Assessment Report for
Ohio, SPS Experiment 2

Visit date: November 12, 2003

List of Tables

List of Figures

1 Executive Summary

A visit was made to the Ohio SPS-2 site on November 12th, 2003 for the purpose of conducting an assessment of the WIM system located on US Route 23 northbound at milepost 19.7. The equipment is also used for the SPS-1 site in the southbound lanes at the same location.

The site is instrumented with Mettler-Toledo load cells and controller. The equipment is in working order. However, adjustments are needed to the speed measurements and potentially the classification algorithms.

This site is not recommended for a site validation. The site has large errors in the classification algorithm for trucks other than Class 9s. The speed and axle spacings are significantly beyond LTPP precision requirements. More than 80 percent of the LTPP WIM Index values exceed the threshold at which there is no expected impact on equipment outputs.

Sufficient data was collected to provide a Sheet 16 for classification verification at this site. There are 0 percent unclassified vehicles. This is below the percentage of 5% defined as the criteria for research data. The following truck classes had an error rate exceeding 2% of matches: Class 4, Class 5, Class 6 and Class 8. The algorithm for classification should be reviewed and the classification verification repeated at the next assessment or evaluation.

The pavement condition is satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly. A visual survey of truck movement over the site determined that there is no discernable vertical or horizontal movement of the trucks prior to, passing over, or beyond the WIM scale area. The WIM index was exceeded at 80 percent of the locations. The site does not meet LTPP smoothness requirements.

A review of the speed information collected on-site indicates that the range of truck speeds is 50 to 60 mph. With a speed limit of 55 mph the range for validation will be limited to 45 to 55 mph.

This site has 3 years of data. Based on available information and review of the data submitted through last year, this site still needs 5 years of data to meet the need for 5 years of research quality data. The February and March 1998 data is bad but its removal will not affect the inclusion of that year when a determination is made on nominal research quality. There is no validation information in the LTPP database for this site as of June 2003 upload.

2 Corrective Actions Recommended

Controller classification firmware should be updated to facilitate the use of weights in the classification process. A calibration of speed/spacing needs to be conducted.

The pavement is not smooth enough to meet LTPP WIM expectations for a no impact condition on the equipment. The threshold is exceeded for both the SRI and LRI indices. The pavement tends to be smoother on the right hand side of the road, however full width grinding or slab replacement is recommended. The pavement currently has transverse grooves throughout the section except immediately adjacent to the section. Their precise impact is unknown. If this is the typical practice for the state, and a pavement without grooves is not an option doing an evaluation as a benchmark only rather than an annual activity should be considered.

The February and March 1998 data is bad with an excessive number of 4,000 pound Class 9s (20 percent) when a tractor weighs 12,000 lbs by itself. It should be removed from the database.

3 Equipment inspection and diagnostics

The site is instrumented with Mettler-Toledo mechanical load cells and WIM controller. The WIM controller is shared with the WIM equipment sensors installed in the southbound direction

There are two lanes of traffic in each direction being monitored by the WIM controller. All in-road sensor cabling is routed to the main controller cabinet installed in the northbound right of way. The sensor array itself consists of a loop followed by a pair of Mettler Toledo load cells staggered in the left and right wheel paths.

Electrical checks of system components verified that all equipment is working properly.

The equipment is in working order, however, adjustments are needed to correct observed operational deficiencies. The current controller firmware classification process does not utilize weight, leading to misclassification of type 5 vehicles. Speed and axle spacing reports are off by an approximate average of +10 percent. Verification of spacing errors is pending receipt of data from the agency.

A visual inspection discovered that the drainage area for the load cells is inadequate and needs to be improved. Figure 15-1 shows the drainage culvert at the site. The culvert needs to be dug deeper or made larger to permit the proper permeation of water being drained from the load cell sensor.

All other support equipment such as service masts, telephone pedestal, cabinet, conduit, power service equipment, etc. are in good operational and physical condition.

4 Classification Verification with test truck recommendations

The agency uses the 13-bin classification scheme for classification data collection. It has used both the 13-bin and the Truck Weight Monitoring Study classification schemes in collecting weight data.

A sample of one hour of data was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Based on a 100 percent sample it was determined that there are 0 percent unknown vehicles and 0 percent unclassified vehicles.

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

Table 1 Error rates for Truck Classification

Class	Error rate	Class	Error rate	Class	Error rate
4	166 %	5	64%	6	78%
7	N/A				
8	16%	9	0	10	0
11	0	12	N/A	13	N/A

There were 6 buses observed in the field. Of the 16 buses reported by the equipment, 10 were either Class 5 or Class 6 vehicles. Of the 14 Class 3s and 5s observed, more than one-third ended up in the wrong classification. There were 9 Class 6s observed with the WIM equipment classifying 7 of them as Class 4s. The incorrectly identified Class 8 was classified by the observer as a Class 3. It would appear that absent a weight trigger, the length algorithm for the equipment is not adequate to differentiate between the less common classes of trucks and some passenger vehicles.

A review of the site data both collected on site and previously submitted by the agency indicates that Class 9s and Class 8s constitute more than 10 percent of the truck population. As Class 8s are barely 10 percent, their use in validation is not considered critical compared to the 75 plus percent that are Class 9s. Based on this information in addition to the air-suspension 3S2, the second vehicle used for evaluation should be a Class 9. As this direction is also effectively unloaded, a somewhat lighter vehicle with the same or different suspension is preferred. Due to the length of the truck turn around one additional vehicle should be used. It is recommended that it also be a Class 9. An unloaded vehicle would be acceptable.

5 Profile Evaluation

Profile data collected at the SPS WIM location by Stantec Inc. on December 2002 was processed through the LTPP SPS WIM Index software. This WIM scale is installed on a cement concrete pavement. The results are shown in Table 2.

A total of 15 profiler passes were conducted over the WIM site. These included 5 passes at the center of the lane, 5 passes shifted to the left side of the lane, and 5 passes shifted

to the right side of the lane. Shifts to the sides of the lanes were made such that data were collected as close to the lane edges as was safely possible. For each profiler pass, profiles were recorded under the left wheel path (LWP) and the right wheel path (RWP).

Table 2 shows the computed index values for all 15 profiler passes for this WIM site. The average values over the five passes at each path were also calculated, as shown in the right most column of the table. Values failing to meet the index limits are presented in italics.

Table 2 Long Range Index (LRI) and Short Range Index (SRI)

Profiler Passes			Pass 1	Pass 2	Pass 3	Pass 4	Pass 5	Ave.
Center	LWP	LRI (m/km)	*1.163*	*1.175*	*1.142*	*1.182*	*1.390*	***1.210***
		SRI (m/km)	*1.448*	*1.466*	*1.521*	*1.579*	*1.724*	***1.548***
	RWP	LRI (m/km)	0.738	0.746	0.739	0.741	*1.151*	***0.823***
		SRI (m/km)	0.445	0.469	0.415	0.493	*2.569*	***0.878***
Left Shift	LWP	LRI (m/km)	*1.307*	*1.329*	*1.180*	*1.134*	*1.322*	***1.254***
		SRI (m/km)	*1.786*	*1.729*	*1.548*	*1.567*	*1.703*	***1.667***
	RWP	LRI (m/km)	*1.119*	*1.102*	*0.807*	*0.819*	*1.095*	***0.988***
		SRI (m/km)	*2.153*	*2.143*	0.669	0.563	*2.132*	***1.532***
Right Shift	LWP	LRI (m/km)	*1.266*	*1.257*	*1.324*	*1.257*	*1.341*	***1.289***
		SRI (m/km)	*1.716*	*1.507*	*1.689*	*1.796*	*1.853*	***1.712***
	RWP	LRI (m/km)	0.654	0.611	0.699	0.613	0.678	**0.651**
		SRI (m/km)	0.652	0.642	0.709	0.593	0.755	**0.670**

The WIM site is a section of pavement that is 305 meters long with the WIM scale located at 274.5 meters from the beginning of the test section. An ICC profiler was used to collect longitudinal profiles of the test section with a sampling interval of 25 millimeters. The LRI incorporates the pavement profile starting 25.8 m prior to the scale and ending 3.2 m after the scale in the direction of travel. The SRI incorporates a shorter section of pavement profile beginning 2.7 m prior to the WIM scale and ending 0.5 m after the scale.

