Validation Report

Pennsylvania, SPS-6
Task Order 8, CLIN 2
May 29 to 30, 2007

## List of Tables

## List of Figures

# 1 Executive Summary

A visit was made to the Pennsylvania 0600 on May 29 to 30, 2007 for the purposes of conducting a validation of the WIM system located on I-80, 0.2 miles east of Milesburg near exit 158. The SPS-6 is located in the righthand, westbound lane of a four-lane divided facility. The posted speed limit at this location is 65 mph. The LTPP lane (numbered 4 on the controller) is one of two lanes instrumented at this site. The adjacent lane is instrumented for classification data collection. The validation procedures were in accordance with LTPP's SPS WIM Data Collection Guide dated August 21, 2001.

This site is a relocation of the site originally installed at milepost 151 near Snow Shoe, Pennsylvania. An assessment of that site determined that it would not be possible to validate the installation due to vehicles missing the right wheelpath sensor.

This is the first validation visit to this location. The site was installed on April 30 to May 2, 2007 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 algorithm is not currently providing research quality classification information.**

The site is instrumented with quartz piezo WIM sensors and iSINC electronics. It is installed in asphalt concrete. The validation used the following trucks:

1) 5-axle tractor-trailer with a tractor having an air suspension and a trailer with a standard rear tandem and an air suspension loaded to 77,240 lbs., the "golden" truck.
2) 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a split rear tandem and an air suspension loaded to 62,460 lbs., the "partial" truck.

The validation speeds ranged from 53 to 65 miles per hour. The pavement temperatures ranged from 76 to 117 degrees Fahrenheit. The desired speed range was achieved during this validation. The desired 30 degree Fahrenheit temperature range was also achieved.

**Table 1-1 Post-Validation results – 420600 – 30-May-2007**

| SPS-1, -2, -5, -6 and -8 | 95 %Confidence Limit of Error | Site Values | Pass/Fail |
|---|---|---|---|
| Steering axles | ±20 percent | -4.4 ± 5.6% | Pass |
| Single axles | ±20 percent | -1.3 ± 11.3% | Pass |
| Tandem axles | ±15 percent | 0.2 ± 6.8% | Pass |
| GVW | ±10 percent | -0.1 ± 4% | Pass |
| **Speed** | **±1 mph [2 km/hr]** | **0.2 ± 1.9 mph** | **Fail** |
| Axle spacing | ± 0.5 ft [150mm] | 0 ± 0.1 ft | Pass |

The pavement condition appeared to be satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey determined that there is no discernable bouncing or avoidance by trucks in the sensor area. No profile information has been collected at this site since the installation of the sensors. An amended report will be submitted when profile data is available to calculate the WIMIndex values associated with this installation.

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 |

This site needs five years of data to meet the goal of five years of research quality data. There is insufficient information from agency validations to determine if the prior location produced research quality data.

## 2 Corrective Actions Recommended

There are no corrective actions required for this site at this time.

## 3 Post Calibration Analysis

This final analysis is based on test runs conducted May 30, 2007 during the morning and early afternoon hours at test site 420600 on I-80. This SPS-6 site is at milepost 158.2 on the westbound, righthand of a four-lane divided facility. No auto-calibration was used during test runs. The two trucks used for the calibration and for the subsequent validation included:

1. 5-axle tractor-trailer with a tractor having an air suspension and trailer with a standard rear tandem and air suspension loaded to 77,240 lbs., the "golden" truck.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a split rear tandem and an air suspension loaded to 62,460 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 76 to 117 degrees Fahrenheit. The desired 30 degree Fahrenheit temperature range was also achieved. The computed values of 95% confidence limits of each statistic for the total population are in Table 3-1.

As shown in Table 3-1, the site passed all of the performance criteria except for speed.

**Table 3-1 Post-Validation Results – 420600 – 30-May-2007**

| SPS-1, -2, -5, -6 and -8 | 95 %Confidence Limit of Error | Site Values | Pass/Fail |
|---|---|---|---|
| Steering axles | ±20 percent | -4.4 ± 5.6% | Pass |
| Single axles | ±20 percent | -1.3 ± 11.3% | Pass |
| Tandem axles | ±15 percent | 0.2 ± 6.8% | Pass |
| GVW | ±10 percent | -0.1 ± 4% | Pass |
| **Speed** | **±1 mph [2 km/hr]** | **0.2 ± 1.9 mph** | **Fail** |
| Axle spacing | ± 0.5 ft [150mm] | 0 ± 0.1 ft | Pass |

The test runs were conducted primarily during the morning and early afternoon hours under mostly sunny conditions, resulting in a wide range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed 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 achieved for this set of validation runs.

The three speed groups were divided as follows: Low speed – 53 to 58 mph, Medium speed – 59 to 62 mph and High speed – 63 + mph. The three temperature groups were created by splitting the runs between those at 76 to 88 degrees Fahrenheit for Low temperature, 89 to 101 degrees Fahrenheit for Medium temperature and 102 to 117 degrees Fahrenheit for High temperature.

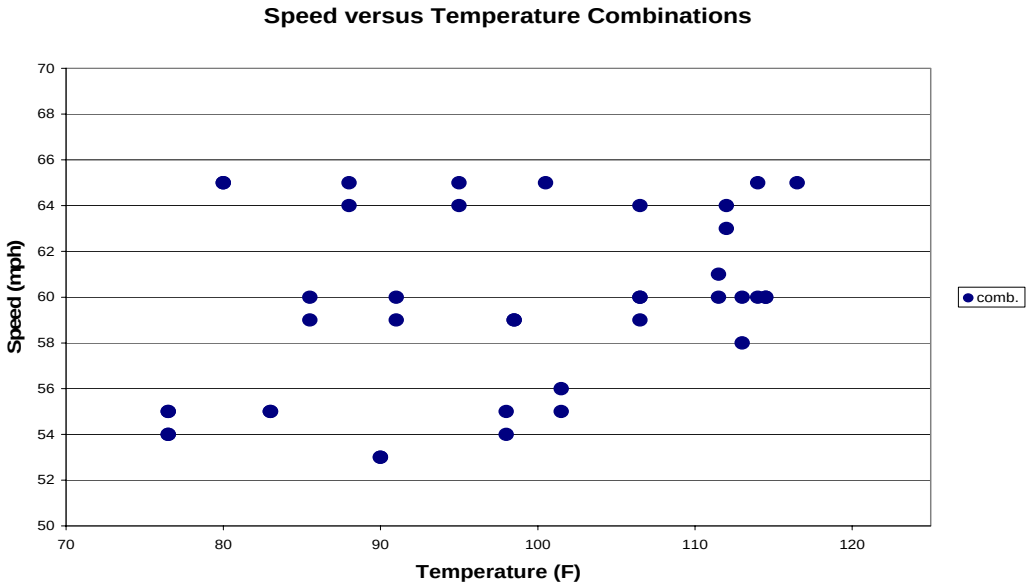



**Figure 3-1 Post-Validation Speed-Temperature Distribution – 420600 – 30-May-2007**

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 mean error of GVW estimates is generally consistent throughout the entire speed range. The equipment estimates GVW reasonably well at all speeds. Variability in error is somewhat greater at the lower speeds.

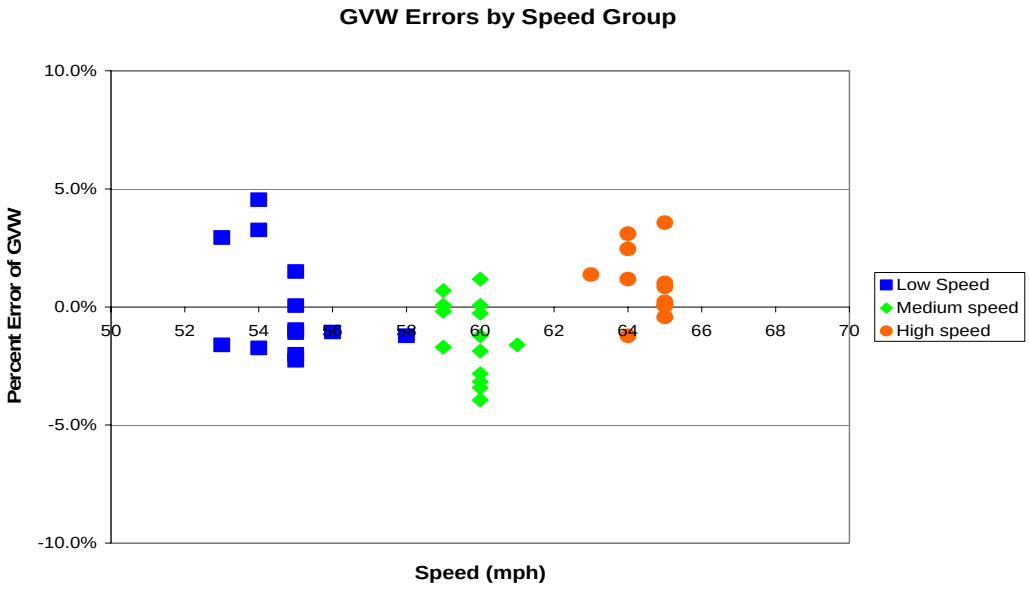



**Figure 3-2 Post-validation GVW Percent Error vs. Speed – 420600 – 30-May-2007**

Figure 3-3 shows a slight relationship between temperature and GVW percentage error. Increasing temperatures appear to produce lower estimates of GVW.

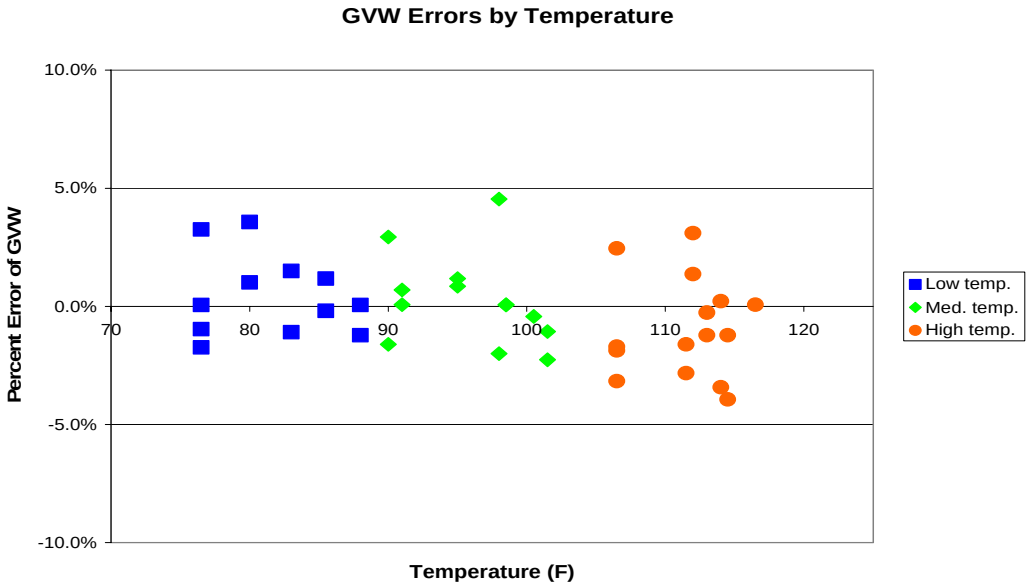



**Figure 3-3 Post-Validation GVW Percent Error vs. Temperature – 420600 – 30-May-2007**

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.

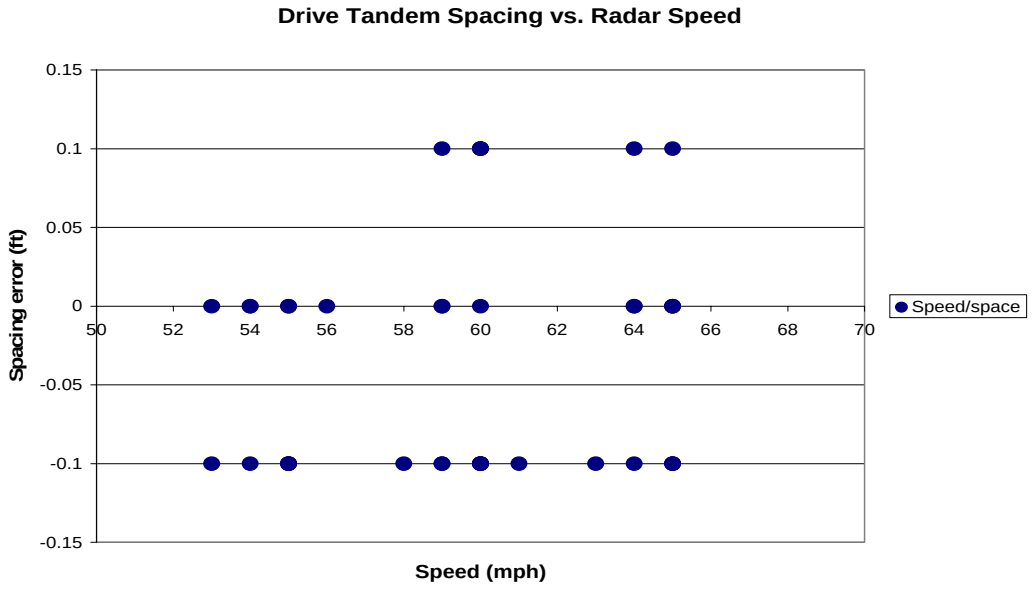



**Figure 3-4 Post-Validation Spacing vs. Speed – 420600 – 30-May-2007**

### *3.1 Temperature-based Analysis*

The three temperature groups were created by splitting the runs between those at 76 to 88 degrees Fahrenheit for Low temperature, 89 to 101 degrees Fahrenheit for Medium temperature and 102 to 117 degrees Fahrenheit for High temperature.

**Table 3-2 Post-Validation Results by Temperature Bin – 420600 – 30-May-2007**

| Element | 95% Limit | Low Temperature 76 to 88 °F | Medium Temperature 89 to 101 °F | High Temperature 102 to 117 °F |
|---|---|---|---|---|
| Steering axles | ±20 % | -2.8 ± 6.4% | -3.9 ± 5.7% | -6.2 ± 3.6% |
| Single axles | ±20 % | -0.7 ± 10.3% | -0.9 ± 11.0% | -2.2 ± 13.3% |
| Tandem axles | ±15 % | 1.1 ± 6.9% | 0.7 ± 7.4% | -0.8 ± 6.7% |
| GVW | ±10 % | 0.5 ± 3.8% | 0.2 ± 4.2% | -0.9 ± 4.5% |
| Speed | ±1 mph | 0.2 ± 2.1 mph | 0.7 ± 2.2 mph | -0.1 ± 1.4 mph |
| Axle spacing | ± 0.5 ft | 0.0 ± 0.2 ft | 0.0 ± 0.1 ft | 0.0 ± 0.2 ft |

From Table 3-2, it appears that for steering axle weights, the underestimation of weights increases and variability in error decreases as temperature increases. For single axle weights as a whole, underestimation of weights and variability in error increase as temperature increases. For tandem and GVW weights, estimates tend to decrease as temperatures increase. Variability of tandem and GVW estimates is fairly consistent throughout the entire temperature range.

Figure 3-5 is the distribution of GVW Errors versus Temperature by Truck graph. From the figure, it appears that mean error trends downwards with increasing temperature for the population as a whole and for each truck independently. Variability for the partial truck (diamonds) appears slightly greater than that of the golden truck (squares) throughout the range of temperatures observed.

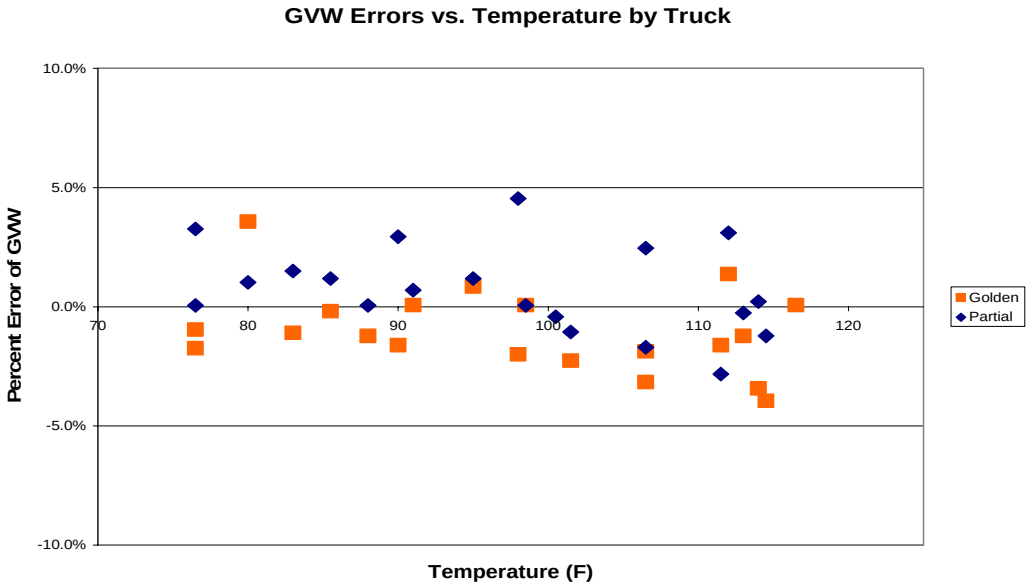



**Figure 3-5 Post-Validation GVW Percent Error vs. Temperature by Truck – 420600 – 30-May-2007**

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 has a tendency to increasingly underestimate steering axle weights as temperature increases. Variability in steering axle error appears to decrease as temperature increases.

