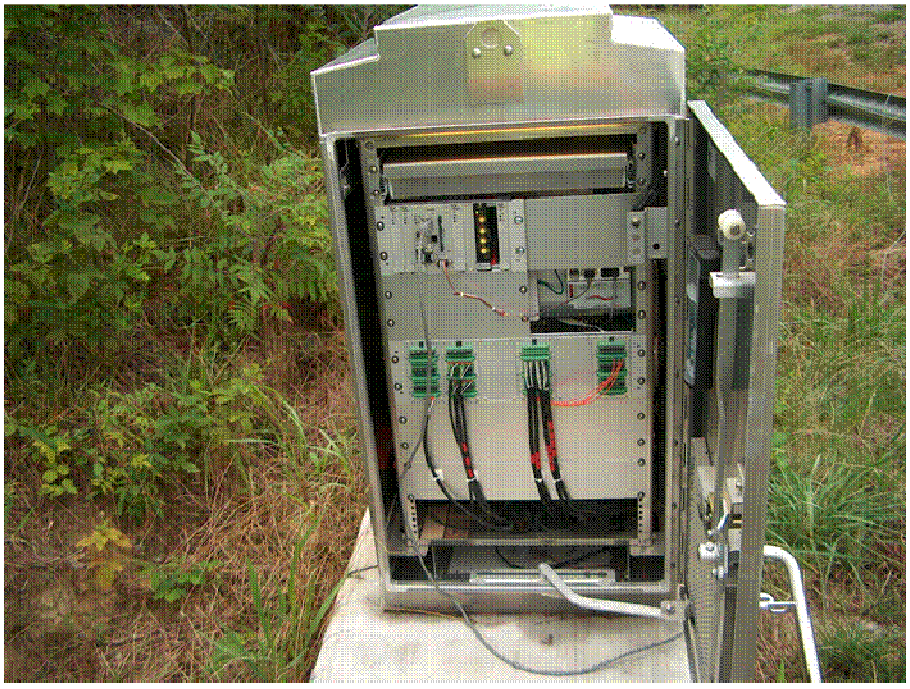

Figure 6-10 51_0100_ Cabinet_Interior_Front_07_24_2007.jpg

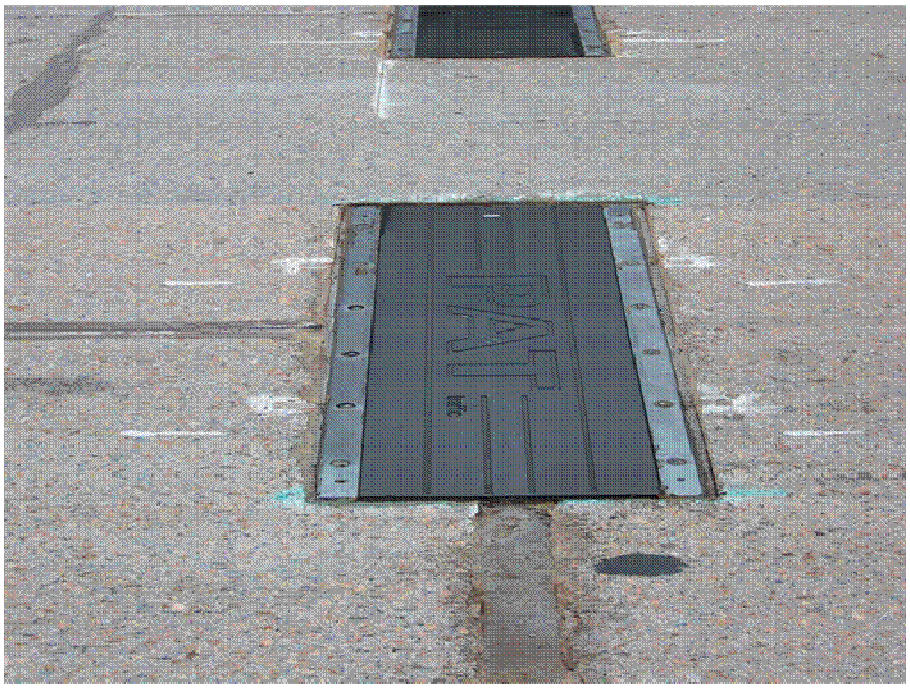

Figure 6-11 51_0100_ Leading_WIM_Sensor _07_24_2007.jpg

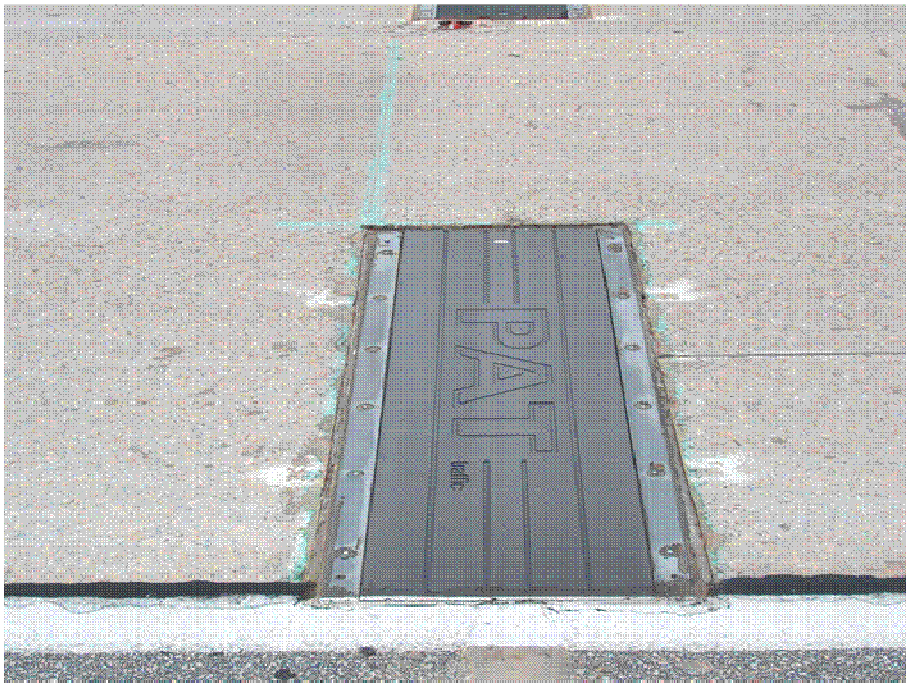

Figure 6-12 51_0100_ Trailing_WIM_Sensor_07_24_2007.jpg

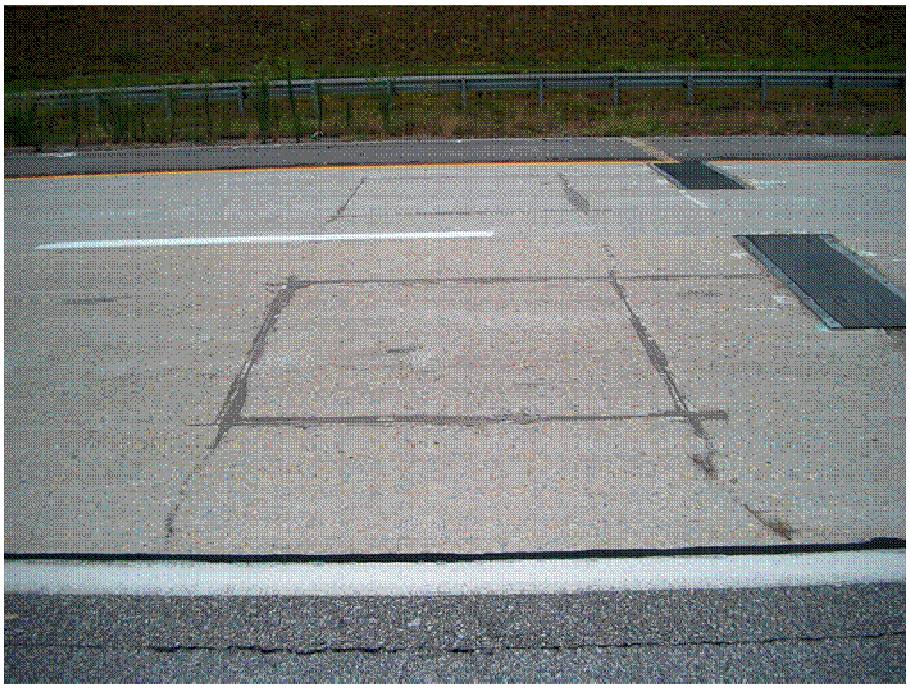

Figure 6-13 51_0100_ Leading_Loop_07_24_2007.jpg

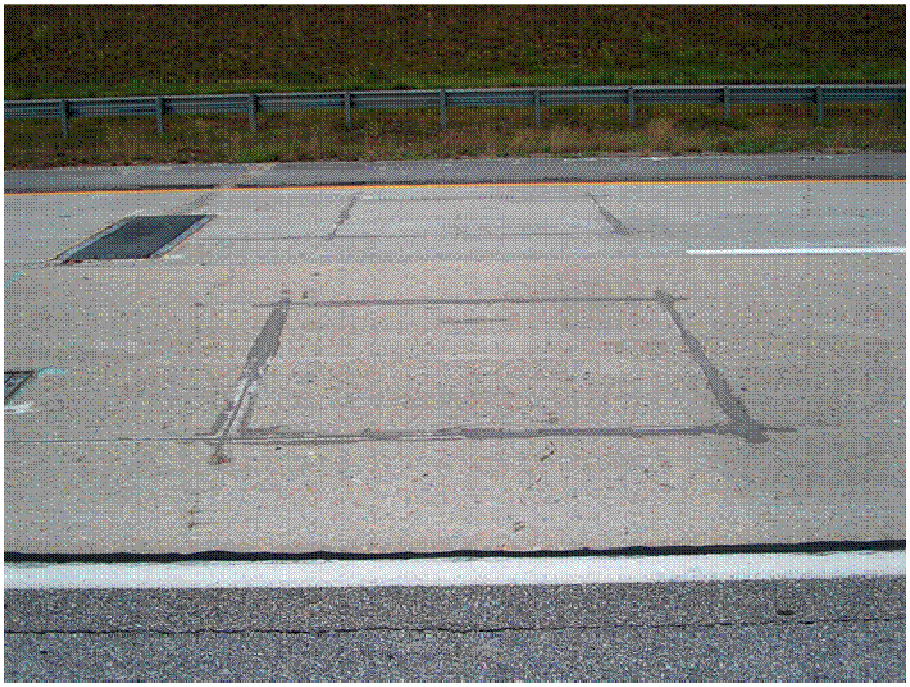

Figure 6-14 51_0100_ Trailing Loop _07_24_2007.jpg

SHEET 18	STATE CODE [51]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0100]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 7/24/2007

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

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 _____ ☐ days ☒ weeks

b. Notice for straightedge and grinding check - _____ ☐ 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 [51]
LTPP MONITORED TRAFFIC DATA	SPS PROJECT ID [0100]
WIM SITE COORDINATION	DATE: (mm/dd/yyyy) 7/24/2007

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: Don French Phone:434-947-6559

Agency: Lynchburg District, VA DOT

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

Name: Ed Foust Phone:434-799-6743

Agency: Thompson Trucking, Inc.

f. Traffic Control –

Name: Don French Phone:434-947-6559

Agency: Lynchburg Distrcit, VA DOT

g. Enforcement Coordination –

Name: _____ Phone:_____

Agency: _____

h. Nearest Static Scale

Name: Kangaroo Location:I-29 Business, Blairs, VA

Phone: _____

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [51] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [7/24/2007]