All but two of the wheel paths exceed the WIM Index limit of 0.789 m/km as can be seen in the table. When all values are less than 0.789 it is presumed unlikely that pavement conditions will significantly influence sensor output. Based on the profile data analysis, the Ohio SPS-2 WIM site does not meet the requirements for WIM site locations since more than half of the calculated LRI and SRI values for the pavement site are higher than the index limits. The smoothest paths are along the right hand side of the lane. Replacement of the pavement is the preferred option.

6 Distress survey and any applicable photos

The pavement condition is satisfactory for conducting a performance evaluation. There were no distresses observed that would influence truck motions significantly.

Figure *13-1* shows the condition of the pavement in the downstream direction and Figure 13-2 shows the condition of the pavement in the upstream direction

7 Vehicle-pavement interaction discussion

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

8 Speed data with speed range recommendations for evaluation

Based on the data collected on site the 15th and 85th percentile speeds for Class 9s are 50 and 55 mph respectively. The upper end of the range is the posted speed limit. This range does not vary significantly for other truck classes. As a result the recommended speeds for test trucks in an evaluation are 45, 50 and 55.

Measurements of speeds on-site indicated that the equipment is currently measuring speeds with a bias of 7.1 mph and an associated standard deviation of 4.5 mph

The review of drive axle spacings for Class 9 vehicles is pending receipt of the comparison data from the agency. As late as 2001 the average value for Class 9 drive tandems was 4.4 feet with a standard deviation of 0.3 feet, a reasonable value.

9 Traffic Data review: Overall Quantity and Sufficiency

As of November 19, 2003 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. The precision requirements are shown in
Table 3. Calibration information has not been provided for this site as of the June 2003 upload in the LTPP traffic database.

Table 3 Precision and Bias Requirements for Weight Data

Pooled Fund Site	**95 Percent Confidence Limit of Error**
Single Axles	± 20 percent
Axle groups	± 15 percent
Gross Vehicle Weight	± 10 percent
Vehicle Speed	±1 mph (2 kph)
Axle Spacing	± 0.5 ft (150 mm)

Data that has validation information available is reviewed in light of the patterns present in the two weeks immediately following the validation/calibration activity. A determination of research quality data is based on the consistency with the validation pattern. Data that follows consistent and rational patterns in the absence of calibration information may be considered nominally of research quality pending validation

information with which to compare it. Data that is inconsistent with expected patterns and has no supporting validation information is not considered research quality.

The amount and coverage for the site is shown in Table 4. The value for months is a measure of the seasonal variation in the data. The indicator of coverage indicates whether day of week variation has been accounted for on an annual basis. As can be seen from the table 1998, 2000 and 2001 have a sufficient quantity to be considered "full" years. In the absence previously gathered calibration information it can be seen that at least 5 additional years of research quality data are needed to meet the goal of a minimum of 5 years of research quality weight data.

Table 4 Amount of Traffic Data Available

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

*Days of Data after eliminating February and March information

To evaluate the consistency of the existing data and determine its probable quality a series of reports and graphs have been generated. They include the SPS Summary report, vehicle distribution graphs, ESAL graphs, average daily steering axle weights for Class 9 vehicles, and GVW distributions both over all years and by month within years.

9.1 SPS Summary Report

The overall report is the SPS Summary Report. This report using sets of benchmark data based on calibration information or consistent, rational data patterns. The report shows the trend in some basic statistics at the site over time. It provides a numeric equivalent to the graphs typically run for the comparison evaluation process. It includes the number of days of data and statistics associated with Class 9 vehicles. They include the average volumes, average ESALs, the average steering axle weight and mean loaded and unloaded weight on a monthly basis. Class Days and Percent Class 9s are generated from classification data submissions. All other values come from the weight data submitted. Counts derived from weight data are available for all months. Steering axle and weight statistics are only present when that data was loaded through LTPP's new traffic analysis software, since it is the only software that calculates them. The data is separated into blocks that depend on when the site was validated. Where there is no validation record an initial time point has been picked at which continuous data exists and that data is used as the basis for comparison.

Table 5 SPS Summary Report

11/25/2003 SPS Summary Report Page 1
Ohio 0200

North Lane 1

Comparison Date Weight - 17-February-1998 Classification - 17-February-1998

Month-Year	Class Days	Percent Class 9s	Weight Days	Average No. Class 9s	Avg.ESALs Per Class 9	Average Class 9 Steering	Mean Loaded Weight	Mean Unloaded Weight
Comparison values		16.0		6228	0.19	3,550	76,557	3,312
FEB 1998	12	16.3	12	6199	0.19	3,571	76,472	3,306
MAR 1998	29	16.5	31	3246	0.38	7,365	76,588	33,785

Comparison Date Weight - 01-April-1998 Classification - 01-April-1998

Month-Year	Class Days	Percent Class 9s	Weight Days	Average No. Class 9s	Avg.ESALs Per Class 9	Average Class 9 Steering	Mean Loaded Weight	Mean Unloaded Weight
Comparison values		14.7		1345	0.98	9,925	76,783	33,701
APR 1998	30	15.4	30	1351	0.98	9,933	76,636	33,788
MAY 1998	16	13.5	17	1155	1.01	9,997	76,732	33,854
JUN 1998	29	13.5	30	1139	0.99	10,000	76,612	33,814
JUL 1998	31	12.4	30	1104	0.96	10,035	76,749	33,788
AUG 1998	30	12.9	31	1089	0.99	10,047	76,810	33,823
SEP 1998	10	12.8	17	550	0.99	11,335	76,938	33,926
OCT 1998	13	15.6	18	885	1.01	10,025	76,964	33,664
NOV 1998	30	14.0	30	1193	0.94	9,973	76,739	33,639
DEC 1998	25	14.9	26	1253	0.91	9,619	76,560	33,729
JAN 2000	11	14.0	14	841	0.97	10,225	77,212	34,167
FEB 2000	27	16.9	29	1203	1.03	10,181	77,589	34,145
MAR 2000	30	16.8	31	1075	0.92	9,942	74,456	33,633
APR 2000	26	15.8	30	1006	0.91	9,927	76,539	33,532
MAY 2000	29	13.7	31	1217	0.94	10,053	76,804	33,722
JUN 2000	30	14.1	30	1239	0.95	10,065	76,969	33,775
JUL 2000	21	12.3	22	983	0.98	10,086	77,255	33,753
AUG 2000	18	15.1	24	753	0.93	10,008	77,241	33,925
SEP 2000	25	14.7	26	917	0.90	9,860	76,765	33,495
OCT 2000	26	14.4	28	850	0.91	9,888	76,736	33,540
NOV 2000			27	1079	0.92	10,020	76,758	33,574
DEC 2000	31	13.0	31	983	0.88	10,040	76,740	33,850
JAN 2001	31	15.4	31	1117	0.87	10,053	76,627	33,695
FEB 2001	28	15.4	28	1136	0.87	10,005	76,377	33,433
MAR 2001	25	15.3	25	1217	0.93	10,036	76,699	33,445
MAY 2001	2	17.8	3	1220	0.98	9,650	77,178	33,962
JUN 2001	30	12.5	30	937	0.99	10,068	76,948	33,777
JUL 2001	24	12.5	30	568	0.95	9,928	76,684	33,626
AUG 2001	19	13.4	26	638	0.91	9,880	76,767	33,657
SEP 2001	26	13.5	30	712	0.91	9,762	74,242	33,402
OCT 2001	30	14.4	31	806	0.94	9,927	76,813	33,546
NOV 2001	28	12.9	28	1095	0.94	10,098	76,774	33,595
DEC 2001	29	12.0	28	878	0.94	10,081	76,783	33,639

The February 1998 data was originally picked as the sole comparison value. According to the results shown in Table 5 in 1998, 2000 and 2001 when more than 210 days of classification data was collected the percentage of Class 9 vehicles was similar. In the loading data, the average number of Class 9's were significantly higher and the average ESALs per Class 9 and average Class 9 steering axle weights were significantly lesser in February and March of 1998 compared to the rest of 1998, and 2000 and 2001. However, the mean loaded and unloaded weights were essentially similar for 1998, 2000 and 2001. Based on the initial review, a second comparison set using April 1998 data was created. The data from April 1998 through December 2001 is far more consistent with those values.