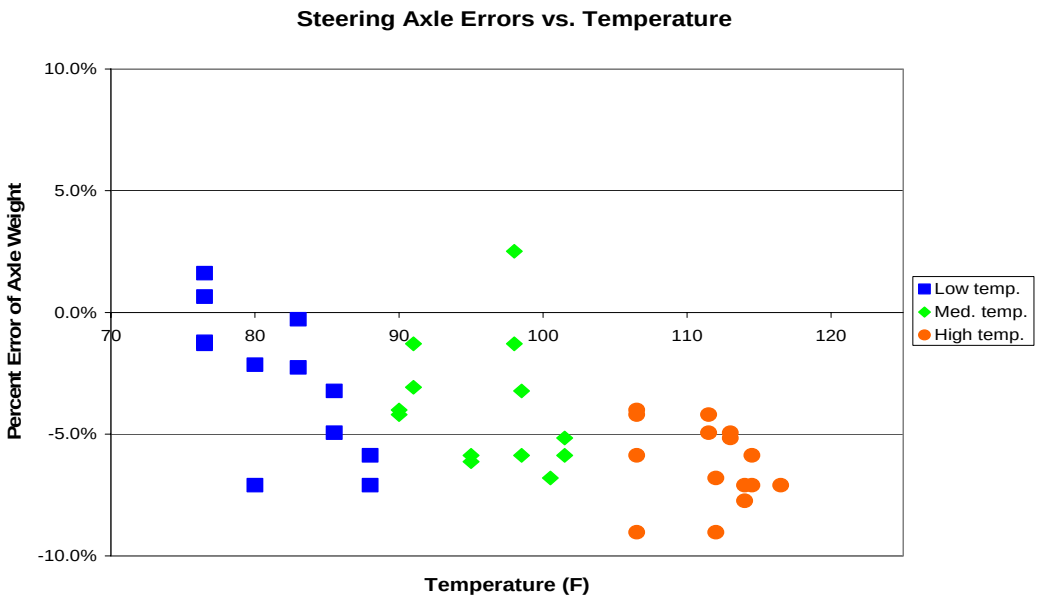



**Figure 3-6 Post-Validation Steering Axle Error vs. Temperature by Group – 420600 – 30-May-2007**

Figure 3-7 shows the relation between single axle errors and temperature. This graph is included due to the split tandem configuration of the partial truck trailer.

From the figure, it can be seen that the equipment estimates the single axles of the partial truck trailer (diamonds) with reasonable accuracy, although variability tends to increase with temperature. For the steering axle weights (squares), underestimation of weights increases with temperature. The axles on the split tandem weigh approximately 150 percent of the steering axles.

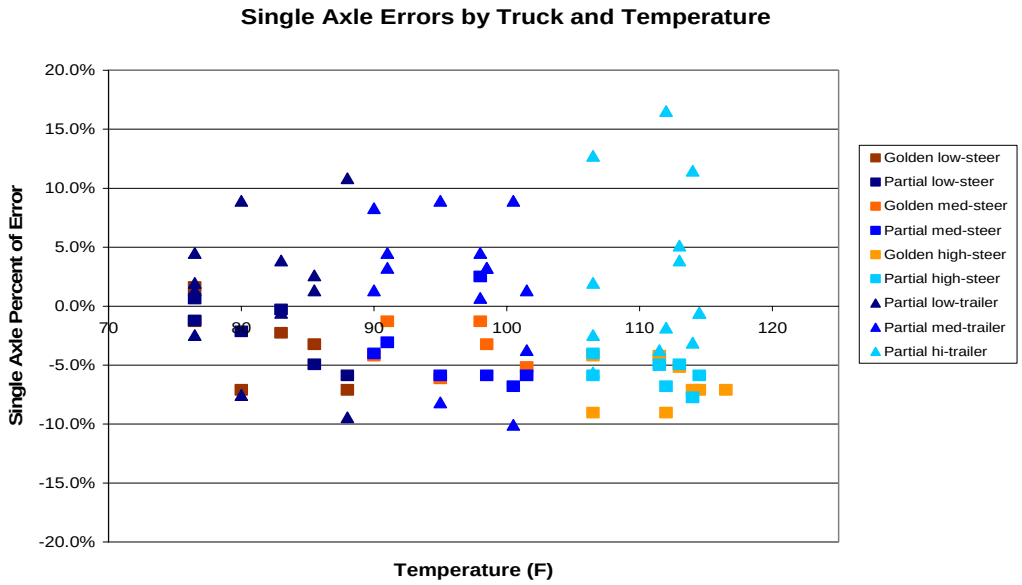



**Figure 3-7 Post-Validation Single Axle Percent Error vs. Temperature by Truck - 420600 –30-May-2007**

### *3.2 Speed-based Analysis*

The three speed groups were divided using 53 to 58 mph for Low speed, 59 to 62 mph for Medium speed and 63+ mph for High speed.

**Table 3-3 Post-Validation Results by Speed Bin – 420600 – 30-May-2007**

| Element | 95% Limit | Low Speed 53 to 58 mph | Medium Speed 59 to 62 mph | High Speed 63+ mph |
|---|---|---|---|---|
| Steering axles | ±20 % | -2.0 ± 5.9% | -5.0 ± 4.1% | -6.3 ± 3.9% |
| Single axles | ±20 % | -0.2 ± 7.2% | -2.0 ± 8.3% | -1.7 ± 17.1% |
| Tandem axles | ±15 % | 0.1 ± 7.4% | -1.2 ± 6.2% | 2.4 ± 5.4% |
| GVW | ±10 % | 0.0 ± 4.9% | -1.2 ± 3.4% | 1.0 ± 3.2% |
| Speed | ±1 mph | 0.5 ± 2.5 mph | 0.2 ± 1.7 mph | 0.0 ± 1.9 mph |
| Axle spacing | ± 0.5 ft | -0.1 ± 0.1 ft | 0.0 ± 0.2 ft | 0.0 ± 0.2 ft |

From Table 3-3, it can be seen that for steering axle weights, underestimation increases and variability decreases with increases in speed. For the single axle population as a whole estimation of weights is reasonably accurate and variability in error increases as speeds increase. GVW and tandem weights are estimated reasonably well at all speeds. Variability in error for GVW and tandem weights decreases as speed increases.

Figure 3-8 illustrates the tendency for the system to estimate GVW accurately for the population as a whole over the entire speed range with a slight overestimation for both trucks at the higher speeds. For the partially loaded truck (diamonds), GVW is generally overestimated at low speeds while GVW for the golden truck (squares) is underestimated at the low speeds. Variability appears to be greater at lower speeds due to opposing

tendencies for estimation of GVW for each truck independently. As the majority of the trucks at this location are running at speeds in excess of 60 mph by the post-validation speed check, the divergence at the low end of the speed range is not particularly important.

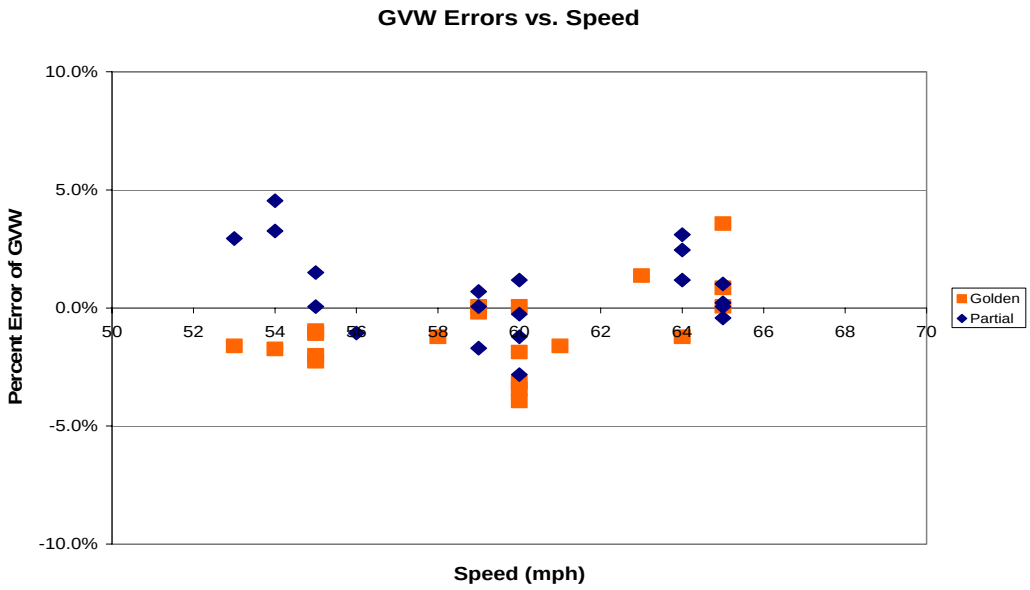



**Figure 3-8 Post-Validation GVW Percent Error vs. Speed by Truck – 420600 – 30-May-2007**

Figure 3-9 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.

From the figure, the WIM equipment increasingly underestimates steering axle weights as speed increases. The variability of error appears to decrease as speed increases.

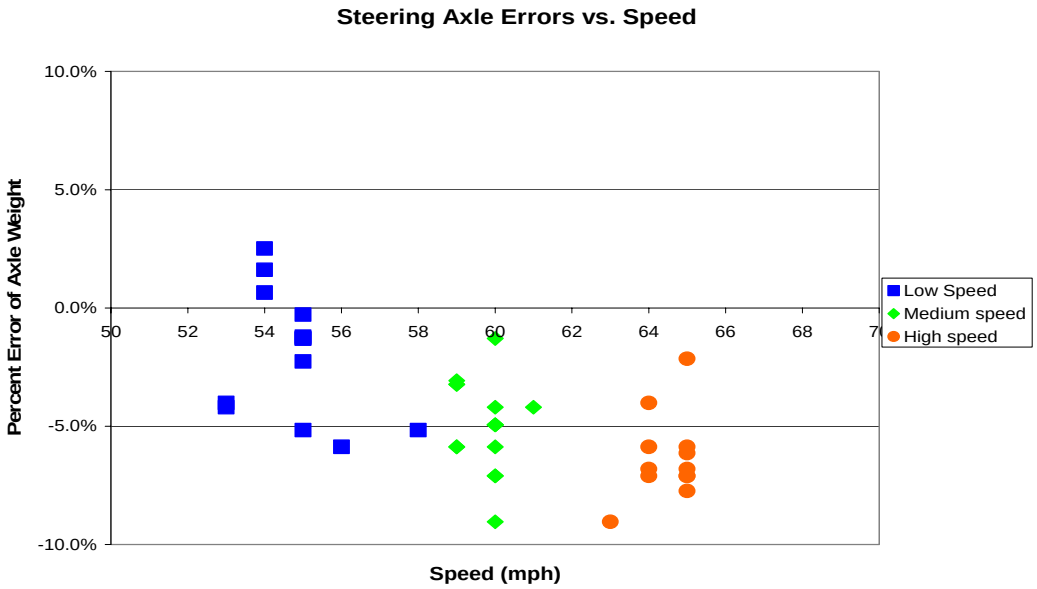



**Figure 3-9 Post-Validation Steering Axle Percent Error vs. Speed by Group – 420600 – 30-May-2007**

Figure 3-10 shows the relation between single axle errors and speed. This graph is included due to the split tandem configuration of the "partial" truck.

From the figure, it appears that the WIM equipment estimates the single axle weight population as a whole with reasonable accuracy. For steering axle weights, the equipment increasingly underestimates the weight as speed increases. For the partial truck trailer single axles, the weights are estimated with reasonable accuracy; however, variability in error is significantly higher at the high speeds where trucks typically operate.

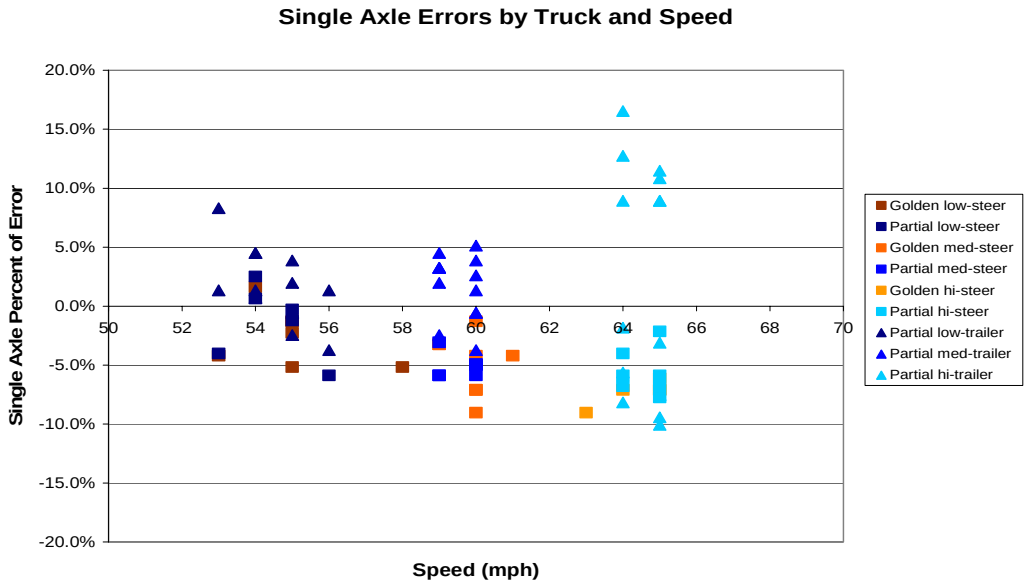



**Figure 3-10 Post-Validation Single Axle Percent Error vs. Speed Group by Truck - 420600 – 30-May-2007**

## *3.3 Classification Validation*

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

The second check is the ability of the algorithm to correctly distinguish between truck classes with no more than 2% errors in such classifications. Table 3-4 has the classification error rates by class. The overall misclassification rate is 5.8 percent. This is the results of problems differentiating between types of single unit trucks and between single unit trucks and passenger vehicles.

**Table 3-4 Truck Misclassification Percentages for 420600 – 30-May-2007**

| Class | Percent Error | Class | Percent Error | Class | Percent Error |
|---|---|---|---|---|---|
| 4 | 100 | 5 | 17 | 6 | 40 |
| 7 | 0 | | | | |
| 8 | 0 | 9 | 0 | 10 | 0 |
| 11 | 0 | 12 | 0 | 13 | N/A |

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

**Table 3-5 Truck Classification Mean Differences for 420600 – 30-May-2007**

| Class | Mean Difference | Class | Mean Difference | Class | Mean Difference |
|---|---|---|---|---|---|
| 4 | UNK | 5 | -17 | 6 | -40 |
| 7 | 0 | | | | |
| 8 | 0 | 9 | 0 | 10 | 0 |
| 11 | 0 | 12 | 0 | 13 | N/A |

These error rates are normalized to represent how many vehicles of the class are expected to be over or under-counted for every hundred of that class observed by the equipment. Thus a value of 0 means the class is identified correctly on average. A number between –1 and –100 indicates at least that number of vehicles either missed or not assigned to the class by the equipment. It is not possible to miss more than all of them or one hundred out of one hundred. Numbers 1 or larger indicate at least how many more vehicles are assigned to the class than the actual "hundred observed". Classes marked Unknown (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. There appears to be a classification problem at this site where Class 6 vehicles are identified as Class 4s and Class 5s are identified as Class 3s by the equipment.

### *3.4 Evaluation by ASTM E-1318 Criteria*

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

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

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

## 4 Pavement Discussion

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

### *4.1 Profile Analysis*

There has been no profile data collected at this location since the installation of the site. An amended report will be submitted when profile data is available to compute the WIMIndex values for this location.

### *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.

## 5 Equipment Discussion

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

### *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 one-iteration of the calibration process between the initial 40 runs and the final 40 runs to improve the performance of the equipment and diminish the discernable bias in weights provided by the equipment at the low and medium speeds.

#### *5.2.1 Calibration Iteration 1*

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

The beginning compensation factors for this validation were:

| Speed point | Left sensors 1/3 | Right sensors 2/4 |
|---|---|---|
| 80 kph (50 mph) | 3071 | 3245 |
| 88 kph (55 mph) | 3040 | 3213 |
| 96 kph (60 mph) | 3024 | 3196 |
| 104 kph (65 mph) | 3024 | 3196 |
| 112 kph (70 mph) | 3040 | 3213 |

Based on the results from the Pre-Validation, which produced a mean GVW error range of -7.5% to +2.9%, the compensation factors were adjusted to compensate for underestimations of GVW at the low and medium speeds. The new factors and changes made are shown below.

| Speed point | Left sensors 1/3 | Right sensors 2/4 |
|---|---|---|
| 80 kph (50 mph) | 3182 | 3372 |
| 88 kph (55 mph) | 3150 | 3329 |
| 96 kph (60 mph) | 3024 | 3196 |
| 104 kph (65 mph) | 3024 | 3196 |
| 112 kph (70 mph) | 3040 | 3213 |

The results of the calibration verification runs are shown in Table 5-1 and Figure 5-1. As illustrated, as a result of the calibration, GVW was estimated with reasonable accuracy at all speeds. As a result, further calibrations were not required and 30 additional test runs were conducted to complete the required 40 run Post-Validation data set.

**Table 5-1 Calibration Iteration 1 Results – 420600 – 30-May-2007 (08:42 AM)**

| SPS-1, -2, -5, -6 and -8 | 95 %Confidence Limit of Error | Site Values | Pass/Fail |
|---|---|---|---|
| Steering axles | ±20 percent | -3.2 ± 6.4% | Pass |
| Single axles | ±20 percent | -1.0 ± 10.5% | Pass |
| Tandem axles | ±15 percent | 1.0 ± 7% | Pass |
| GVW | ±10 percent | 0.3 ± 3.7% | Pass |
| **Speed** | **±1 mph** | **0.2 ± 2.1 mph** | **Fail** |
| Axle spacing | ± 0.5 ft | 0.0 ± 0.2 ft | Pass |

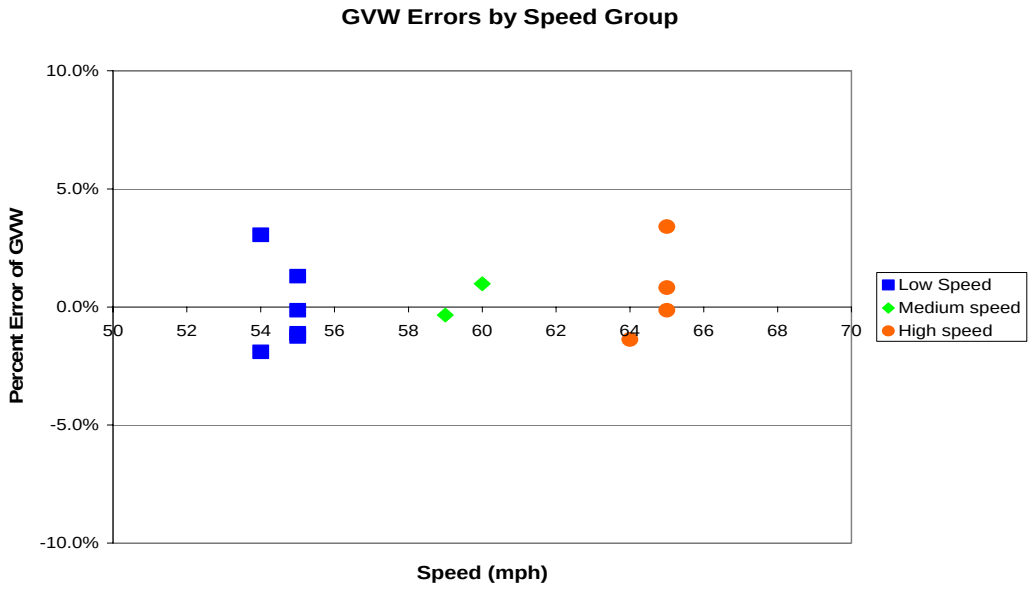



**Figure 5-1 Calibration Iteration 1 GVW Percent Error vs. Speed Group – 420600 – 30-May-2007 (08:42)**

### *5.3 Summary of Traffic Sheet 16s*

This site has validation information for the existing site in the tables below. Table 5-2 has the information provided for the TRF_CALIBRATION_AVC table based on Sheet 16s for the current visit.