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

3. * REASON FOR CALIBRATION
   - ____ REGULARLY SCHEDULED SITE VISIT
   - ____ EQUIPMENT REPLACEMENT
   - ____ DATA TRIGGERED SYSTEM REVISION
   - ____ RESEARCH
   - ____ TRAINING
   - ____ 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

__ 20__ 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_____	___3_____
		1st axle leaf spring, second axle rocker bar
3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   - DYNAMIC AND STATIC GVW ___-0.4 STANDARD DEVIATION ___3.1
   - DYNAMIC AND STATIC SINGLE AXLES ___-0.5 STANDARD DEVIATION ___4.2
   - DYNAMIC AND STATIC DOUBLE AXLES ___0.4 STANDARD DEVIATION ___5.5

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ _55_ __60__ __65_ _____ __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) ___3700.00___

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 8 ____ 0.0
   - FHWA CLASS ____ ____ ____ _____
   - 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 [51] *SHRP SECTION ID [0100]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [7/26/2007]

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

3. * REASON FOR CALIBRATION
   - ____ REGULARLY SCHEDULED SITE VISIT
   - ____ EQUIPMENT REPLACEMENT
   - ____ DATA TRIGGERED SYSTEM REVISION
   - ____ RESEARCH
   - ____ TRAINING
   - ____ 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

__ 20__ 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____	___3__
		1st axle leaf spring, second axle rocker bar
3	_____	_____

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   - DYNAMIC AND STATIC GVW ___0.1 STANDARD DEVIATION ___3.0
   - DYNAMIC AND STATIC SINGLE AXLES ___-2.7 STANDARD DEVIATION ___5.1
   - DYNAMIC AND STATIC DOUBLE AXLES ___0.9 STANDARD DEVIATION ___4.5

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ _55_ __60__ __65_ _____ __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

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

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 8 ____ 0.0
   - FHWA CLASS ____ ____ ____ _____
   - 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 51
LTPP Traffic Data	* SPS PROJECT ID 0100
*CALIBRATION TEST TRUCK # 1	* DATE 7/24/07

Rev. 08/31/01

PART I.

TRUCK # 3206
TRAILER # 90

1.* FHWA Class 9 2.* Number of Axles 5 Number of weight days 3

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight (day __)	5.* Post-Test Average Loaded Axle Weight (day __)	6.* Measured D)irectly or C)alculated?
A		9680	9320	(D) / C
B		19530	19350	(D) / C
C		19503	19350	(D) / C
D		12900	12920	(D) / C
E		12900	12920	(D) / C
F				D / C

GVW (same units as axles)

Day 1

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 64713 74490
*c) Post Test Loaded Weight 64440 73860
*d) Difference Post Test – Pre-test -573 -630

GEOMETRY

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

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

10.* Trailer Load Distribution Description:

ROCK

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE_CODE	51
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	7/24/07

Rev. 08/31/01

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

A to B 15.0 B to C 4.4 C to D 29.0

D to E 4.3 E to F _____

Wheelbased (measured A to last) _____ Computed 52.7

13. *Kingpin Offset From Axle B (units) _____ (+2.3)

(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R22.5	2 full leaf steel leaf
B	11R22.5	AIR
C	11R22.5	AIR
D	275R24.5	AIR
E	275R24.5	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	51
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	7/24/07

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	0	II -I	0	III -II	0	IV -III	0	V -IV	0	V	0
V -VI	0	VI-VII	0	VII-VIII	0	VIII-IX	0	IX`	0	X	0
										XI	0
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	0	II -I	0	III -II	0	IV -III	0	V -IV	0	V	0
V -VI	0	VI-VII	0	VII-VIII	0	VIII-IX	0	IX`	0	X	0
										XI	0
Avg.											

Sheet 19	* STATE_CODE	51
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	7/24/07

Rev. 08/31/01

Table 4 . Axle and GVW computations -

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I	0	II -I	0	III -II	0	IV -III	0	V -IV	0	V	0
V -VI	0	VI-VII	0	VII-VIII	0	VIII-IX	0	IX`	0	X	0
										XI	0
Avg.											

Day 1

pre 74490
post 73860
-630

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9680	19500	19500	12900	12900		74480
2	9740	19470	19470	12910	12910		74500
3	9620	19540	19540	12890	12890		74480
Average	9680	19500	19500	12900	12900		~~74490~~ 74487

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	9320	19350	19350	12920	12920		73860
2							
3							
Average	9320	19350	19350	12920	12920		73860

Measured By dw Verified By MVT Weight date 7/24/07

Sheet 19	* STATE_CODE	51
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 1	* DATE	7/25/07

Rev. 08/31/01

Day 2

7.2 *b) Average Pre-Test Loaded weight 74850

*c) Post Test Loaded Weight 74220

*d) Difference Post Test – Pre-test -630

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	10070	19470	19470	12950	12950		74880
2	10060	19450	19450	12960	12960		74880
3 X	10060	19470	19470	12950	12950		74900
Average	10050	19460	19460	12940	12940		74950

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	9580	19400	19400	12920	12920		74220
2							
3							
Average	9580	19400	19400	12920	12920		74220

Measured By djw Verified By MVT Weight date 7/25/07

Sheet 19	* STATE_CODE 51
LTPP Traffic Data	* SPS PROJECT ID 0100
*CALIBRATION TEST TRUCK # 1	* DATE

Rev. 08/31/01

Day 3

7..3 *b) Average Pre-Test Loaded weight 74610
*c) Post Test Loaded Weight 74180
*d) Difference Post Test – Pre-test -930

Table 5.3. Raw data – Axle scales – pre-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9880	19430	19430	12930	12930		74600
2	9820	19500	19500	12900	12900		74620
3	9820	19490	19490	12910	12910		74620
Average	9840	19470	19470	12910	12910		74610

Table 6.3. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9						
2							
3							
Average							

Table 7.3. Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9660	19350	19350	12910	12910		74180
2							
3							
Average	9660	19350	19350	12910	12910		74180

Measured By JW Verified By _____ Weight date 9/26/07

Sheet 19	* STATE_CODE	51
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 2	* DATE	7/24/97

Rev. 08/31/01

Truck # 3411

PART I.