9.2 Vehicle Distribution

The vehicle distribution graphs indicate whether the fleet mix is stable over time and any day of week or seasonal patterns that may exist. The vehicle distribution graphs contain two types of comparisons, one between data types and one over time. The between types comparison is represented by the two columns for every time unit present. The column on the left generally labeled with a 4 is for classification data. The right hand column of the pair is for weight data. Whether or not the data is equivalent is perhaps more important than the variation over time. Figure 14-1 shows a typical by week pattern for classification data. The individual weeks show essentially the same mix to the fleet. Every vehicle in Classes 6 through 13 that constitutes at least 10 percent of the population is expected to stay within plus or minus 5 percent of the value observed during the two weeks following validation. This range is shown by the darker band inside the lighter band to the right of the weekly data. Weeks that go outside more than plus or minus 10 percent of the expected value will fall above or below the light gray areas of the band. These are weeks that should have been subjected to additional scrutiny prior to accepting the data as reasonable.

For this site, the fleet mix is comparatively stable for 1998, 2000 and 2001. When the Class 9 percentages fall out of expected bounds the number of Class 8s tends to increase. A representative graph of this pattern is shown in Figure 14-2. Also the percentage of Class 13's significantly increased from June 2001 till December 2001. Figure 14-3 shows the increase in Class 13s with the decrease in Class 9s and increases in Class 8s, which is another variation of the change in distributions.

Figure 14-4 shows the typical pattern for vehicle distribution by month by year for the data collected from the classifier versus the data collected by the WIM equipment. Truck traffic at this site is dominated by Class 9s. There appears to be a modest increase in Class 6s and 8s in late spring through the summer months. The data collected for all the months in 2000 appear to be similar except for April and August where the classifier data was significantly higher than the WIM equipment data.

9.3 ESALs per year

Average ESALs for Class 9 vehicles are a very crude method of identifying loading shifts. Figure 14-5 shows the average Class 9 ESALs per month for this location. To remove the influence of changing pavement structure all ESAL values have been

computed with and SN = 5 and a p_t of 2.5. Average ESALs per Class 9 are not used as an indicator of research quality data. For all the years the data appears to be similar except in February and March 1998 when the average ESALs was significantly less. This is consistent with the data problem discussed earlier.

9.4 Average Daily Steering Axle Weight

A frequently used statistic for checking scale calibration and doing auto-calibration of WIM equipment is the weight of the front axle. This value is site specific and should be relatively constant particularly for loaded Class 9s (vehicles in excess of 60,000 lbs.). Typically when auto calibration is used this value either cycles repeatedly or with very large truck volumes results in an essentially straight line for the mean. As shown in Figure 14-6 the weight of the front axle was essentially constant in the months the data was collected.

9.5 GVW Distributions for Class 9s

The Class 9 GVW graph is a generally accepted way to evaluate loading data reported at a site. A typical graph is has two peaks, one between 28,000 and 36,000 pounds and the other between 72,000 and 80,000 pounds. The first is the unloaded peak. The second, the loaded peak reflects the legal weight limit for a 5-axle tractor-trailer vehicle. Additionally, it is expected that less than 3 percent of the trucks will be excessively light (less than 12,000 pounds) and less than 5 percent will be significantly overweight (in excess of 96,000 pounds). Data that falls outside of the expected conditions needs a record of validation to verify that the pattern is in fact correct for the location. Data meeting the expected patterns is not automatically considered to be of research quality, merely rational as bias in scale measurements may shift the peaks in the data from their true values.

The overall assessment of loading patterns is done using a Class 9 GVW graph by year over the available years. Figure 14-7 shows a tri-modal rather than the expected bimodal curve over time. It is however, unreasonable to expect more than 20 percent of the Class 9 population to weigh less than 4,000 pounds. This fact is affecting the overall average for the comparison between years. A year by month investigation was done for 1998. As shown in Figure 14-8 the data for February and March is inconsistent with the rest of the year. The remaining months of data are represented by Figure 14-9. With the removal of that data the by year graph is transformed into Figure 14-10.

To investigate any seasonal variations the Class 9 GVW distributions are graphed by month by year. As shown in Figure 14-11, there is no significant difference between the three months.

9.6 Axle Distributions

GVW graphs were available for all years. No axle distribution graphs were required for data review.

10 Updated handout guide and Sheet 17

A copy of the handout has been included following page 19. It includes a current Sheet 17 with all applicable maps and photographs. There are no significant changes in the information provided.

11 Updated Sheet 18

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

12 Traffic Sheet 16(s) (Classification Verification only)

Sufficient classification information was collected between 12:40 pm and 1:40 pm on November 12, 2003 to complete a Sheet 16. A copy is attached following the updated Sheet 18.

13 Distress Photographs

Figure 13-1 Pavement condition of 390200 site (Downstream)

Figure 13-2 Pavement Condition of 390200 (Upstream)

14 Traffic Graphs

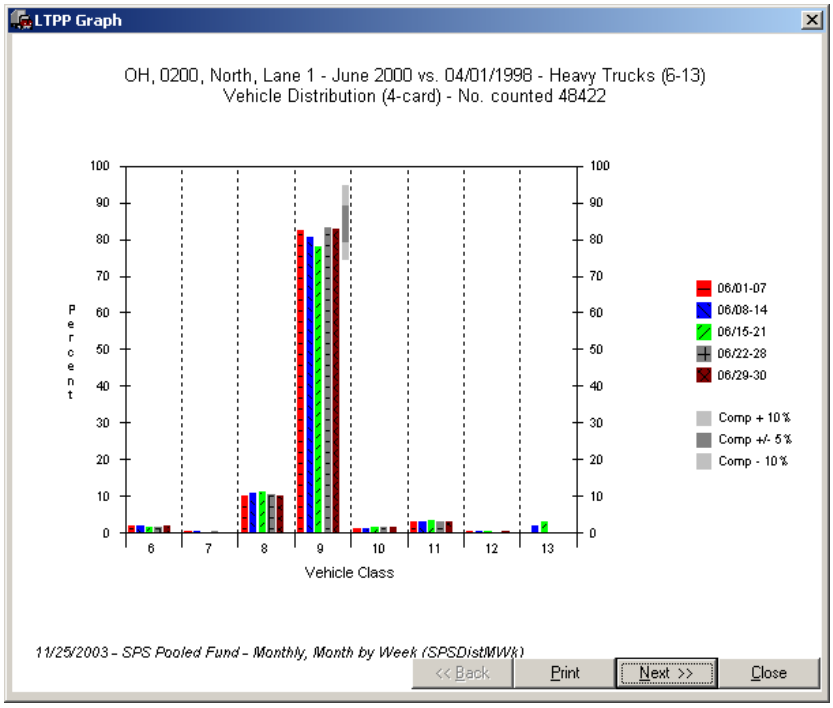


Figure 14-1 Typical Heavy Truck Distribution Pattern for Classification Data at 390200