**Table 5-2 Classification Validation History – 420600 – 30-May-2007**

| Date | Method | Mean Difference | | | | Percent Unclassified |
|---|---|---|---|---|---|---|
| | | Class 9 | Class 8 | Other 1 | Other 2 | |
| 05-30-07 | Manual | 0 | 0 | | | 0 |
| 05-29-07 | Manual | 0 | 0 | | | 0 |

Table 5-3 has the information provided for the TRF_CALIBRATION_WIM table based on Sheet 16s for the current visit.

**Table 5-3 Weight Validation History – 420600 – 30-May-2007**

| Date | Method | Mean Error and (SD) | | |
|---|---|---|---|---|
| | | GVW | Single Axles | Tandem Axles |
| 05-30-07 | Test Trucks | -0.1 (2.0) | -1.3 (5.7) | 0.2 (3.4) |
| 05-29-07 | Test Trucks | -2.3 (2.6) | -2.7 (4.5) | -2.6 (3.7) |

### *5.4 Projected Maintenance/Replacement Requirements*

As a part of the SPS Pooled Fund contract under which this site was installed semi-annual maintenance activities will be conducted. No additional maintenance requirements have been identified as a result of this visit.

## 6 Pre-Validation Analysis

This pre-validation analysis is based on test runs conducted May 29, 2007 during the morning and afternoon hours at 420600 on 0.2 miles east of Milesburg near exit 158. This SPS-6 site is at milepost 158.2 on I-80 in the westbound, 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 77,330 lbs.
2. 5-axle tractor semi-trailer with a tractor having an air suspension and a trailer with a split rear tandemand an air suspension loaded to 62,490 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 49 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 104 to 120degrees 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 seen in Table 6-1, the site passed all of the performance criteria for research quality data except speed. As a result of the Pre-Validation, a bias was observed for both test trucks at the low and medium speeds, and it was determined that additional adjustment could further improve the overall quality of the data.

**Table 6-1 Pre-Validation Results – 420600 – 29-May-2007**

| SPS-1, -2, -5, -6 and -8 | 95 %Confidence Limit of Error | Site Values | Pass/Fail |
|---|---|---|---|
| Steering axles | ±20 percent | -5.0 ± 3.9% | Pass |
| Single axles | ±20 percent | -2.7 ± 8.9% | Pass |
| Tandem axles | ±15 percent | -2.6 ± 7.4% | Pass |
| GVW | ±10 percent | -2.3 ± 5.2% | Pass |
| **Speed** | **±1 mph [2 km/hr]** | **-0.1 ± 1.5 mph** | **Fail** |
| Axle spacing | ± 0.5 ft [150mm] | 0.0 ± 0.1 ft | Pass |

The test runs were conducted primarily during the late morning and afternoon hours under generally sunny conditions, resulting in a range of pavement temperatures. The runs were also conducted at various speeds to determine the effects of these variables on the performance of the WIM scale. To investigate these effects, the dataset was split into three speed 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. In addition to the small temperature range, it was not possible to obtain "low" temperature high speed runs.

The three speed groups were divided into 49 to 54 mph for Low speed, 55 to 60 mph for Medium speed and 61+ mph for High speed. The two temperature groups were created by splitting the runs between those at 104 to 112 degrees Fahrenheit for Low temperature and 113 to 120 degrees Fahrenheit for High temperature.

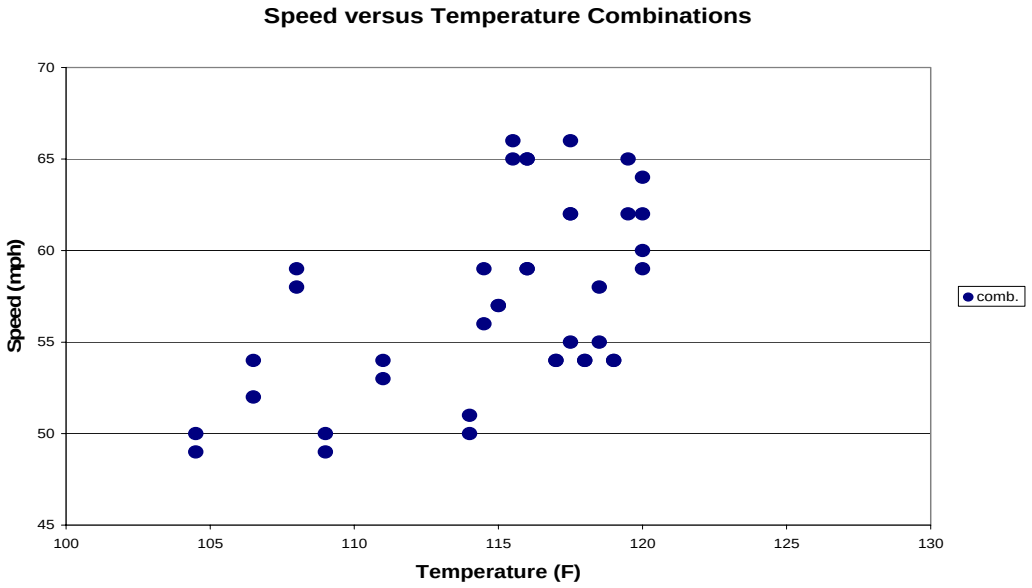



**Figure 6-1 Pre-Validation Speed-Temperature Distribution – 420600 – 29-May-2007**

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 tendency for the equipment to underestimate GVW at low and medium speeds. Variability appears to be greater at the low and medium speeds when compared with the high speeds.

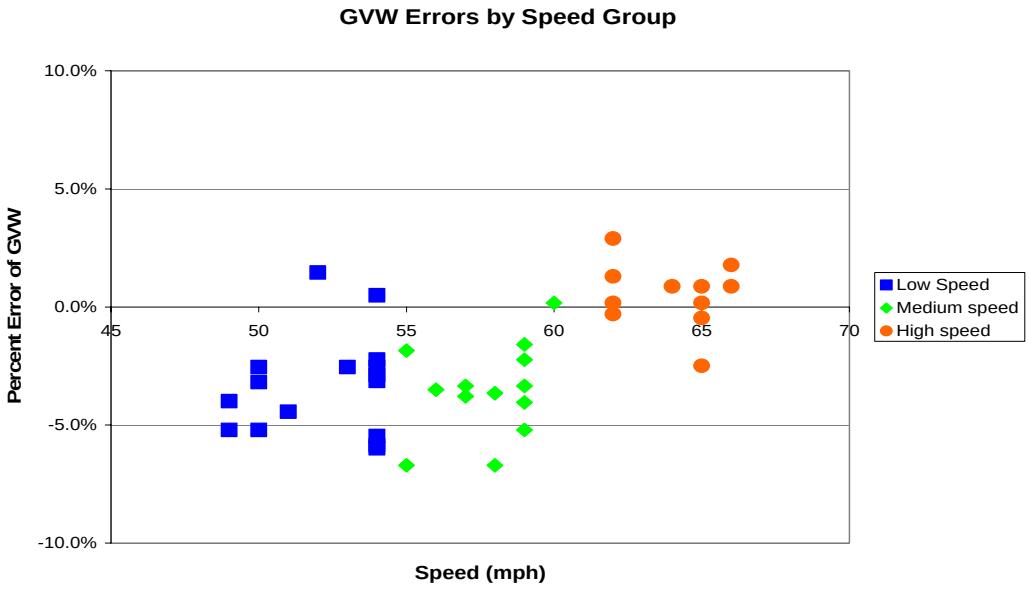



**Figure 6-2 Pre-validation GVW Percent Error vs. Speed – 420600 – 29-May-2007**

Figure 6-3 shows the relationship between temperature and GVW percentage error. From the figure, it appears that the GVW is measured reasonably accurately over the entire temperature range. The unequal size of the temperature groups makes it difficult to comment on the variability as a function of temperature group.

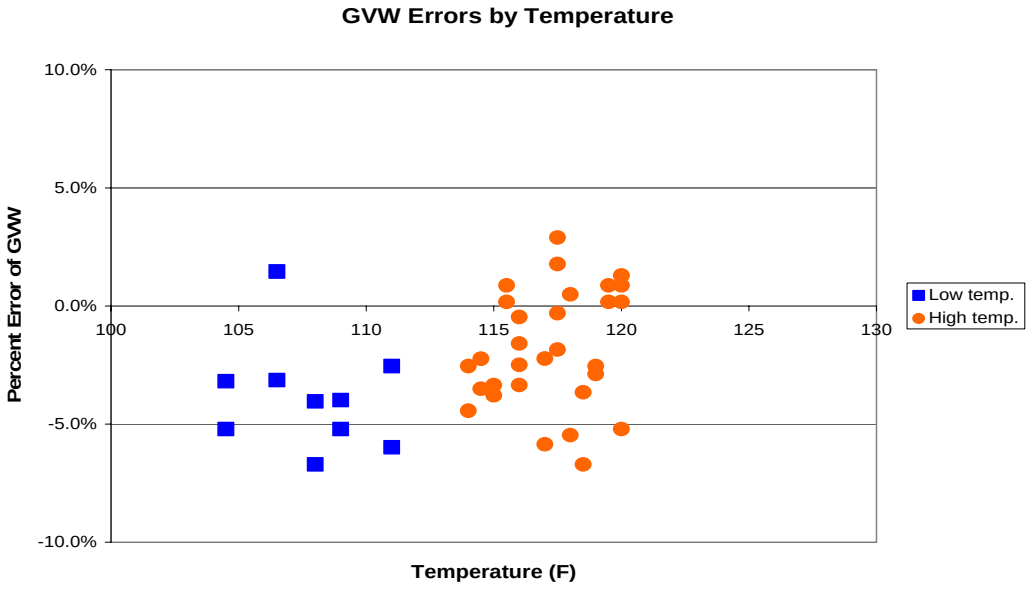



**Figure 6-3 Pre-Validation GVW Percent Error vs. Temperature – 420600 – 29-May-2007**

Figure 6-4 shows the relationship between the drive tandem spacing errors in feet and speeds. This graph is used as a potential indicator of classification errors due to failure to correctly identify spacings on a vehicle. Since the most common reference value is the drive tandem on a Class 9 vehicle, this is the spacing evaluated and plotted for validations. The graph indicates that the errors in tandem spacings for the test trucks were not affected by changes in speed.

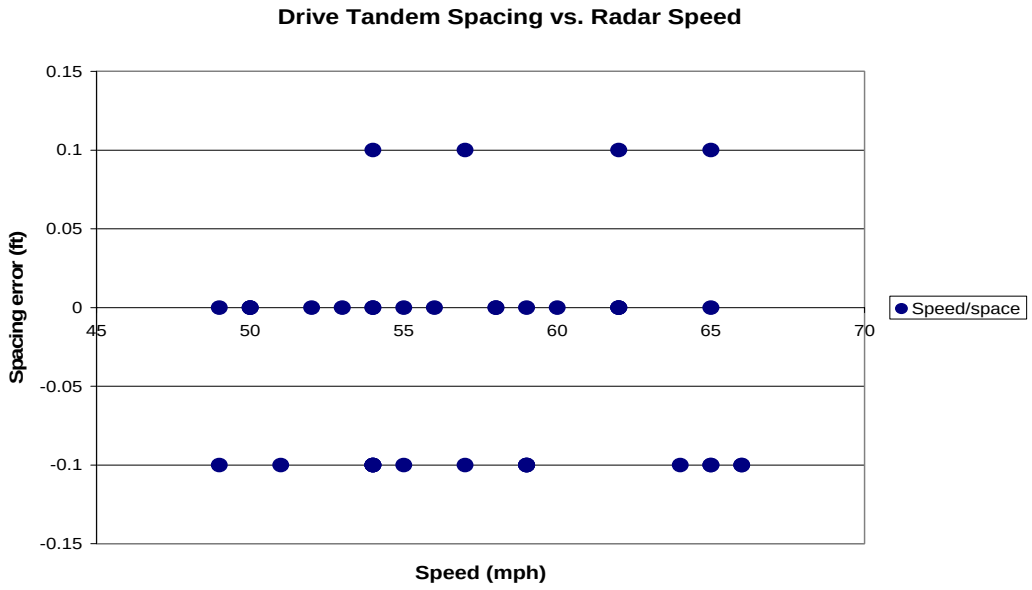



**Figure 6-4 Pre-Validation Spacing vs. Speed - 420600 – 29-May-2007**

### *6.1 Temperature-based Analysis*

The two temperature groups were created by splitting the runs between those at 104 to 112 degrees Fahrenheit for Low temperature and 113 to 120 degrees Fahrenheit for High temperature.

**Table 6-2 Pre-Validation Results by Temperature Bin – 420600 – 29-May-2007**

| Element | 95% Limit | Low Temperature 104 to 112 °F | High Temperature 113 to 120 °F |
|---|---|---|---|
| Steering axles | ±20 % | -5.1 ± 4.7% | -5.0 ± 3.9% |
| Single axles | ±20 % | -4.0 ± 5.3% | -2.3 ± 9.8% |
| Tandem axles | ±15 % | -4.2 ± 7.7% | -2.0 ± 7.3% |
| GVW | ±10 % | -3.9 ± 5.2% | -1.8 ± 5.1% |
| Speed | ±1 mph | 0.0 ± 1.5 mph | -0.1 ± 1.6 mph |
| Axle spacing | ± 0.5 ft | 0.0 ± 0.1 ft | 0.0 ± 0.1 ft |

From Table 6-2, it can be seen that all weights are underestimated throughout the entire temperature range. Variability also appears to be reasonably consistent throughout the

temperature range for steering, GVW and tandem weights while variability in the single axle weight population appears to increase with temperature.

Figure 6-5 shows the distribution of GVW Errors versus Temperature by Truck. The equipment appears to produce a generally accurate estimation of the partial truck (diamonds) GVW over the observed temperature range. For the golden truck (squares), the equipment appears to underestimate GVW at the lower temperatures. The variability in error for the golden truck appears to be greater at the higher temperatures while variability in GVW error for the partial appears to remain consistent over the entire temperature range.

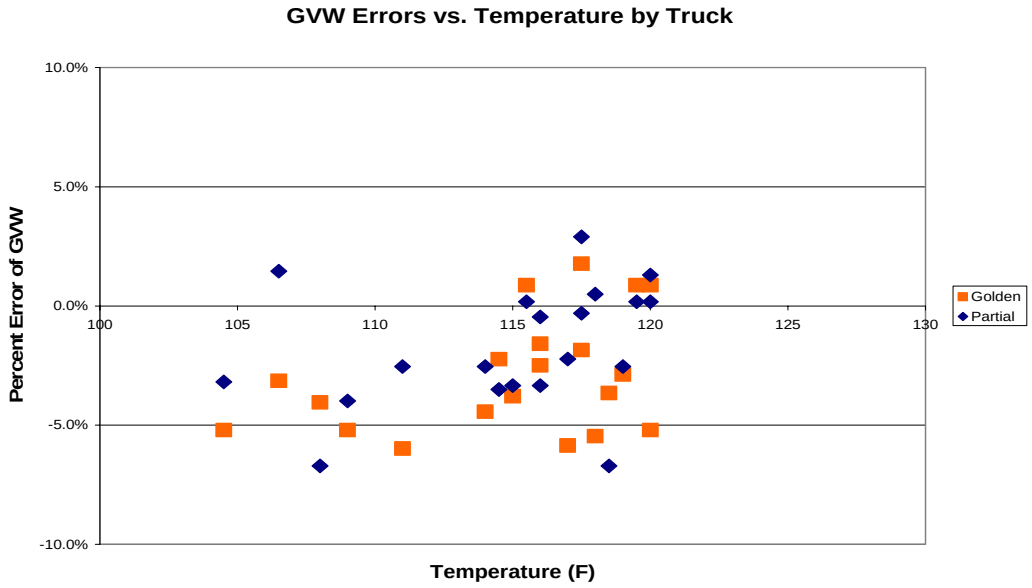



**Figure 6-5 Pre-Validation GVW Percent Error vs. Temperature by Truck – 420600 – 29-May-2007**

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 consistently underestimated by the equipment over the temperature range. Variability in error appears to also be consistent over the entire temperature range.

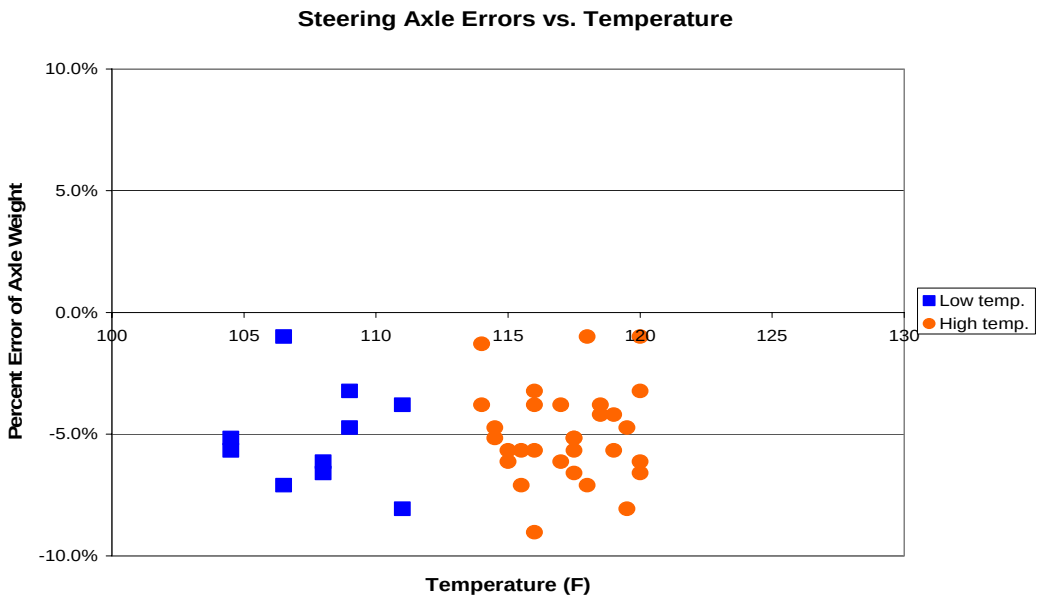



**Figure 6-6 Pre-Validation Steering Axle Error vs. Temperature by Group – 420600 – 29-May-2007**

Figure 6-7 shows the relationship between single axle errors and temperature. This graph is included due to the split tandem configuration of the partial truck trailer

The figure shows that steering axle weights are consistently underestimated by the equipment over the temperature range while the partial truck trailer axles are generally estimated with reasonable accuracy. Variability in error appears to be consistent over the entire temperature range for the steering axle weights but is much greater for the single axle weights of the partial truck trailer at the higher temperatures.