1.* FHWA Class 9 2.* Number of Axles 5 Number of weight days 3

AXLES - units - lbs / 100s lbs / kg

	3. Empty Truck Axle Weight	4.* Pre-Test Average Loaded Axle Weight (day __)	5.* Post-Test Average Loaded Axle Weight (day __)	6.* Measured D)irectly or C)alculated?
A		9827	9460	(D) / C
B		10347	10220	(D) / C
C		10347	10220	(D) / C
D		17097	17120	(D) / C
E		17097	17120	(D) / C
F				D / C

GVW (same units as axles)

Day 1

7. a) Empty GVW _____

*b) Average Pre-Test Loaded weight 64710

*c) Post Test Loaded Weight 64140

*d) Difference Post Test – Pre-test -570

GEOMETRY

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

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

10.* Trailer Load Distribution Description:

Box

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

b). Trailer Tare Weight (units): _____

Sheet 19	* STATE_CODE	51
LTPP Traffic Data	* SPS PROJECT ID	0100
*CALIBRATION TEST TRUCK # 2	* DATE	7/24/07

Rev. 08/31/01

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

A to B 15.0 B to C 4.4 C to D 20.6

D to E 4.3 E to F _____

Wheelbased (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) + 2.3 (_____)
(+ is to the rear)

SUSPENSION

Axle	14. Tire Size	15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.)
A	11R22.5	2 FULL STEEL LEAF
B	11R22.5	AIR
C	11R22.5	AIR
D	11R22.5	9 -WIDED STEEL LEAF
E	11R22.5	ROCKER BAR
F	_____	_____

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

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

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PART II

Table 1. Axle and GVW computations - pre-test

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I	0	II -I	0	III -II	0	IV -III	0	V -IV	0	V	0
V -VI	0	VI-VII	0	VII-VIII	0	VIII-IX	0	IX`	0	X	0
										XI	0
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	0	II -I	0	III -II	0	IV -III	0	V -IV	0	V	0
V -VI	0	VI-VII	0	VII-VIII	0	VIII-IX	0	IX`	0	X	0
										XI	0
Avg.											

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Table 4 . Axle and GVW computations -

Axle A		Axle B		Axle C		Axle D		Axle E		GVW	
I	0	II -I	0	III -II	0	IV -III	0	V -IV	0	V	0
V -VI	0	VI-VII	0	VII-VIII	0	VIII-IX	0	IX`	0	X	0
										XI	0
Avg.											

Day 1

pre 64710
post 64140
-570

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9840	~~10340~~ 10360	~~10340~~ 10360	17090	17090		64700
2	9820	10340	10340	17110	17110		64720
3	9820	10360	10360	17090	17090		64720
Average	~~9830~~	~~10350~~	~~10350~~	~~17100~~	17100		~~64710~~
	9827	10347	10347	17097			64713

Table 6. Raw data – Axle scales –

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9460	~~10220~~	~~10220~~	~~17120~~	~~17120~~		~~64140~~
2							
3							
Average	9460	~~10220~~	~~10220~~	~~17120~~	~~17120~~		~~64140~~

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9460	10220	10220	17120	17120		64140
2							
3							
Average	9460	10220	10220	17120	17120		64140

Measured By djw Verified By MVT Weight date 7/24/07

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Day 2

7.2 *b) Average Pre-Test Loaded weight 65050

*c) Post Test Loaded Weight 64420

*d) Difference Post Test – Pre-test -630

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

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9840	10380	10380	17230	17230		65060
2	9840	10400	10400	17200	17200		65040
3	9840	10370	10370	17230	17230		65040
Average	9840	10380	10380	17220	17220		65050

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	9480	10260	10260	17210	17210		64420
2							
3							
Average	9480	10260	10260	17210	17210		64420

Measured By d. w Verified By MVT Weight date 7/25/07

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8619

Day 3

7..3 *b) Average Pre-Test Loaded weight 64950

*c) Post Test Loaded Weight 64580

*d) Difference Post Test – Pre-test -370

Table 5.3. Raw data – Axle scales – pre-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9820	10370	10370	17200	17200		64960
2	9840	10360	10360	17190	17190		64940
3	9820	10360	10360	17210	17210		64960
Average	9830	10360	10360	17200	17200		64950

Table 6.3. Raw data – Axle scales –

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

Table 7.3. Raw data – Axle scales – post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	9620	10290	10290	17190	17190		64580
2							
3							
Average	9620	10290	10290	17190	17190		64580

Measured By JW Verified By _____ Weight date 7/24/07

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LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 1 of* 2	* DATE 07/24/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
58	6	6614	~~65~~58	6	60	9	6970	61	9
68	9	6618	68	9	65	9	6978	65	9
65	9	6629	62	9	60	9	6982	61	9
63	9	6631	63	9	66	9	6985	66	9
65	9	6632	65	9	69	9	6987	~~9~~0	9
64	9	6634	65	9	64	12	6998	63	12
62	6	6650	62	6	65	9	7003	65	9
68	9	6725	68	9	65	9	7007	65	9
62	9	6728	62	9	70	9	7009	71	9
67	9	6731	67	9	66	9	7034	67	9
63	9	6743	63	9	64	8	7035	65	8
60	9	6797	61	9	64	9	7049	63	9
64	9	6803	63	9	64	9	7052	63	9
70	9	6808	70	9	65	8	7053	65	8
62	9	6833	63	9	57	9	7081	57	9
62	9	6842	62	9	66	9	7083	66	9
62	9	6844	62	9	69	9	7101	68	9
60	11	6848	58	11	65	9	7105	65	9
69	9	6850	68	9	63	9	7110	61	9
70	9	6854	68	9	54	5	7111	54	5
63	9	6935	63	9	63	8	7116	63	8
63	9	6937	63	9	64	9	7125	64	9
55	9	6943	55	9	61	9	7126	62	~~62~~ 9
55	9	6944	55	9	64	8	7134	64	8
61	9	6956	62	9	65	5	7140	65	5