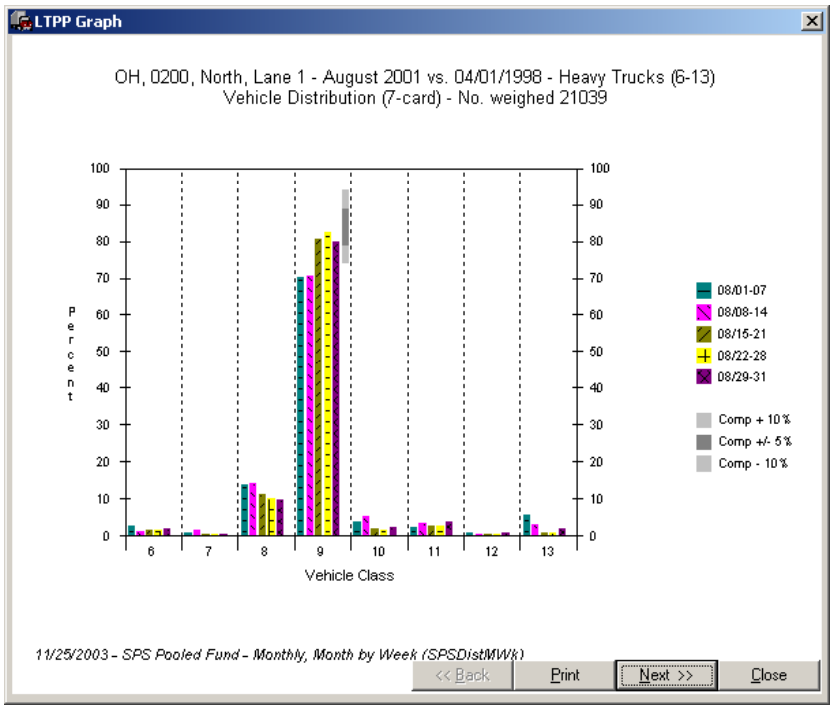


Figure 14-2 Typical swap of Class 8 and Class 9 volumes for 390200 when Class 9s fall below expected values

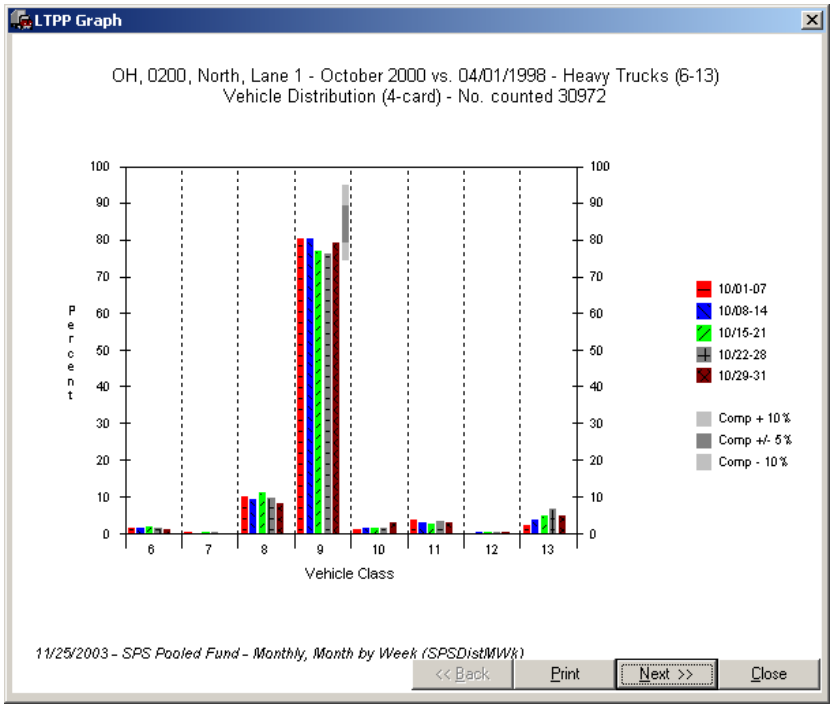


Figure 14-3 Rising Class 13 volumes with rising Class 8s and decreasing Class 9s for 390200