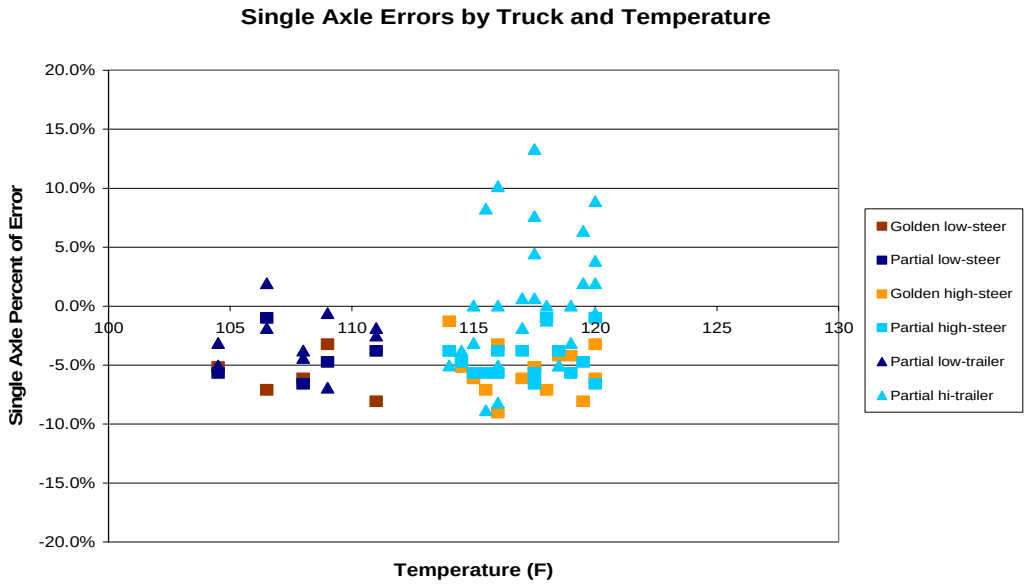



**Figure 6-7 Pre-Validation Single Axle Percent Error vs. Temperature by Truck - 420600 –29-May-2007**

### *6.2 Speed-based Analysis*

The speed groups were divided as follows: Low speed – 49 to 54 mph, Medium speed – 55 to 60 mph and High speed – 61+ mph.

**Table 6-3 Pre-Validation Results by Speed Bin – 420600 – 29-May-2007**

| Element | 95% Limit | Low Speed 49 to 54 mph | Medium Speed 55 to 60 mph | High Speed 61+ mph |
|---|---|---|---|---|
| Steering axles | ±20 % | -4.5 ± 4.6% | -4.5 ± 3.4% | -6.4 ± 2.8% |
| Single axles | ±20 % | -3.3 ± 5.1% | -3.7 ± 4.5% | -0.9 ± 15.0% |
| Tandem axles | ±15 % | -3.4 ± 6.5% | -3.9 ± 7.7% | 0.5 ± 6.0% |
| GVW | ±10 % | -3.3 ± 4.5% | -3.5 ± 4.2% | 0.5 ± 3.1% |
| Speed | ±1 mph | -0.1 ± 1.2 mph | 0.2 ± 2.2 mph | -0.3 ± 1.4 mph |
| Axle spacing | ± 0.5 ft | 0.0 ± 0.1 ft | 0.0 ± 0.1 ft | 0.0 ± 0.2 ft |

From Table 6-3, it can be seen that Tandem and GVW weights are underestimated at the low and medium speeds. Steering and single axle weights are underestimated at all speeds. Variability tends to decrease as speed increases except for single axle weights at high speeds, where variability in error is much greater.

Figure 6-8 illustrates the tendency of the equipment to generally underestimate GVW for each truck independently and for the truck population as a whole at low and medium speeds. Variability appears to slightly decrease as speed increases. Both trucks follow similar trends in GVW estimation with speed.

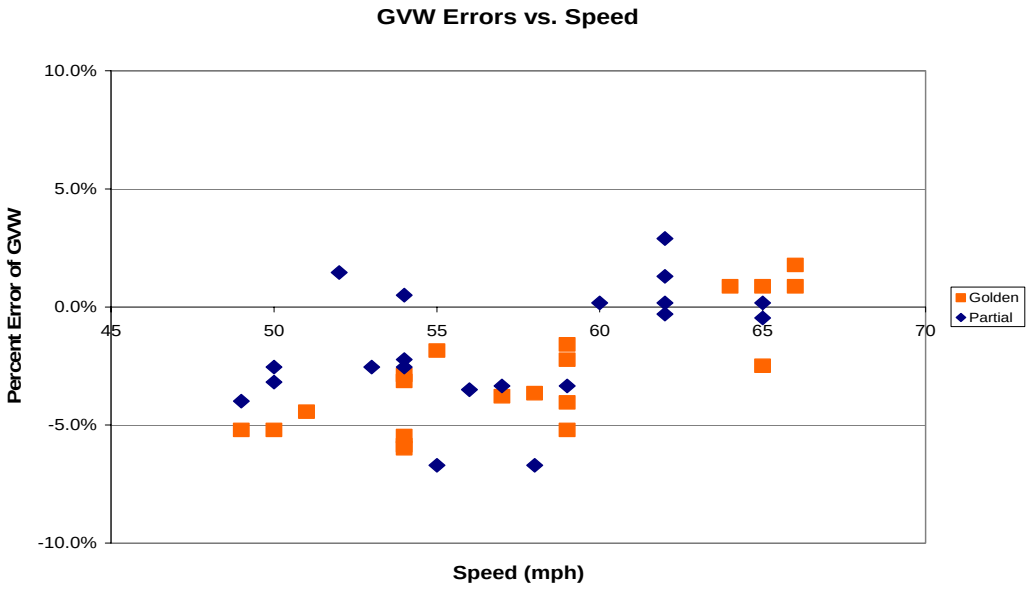



**Figure 6-8 Pre-Validation GVW Percent Error vs. Speed Group - 420600 –29-May-2007**

Figure 6-9 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 increasingly underestimates steering axle weights as speed increases. Variability in error appears to be slightly greater at the lower speeds.

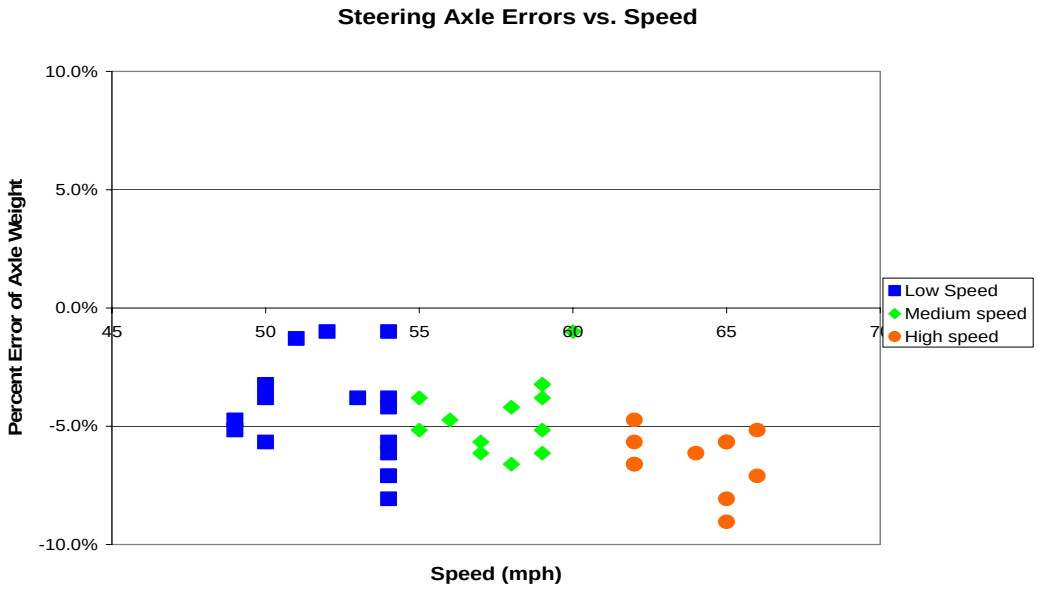



**Figure 6-9 Pre-Validation Steering Axle Percent Error vs. Speed Group - 420600 – 29-May-2007**

Figure 6-10 shows the relation between single axle errors and speed. This graph is included due to the split tandem configuration of the partial truck.

From the figure, it appears that the equipment generally underestimates single axle weights at low and medium speeds. At the higher speeds, the equipment overestimates the partial truck axle weights on the split tandem (diamonds), which increases variability of single axle weights at the high speeds.

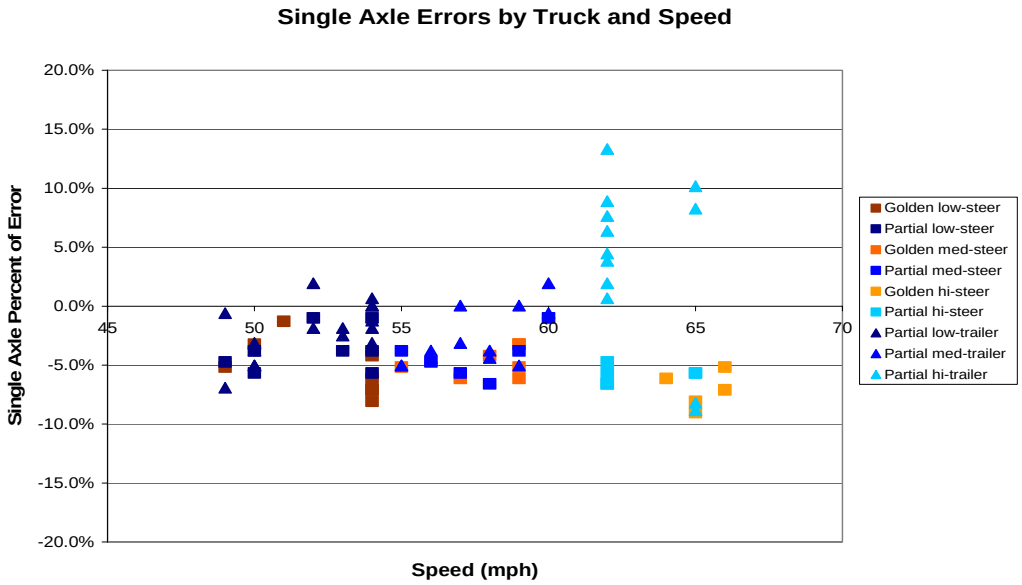



**Figure 6-10 Pre-Validation Single Axle Percent Error vs. Speed Group by Truck - 420600 –29-May-2007**

### *6.3 Classification Validation*

This LTPP installed site uses the FHWA 13-bin classification scheme and the LTPP Mod 3 classification algorithm. Classification 15 has been added to define 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 zero percent unknown vehicles and zero percent unclassified vehicles. There appears to be a classification problem at this site where Class 6 vehicles are identified as Class 4s and Class 5s are identified as Class 3s by the equipment.

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 5.8 percent.

**Table 6-4 Truck Misclassification Percentages for 420600 – 29-May-2007**

| Class | Percent Error | Class | Percent Error | Class | Percent Error |
|---|---|---|---|---|---|
| 4 | 100 | 5 | 50 | 6 | 50 |
| 7 | 0 | | | | |
| 8 | 0 | 9 | 0 | 10 | N/A |
| 11 | N/A | 12 | N/A | 13 | 0 |

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

**Table 6-5 Truck Classification Mean Differences for 420600 – 29-May-2007**

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

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 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 |

## 7 Data Availability and Quality

As of May 29, 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.

There is insufficient data for this SPS-6 project prior to the installation of this site to qualify for one or more years of research quality data.

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

Only Class 9s constitute more than 10 percent of the truck population. Based on the data collected from the end of the last calibration iteration the following are the expected values for these populations. The precise values to be used in data review will need to be determined by the RSC on receipt of the first 14 days of data after the successful validation. For sites that do not meet LTPP precision requirements, this period may still be used as a starting point from which to track scale changes. Table 7-1 is generated with a column for every vehicle class 4 or higher that represents 10 percent or more of the truck (class 4-20) population. In creating Table 7-1 the following definitions are used:

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

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

**Table 7-1 GVW Characteristics of Major sub-groups of Trucks – 420600 – 30-May-2007**

| Characteristic | Class 9 |
|---|---|
| Percentage Overweights | 0.1% |
| Percentage Underweights | 1.7% |
| Unloaded Peak | 28,000 kips |
| Loaded Peak | 68,000 kips |

The expected percentage of unclassified vehicles is 0.3%. This is based on the percentage of unclassified vehicles in the post-validation data download.

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

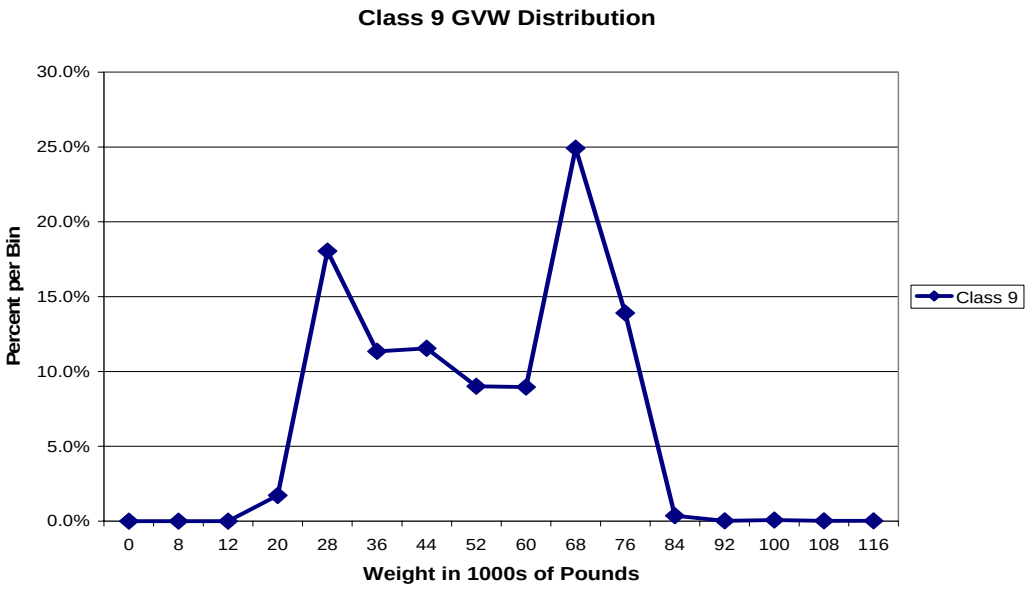



**Figure 7-1 Expected GVW Distribution Class 9 – 420600 – 30-May-2007**

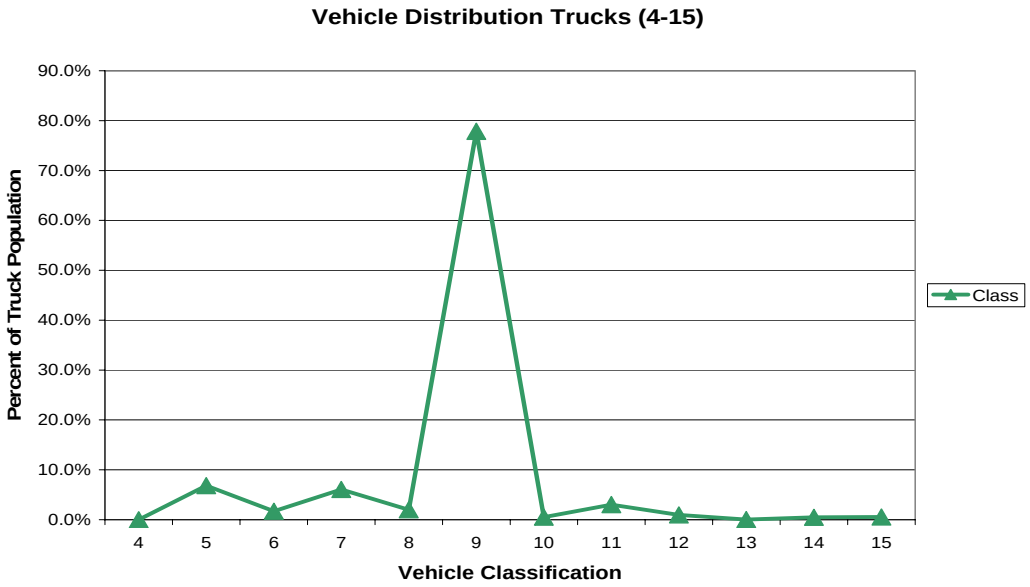



**Figure 7-2 Expected Vehicle Distribution – 420600 – 30-May-2007**

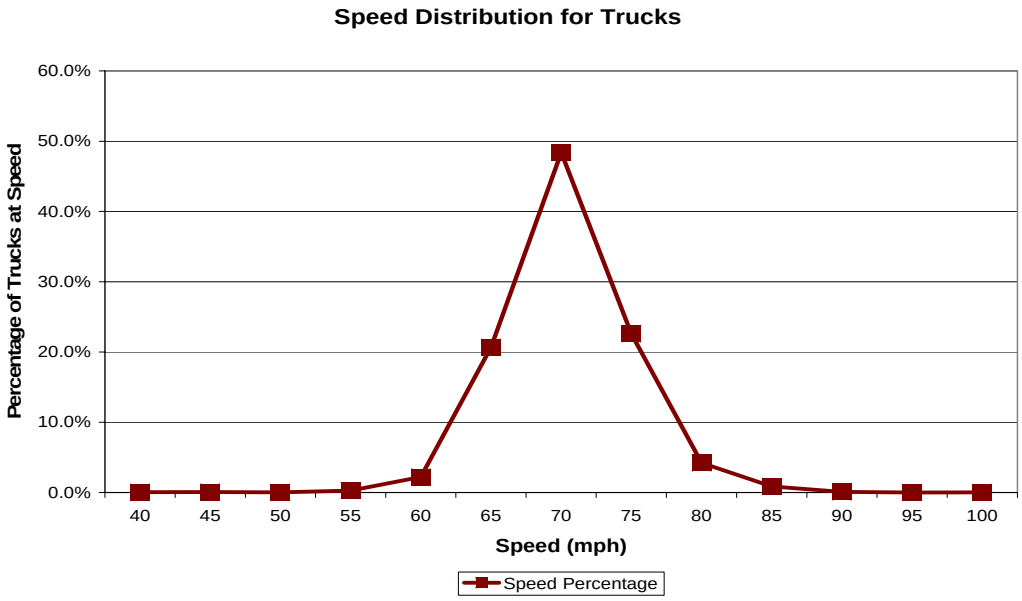



**Figure 7-3 Expected Speed Distribution – 420600 – 30-May-2007**

## 8 Data Sheets

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

Sheet 19 – Truck 1 – 3S2 loaded air suspension (4 pages)
Sheet 19 – Truck 2 – 3S2 partial loaded air suspension; split-tandem tractor (4 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 – Calibration Iteration 1 (1 page)
Sheet 21 – Post-validation (2 pages)

Calibration Iteration 1 Worksheets – (1 page)

Test Truck Photographs (7 pages)

LTPP Mod 3 Classification Scheme (1 page)

Final System Parameters (1 page)

## 9 Updated Handout Guide and Sheet 17

A copy of the handout has been included following this page. It includes a current Sheet 17 with all applicable maps and photographs.