Recorded by MVT Direction South Lane 1 Time from 10:31 to 12:25

Sheet 20	* STATE_CODE 51
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 2 of* 2	* DATE 07/24/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
62	6	7143	60	6	65	9	7360	65	9
65	9	7144	65	9	66	9	7362	66	9
55	11	7168	55	11	64	5	7609	64	5
65	9	7169	65	9	65	9	7629	64	9
62	9	7179	64	9	62	9	7649	62	9
55	9	7183	54	9	64	9	7654	64	9
64	5	7190	64	5	68	9	7663	66	9
60	11	7207	60	11	62	5	7664	62	5
63	9	7242	65	9	57	10	7673	59	10
64	9	7243	65	9	68	5	7674	67	5
66	9	7248	64	9	67	9	7675	67	9
62	9	7254	61	9	61	9	7676	60	9
67	10	7257	67	10	68	6	7701	68	6
64	9	7263	64	9	64	9	7702	63	9
61	9	7265	61	9	60	9	7755	60	9
63	9	7266	63	9	62	5	7801	62	5
64	5	7278	64	5	58	5	7822	56	5
65	8	7284	67	8	61	5	7823	61	5
66	9	7330	66	9	60	9	7824	60	9
59	05	7333	59	5	68	9	7835	68	9
66	9	7339	66	9	54	9	7842	54	9
59	9	7345	58	9	55	9	7843	55	9
66	9	7349	67	9	59	9	7889	59	9
67	6	7350	67	6	60	9	7893	60	9
64	9	7358	66	9	67	9	7895	67	9

Recorded by JW Direction S Lane 1 Time from 12:26 to 3:41

Sheet 20	* STATE_CODE 51
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 1 of* 2	* DATE 07/26/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
61	9	215	60	9	59	9	378	59	9
69	9	217	68	9	52	5	394	52	5
65	9	246	64	9	67	9	399	67	9
64	9	247	64	9	62	9	404	62	9
53	5	248	53	5	64	9	418	64	9
61	9	252	61	9	63	9	430	63	9
67	9	263	66	9	67	9	477	67	9
59	5	264	59	5	58	9	478	58	9
51	5	270	50	5	67	9	488	66	9
63	9	272	61	9	65	9	490	65	9
63	9	276	63	9	65	9	491	64	9
73	12	281	72	12	56	9	492	54	9
51	6	301	53	6	54	6	502	56	6
66	5	319	66	5	59	8	504	59	8
64	5	320	63	5	71	8	506	71	8
65	9	328	64	9	64	9	508	64	9
65	9	329	65	9	70	9	513	70	9
66	9	332	65	9	62	9	538	60	9
61	9	338	61	9	60	9	540	60	9
65	9	342	65	9	59	9	541	59	9
56	5	345	56	5	59	9	542	58	9
66	9	349	65	9	64	5	547	64	5
48	5	352	50	5	62	9	549	62	9
60	9	355	62	9	64	5	550	65	5
66	9	358	66	9	66	9	551	65	9

Recorded by djw Direction S Lane 1 Time from 8:30am to 9:20am

Sheet 20	* STATE_CODE 51
LTPP Traffic Data	*SPS PROJECT_ID 0100
Speed and Classification Checks * 2 of* 2	* DATE 07/26/2007

Rev. 08/31/2001....

WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class	WIM speed	WIM class	WIM Record	Obs. Speed	Obs Class
55	9	552	55	9	67	11	734	67	11
69	9	569	68	9	61	9	753	61	9
64	9	571	64	9	64	9	758	64	9
58	6	574	58	6	66	9	759	65	9
51	6	633	52	6	59	9	788	59	9
55	9	635	56	9	59	9	792	59	9
56	9	636	55	9	62	9	798	62	9
62	9	641	62	9	62	6	804	62	6
55	9	643	56	9	64	8	806	64	8
63	6	645	63	6	68	9	810	67	9
67	6	647	67	6	65	9	811	65	9
62	9	652	62	9	64	6	812	64	6
63	~~6~~ 9	655	64	9	64	9	820	64	9
54	5	656	53	5	61	9	825	60	9
64	9	660	64	9	57	6	826	57	~~6~~ 9
66	9	665	66	9	67	9	828	68	~~8~~ 9
59	5	670	60	5	67	10	831	67	10
58	9	671	58	9	71	9	835	71	9
60	8	705	61	8	52	9	837	52	9
62	9	706	61	9	59	6	839	59	6
62	9	708	61	9	60	8	841	60	8
65	9	722	64	9	69	9	868	71	9
68	9	727	69	9	72	9	869	71	9
67	5	728	67	5	68	5	884	68	5
64	~~6~~ 9	733	64	9	63	9	890	63	9