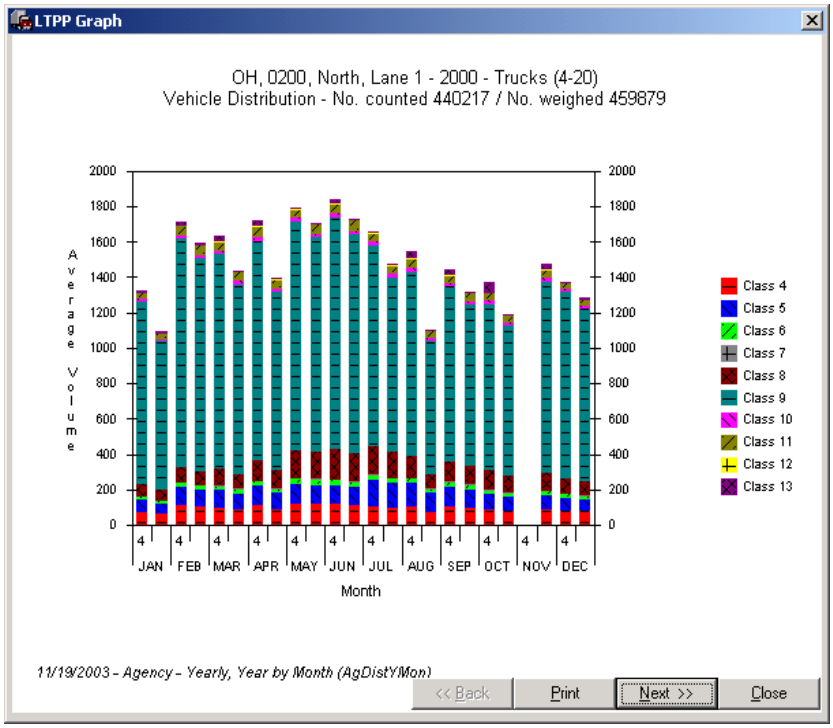


Figure 14-4 Vehicle Distribution by Month for the Year 2000 for 390200

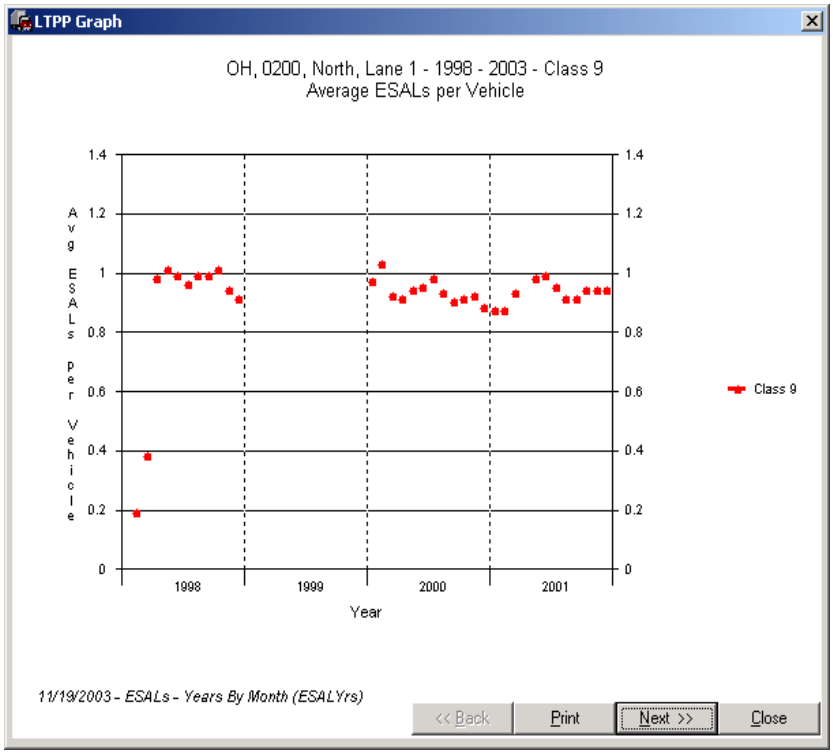


Figure 14-5 Average Class 9 ESALs for site from 1998 to 2001 for 390200

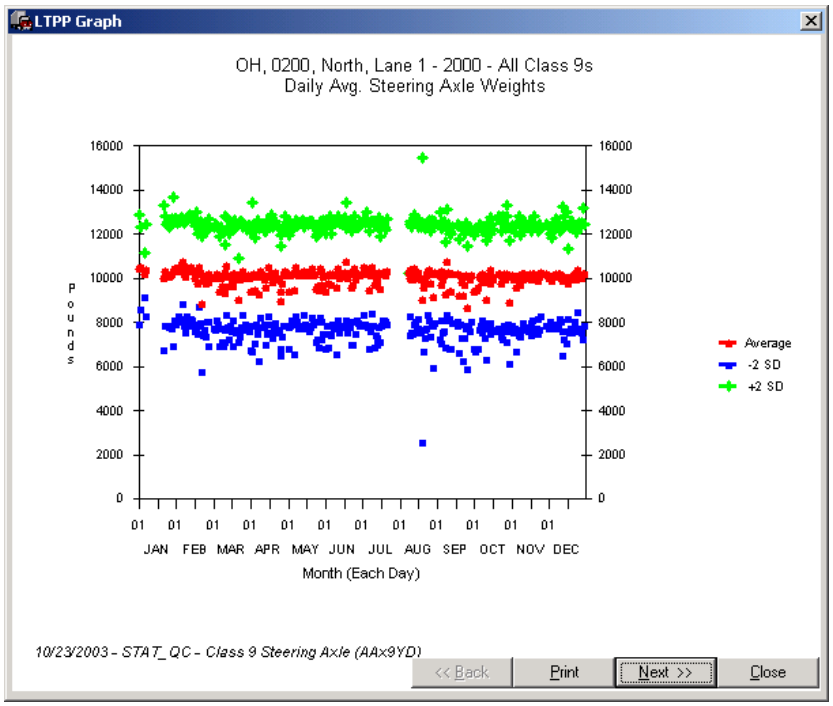


Figure 14-6 Average Daily Class 9 Steering Axle Weight - 2000 for 390200

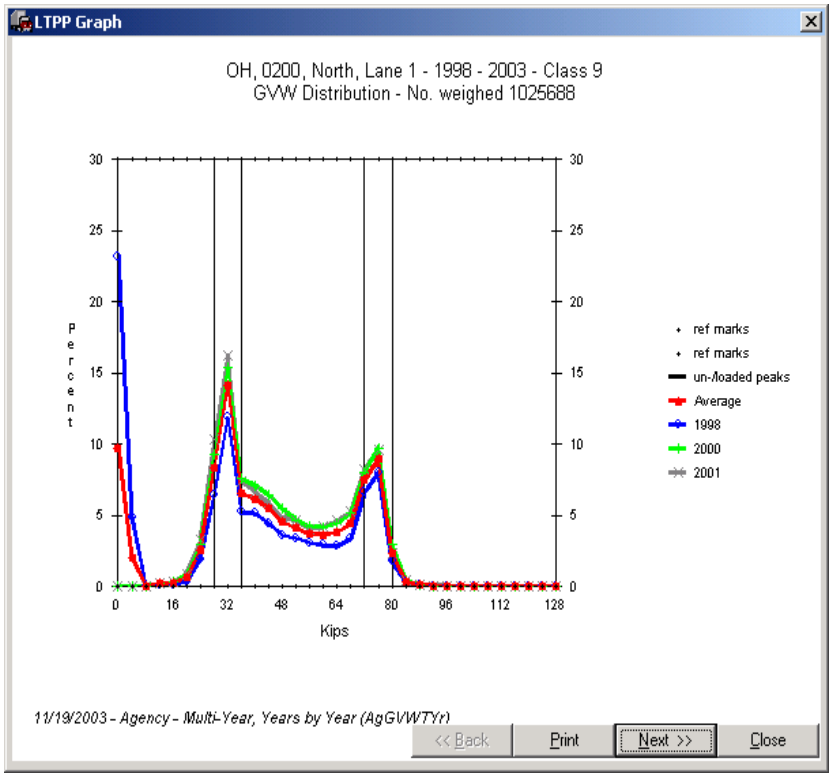


Figure 14-7 Class 9 GVW Distribution - 1998 to 2001 for 390200

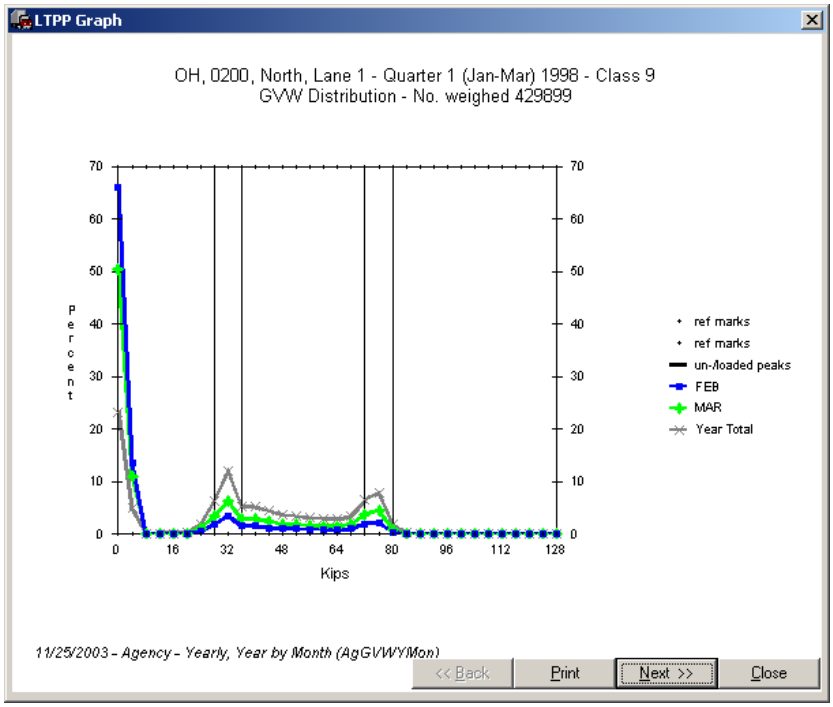


Figure 14-8 February and March 1998 abnormal Class 9 GVW data for 390200

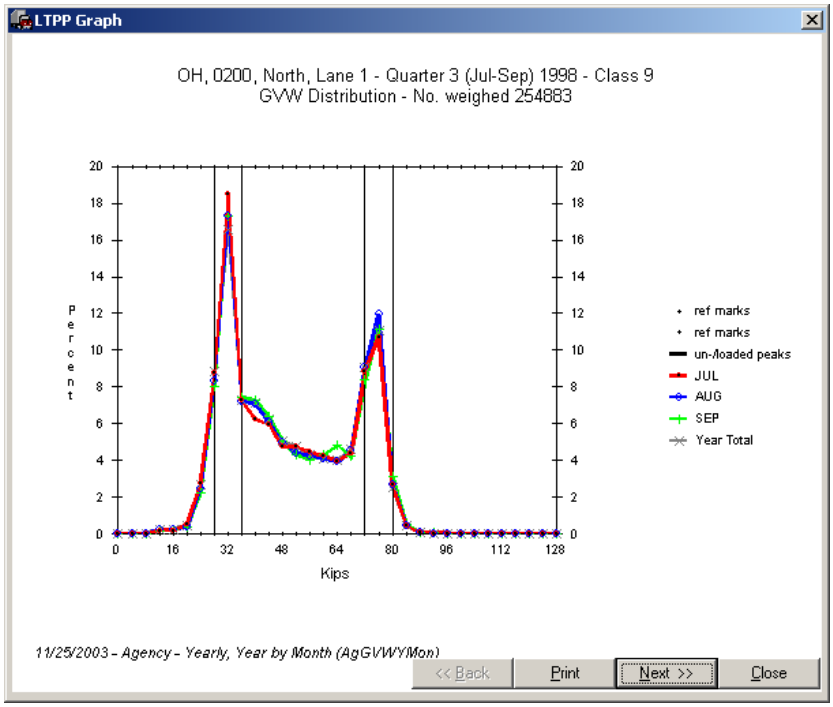


Figure 14-9 Typical GVW graph for 1998 for April and later for 390200

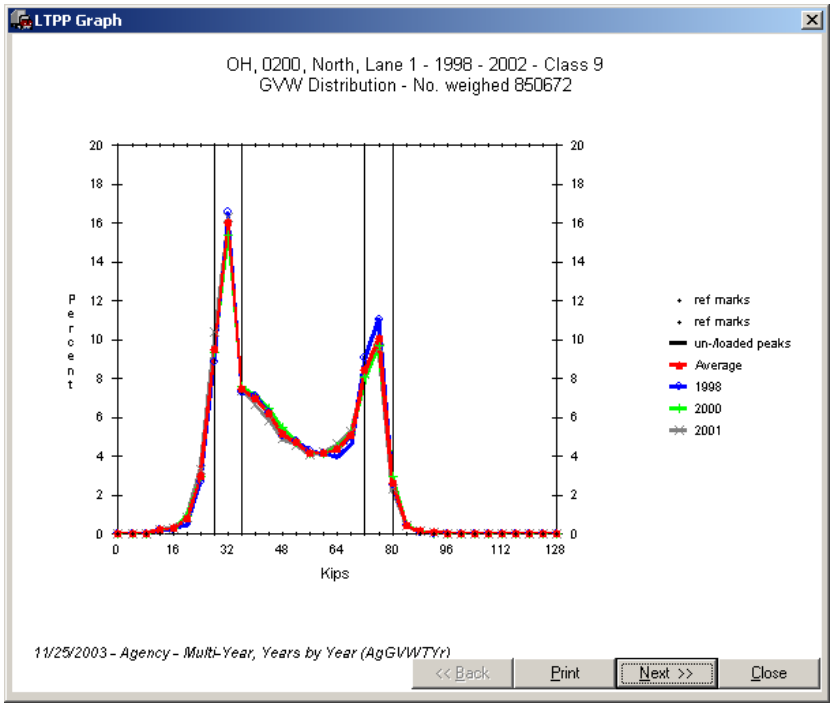


Figure 14-10 By year GVW Graph with adjusted data for 1998 for 390200

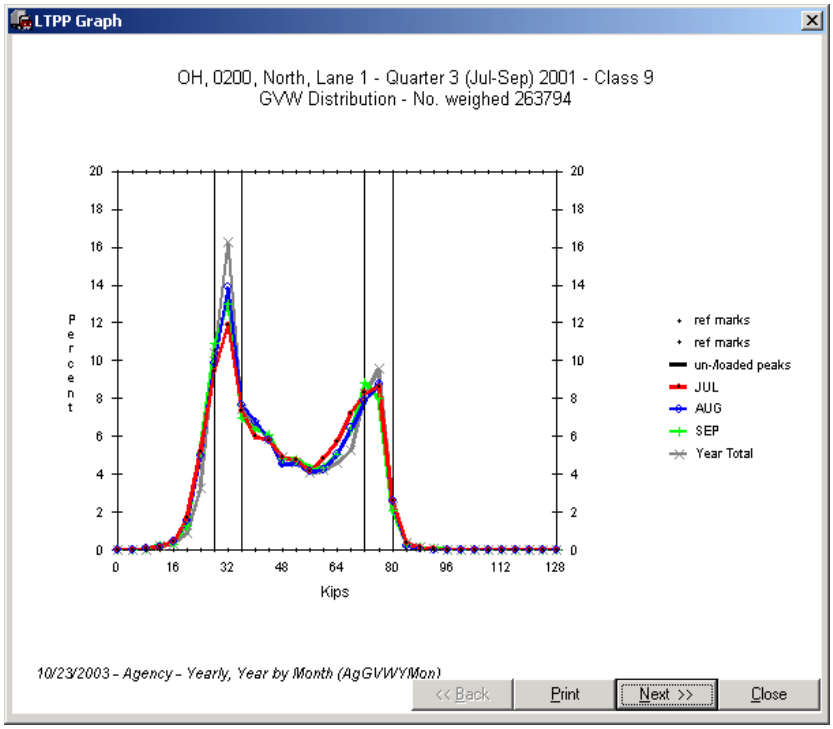


Figure 14-11 Class 9 GVW Distribution - July 2001 to September 2001- 390200

15 Corrective Actions Illustrations

Figure 15-1 Drainage Culvert at 390200

HANDOUT GUIDE FOR SPS WIM ASSESSMENT

STATE: Ohio

SHRP ID: 0200

Figures

1. General Information

SITE ID: *390200*

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

VISIT DATE: *November 13, 2003*

VISIT TYPE: *Assessment*

2. Contact Information

POINTS OF CONTACT:

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

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

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

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

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

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

3. Agenda

BRIEFING DATE: *November 12, 2003, 8:00 a.m. at Ohio DOT District 6 Office, 400 East Williams Street (US 36), Delaware, OH 43015 – Wilderness Room - Contact Sherri Tobias on 740-363-1251 ext: 231*