## 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 VALIDATION

## STATE: Pennsylvania

## SHRP ID: 0600



Figures

## 1. General Information

SITE ID: *420600*

LOCATION: *I-80 West, milepost 158.2, near Milesburg, PA*

VISIT DATE: *May 29th, 2007*

VISIT TYPE: *Validation*

## 2. Contact Information

POINTS OF CONTACT:

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

**Highway Agency:** *Gaye Liddick, 717-787-5983, galiddick@state.pa.us*

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

**FHWA Division Office Liaison:** *Zahur Siddiqui, 717-221-3410, zahur.siddiqui@fhwa.dot.gov*

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

## 3. Agenda

BRIEFING DATE: *Not requested for this visit.*

ON-SITE PERIOD: *Beginning May 29th, 2007 at 8:00 am.*

TRUCK ROUTE CHECK: *Completed during installation calibration, May, 2007.*

## 4. Site Location/ Directions

NEAREST AIRPORT: *Pittsburgh International Airport, Pittsburgh, PA*

DIRECTIONS TO THE SITE: *Approximately .5 miles east of I-80, Exit 158.*

MEETING LOCATION: *On site beginning at 8:00 am.*

WIM SITE LOCATION: *I -80, milepost 158.2, Latitude: 40.9555° N, Longitude: -77.7593° W, near Milesburg, PA*

WIM SITE LOCATION MAP: *See Figure 4.1*

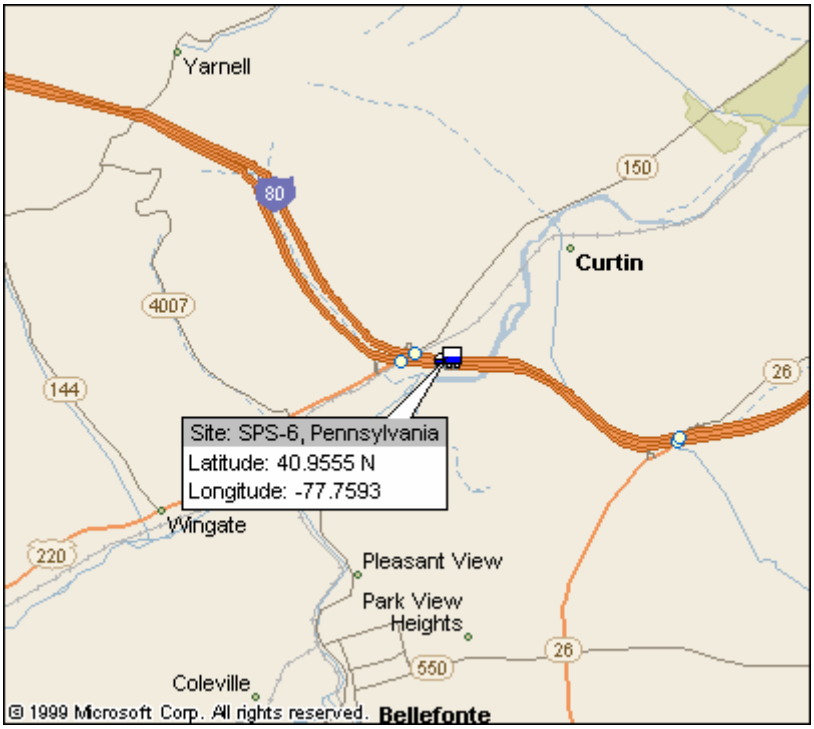



**Figure 4-1 – Section 420600 near Milesburg, Pennsylvania**

## 5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *TA Milesburg, I 80, exit 158 in Milesburg, PA (approximately .5 west of the site). Open 24 hours. Cost is $8.50 per weigh.*

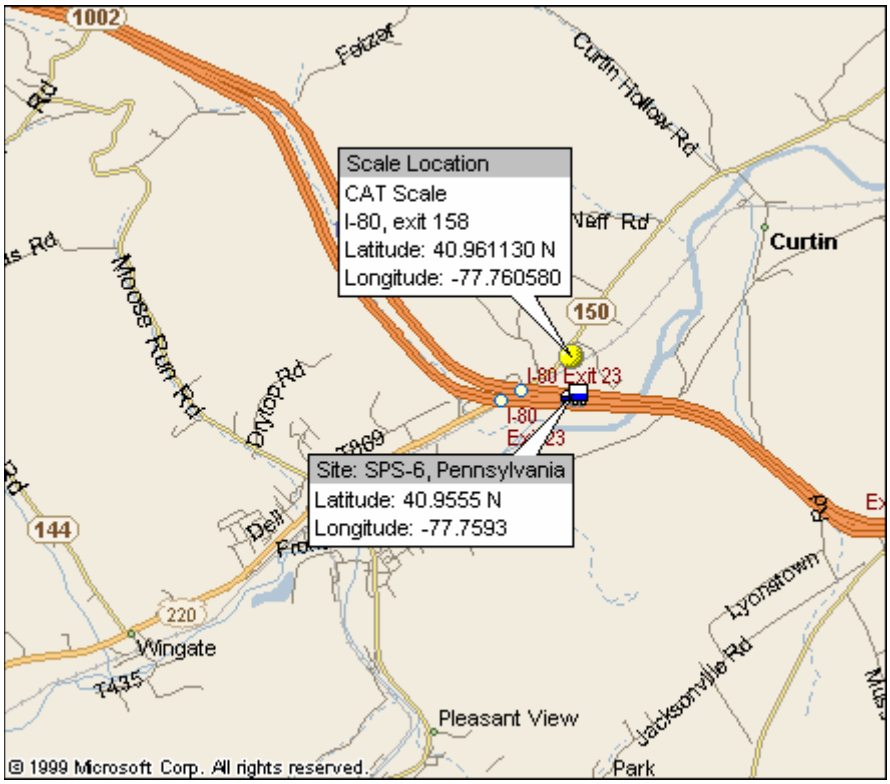



**Figure 5-1 – Scale Location for 420600 in Pennsylvania**

TRUCK ROUTE:

- *.5 miles West to exit 158, west on SR150 for .4 miles, right onto I-80*
- *2.5 miles East to exit 161, east on SR26 for .6 miles, right turn onto I-80*

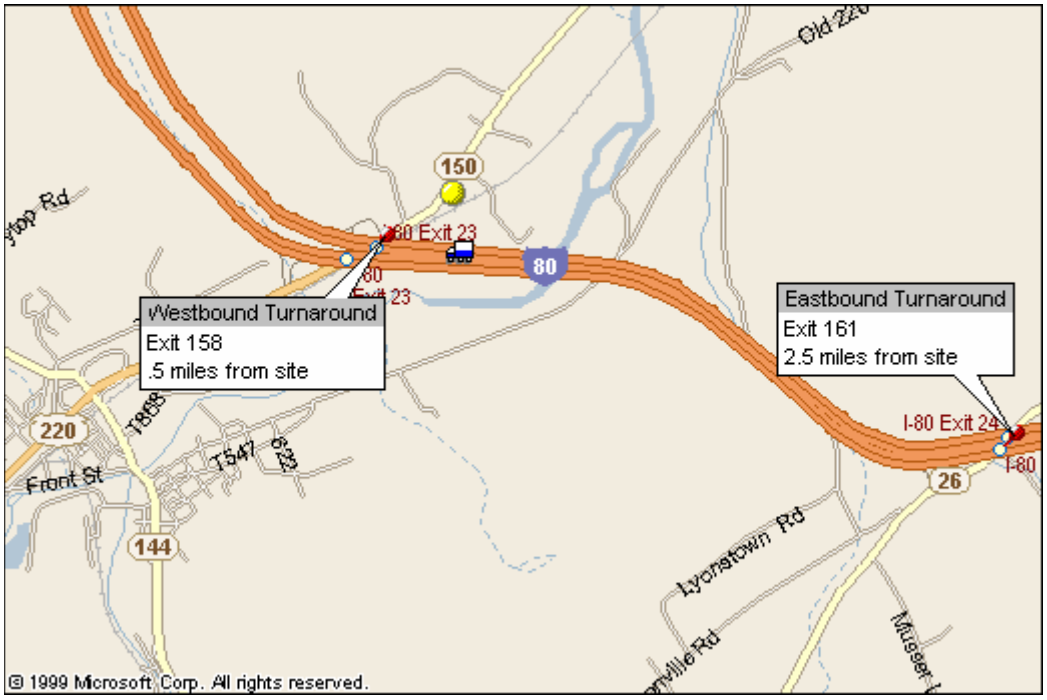



**Figure 5-2 – Test Truck Route for 420600 in Pennsylvania**

## 6. Sheet 17 – Pennsylvania (420600)

1.* ROUTE _____I-80__ MILEPOST __158.2__ LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade __< 1%__ % Sag vertical Y / N
Nearest SPS section upstream of the site __unknown___
Distance from sensor to nearest downstream SPS Section ___ ___ ___ ___ 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_2_ ft

4.* PAVEMENT TYPE ___asphalt_____

5.* PAVEMENT SURFACE CONDITION – Distress Survey
Date __5/29/2007_ Photo – 420600_2007_05_29_Downstream_____
Date __5/29/2007_Photo – 420600_2007_05_29_Upstream_____
Date _____Photo_____

6. * SENSOR SEQUENCE _____loop – quartz piezo – quartz piezo loop_____

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

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

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

Clearance under plate ___ ___ . ___ in
Clearance/access to flush fines from under system Y / N

10. * CABINET LOCATION

Same side of road as LTPP lane Y / N Median Y/ N Behind barrier Y / N

Distance from edge of traveled lane _9_ _1_ ft
Distance from system _1_ _0_ _8_ ft
TYPE _____3R_____

CABINET ACCESS controlled by LTPP / STATE / JOINT ?
Contact - name and phone number ___Gaye Liddick__(717) 787-5983___
Alternate - name and phone number ____Roy Czinku__(306) 653-6627__

11. * POWER

Distance to cabinet from drop ___ _3__ ___ ft Overhead / underground / solar / AC in cabinet?
Service provider _____ Phone number _____

12. * TELEPHONE

Distance to cabinet from drop ___ __0_ ___ ft Overhead / under ground / cell?
Service provider _____ Phone Number _____

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

14. * TEST TRUCK TURNAROUND time ___12____ minutes DISTANCE _4.5__ mi.

| 15. PHOTOS | FILENAME |
|---|---|
| Power source | 420600_2007_05_29_Solar_Panels.JPG_____ |
| | 420600_2007_05_29_Service_Mast.JPG_____ |
| Phone source | 420600_2007_05_29_Cell_Modem.JPG_____ |
| Cabinet exterior | 420600_2007_05_29_Cabinet_Exterior.JPG_____ |
| Cabinet interior | 420600_2007_05_29_Cabinet_Interior_Front.JPG_____ |
| | 420600_2007_05_29_Cabinet_Interior_Back.JPG_____ |
| Weight sensors | 420600_2007_05_29_Leading_Quartz_Sensor.JPG_____ |
| | 420600_2007_05_29_Trailing_Quartz_Sensor.JPG_____ |
| Classification sensors | _____ |
| Other sensors | _Loops_____ |
| Description | 420600_2007_05_29_Leading_Loop_JPG_____ |
| | 420600_2007_05_29_Trailing_Loop.JPG |

Downstream direction at sensors on LTPP lane _420600_2007_05_29_Downstream.JPG
Upstream direction at sensors on LTPP lane _420600_2007_05_29_Upstream_JPG

COMMENTS
__ Mile post is 158 + 1013’

___ GPS 40.9555 N -77.7593 W

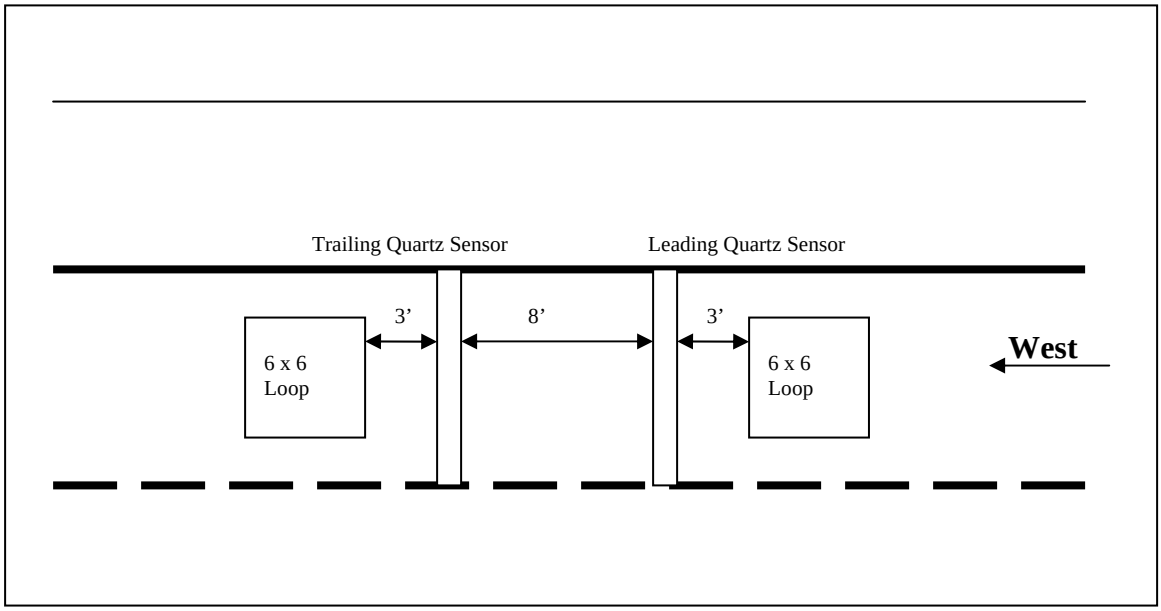
Truck route west 2600 ft (turn around, exit 158), east (exit 161) 9130 ft