Recorded by Kyle Direction S Lane 1 Time from 9:21am to 10:16am

Sheet 21	* STATE_CODE 51
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 1 of 3	* DATE 07/24/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
69.5	54	1	1	9:10	6227	54	4.2/4.9	9.8/9.7	8.8/9.8	6.2/7.1	6.3/7.5		74.1	14.9	4.3	28.9	4.3	
69.5	55	2	1	9:10	6229	55	4.3/4.4	4.6/5.5	4.1/5.3	7.3/8.5	7.1/8.5		59.5	15.0	4.4	20.6	4.2	
67.5	57	1	2	9:29	6316	59	4.8/5.0	8.6/9.5	7.5/9.4	6.6/6.6	6.4/7.3		71.8	14.9	4.4	29.0	4.3	
67.5	58	2	2	9:29	6317	60	5.2/4.9	5.5/5.5	5.2/5.3	8.8/9.5	8.0/9.1		66.9	15.0	4.3	20.6	4.2	
70.5	64	1	3	9:42	6387	64	4.8/5.0	9.9/10.5	9.2/10.3	6.4/6.5	5.7/7.5		75.7	14.9	4.4	29.2	4.3	
70.5	65	2	3	9:42	6388	65	5.0/4.8	5.3/5.2	4.9/4.7	7.6/9.1	7.6/8.6		63.0	15.0	4.4	20.6	4.2	
72.0	53	1	4	9:56	6437	55	4.3/5.2	9.5/10.3	8.3/9.8	5.9/7.0	5.4/7.8		73.5	14.9	4.4	28.9	4.3	
72.0	53	2	4	9:56	6439	54	4.5/4.8	5.6/5.8	5.3/5.6	6.8/8.6	7.8/8.6		63.3	14.9	4.3	20.5	4.1	
71.5	59	1	5	10:09	6508	59	4.6/5.2	8.5/9.5	7.3/9.5	6.8/6.8	6.6/7.5		72.3	14.9	4.4	29.1	4.3	
71.5	59	2	5	10:09	6509	60	~~5.5/4.6~~	5.2/5.0	5.5/5.4	5.5/5.4	8.6/9.1	7.9/8.5	66.0	15.0	4.3	20.6	4.2	
72.5	62	1	6	10:23	6572	64	4.6/5.0	4.8/10.8	9.1/10.6	6.1/7.4	6.1/7.6		77.1	15.0	4.4	29.2	4.4	
72.5	62	2	6	10:23	6573	64	5.0/4.8	5.3/5.2	5.2/5.2	8.5/8.9	8.0/8.4		64.5	15.0	4.4	20.5	4.2	
74.0	54	1	7	10:36	6637	55	4.3/4.2	9.1/9.9	8.4/10.0	5.8/7.4	5.4/8.0		72.7	14.9	4.3	28.9	4.3	
74.0	55	2	7	10:36	6638	55	4.4/5.0	5.5/6.1	5.0/5.8	7.6/8.2	7.1/8.4		63.0	15.0	4.4	20.5	4.1	
75.5	58	1	8	10:50	6698	58	4.9/5.4	8.5/9.7	7.7/9.6	6.8/7.1	6.2/7.4		73.3	14.9	4.4	29.0	4.3	
75.5	60	2	8	10:50	6699	60	5.4/4.7	5.7/5.6	5.4/5.3	8.4/8.9	8.4/8.9		66.7	15.0	4.4	20.6	4.1	

Recorded by MT

Checked by

Sheet 21	* STATE_CODE 51
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 2 of 3	* DATE 07/29/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
75.0	63	1	9	11:03	6752	64	4.7/4.9	10.1/10.6	9.5/10.2	6.4/6.6	5.9/7.3		76.2	14.9	4.4	29.2	4.3	
75.0	64	2	9	11:03	6753	64	5.0/4.9	5.0/5.5	4.7/5.1	8.0/8.6	7.7/9.4		63.9	15.0	4.3	20.7	4.2	
74.5	55	1	10	11:16	6809	55	4.2/5.1	9.4/10.1	8.7/9.6	6.5/6.6	6.3/~~7.6~~		74.0	14.9	4.4	28.9	4.3	
74.5	55	2	10	~~11:16~~ 11:17	6810	55	4.4/4.9	5.7/5.9	5.0/5.7	7.7/7.9	7.4/8.4		63.1	14.9	4.3	20.5	4.1	
74.5	60	1	11	11:30	6869	60	4.6/4.9	8.5/9.1	9.4/9.4	6.8/7.2	6.1/7.4		73.4	14.9	4.3	29.0	4.3	
74.5	60	2	11	11:30	6870	60	5.1/4.8	5.4/5.9	5.0/5.5	8.7/9.5	8.3/8.8		67.0	15.0	4.4	20.6	4.2	
84.0	54	1	12	14:43	7842	54	4.3/4.3	9.6/9.8	9.0/10.5	5.9/7.0	5.9/7.8		74.1	14.9	4.3	29.0	4.3	
84.0	55	2	12	14:43	7843	55	4.8/4.9	5.5/5.5	5.0/5.3	7.3/7.7	7.9/8.5		62.3	15.0	4.4	20.5	4.2	
85.0	59	1	13	14:56	7911	58	4.6/5.0	8.7/9.3	7.8/9.2	6.5/6.7	6.1/7.4		71.4	14.9	4.4	29.0	4.3	
85.0	59	2	13	14:56	7912	59	4.4/4.8	4.4/5.5	4.2/5.2	7.8/9.0	6.8/7.9		60.1	15.1	4.4	20.6	4.2	
83.0	64	1	14	15:10	7991	64	4.7/4.9	9.8/10.6	9.4/10.2	6.2/6.5	6.4/7.5		76.3	14.9	4.4	29.1	4.4	
83.0	64	2	14	15:10	7992	64	4.9/4.7	4.7/5.4	5.0/5.0	7.4/9.2	7.6/9.2		63.1	15.0	4.4	20.5	4.2	
80.5	54	1	15	15:23	8076	54	4.2/4.8	9.5/9.5	8.9/9.4	6.5/6.8	6.4/7.3		73.1	14.9	4.3	28.9	4.3	
80.5	54	2	15	15:23	8080	55	4.1/5.0	5.5/6.1	5.1/5.9	7.5/8.9	6.9/8.4		63.5	15.0	4.3	20.5	4.2	
82.5	59	1	16	15:38	8162	59	4.9/4.9	8.8/10.7	8.0/9.1	6.7/7.0	6.4/7.5		73.9	14.9	4.3	29.0	4.3	
82.5	60	2	16	15:38	8164	60	5.0/4.8	5.3/5.6	5.1/5.2	8.4/9.5	8.1/9.3		66.2	15.0	4.4	20.6	4.2	