ONSITE PERIOD: *November 13, 2003*

TRUCK ROUTE CHECK: *Done (See Truck Route)*

4. Site Location/ Directions

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

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

MEETING LOCATION: *Meet at WIM site 8:00 a.m. 11-13-03*

WIM SITE LOCATION: *US 23, Milepost 19.7*

WIM SITE LOCATION MAP:*See Figure 4.1*

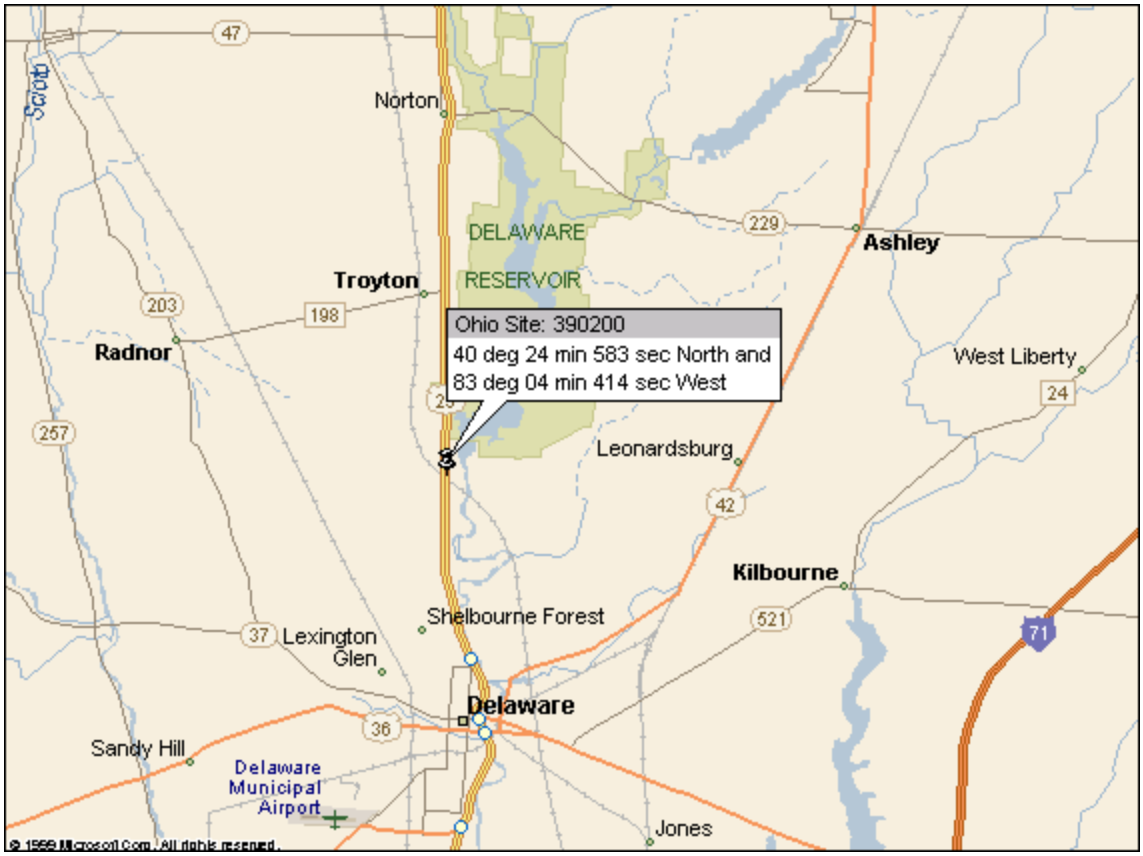


Figure: 4.1 Section 390200 near Delaware, Ohio

5. Truck Route Information

ROUTE RESTRICTIONS: *None*

SCALE LOCATION: *Pilot Travel Center, I-70 and Wilson Road Intersection, Exit 94. Phone: 614-308-9195. Cost is $8 per run. Open 24 Hours*

TRUCK ROUTE:

- *Northbound Turnaround –1.678 miles from site at SR 229 (40^0 26' 035" North and 83^0 04' 363" West)*
- *Southbound Turnaround –1.424 miles from site at Irwin Road (40^0 23' 356" North and 83^0 04' 459" West)*

6. Sheet 17 – Ohio (390200)

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

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

3.* LANE CONFIGURATION
Lanes in LTPP direction __2__ Lane width _1_ _2_ ft

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

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

Shoulder width _1__ _0__ ft

4.* PAVEMENT TYPE _____ Cement Concrete_____

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

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

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

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

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

Clearance under plate ___ _6__. _0__ in
Clearance/access to flush fines from under system Y / N

10. * CABINET LOCATION

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

Distance from edge of traveled lane _5_ _4_ ft

Distance from system __ __ __ ft

TYPE ___Mettler - Toledo_____

CABINET ACCESS controlled by LTPP / STATE / JOINT?

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

Alternate - name and phone number Dave Gardner 614-752-5740

11. * POWER

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

Service provider __Amer. Elec. Power_____ Phone number _____

12. * TELEPHONE

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

Service provider ____Verizon_____ Phone Number _____

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

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

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

15. PHOTOS FILENAME

Power source _AC_Meter_Box_TO_1_7A_39_0200_11_12_03.JPG____

Phone source _____

Cabinet exterior _Cabinet_Exterior_TO_1_7A_39_0200_11_12_03.JPG

Cabinet interior _Cabinet_Interior_TO_1_7A_39_0200_11_12_03.JPG

Weight sensors _Load_Cells_1_TO_1_7A_39_0200_11_12_03.JPG_

Classification sensors _Loop_Sensors_1_TO_1_7A_39_0200_11_12_03.JPG

Other sensors _____

Description _____

Downstream direction at sensors on LTPP lane

_Downstream_1_TO_1_7A_39_0200_11_12_03.JPG_____

Upstream direction at sensors on LTPP lane

_Upstream_1_TO_1_7A_39_0200_11_12_03.JPG_____

COMMENTS

GPS Coordinates for site: 40^0 24’ 583” North and 83^0 04’ 414” West

Amenities_-_5.5_miles_ south_of_site
Food_-Wendy’s & Mc Donald’s
Gas_-_Citgo, Sunoco, mini-mart
Miscelleaneous_-_84 Lumber
Hotel_-_Travel Lodge

10.0_miles south of site

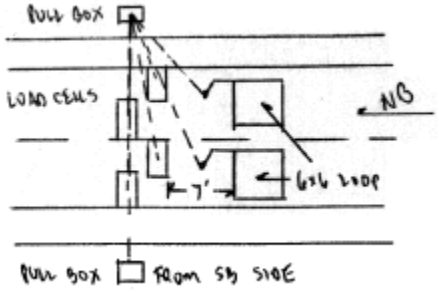
Food_-_Damon’s, Wendy’s, Taco Bell, Kroger’s
Hotel_-_Super 8, Ameri Host
Miscellaneous_- Banks, Wal-Mart, Sears Hardware

Contact for Lane Switch -__Dave Zurbe – 740-363-1251_(ext 266) - Striping
Roger Green – LTPP Division Liaison (Ohio)
Delaware County Garage – Bob Lloyd 740-369-1569