Old site 36260’ from new site to the west _____

COMPLETED BY ___Dean J. Wolf._____

PHONE __301-210-5105_____ DATE COMPLETED _0 _5 /_2_ 9_ / 2_ 0_ 0_7

Sketch of equipment layout




Site Map

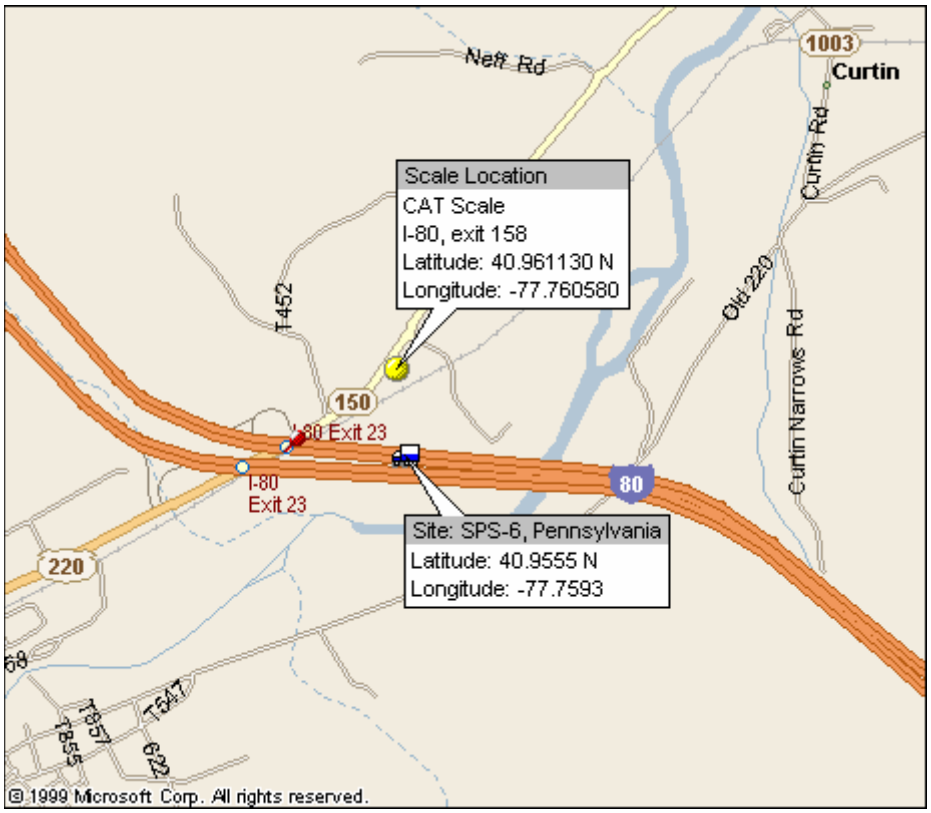



**Figure 6-1 – Site Map of 420600 in Pennsylvania**

**Figure 6-2 – 420600_2007_05_29_Downstream.JPG**

**Figure 6-3 – 420600_2007_05_29_Upstream.JPG**

**Figure 6-4 – 420600_2007_05_29_WIM_Site.JPG**

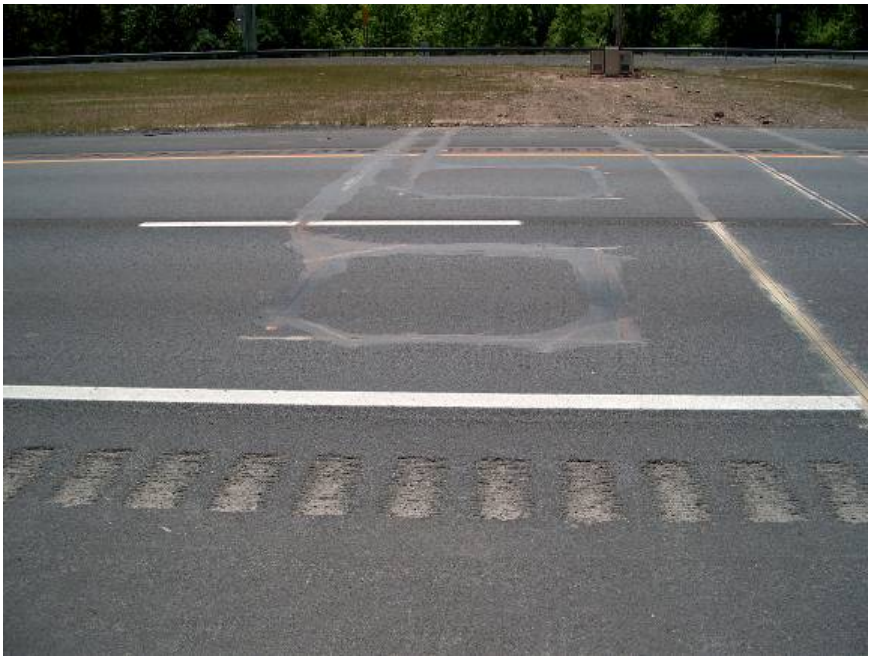


**Figure 6-5 – 420600_2007_05_29_Leading_Loop.JPG**

**Figure 6-6 – 420600_2007_05_29_Leading_Quartz_Sensor.JPG**

**Figure 6-7 – 420600_2007_05_29_Trailing_Quartz_Sensor.JPG**

**Figure 6-8 – 420600_2007_05_29_Trailing_Loop.JPG**

**Figure 6-9 – 420600_2007_05_29_Cabinet_Exterior.JPG**

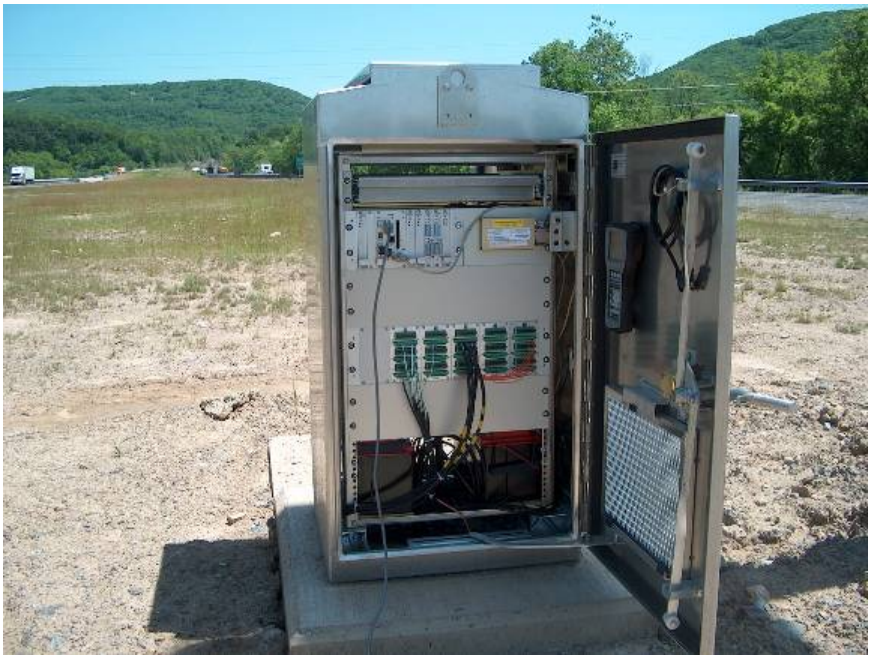


**Figure 6-10 – 420600_2007_05_29_Cabinet_Interior_Front.JPG**

**Figure 6-11 – 420600_2007_05_29_Cabinet_Interior_Back.JPG**

**Figure 6-12 – 420600_2007_05_29_Service_Mast.JPG**

**Figure 6-13 – 420600_2007_05_29_Solar_Panels.JPG**


**Figure 6-14 – 420600_2007_05_29_Cell_Modem.JPG**

.

| SHEET 18 | STATE CODE [ 42] |
|---|---|
| LTPP MONITORED TRAFFIC DATA | SPS PROJECT ID [ 0600] |
| WIM SITE COORDINATION | DATE: (mm/dd/yyyy) 5/29/2007 |

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 – _____

e. Test Vehicles

i. Trucks –

1st – Air suspension 3S2 ☐ State ☒ LTPP

2nd – 3S2 different weight/suspension ☐ State ☒ LTPP

3rd – _____ ☐ State ☐ LTPP

4th – _____ ☐ State ☐ LTPP

ii. Loads – ☐ State ☐ LTPP

iii. Drivers – ☐ State ☐ LTPP

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

_____

g. Access to cabinet

i. Personnel Access –

☐ State only

☐ Joint

☐ LTPP

ii. Physical Access –

☐ Key

☐ Combination

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

i. Traffic Control Required – ☐Yes ☐No

j. Enforcement Coordination Required – ☐Yes ☐No

5. SITE SPECIFIC CONDITIONS –

a. Funds and accountability – _____

b. Reports – _____

c. Other – _____

d. Special Conditions – _____

6. CONTACTS –

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

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

Agency: IRD

b. Maintenance (equipment) –

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

Agency: IRD

c. Data Processing and Pre-Visit Data –

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

Agency: IRD

d. Construction schedule and verification –

Name: _____ Phone:_____

Agency: _____

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

Name: _____ Phone:_____

Agency: _____

f. Traffic Control –

Name: _____ Phone:_____

Agency: _____

g. Enforcement Coordination –

Name: _____ Phone:_____

Agency: _____

h. Nearest Static Scale

Name: _____ Location:_____

Phone: _____

| **SHEET 16**<br>**LTPP MONITORED TRAFFIC DATA**<br>**SITE CALIBRATION SUMMARY** | *STATE ASSIGNED ID [ __ __ __ __ ]<br>*STATE CODE [ 42 ]<br>*SHRP SECTION ID [ 0600] |
|---|---|

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [ 5/29/2007]

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

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
   ___ BARE ROUND PIEZO CERAMIC ___ BARE FLAT PIEZO _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 Kitler quartz_____

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 | 1 |
| 3 | | |

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW -2.3 STANDARD DEVIATION 2.6
   DYNAMIC AND STATIC SINGLE AXLES -2.7 STANDARD DEVIATION 4.5
   DYNAMIC AND STATIC DOUBLE AXLES -2.6 STANDARD DEVIATION 3.7

8. 4 ____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____ 50 55 60 65 __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) 3003213

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   *** FHWA CLASS 9 ____ 0.0 FHWA CLASS ___ ____ ____ _____
   *** FHWA CLASS 8 ____ 0.0 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**<br>**LTPP MONITORED TRAFFIC DATA**<br>**SITE CALIBRATION SUMMARY** | *STATE ASSIGNED ID [ __ __ __ __ ]<br>*STATE CODE [ 42 ]<br>*SHRP SECTION ID [ 0600] |
|---|---|

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [ 5/30/2007]

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

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

4. * SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
   ___ BARE ROUND PIEZO CERAMIC ___ BARE FLAT PIEZO _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 Kistler quartz_____

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 | 1 |
| 3 | | |

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW -0.1 STANDARD DEVIATION 2.0
   DYNAMIC AND STATIC SINGLE AXLES -1.3 STANDARD DEVIATION 5.7
   DYNAMIC AND STATIC DOUBLE AXLES 0.2 STANDARD DEVIATION 3.4

8. 4 ____ NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED

9. DEFINE THE SPEED RANGES USED (MPH) _____ 50 55 60 65 __ __ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) 3040/3213

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

CLASSIFIER TEST SPECIFICS***

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

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

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   *** FHWA CLASS 9 ____ 0.0 FHWA CLASS ___ ____ ____ _____
   *** FHWA CLASS 8 ____ 0.0 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 | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 1 | * DATE | 5/29/07 |

Rev. 08/31/01

PART I.

TRUCK 42
TRAILER 453

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

**AXLES** - units - lbs / 100s lbs / kg

| | 3. Empty Truck Axle Weight | 4.* Pre-Test Average Loaded Axle Weight (Day 1) | 5.* Post-Test Average Loaded Axle Weight (Day 1) | 6.* Measured D)irectly or C)alculated? |
|---|---|---|---|---|
| A | | 10367 | 10300 | (D) / C |
| B | | 15960 | 15870 | (D) / C |
| C | | 15960 | 15870 | (D) / C |
| D | | 17593 | 17580 | (D) / C |
| E | | 17593 | 17580 | (D) / C |
| F | | | | D / C |

**GVW** (same units as axles)

7. a) Empty GVW 0

| | Day 2 | Day 1 |
|---|---|---|
| *b) Average Pre-Test Loaded weight | 77367 | 77473 |
| *c) Post Test Loaded Weight | 77120 | 77180 |
| *d) Difference Post Test – Pre-test | -247 | -293 |

**GEOMETRY**

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

9. a) * Make: PETERBILT b) * Model: 377

10.* Trailer Load Distribution Description:

STEER BEAMS LOADED DOWN CENTER OF TRAILER (SLIGHTLY RIGHT)
BACK TO REAR AXLE

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

b). Trailer Tare Weight (units): _____

| Sheet 19 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 1 | * DATE | 5/29/07 |

Rev. 08/31/01

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

A to B 16.5 B to C 4.4 C to D 36'

D to E 4.1 E to F 0

Wheelbased (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) _____ ( + 1.7' )

( + is to the rear)

**SUSPENSION**

| Axle | 14. Tire Size | 15.* Suspension Description (leaf, air, no. of leaves, taper or flat leaf, etc.) |
|---|---|---|
| A | 11R24.5 | 2 LEAF SPRINGS |
| B | 11R24.5 | AIR |
| C | 11R24.5 | AIR |
| D | 80R22.5 | AIR |
| E | 80R22.5 | 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 | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 1 | * DATE | 05-29-07 |

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 | | II<br>-I | | III<br>-II | | IV<br>-III | | V<br>-IV | | V | |
| V<br>-VI | | VI-<br>VII | | VII-<br>VIII | | VIII-<br>IX | | IX | | X | |
| | | | | | | | | | | XI | |
| Avg. | | | | | | | | | | | |

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

| Sheet 19 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 1 | * DATE | 5-29-07 |

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

Table 5. Raw data – Axle scales – pre-test - day 1 pm

| Pass | Axle A | Axle B | Axle C | Axle D | Axle E | Axle F | GVW |
|---|---|---|---|---|---|---|---|
| 1 | 10400 | 15940 | 15940 | 17600 | 17600 | | 77480 |
| 2 | 10320 | 15980 | 15980 | 17590 | 17590 | | 77460 |
| 3 | 10380 | 15960 | 15960 | 17590 | 17590 | | 77480 |
| Average | 10367 | 15940 | 15960 | 17593 | 17593 | | 77470 |
| Post | 10300 | 15870 | 15870 | 17570 | 17570 | | |

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 pre day 2

| Pass | Axle A | Axle B | Axle C | Axle D | Axle E | Axle F | GVW |
|---|---|---|---|---|---|---|---|
| 1 | 10380 | 15910 | 15910 | 17580 | 17580 | | 77360 |
| 2 | 10380 | 15920 | 15920 | 17580 | 17580 | | 77380 |
| 3 | 10340 | 15930 | 15930 | 17580 | 17580 | | 77360 |
| Average | 10367 | 15920 | 15920 | 17580 | 17580 | | 77367 |
| Post | 10300 | 15830 | 15830 | 17580 | 17580 | | 77120 |

Measured By DJW Verified By _____

| Sheet 19 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 2 | * DATE | 5.29.07 |

Rev. 08/31/01

truck 1635/006
trailer 1635/004

PART I.

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

**AXLES** - units - lbs / 100s lbs / kg

| | 3. Empty Truck Axle Weight | 4.* Pre-Test Average Loaded Axle Weight | 5.* Post-Test Average Loaded Axle Weight | 6.* Measured D)irectly or C)alculated? |
|---|---|---|---|---|
| A | | | | D / C |
| B | | day 1 table 5 | day 1 line between table 5 & 6 | D / C |
| C | | " | " | D / C |
| D | | " | " | D / C |
| E | | " | " | D / C |
| F | | | | D / C |

**GVW** (same units as axles)

7. a) Empty GVW _____

| | Day 2 | Day 1 |
|---|---|---|
| *b) Average Pre-Test Loaded weight | 62587 | 62600 |
| *c) Post Test Loaded Weight | 62340 | 62380 |
| *d) Difference Post Test – Pre-test | -247 | -220 |

**GEOMETRY**

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

9. a) * Make: FREIGHTLINER b) * Model: C12006 4ST

10.* Trailer Load Distribution Description:

STEEL BEAMS LOADED CENTERLINE ALONG ENTIRE TRAILER

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

b). Trailer Tare Weight (units): _____

| Sheet 19 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 2 | * DATE | 5-29-07 |

Rev. 08/31/01

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

A to B 15.1 B to C 4.3 C to D 30.6

D to E 10.2 E to F 0

Wheelbased (measured A to last) _____ Computed _____

13. *Kingpin Offset From Axle B (units) _____ ( + 2.2 )

( + 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 | 3 SPRING LEAF |
| B | 11R22.5 | AIR |
| C | 11R22.5 | AIR |
| D | 70R22.5 | AIR |
| E | 70R22.5 | 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 | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 2 | * DATE | 5-29-07 |

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 | | II<br>-I | | III<br>-II | | IV<br>-III | | V<br>-IV | | V | |
| V<br>-VI | | VI-<br>VII | | VII-<br>VIII | | VIII-<br>IX | | IX | | X | |
| | | | | | | | | | | XI | |
| Avg. | | | | | | | | | | | |

Table 2. Raw Axle and GVW measurements

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

Table 3. Axle and GVW computations - post -test

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

| Sheet 19 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | * SPS PROJECT ID | 0600 |
| *CALIBRATION TEST TRUCK # 2 | * DATE | 5-29-07 |

Rev. 08/31/01

Table 4 . Axle and GVW computations -

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

Table 5. Raw data – Axle scales – pre-test - day 1 pm

| Pass | Axle A | Axle B | Axle C | Axle D | Axle E | Axle F | GVW |
|---|---|---|---|---|---|---|---|
| 1 | 10800 | 10110 | 10110 | 15790 | 15790 | | 62600 |
| 2 | 10760 | 10130 | 10130 | 15790 | 15790 | | 62600 |
| 3 | 10760 | 10110 | 10110 | 15810 | 15810 | | 62600 |
| Average | 10773 | 10117 | 10117 | 15797 | 15797 | | 62600 |
| Post | 10640 | 10080 | 10080 | 15790 | 15790 | | 62380 |

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 day 2 p-c

| Pass | Axle A | Axle B | Axle C | Axle D | Axle E | Axle F | GVW |
|---|---|---|---|---|---|---|---|
| 1 | 10820 | 10100 | 10100 | 15780 | 15780 | | 62580 |
| 2 | 10780 | 10100 | 10100 | 15800 | 15800 | | 62580 |
| 3 | 10800 | 10090 | 10090 | 15810 | 15810 | | 62600 |
| Average | 10800 | 10097 | 10097 | 15797 | 15797 | | 62587 |
| Post | 10660 | 10060 | 10060 | 15780 | 15780 | | 62340 |

Measured By DJW Verified By _____

| Sheet 20 | * STATE_CODE 42 |
|---|---|
| LTPP Traffic Data | *SPS PROJECT_ID 0600 |
| Speed and Classification Checks * 1 of* 2 | * DATE 05/29/2007 |

Rev. 08/31/2001....

| WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class | WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class | |
|---|---|---|---|---|---|---|---|---|---|---|
| 59 | 9 | 33862 | 59 | 9 | 64 | 9 | 34149 | 66 | 9 | |
| 74 | 9 | 33878 | 74 | 9 | 66 | 9 | 151 | 68 | 9 | |
| 68 | 9 | 33885 | 67 | 9 | 67 | 9 | 171 | 68 | 9 | |
| 63 | 9 | 33910 | 65 | 9 | 69 | 5 | 176 | 69 | 5 | |
| 68 | 9 | 33916 | 68 | 9 | 64 | 9 | 181 | 65 | 9 | |
| 70 | 9 | 33925 | 69 | 9 | 65 | 9 | 184 | 65 | 9 | |
| 68 | 9 | 33934 | 69 | 9 | 66 | 9 | 187 | 67 | 9 | |
| 65 | 9 | 33942 | 65 | 9 | 59 | 9 | 196 | 61 | 9 | |
| 65 | 9 | 33954 | 64 | 9 | 62 | 9 | 208 | 64 | 9 | |
| 65 | 9 | 33960 | 65 | 9 | 72 | 9 | 217 | 71 | 9 | |
| 64 | 9 | 33972 | 66 | 9 | 64 | 9 | 225 | 64 | 9 | |
| 65 | 9 | 33984 | 64 | 9 | 70 | 4 | 232 | 69 | 6 | *21.6 4.4 |
| 64 | 9 | 993 | 64 | 9 | 65 | 9 | 236 | 65 | 9 | |
| 67 | 9 | 34013 | 70 | 9 | 66 | 9 | 241 | 68 | 9 | |
| 65 | 9 | 027 | 65 | 9 | 64 | 9 | 257 | 70 | 9 | |
| *4.1 67 | 4 | 032 | 67 | 5 | 68 | 9 | 267 | 67 | 9 | |
| 70 | 9 | 057 | 68 | 9 | 65 | 9 | 275 | 67 | 9 | |
| 64 | 9 | 077 | 65 | 9 | 65 | 9 | 283 | 65 | 9 | |
| 69 | 9 | 085 | 70 | 9 | 70 | 9 | 299 | 70 | 9 | |
| 67 | 9 | 102 | 68 | 9 | 65 | 9 | 306 | 65 | 9 | |
| 62 | 8 | 113 | 63 | 8 | 66 | 9 | 325 | 66 | 9 | |
| 63 | 9 | 34122 | 63 | 9 | 65 | 9 | 352 | 67 | 9 | |
| 69 | 9 | 125 | 71 | 9 | 67 | 7 | 355 | 65 | 7 | |
| 70 | 9 | 134 | 71 | 9 | 63 | 9 | 357 | 63 | 9 | |
| 65 | 9 | 140 | 65 | 9 | 65 | 9 | 374 | 65 | 9 | |

Recorded by LV Direction W Lane 4 Time from 4:50 to 5:24

| Sheet 20 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | *SPS PROJECT_ID | 0600 |
| Speed and Classification Checks * 2 of* 2 | * DATE | 05/29/2007 |