Recorded by MT Checked by DH

Sheet 21	* STATE_CODE	51
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 3 of 3	* DATE	07/24/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
79.5	64	1	17	15:51	8231	64	4.6/4.6	10.0/10.7	9.4/10.3	7.0/6.8	5.5/7.0		75.7	14.9	4.4	29.1	4.4	
79.5	64	2	17	15:51	8232	64	5.0/4.6	5.5/5.9	5.1/5.1	9.0/9.2	8.5/8.6		66.5	15.0	4.4	20.6	4.1	
79.5	54	1	18	16:04	8307	55	4.1/5.0	9.5/9.4	8.8/9.9	5.9/6.9	5.9/7.5		72.9	14.9	4.3	28.9	4.3	
79.5	56	2	18	16:04	8308	56	4.8/4.6	5.1/5.4	5.1/4.9	6.8/8.4	8.4/7.8		61.3	15.0	4.3	20.5	4.1	
77.5	59	1	19	16:18	8381	60	4.5/4.6	8.5/8.9	9.2/9.0	6.9/6.4	6.0/6.8		71.0	14.9	4.3	29.1	4.3	
77.5	59	2	19	16:18	8382	60	5.1/4.6	5.8/6.0	5.5/5.6	8.1/9.6	8.0/9.4		67.7	15.0	4.4	20.6	4.1	
80.5	64	1	20	16:32	8458	64	4.6/4.9	9.7/10.6	9.1/8.7	7.4/6.7	5.6/7.2		74.4	15.0	4.4	29.2	4.4	
80.5	64	2	20	16:32	8459	64	5.0/4.7	5.4/5.8	5.4/5.5	8.8/9.3	8.2/8.6		66.8	15.0	4.4	20.7	4.2	

Recorded by MT

Checked by DR

Sheet 21	* STATE_CODE 51
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 1 of 3	* DATE 07/25/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
71.0	54	1	1	10:45	698	54	4.2/4.5	9.6/9.9	8.7/10.5	5.9/7.4	6.1/7.4		74.2	14.9	4.3	29.0	4.3	
71.0	56	2	1	10:45	699	56	4.4/4.9	5.6/5.8	5.4/5.6	7.4/8.6	7.7/8.4		63.7	14.9	4.3	20.5	4.1	
72.0	59	1	2	10:58	765	60	4.7/5.1	8.1/9.6	9.3/9.6	7.0/6.9	6.2/7.4		73.9	14.9	4.4	29.1	4.3	
72.0	59	2	2	10:58	766	60	5.0/5.0	4.9/5.3	4.6/5.4	7.5/8.9	7.2/8.9		62.7	15.1	4.4	20.7	4.2	
72.0	64	1	3	11:13	836	64	4.7/5.2	10.1/10.6	9.4/10.4	6.3/6.6	6.1/7.9		77.4	14.9	4.3	29.2	4.3	
72.0	65	2	3	11:13	837	65	5.1/4.7	5.5/5.7	5.1/5.1	9.2/9.1	8.5/8.9		66.8	15.0	4.4	20.6	4.2	
74.0	54	1	4	11:26	919	55	4.3/4.9	9.4/9.8	8.6/10.1	6.3/6.4	6.0/7.2		72.9	14.9	4.3	29.1	4.3	
74.0	56	2	4	11:26	923	57	4.3/4.9	5.6/5.7	5.4/5.5	7.3/8.6	7.3/8.3		63.0	15.0	4.3	20.6	4.2	
73.5	65	1	5	11:53	1063	65	5.0/4.6	10.0/10.8	9.5/10.2	6.7/7.1	6.3/7.2		77.3	14.9	4.3	29.2	4.3	
73.5	65	2	5	11:53	1064	64	5.2/4.8	5.6/5.9	5.5/5.5	8.5/8.9	8.6/9.1		67.8	15.0	4.4	20.7	4.2	
74.5	56	1	6	12:07	1140	56	3.9/4.9	9.2/9.2	8.5/9.6	7.1/6.8	6.0/7.6		72.9	14.9	4.3	29.0	4.3	
74.5	54	2	6	12:07	1142	54	4.3/4.2	4.6/5.5	4.0/5.1	7.4/8.4	7.5/7.8		58.8	15.0	4.4	20.5	4.1	
93.5	58/54	1	7	14:23	1820	57	5.4/4.9	9.2/9.3	8.3/9.5	6.7/6.6	6.3/7.5		73.6	14.9	4.3	29.0	4.3	
93.5	59/56	2	7	14:23	1821	59	5.0/4.8	5.3/5.6	5.2/5.2	8.8/9.4	8.4/9.1		66.8	15.0	4.4	20.5	4.2	
96.0	63	1	8	14:36	1893	64	5.1/4.7	10.0/10.4	9.4/10.0	6.5/6.7	5.9/6.9		75.6	14.9	4.4	29.1	4.4	
96.0	65	2	8	14:36	1894	65	5.1/4.7	5.5/5.9	5.0/5.1	8.9/9.1	8.4/8.4		66.1	15.0	4.4	20.5	4.2	