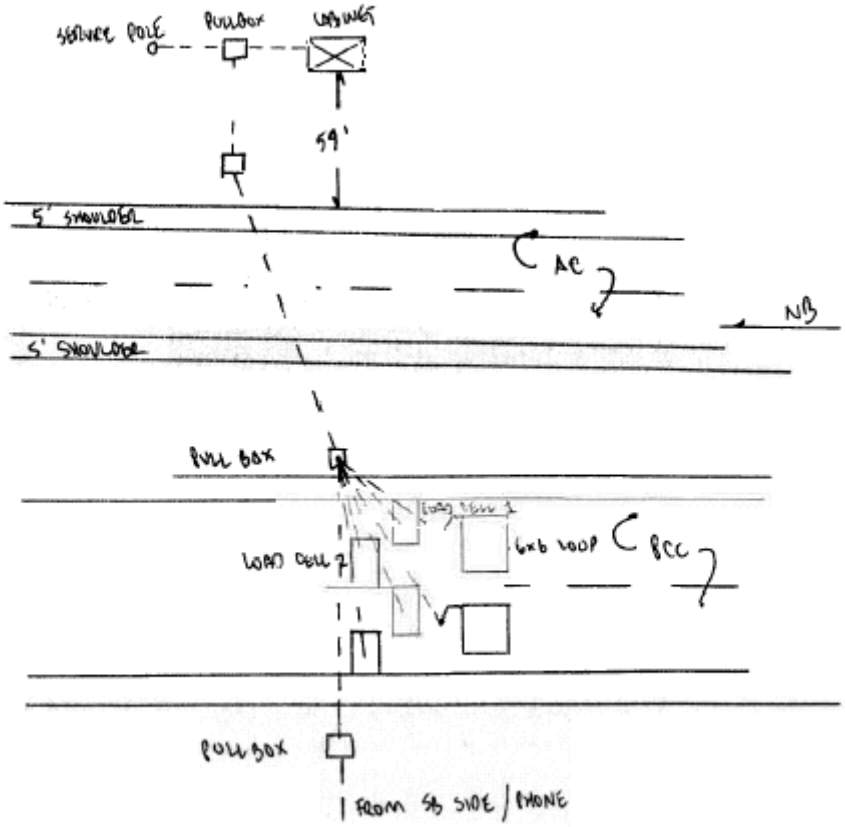
COMPLETED BY ____Dean J. Wolf

PHONE _301-210-5105_____DATE COMPLETED _1_ 1_ /_1_ 2_ / _2_ 0_ 0_ 3_

Sketch of equipment layout



Site Map



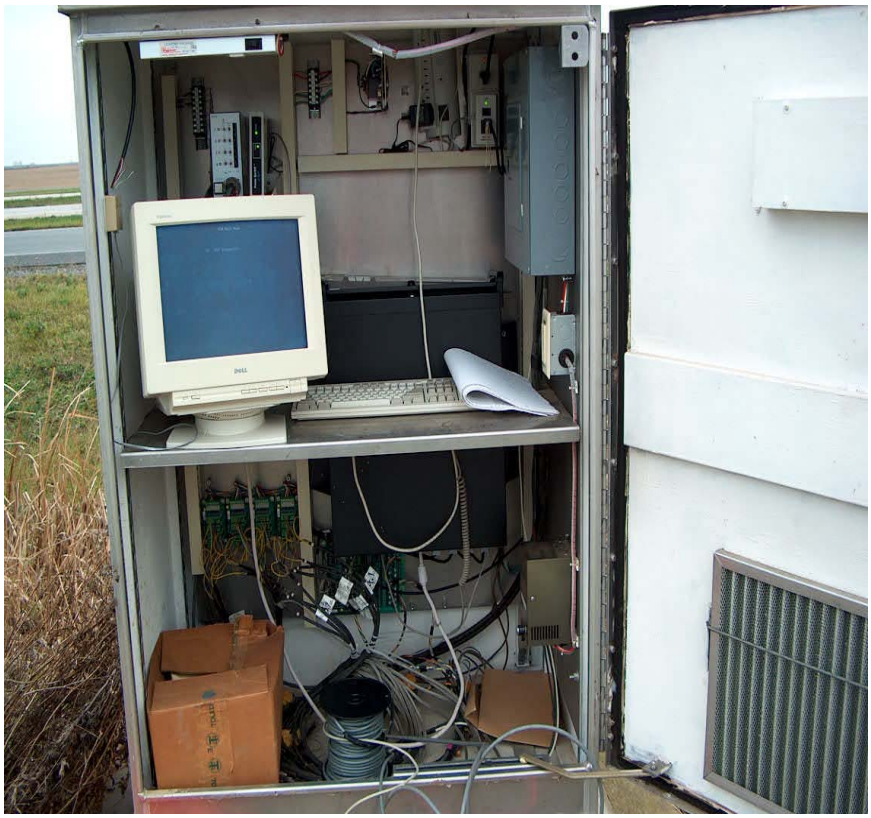
Downstream_1_TO_1_7A_39_0200_11_12_03.JPG (Distress Photo 1)

Downstream_2_TO_1_7A_39_0200_11_12_03.JPG (Distress Photo 2)

Upstream_1_TO_1_7A_39_0200_11_12_03.JPG (Distress Photo 3)

AC_Meter_Box_TO_1_7A_39_0200_11_12_03.JPG

Cabinet_Exterior_TO_1_7A_39_0200_11_12_03.JPG



Cabinet_Interior_TO_1_7A_39_0200_11_12_03.JPG

Load_Cells_1_TO_1_7A_39_0200_11_12_03.JPG

Loop_Sensors_1_TO_1_7A_39_0200_11_12_03.JPG

Downstream_1_TO_1_7A_39_0200_11_12_03.JPG

Upstream_1_TO_1_7A_39_0200_11_12_03.JPG

Sheet 18
LTPP Traffic Data

STATE_CODE 04

WIM SITE COORDINATION

SPS Project_ID 0200

Equipment –

- Maintenance – contract with purchase / separate contract LTPP / separate contract State / state personnel
  Contact STEVEN M. JESSBERGER 614-752-9057

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

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

Calibration – Vendor / (State) / LTPP

Manuals and software – (State) / LTPP

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

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

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

2. Site visits – Evaluation

WIM Validation Check - advance notice required 14 days / weeks

Trucks – air suspension 3S2	State / (LTPP)
2nd common	State / (LTPP)
3rd common	State / LTPP
4th common	State / LTPP
Loads	State / LTPP

Contact _____

Drivers State / LTPP

Contact _____

Contractors with prior successful experience in WIM calibration in state:

_____

Nearest static scale (commercial or enforcement)

_____

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

Sheet 18
LTPP Traffic Data

STATE_CODE 04

WIM SITE COORDINATION

SPS Project_ID 0200

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

Access to cabinet
State only (Joint) / LTPP (Key) / Combination

- State personnel required on site (Y) / N
Contact information STEVEN JESSBERGER

- Enforcement Coordination required Y (N)
Contact information _____

- Traffic Control Required Y/(N)
Contact information _____

Maximum number of personnel on site 4;
Invitees _____

Authorization to calibrate site -- State only / (LTPP)

Special conditions _____

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

4. Site visits – Validation

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

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

Sheet 18
LTPP Traffic Data
WIM SITE COORDINATION

STATE_CODE 08

SPS Project_ID 0200

Contact _____

Contractors with prior successful experience in WIM calibration in state:

_____

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

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

Access to cabinet
State only (Joint) / LTPP (Key) / Combination

- State personnel required on site (Y) / N
Contact information STEVEN JESSBERGER

- Enforcement Coordination required Y / (N)
Contact information _____

- Traffic Control Required Y / (N)
Contact information _____

Authorization to calibrate site -- State only / (LTPP)

Special conditions _____

5. Site visit – Construction

Construction schedule and verification – Contact _____

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

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

Trucks – air suspension 3S2	State / LTPP
2nd common	State / LTPP
Loads	State / LTPP
Drivers	State / LTPP

Contractors with prior successful experience in WIM calibration in state:

SHEET 16 **LTPP MONITORED TRAFFIC DATA** **SITE CALIBRATION SUMMARY**	*STATE ASSIGNED ID [__ __ __ __] *STATE CODE [_3_ _9_] *SHRP SECTION ID [0__ _2_ _0_ _0_]

SITE CALIBRATION INFORMATION

1. * DATE OF CALIBRATION (MONTH/DAY/YEAR) [_1_ _1_ / _1_ _2_ / _2_ _0_ _0_ _3_]

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

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

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

5. EQUIPMENT MANUFACTURER _____Mettler Toledo_____

WIM SYSTEM CALIBRATION SPECIFICS**

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

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

   __ __ __ PASSES PER TRUCK

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

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   MEAN DIFFERENCE BETWEEN ---
   DYNAMIC AND STATIC GVW ___ ___ ___ . __ STANDARD DEVIATION __ __ . __
   DYNAMIC AND STATIC SINGLE AXLES ___ ___ ___ . __ STANDARD DEVIATION __ __ . __
   DYNAMIC AND STATIC DOUBLE AXLES ___ ___ ___ . __ STANDARD DEVIATION __ __ . __

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

9. DEFINE THE SPEED RANGES USED (MPH) _____ _____ _____ _____ _____ _____ _____ _____
   _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

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

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

CLASSIFIER TEST SPECIFICS***

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

13. METHOD TO DETERMINE LENGTH OF COUNT ___ TIME _100__ NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
   *** FHWA CLASS 9 _____ __0_ ____ FHWA CLASS ____ ____ ____ ____ ____
   *** FHWA CLASS 8 _____ _17____ FHWA CLASS ____ ____ ____ ____ ____
   FHWA CLASS ____ ____ ____ ____ ____
   FHWA CLASS ____ ____ ____ ____ ____
   *** PERCENT "UNCLASSIFIED" VEHICLES: _____ __0__ . ____

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