Rev. 08/31/2001....

| WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class | WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class |
|---|---|---|---|---|---|---|---|---|---|
| 67 | 9 | 34397 | 67 | 9 | 64 | 9 | 34599 | 65 | 9 |
| 62 | 9 | 407 | 63 | 9 | 70 | 9 | 600 | 71 | 9 |
| 66 | 9 | 408 | 67 | 9 | 65 | 9 | 608 | 65 | 9 |
| 65 | 9 | 34416 | 66 | 9 | 68 | 9 | 612 | 70 | 9 |
| 60 | 9 | 422 | 62 | 9 | 64 | 9 | 654 | 69 | 9 |
| 64 | 9 | 432 | 64 | 9 | 70 | 9 | 655 | 67 | 9 |
| 72 | 9 | 446 | 71 | 9 | 68 | 9 | 668 | 66 | 9 |
| 63 | 9 | 445 | 63 | 9 | 63 | 9 | 669 | 68 | 9 |
| 63 | 9 | 449 | 66 | 9 | 67 | 9 | 683 | 69 | 9 |
| 63 | 9 | 454 | 63 | 9 | 64 | 9 | 689 | 66 | 9 |
| 65 | 9 | 458 | 69 | 9 | 70 | 9 | 694 | 68 | 9 |
| 68 | 6 | 467 | 72 | 6 | 65 | 9 | 697 | 64 | 9 |
| 72 | 9 | 474 | 66 | 9 | 65 | 9 | 700 | 65 | 9 |
| 64 | 8 | 481 | 66 | 8 | 72 | 9 | 711 | 71 | 9 |
| 67 | 9 | 496 | 66 | 9 | 63 | 9 | 718 | 63 | 9 |
| 70 | 9 | 507 | 70 | 9 | 68 | 9 | 722 | 71 | 9 |
| 65 | 9 | 510 | 66 | 9 | 68 | 9 | 728 | 65 | 9 |
| 64 | 9 | 521 | 65 | 9 | 64 | 9 | 734 | 65 | 9 |
| 67 | 13 | 34545 | 64 | 13 | 68 | 9 | 738 | 66 | 9 |
| 64 | 9 | 559 | 64 | 9 | 66 | 9 | 34754 | 67 | 9 |
| 65 | 4 | 567 | 68 | 5 | 73 | 9 | 757 | 70 | 9 |
| 70 | 9 | 577 | 69 | 9 | 67 | 9 | 780 | 67 | 9 |
| 70 | 9 | 584 | 71 | 9 | 61 | 9 | 784 | 62 | 9 |
| 66 | 9 | 590 | 66 | 9 | 68 | 5 | 787 | 68 | 5 |
| 62 | 9 | 591 | 59 | 9 | 60 | 9 | 794 | 64 | 9 |

Recorded by Idc Direction W Lane 4 Time from 5:25 to 5:51

| Sheet 20 | * STATE_CODE 42 |
|---|---|
| LTPP Traffic Data | *SPS PROJECT_ID 0600 |
| Speed and Classification Checks * 1 of* 2 | * DATE 05/30/2007 |

Rev. 08/31/2001....

| WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class | WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class | |
|---|---|---|---|---|---|---|---|---|---|---|
| 72 | 12 | 41453 | 72 | 12 | 67 | 9 | 41705 | 68 | 9 | |
| 60 | 6 | 458 | 59 | 6 | 70 | 9 | 820 | 72 | 9 | |
| 65 | 9 | 466 | 65 | 9 | 60 | 10 | 822 | 68 | 10 | |
| 65 | 12 | 470 | 66 | 12 | 66 | 9 | 833 | 66 | 9 | |
| 65 | 9 | 572 | 64 | 9 | 75 | 9 | 834 | 75 | 9 | |
| 65 | 5 | 574 | 64 | 5 | 67 | 9 | 847 | 68 | 9 | |
| 62 | 11 | 578 | 63 | 11 | 64 | 9 | 850 | 65 | 9 | |
| 61 | 9 | 582 | 62 | 9 | 61 | 5 | 851 | 61 | 5 | |
| 64 | 9 | 620 | 67 | 9 | 65 | 4 | 932 | 65 | 6 | * 22.5 4.3 |
| 62 | 4 | 621 | 63 | 6 | 60 | 4 | 942 | 58 | 5 | * 23.0 |
| 65 | 9 | 626 | 69 | 9 | 65 | 9 | 942 | 67 | 9 | |
| 65 | 9 | 635 | 67 | 9 | 67 | 5 | 947 | 68 | 5 | |
| 64 | 7 | 636 | 65 | 7 | 73 | 12 | 955 | 71 | 12 | |
| 58 | 9 | 646 | 60 | 9 | 70 | 12 | 962 | 72 | 12 | |
| 68 | 9 | 642 | 64 | 9 | 64 | 9 | 963 | 63 | 9 | |
| 64 | 9 | 645 | 65 | 9 | 72 | 9 | 975 | 70 | 9 | |
| 64 | 9 | 650 | 63 | 9 | 71 | 9 | 977 | 72 | 9 | |
| 64 | 7 | 41 659 | 67 | 7 | 62 | 9 | 981 | 64 | 9 | |
| 55 | 9 | 662 | 56 | 9 | 67 | 7 | 986 | 68 | 7 | |
| 73 | 10 | 668 | 73 | 10 | 67 | 5 | 989 | 69 | 5 | |
| 65 | 11 | 676 | 66 | 11 | 72 | 9 | 991 | 71 | 9 | |
| 65 | 9 | 684 | 68 | 9 | 64 | 9 | 999 | 64 | 9 | |
| 67 | 11 | 692 | 69 | 11 | 66 | 11 | 42001 | 66 | 11 | |
| 65 | 9 | 695 | 66 | 9 | 70 | 9 | 086 | 70 | 9 | |
| 68 | 9 | 700 | 70 | 9 | 69 | 7 | 094 | 72 | 7 | |

* 21.8 4.3

Recorded by JdV Direction W Lane 4 Time from 8:30 to 9:54

| Sheet 20 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | *SPS PROJECT_ID | 0600 |
| Speed and Classification Checks * 2 of* 2 | * DATE | 05/30/2007 |

Rev. 08/31/2001....

| WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class | WIM speed | WIM class | WIM Record | Obs. Speed | Obs Class |
|---|---|---|---|---|---|---|---|---|---|
| 67 | 9 | 42105 | 69 | 9 | 69 | 9 | 412 | 70 | 9 |
| 58 | 9 | 113 | 66 | 9 | 60 | 9 | 413 | 59 | 9 |
| 64 | 6 | 120 | 67 | 6 | 65 | 9 | 462 | 65 | 9 |
| 63 | 9 | 123 | 64 | 9 | 63 | 9 | 464 | 62 | 9 |
| 66 | 9 | 125 | 66 | 9 | 57 | 9 | 477 | 55 | 9 |
| 69 | 9 | 145 | 69 | 9 | 63 | 9 | 479 | 61 | 9 |
| 67 | 9 | 147 | 66 | 9 | 61 | 11 | 482 | 63 | 11 |
| 69 | 9 | 151 | 65 | 9 | 66 | 9 | 487 | 66 | 9 |
| 60 | 9 | 152 | 60 | 9 | 63 | 9 | 42491 | 62 | 9 |
| 67 | 9 | 239 | 66 | 9 | 66 | 9 | 493 | 66 | 9 |
| 69 | 9 | 242 | 69 | 9 | 69 | 10 | 494 | 70 | 10 |
| 61 | 9 | 246 | 64 | 9 | 65 | 9 | 495 | 69 | 9 |
| 63 | 9 | 247 | 65 | 9 | 60 | 9 | 496 | 56 | 9 |
| 68 | 9 | 254 | 66 | 9 | 66 | 9 | 503 | 67 | 9 |
| 71 | 9 | 268 | 71 | 9 | 65 | 7 | 505 | 64 | 7 |
| 67 | 9 | 273 | 67 | 9 | 60 | 8 | 506 | 60 | 8 |
| 70 | 9 | 275 | 70 | 9 | 63 | 9 | 523 | 63 | 9 |
| 67 | 8 | 285 | 67 | 8 | 69 | 9 | 523 | 66 | 9 |
| 64 | 9 | 358 | 67 | 9 | 68 | 7 | 526 | 67 | 7 |
| 64 | 9 | 362 | 68 | 9 | 62 | 9 | 527 | 61 | 9 |
| 68 | 9 | | 65 | 9 | 65 | 9 | 537 | 66 | 9 |
| 66 | 9 | 399 | 68 | 8 | 70 | 6 | 539 | 68 | 6 |
| 64 | 9 | 403 | 67 | 9 | 64 | 9 | 545 | 65 | 9 |
| 62 | 9 | 408 | 62 | 9 | 65 | 9 | 549 | 65 | 9 |
| 60 | 9 | 409 | 67 | 9 | 62 | 5 | 550 | 63 | 5 |

Recorded by dr Direction W Lane 4 Time from 9:54 to 10:34

| Sheet 21 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | *SPS PROJECT_ID | 0600 |
| WIM System Test Truck Records 1 of 3 | * DATE | 05/29/2007 |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 104.5 | 50 | 2 | 1 | 11:33 | 29319 | 50 | 5.2/4.9 | 4.7/5.7 | 9.9/4.7 | 8.7/6.5 | 8.8/6.5 | | 60.5 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 104.5 | 49 | 1 | 1 | 11:34 | 29321 | 50 | 4.7/5.1 | 9.3/6.5 | 7.3/7.1 | 8.9/7.5 | 9.1/7.7 | | 73.3 | 16.5 | 4.3 | 35.9 | 4.0 | |
| 106.5 | ~~52~~ 52 | 2 | 2 | 11:45 | 29454 | 52 | 5.3/5.3 | 6.0/6.1 | 5.3/4.9 | 9.1/7.0 | ~~82~~ 9.2/7.3 | | 63.4 | 15.3 | 4.3 | 30.4 | 10.1 | |
| 106.5 | 54 | 1 | 2 | 11:45 | 29454 | 55 | 4.5/5.1 | 9.2/6.7 | 9.0/7.6 | 9.5/7.6 | 9.2/7.5 | | 74.9 | 16.6 | 4.3 | 36.1 | 4.0 | |
| 108.0 | 58 | 2 | 3 | 11:56 | 29600 | 57 | 4.9/5.1 | 4.5/4.9 | 4.5/4.1 | 9.5/6.9 | 8.2/7.0 | | 58.3 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 108.0 | 59 | 1 | 3 | 11:56 | 29601 | 59 | 4.7/5.0 | 9.2/6.4 | 7.4/6.9 | 9.9/7.6 | 9.9/7.3 | | 74.2 | 16.5 | 4.3 | 35.9 | 4.0 | |
| 109 | 49 | 2 | 4 | 12:20 | 29852 | 48 | 5.2/5.0 | 4.3/5.6 | 5.0/4.4 | 5.6/6.1 | 8.6/7.1 | | 60.0 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 109 | 50 | 1 | 4 | 12:20 | 29854 | 50 | 4.8/5.2 | 9.1/6.4 | 7.2/7.2 | 9.3/7.1 | 9.5/7.5 | | 73.3 | 16.6 | 4.4 | 36.0 | 4.0 | |
| 111 | 53 | 2 | 5 | 12:34 | 30016 | 53 | 5.4/4.9 | 4.7/5.5 | 4.9/4.6 | 9.0/6.4 | 8.6/6.9 | | 60.9 | 15.2 | 4.3 | 30.3 | 10.0 | |
| 111 | 54 | 1 | 5 | 12:34 | 30018 | 54 | 4.7/4.8 | 9.1/6.3 | 7.2/7.0 | 9.4/7.3 | 9.3/7.6 | | 72.7 | 16.5 | 4.3 | 35.5 | 4.0 | |
| 114.5 | 56 | 2 | 6 | 12:48 | 30211 | 57 | 5.7/5.0 | 4.7/5.8 | 4.9/4.2 | 8.7/6.4 | 8.0/7.2 | | 60.3 | 15.3 | 4.3 | 30.3 | 10.0 | |
| 114.5 | 59 | 1 | 6 | 12:48 | 30213 | 60 | 4.7/5.1 | 9.1/6.4 | 7.1/7.2 | 10.3/8.0 | 10.1/7.5 | | 75.6 | 16.6 | 4.3 | 36.0 | 4.1 | |
| 115.5 | ~~55~~ ~~7.00~~ | 2 | 7 | 1:00 | 30360 | 65 | 5.1/5.0 | 5.1/6.0 | 5.1/4.8 | 8.2/6.2 | 9.2/7.9 | | 62.6 | 15.3 | 4.3 | 30.5 | 10.0 | |
| 115.5 | ~~66~~ ~~1.50~~ | 1 | 7 | 1:00 | 30361 | 65 | 4.6/5.0 | 9.4/6.8 | 8.0/7.7 | 10.2/7.7 | 10.5/8.1 | | 78.0 | 16.6 | 4.3 | 36.2 | 4.1 | |
| 114 | 50 | 2 | 8 | 13:11 | 30502 | 50 | 5.2/5.1 | 4.7/6.8 | 5.0/4.8 | 9.0/6.2 | 8.4/6.6 | | 60.9 | 15.2 | 4.3 | 30.3 | 10.0 | |
| 114 | 51 | 1 | 8 | 13:11 | 30504 | 50 | 4.9/5.3 | 9.4/6.4 | 7.5/6.7 | 9.6/7.0 | 9.7/7.4 | | 73.9 | 16.6 | 4.3 | 35.8 | 4.0 | |

Recorded by LV

Checked by

| Sheet 21 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | *SPS PROJECT_ID | 0600 |
| WIM System Test Truck Records 2 of 3 | * DATE | 05/29/2007 |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 117 | 54 | 2 | 9 | 13:25 | 30658 | 54 | 5.3/5.0 | 4.2/5.6 | 4.9/4.8 | 8.8/6.7 | 8.9/7.0 | | 61.1 | 15.4 | 4.4 | 30.6 | 10.1 | |
| 117 | 54 | 1 | 9 | 13:25 | 30690 | 54 | 4.7/5.0 | 9.2/6.9 | 7.3/7.2 | 9.4/7.5 | 8.9/6.9 | | 72.8 | 16.6 | 4.3 | 36.0 | 4.1 | |
| 115 | 57 | 2 | 10 | 13:38 | 30867 | 58 | 5.1/5.0 | 4.6/5.6 | 4.7/4.4 | 9.1/6.7 | 8.3/7.0 | | 60.4 | 15.3 | 4.4 | 30.4 | 10.0 | |
| 115 | 57 | 1 | 10 | 13:38 | 30869 | 58 | 4.7/5.0 | 9.3/6.5 | 7.0/7.1 | 9.8/7.9 | 9.7/7.3 | | 74.4 | 16.5 | 4.3 | 36.0 | 4.0 | |
| 116 | 65 | 2 | 11 | 13:51 | 31053 | 65 | 5.2/4.9 | 5.0/5.8 | 9.8/4.5 | 8.2/6.3 | 9.5/7.9 | | 62.2 | 15.4 | 4.4 | 30.6 | 10.1 | |
| 116 | 65 | 1 | 11 | 13:51 | 31054 | 65 | 4.5/4.9 | 9.4/6.7 | 7.9/7.9 | 9.5/7.7 | 9.4/7.7 | | 75.4 | 16.6 | 4.3 | 36.0 | 4.0 | |
| 118 | 54 | 2 | 12 | 14:02 | 31220 | 54 | 5.4/5.2 | 4.8/5.9 | 5.3/4.4 | 8.9/6.7 | 8.6/7.2 | | 62.5 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 118 | 54 | 1 | 12 | 14:02 | 31224 | 54 | 4.4/5.0 | 9.4/6.5 | 7.0/7.1 | 9.4/7.5 | 9.2/7.4 | | 73.1 | 16.6 | 4.3 | 36.1 | 4.1 | |
| 117.5 | 62 | 2 | 13 | 14:26 | 31576 | 62 | 5.0/5.0 | 5.0/5.0 | 4.8/4.6 | 8.8/7.1 | 9.0/8.0 | | 62.3 | 15.3 | 4.3 | 30.5 | 10.1 | |
| 117.5 | 66 | 1 | 13 | 14:26 | 31577 | 64 | 4.7/5.1 | 9.6/6.8 | 9.1/7.7 | 10.4/9.0 | 10.4/7.9 | | 78.7 | 16.6 | 4.3 | 36.1 | 4.0 | |
| 119 | 54 | 2 | 14 | 14:37 | 31752 | 53 | 5.3/4.8 | 4.4/5.4 | 5.3/4.7 | 8.2/6.6 | 8.6/6.7 | | 60.9 | 15.3 | 4.5 | 30.4 | 10.0 | |
| 119 | 54 | 1 | 14 | 14:37 | 31755 | 54 | 4.7/5.2 | 9.3/6.5 | 7.3/6.8 | 10.1/7.5 | 9.6/8.2 | | 75.1 | 16.6 | 4.3 | 35.9 | 4.1 | |
| 118.5 | 55 | 2 | 15 | 14:48 | 31932 | 56 | 5.1/5.2 | 5.9/5.1 | 4.8/4.2 | 8.5/6.5 | 8.2/6.8 | | 58.3 | 15.3 | 4.3 | 30.3 | 10.0 | |
| 114.5 | 58 | 1 | 15 | 14:49 | 31933 | 59 | 4.8/5.1 | 9.1/6.6 | 6.9/7.2 | 9.5/7.4 | 9.3/8.4 | | 74.5 | 16.7 | 4.4 | 36.1 | 4.1 | |
| 120 | 62 | 2 | 16 | 15:04 | 32156 | 62 | 5.2/4.8 | 4.9/5.7 | 4.4/4.3 | 9.4/7.0 | 9.4/7.8 | | 63.3 | 15.2 | 4.3 | 30.3 | 10.0 | |
| 120 | 64 | 1 | 16 | 15:05 | 32159 | 64 | 4.8/4.9 | 10.0/6.4 | 8.3/7.3 | 10.4/7.2 | 10.7/7.9 | | 78.0 | 16.5 | 4.3 | 35.9 | 4.0 | |