Recorded by MT

Checked by _____

Sheet 21	* STATE_CODE	51
LTPP Traffic Data	*SPS PROJECT_ID	0100
WIM System Test Truck Records 2 of 3	* DATE	07/25/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
93.0	56	1	9	14:50	1964	55	4.4/4.9	9.7/9.6	8.9/10.0	6.9/7.1	6.1/7.5		75.0	14.9	4.3	29.0	4.3	
93.0	55	2	9	14:50	1965	55	5.0/4.7	5.4/5.7	5.4/5.3	8.5/8.2	8.0/8.8		65.0	15.0	4.3	20.6	4.1	
95.5	59	1	10	15:04	2035	59	5.0/5.0	8.5/9.8	9.1/9.6	6.4/6.3	6.1/6.9		72.6	14.9	4.4	28.9	4.3	
95.5	59	2	10	15:04	2037	59	5.3/4.7	5.4/5.7	5.4/5.6	8.7/9.7	8.1/8.9		67.4	14.9	4.4	20.5	4.1	
73.5	54	1	11	10:26	935	55	4.3/4.8	9.6/9.3	8.8/9.8	6.4/6.7	6.1/7.4		73.3	14.9	4.3	29.0	4.3	
73.5	53	2	11	10:26	936	55	5.1/4.9	5.1/5.5	4.6/5.2	7.4/8.6	7.0/8.7		62.3	15.0	4.4	20.6	4.2	
88.5	62	1	12	10:39	1015	62	5.0/4.7	8.3/10.5	9.3/9.0	6.2/6.2	6.0/7.3		72.6	17.7	3.6	29.1	4.3	
88.5	59	2	12	10:39	1017	59	5.3/5.0	5.2/5.5	4.8/5.2	8.4/9.4	7.5/8.4		65.0	15.1	4.4	20.6	4.2	
82.5	63	1	13	10:52	1046	63	5.1/4.7	9.9/10.7	9.3/10.3	6.0/6.6	6.2/7.3		76.1	14.9	4.3	29.1	4.3	
82.5	64	2	13	10:52	1048	64	5.2/4.8	5.5/5.6	5.5/5.3	9.0/9.4	8.2/8.6		67.1	15.0	4.3	20.6	4.2	
81.0	55	1	14	11:06	1175	55	4.6/4.7	9.4/9.6	8.7/9.2	6.5/6.5	5.9/7.3		72.4	14.9	4.4	28.9	4.3	
81.0	56	2	14	11:06	1176	57	5.3/4.8	5.6/5.7	5.2/5.7	8.9/9.1	8.4/8.7		66.5	15.0	4.4	20.5	4.1	
82.0	59	1	15	11:20	1248	59	5.1/4.7	8.3/10.6	9.2/9.2	6.3/6.4	5.8/7.3		73.0	15.0	4.3	29.2	4.3	
82.0	59	2	15	11:20	1249	59	4.6/4.9	4.8/5.5	4.7/5.1	7.2/9.2	6.6/9.2		61.5	15.0	4.4	20.5	4.2	
85.5	63	1	16	11:34	1326	63	4.6/5.1	9.8/10.6	9.3/9.2	6.8/7.0	6.1/7.5		75.9	14.9	4.4	29.2	4.3	
85.5	58	2	16	11:34	1328	60	5.1/4.8	5.6/6.0	5.0/5.5	8.8/9.4	8.5/8.5		67.1	15.0	4.4	20.6	4.2	

Recorded by MT

Checked by _____

Sheet 21	* STATE_CODE 51
LTPP Traffic Data	*SPS PROJECT_ID 0100
WIM System Test Truck Records 3 of 3	* DATE 07/26/2007

Rev. 08/31/2001

Pvmt temp	Radar Speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A weight.	Axle B weight.	Axle C weight.	Axle D weight.	Axle E weight.	Axle F weight	GVW	A-B space	B-C space	C-D space	D-E space	E-F space
88	54	1	17	11:47	1416	54	4.4/4.2	9.9/9.4	8.9/9.4	6.7/6.9	6.0/7.6		73.4	14.9	4.3	28.9	4.3	
88	58	2	17	11:47	1417	58	5.3/5.0	5.6/6.0	4.9/5.8	8.4/9.7	7.7/8.9		67.4	15.0	4.4	20.5	4.2	
86.0	59	1	18	12:01	1480	59	4.9/4.7	8.8/10.7	8.9/9.4	6.5/6.9	6.1/7.6		74.5	14.9	4.3	29.0	4.3	
86.0	59	2	18	12:01	1481	59	5.0/4.8	5.5/5.4	5.1/5.0	8.7/8.9	8.4/9.2		66.1	15.0	4.4	20.5	4.1	
86.5	63	1	19	12:15	1562	63	5.0/4.5	10.1/10.5	9.5/10.0	6.8/6.6	5.8/6.9		75.8	14.9	4.3	29.1	4.4	
86.5	64	2	19	12:15	1563	65	5.1/4.6	5.2/5.7	5.3/5.3	8.5/9.5	8.4/8.6		66.2	15.0	4.4	20.6	4.1	
90.5	56	1	20	12:28	1622	55	4.4/4.4	9.3/10.6	8.6/10.3	6.8/6.9	6.4/7.6		75.1	14.9	4.4	29.0	4.3	
90.5	56	2	20	12:28	1624	56	5.2/4.9	5.7/5.7	5.4/5.6	8.5/9.2	8.1/8.6		66.0	15.0	4.4	20.5	4.1	

Recorded by MT

Checked by _____

TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

Visit Date: July 24, 2007

STATE: VA

SHRP ID: 0100

Photo 1 - Truck_1_Tractor_ 51_0100_07_24_2007.JPG

Photo 2 - Truck_1_Trailer_Load_1_51_0100_07_24_2007.JPG

Photo 3 - Truck_1_Suspension_1_51_0100_07_24_2007.JPG

Photo 4 - Truck_1_Suspension_2_51_0100_07_24_2007.JPG

Photo 5 - Truck_1_Suspension_3_51_0100_07_24_2007.JPG

Photo 6 - Truck_2_Tractor_51_0100_07_24_2007.JPG

Photo 7 - Truck_2_Trailer_51_0100_07_24_2007.JPG

Photo 8 - Truck_2_Suspension_1_51_0100_07_24_2007.JPG

Photo 9 - Truck_2_Suspension_2_51_0100_07_24_2007.JPG

Photo 10 - Truck_2_Suspension_3_51_0100_07_24_2007.JPG

Photo 11 - Truck_2_Suspension_4_51_0100_07_24_2007.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

Virginia SPS-1 (Lane 1)

Validation Visit – 26 July, 2007

Calibration factor for sensor #1:

72 kph:	3700
88 kph:	3700
105 kph:	3700
121 kph:	3700
137 kph:	3700

Calibration factor for sensor #2:

72 kph:	3700
88 kph:	3700
105 kph:	3700
121 kph:	3700
137 kph:	3700