Recorded by ldv

Checked by

Sheet 21

LTPP Traffic Data

WIM System Test Truck Records 3 of 3

| | |
|---|---|
| * STATE_CODE | 42 |
| *SPS PROJECT_ID | 0600 |
| * DATE | 05/29/2007 |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120 | 60 | 2 | 17 | 15:18 | 32357 | 58 | 5.4/5.0 | 5.3/5.0 | 5.3/4.6 | 9.3/6.4 | 9.8/7.3 | | 62.6 | 15.3 | 4.3 | 30.5 | 10.0 | |
| 120 | 59 | 1 | 17 | 15:18 | 32360 | 59 | 4.8/5.2 | 8.8/6.5 | 7.6/6.8 | 9.7/7.7 | 9.2/7.7 | | 73.3 | 16.6 | 4.3 | 35.9 | 4.0 | |
| 119.5 | 62 | 2 | 18 | 15:30 | 32532 | 62 | 5.2/5.0 | 4.4/5.3 | 9.9/4.5 | 9.0/7.1 | 9.1/7.7 | | 62.6 | 15.4 | 4.3 | 30.5 | 10.0 | |
| 119.5 | 65 | 1 | 18 | 15:30 | 32533 | 65 | 4.5/5.0 | 9.4/6.8 | 8.0/7.4 | 10.4/8.4 | 10.4/7.7 | | 79.0 | 16.6 | 4.3 | 36.0 | 4.1 | |
| 116 | 59 | 2 | 19 | 15:43 | 32730 | 59 | 5.3/5.0 | 4.7/5.3 | 5.0/4.3 | 9.2/6.6 | 8.4/6.9 | | 60.4 | 15.4 | 4.3 | 30.4 | 10.0 | |
| 116 | 59 | 1 | 19 | 15:43 | 32732 | 59 | 4.9/5.1 | 9.8/6.5 | 7.4/6.9 | 10.2/7.7 | 10.1/7.3 | | 76.1 | 16.6 | 4.3 | 35.9 | 4.0 | |
| 117.5 | 62 | 2 | 20 | 15:58 | 32987 | 62 | 5.1/5.0 | 5.2/5.3 | 4.9/4.5 | 9.6/6.9 | 9.4/8.3 | | 64.3 | 15.4 | 4.4 | 30.5 | 10.0 | |
| 117.5 | 55 | 1 | 20 | 15:59 | 32991 | 55 | 4.8/5.0 | 9.9/6.7 | 7.5/6.8 | 10.1/7.5 | 10.0/7.7 | | 76.9 | 16.6 | 4.3 | 35.9 | 4.0 | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

Recorded by LV

Checked by

Sheet 21

LTPP Traffic Data

WIM System Test Truck Records 1 of 3

| | |
|---|---|
| * STATE_CODE | 42 |
| *SPS PROJECT_ID | 0600 |
| * DATE | 05/30/2007 |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 76.5 ~~66.2~~ | 54 | 2 | 1 | 8:42 | 41331 | 54 | 5.6/5.2 | 5.1/6.0 | 5.4/4.7 | 9.7/6.3 | 9.3/7.2 | | 64.5 | 16.3 | 4.3 | 30.3 | 9.9 | |
| 76.5 ~~66.6~~ | ~~55~~ | 1 | 1 | 8:42 | 41332 | 54 | 4.9/6.3 | 9.0/7.0 | 7.5/7.4 | 10.1/7.9 | 9.8/7.7 | | 76.5 | 16.5 | 4.3 | 35.9 | 4.0 | |
| 76.5 | 55 | 2 | 2 | 8:54 | 476 | 57 | 5.3/5.3 | 4.7/6.7 | 5.1/6.2 | 8.7/6.7 | 8.5/7.6 | | 62.9 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 76.5 | 54 | 1 | 2 | 8:54 | 478 | 54 | 5.2/5.4 | 9.2/6.6 | 7.4/7.2 | 10.1/7.7 | 9.8/7.4 | | 75.9 | 16.7 | 4.3 | 36.1 | 4.1 | |
| 80 | 65 | 2 | 3 | 9:18 | 41711 | 65 | 5.3/5.2 | 4.9/6.0 | 5.1/4.8 | 8.4/6.2 | 9.1/8.1 | | 63.1 | 16.3 | 4.4 | 30.4 | 10.0 | |
| 80 | 65 | 1 | 3 | 9:18 | 41712 | 65 | 4.6/5.0 | 9.6/7.2 | 8.2/7.6 | 10.5/8.2 | 10.6/8.2 | | 80. | 16.6 | 4.3 | 36.0 | 4.0 | |
| 83 | 55 | 2 | 4 | 9:31 | 857 | 55 | 5.3/5.4 | 4.3/6.5 | 5.1/4.8 | 8.9/6.8 | 8.5/7.6 | | 63.4 | 16.3 | 4.3 | 30.5 | 10.1 | |
| 83 | 55 | 1 | 4 | 9:31 | 858 | 54 | 4.9/5.2 | 9.2/6.9 | 7.2/7.4 | 9.8/8.1 | 9.8/7.8 | | 76.4 | 16.6 | 4.3 | 36.1 | 4.1 | |
| 85.5 | 60 | 2 | 5 | 9:46 | 42008 | 60 | 5.3/4.9 | 4.6/6.4 | 5.2/4.5 | 9.0/7.0 | 8.8/7.4 | | 63.2 | 15.4 | 4.4 | 30.5 | 10.0 | |
| 85.5 | 59 | 1 | 5 | 9:46 | 42009 | 61 | 4.9/5.1 | 9.5/6.6 | 7.4/7.1 | 10.2/7.7 | 10.2/8.5 | | 77.1 | 16.6 | 4.3 | 35.9 | 4.0 | |
| 88 | ~~65~~ | 2 | 6 | 9:59 | 42153 | 66 | 5.1/5.0 | 4.7/5.9 | 5.3/4.8 | 8.4/6.9 | 9.5/8.0 | | 62.5 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 86 | ~~64~~ | 1 | 6 | 9:59 | 42156 | 64 | 4.4/5.2 | 9.4/6.6 | 7.8/7.2 | 10.0/8.3 | 10.0/7.5 | | 76.3 | 16.5 | 4.3 | 36.1 | 4.1 | |
| | | | 7 | | | | | | | | | | | | | | | |
| | | | 7 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

Recorded by ldv

Checked by _____

Cal 1

| Sheet 21 | * STATE_CODE | 42 |
|---|---|---|
| LTPP Traffic Data | *SPS PROJECT_ID | 0600 |
| WIM System Test Truck Records 2 of 3 | * DATE | 05/30/2007 |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | 53 | 2 | 7 | 10:11 | 42289 | 56 | 5.4/4.9 | 5.1/6.1 | 4.8/4.7 | 9.4/6.6 | 9.1/8.0 | | 64.3 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 90 | 53 | 1 | 7 | 10:11 | 42290 | 54 | 4.8/5.1 | 9.2/6.9 | 7.3/7.7 | 9.6/8.1 | 9.3/8.0 | | 76.0 | 16.5 | 4.3 | 36.0 | 4.0 | |
| 91 | 59 | 2 | 8 | 10:23 | 42413 | 60 | 6.4/6.0 | 4.7/5.6 | 4.9/4.5 | 9.5/7.0 | 9.0/7.3 | | 62.9 | 15.4 | 4.4 | 30.6 | 10.1 | |
| 91 | 60 | 1 | 8 | 10:23 | 42415 | 60 | 5.0/5.2 | 9.5/6.5 | 8.0/6.8 | 10.6/8.0 | 10.5/7.4 | | 77.3 | 16.5 | 4.3 | 35.9 | 4.0 | |
| 95 | 64 | 2 | 9 | 10:35 | 42553 | 66 | 5.2/4.9 | 4.5/6.4 | 5.3/5.2 | 8.3/6.2 | 9.3/7.9 | | 63.2 | 15.4 | 4.3 | 30.5 | 10.0 | |
| 95 | 65 | 1 | 9 | 10:35 | 554 | 64 | 4.6/5.1 | 9.7/7.3 | 7.8/7.8 | 9.5/7.9 | 9.8/8.5 | | 77.9 | 16.6 | 4.3 | 36.0 | 4.0 | |
| 98 | 54 | 2 | 10 | 10:47 | 42685 | 55 | 5.5/5.5 | 5.4/6.2 | 5.5/4.9 | 8.7/6.6 | 9.0/7.5 | | 65.3 | 15.2 | 4.3 | 30.3 | 10.0 | |
| ~~98~~ 98.5 | 55 | 1 | 10 | 10:47 | 42686 | 56 | 5.0/5.2 | 9.1/6.6 | 7.5/6.9 | 10.1/7.6 | 10.0/7.6 | | 75.7 | 16.5 | 4.3 | 35.9 | 4.0 | |
| 98.5 | 59 | 2 | 11 | 10:58 | 42618 | 60 | 5.1/5.0 | 4.9/5.4 | 5.1/4.4 | 9.3/7.0 | 8.8/7.3 | | 62.5 | 15.3 | 4.3 | 30.4 | 10.0 | |
| 98.5 | 59 | 1 | 11 | 10:58 | 42621 | 59 | 4.8/5.2 | 9.7/6.5 | 7.6/7.2 | 10.3/7.9 | 10.1/7.9 | | 77.3 | 16.6 | 4.3 | 36.0 | 4.0 | |
| 100.5 | 65 | 2 | 12 | 11:13 | 43006 | 66 | 5.1/4.9 | 4.7/6.0 | 8.6/5.0 5.1/5.2 | 8.1/6.1 5.6 | 9.2/8.0 | | 62.2 | 16.3 | 4.3 | 30.4 | 10.0 | |
| ~~100.5~~ | ~~42~~ | ~~1~~ | ~~12~~ | ~~11:13~~ | ~~43008~~ | ~~42~~ | 4.7/5.1 | 9.4/7.2 | 7.6/7.9 | 9.5/7.7 | 9.4/8.2 | | ~~77.1~~ | ~~16.5~~ | ~~4.3~~ | ~~35.9~~ | ~~4.0~~ | |
| 101.5 | 56 | 2 | 13 | 11:25 | 43138 | 56 | 5.1/5.0 | 4.5/5.6 | 5.2/5.1 | 8.6/6.6 | 8.0/8.0 | | 61.8 | 15.2 | 4.3 | 30.4 | 10.0 | |
| 101.5 | 55 | 1 | 13 | 11:25 | 43139 | 55 | 4.8/5.0 | 9.3/6.9 | 7.3/7.2 | 9.6/8.1 | 9.5/7.9 | | 75.5 | 16.5 | 4.3 | 36.0 | 4.1 | |
| 106.5 | 59 | 2 | 14 | 11:36 | 43295 | 60 | 5.1/5.0 | 4.3/5.8 | 5.0/4.8 | 9.2/6.9 | 8.1/7.3 | | 61.4 | 15.3 | 4.3 | 30.5 | 10.0 | |
| 106.5 | 60 | 1 | 13 | 11:36 | 43296 | 60 | 4.7/5.2 | 9.1/7.0 | 7.2/7.6 | 9.9/7.7 | 9.3/8.0 | | 75.8 | 16.6 | 4.3 | 36.1 | 4.0 | |

Recorded by IdV

Checked by _____



see Cal 1 for first 12 runs of post_val

421 910222

Sheet 21
LTPP Traffic Data
WIM System Test Truck Records 3 of 3
Rev. 08/31/2001

| | |
|---|---|
| * STATE_CODE | 42 |
| *SPS PROJECT_ID | 0602 |
| * DATE | 05/16/2007 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 106.5 | 64 | 2 | 15 | 11:47 | 43433 | 64 | 5.2/5.1 | 4.9/6.1 | 5.4/4.7 | 7.4/6.3 | 9.7/9.1 | | 64.0 | 15.3 | 4.3 | 30.3 | 10.0 | |
| 106.5 | 60 | 1 | 14 | 11:47 | 43436 | 60 | 4.6/4.9 | 9.2/6.6 | 7.3/7.1 | 10.1/7.8 | 9.7/7.8 | | 74.8 | 16.6 | 4.3 | 36.0 | 4.1 | |
| 111.5 | 60 | 2 | 16 | 11:58 | 43564 | 59 | 5.1/5.1 | 4.9/5.9 | 4.9/4.6 | 8.7/6.5 | 7.7/7.3 | | 60.7 | 15.3 | 4.3 | 30.0 | 10.0 | |
| 111.5 | 61 | 1 | 18 | 11:59 | 43567 | 61 | 4.7/5.2 | 9.3/6.6 | 7.5/7.3 | 10.1/8.1 | 9.5/7.7 | | 76.0 | 16.5 | 4.3 | 35.8 | 4.0 | |
| 112 | 64 | 2 | 17 | 12:11 | 43710 | 64 | 5.2/4.8 | 4.9/5.9 | 4.9/4.8 | 6.7/6.5 | 10.2/8.2 | | 64.4 | 15.3 | 4.4 | 30.6 | 10.0 | |
| 112 | 63 | 1 | 16 | 12:11 | 43712 | 64 | 4.5/4.9 | 9.5/6.6 | 8.4/7.5 | 10.6/7.3 | 10.7/7.8 | | 78.3 | 16.6 | 4.3 | 35.9 | 4.0 | |
| 113 | 60 | 2 | 18 | 12:23 | 43544 | ~~60~~ 56 | 5.3/4.9 | 4.0/6.4 | 4.7/4.0 | 9.5/6.9 | 9.2/7.4 | | 62.3 | 15.4 | 4.4 | 30.5 | 10.0 | |
| 113 | ~~60~~ 58 | 1 | ~~18~~ 17 | 12:23 | 43548 | ~~58~~ 60 | 4.7/5.1 | 9.3/6.6 | 7.4/6.9 | 10.2/7.9 | 10.2/8.1 | | 76.3 | 16.6 | 4.3 | 36.0 | 4.0 | |
| 114 | 65 | 2 | 19 | 12:33 | 43976 | 64 | 5.1/4.8 | 4.2/6.0 | 4.6/4.8 | 9.1/6.2 | 9.6/7.8 | | 62.6 | 15.3 | 4.3 | 30.5 | 10.1 | |
| 114 | 60 | 1 | 18 | 12:33 | 43978 | 60 | 4.5/5.1 | 9.0/6.6 | 7.2/6.8 | 9.7/8.2 | 9.3/8.1 | | 74.6 | 16.5 | 4.3 | 36.0 | 4.1 | |
| 114.5 | 60 | 2 | 20 | 12:47 | 44119 | 60 | 5.1/5.0 | 4.7/6.1 | 4.9/4.5 | 8.9/6.8 | 8.0/7.7 | | 61.7 | 15.3 | 4.4 | 30.4 | 10.0 | |
| 114.5 | 60 | 1 | ~~20~~ 19 | 12:47 | 44121 | ~~59~~ 58 | 4.7/4.9 | 9.1/6.7 | 7.2/7.1 | 9.8/8.1 | 8.3/7.4 | | 74.2 | 16.5 | 4.3 | 35.9 | 4.0 | |
| 116.5 | 65 | 1 | ~~19~~ 20 | 12:58 | 44279 | 64 | 4.7/4.9 | 9.3/6.8 | 7.8/7.4 | 10.0/7.6 | 10.0/8.9 | | 77.3 | 16.6 | 4.3 | 35.9 | 4.0 | |
| | | | | | | | | | | | | | | | | | | |
| | | | ~~20~~ | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

Recorded by ldv

Checked by _____

### 3.9.1. Iteration 1 Worksheet

Date 5/29/07

**Beginning factors:**

| Speed Point (mph) | Name | Value |
|---|---|---|
| Overall | | 1/3 / 2/4 |
| Front Axle | | |
| 1 – ( 80 ) 50 | speed point 1 | 3071 / 3245 |
| 2 – ( 88 ) 55 | 2 | 3040 / 3213 |
| 3 – ( 96 ) 60 | 3 | 3024 / 3196 |
| 4 – ( 105 ) 65 | 4 | 3024 / 3196 |
| 5 – ( 112 ) 70 | 5 | 3040 / 3213 |

**Errors (Pre-Validation):**

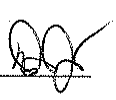
| | Speed Point 1 (50) | Speed Point 2 (55) | Speed Point 3 (60) | Speed Point 4 (65) | Speed Point 5 (70) |
|---|---|---|---|---|---|
| F/A | -4.0 | -4.5 | -5.0 | -6.5 | -7.5 |
| Tandem | -3.5 | -3.5 | 0 | ~~-2~~ +2 | +3 |
| GVW | -3.5 | -3.5 | ~~-5~~ 0 | 0 | 0 |

**Adjustments:**

| | Raise | Lower | Percentage |
|---|---|---|---|
| Overall | ☐ | ☐ | |
| Front Axle | ☐ | ☐ | |
| Speed Point 1 | ☑ | ☐ | 3.629% |
| Speed Point 2 | ☑ | ☐ | 3.629% |
| Speed Point 3 | ☐ | ☐ | |
| Speed Point 4 | ☐ | ☐ | |
| Speed Point 5 | ☐ | ☐ | |

**End factors:**

| Speed Point (mph) | Name | Value |
|---|---|---|
| Overall | | 1/3 / 2/4 |
| Front Axle | | * |
| 1 – ( 80 ) 50 | speed point 1 | 3182/3372 |
| 2 – ( 88 ) 55 | 2 | 3150/3329 |
| 3 – ( 96 ) 60 | 3 | 3024/3196 |
| 4 – ( 105 ) 65 | 4 | 3024/3196 |
| 5 – ( 112 ) 70 | 5 | 3040/3213 |

Task Leader Initials: 

# TEST VEHICLE PHOTOGRAPHS FOR SPS WIM VALIDATION

**May 29 and 30, 2007**

**STATE: Pennsylvania**

**SHRP ID: 420600**

**Photo 1 - Truck_1_Tractor_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 2 - Truck_1_Trailer_Load_1_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 3 - Truck_1_Suspension_1_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 4 - Truck_1_Suspension_2_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 5 - Truck_1_Suspension_3_ TO_8_42_2.47_0600_05_29_07.JPG**


**Photo 6 - Truck_2_Tractor_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 7 - Truck_2_Trailer_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 8 - Truck_2_Suspension_1_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 9 - Truck_2_Suspension_2_ TO_8_42_2.47_0600_05_29_07.JPG**

**Photo 10 - Truck_2_Suspension_3_ TO_8_42_2.47_0600_05_29_07.JPG**


**Photo 11 - Truck_2_Suspension_4_TO_8_42_2.47_0600_05_29_07.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

Pennsylvania SPS-6 (Lane 4)

Validation Visit – 30 May, 2007

Calibration factor for sensors #1 and 3 (left side):

| | |
|---|---|
| 80 kph: | 3182 |
| 88 kph: | 3150 |
| 96 kph: | 3024 |
| 104 kph: | 3024 |
| 112 kph: | 3040 |

Calibration factor for sensor #2 and 4 (right side):

| | |
|---|---|
| 80 kph: | 3372 |
| 88 kph: | 3329 |
| 96 kph: | 3196 |
| 104 kph: | 3196 |
| 112 kph: | 3213 |