Assessment Report for
Colorado, SPS 2

Visit date: March 17, 2004

List of Tables

List of Figures

1 Executive Summary

A visit was made to the Colorado SPS-2 site on March 17, 2004 for the purpose of conducting an assessment of the WIM system located on Interstate 76, 0.44 miles east of the East 136th Avenue overpass, at milepost 20.181.

This site is not recommended for validation.

The site is instrumented with piezo weighing sensors and an IRD WIM controller.

The equipment is not in working order. The actions listed in the corrective actions section should be undertaken to make the equipment fully operational.

There was insufficient data to support a Sheet 16 for classification verification since the equipment is not functioning at present. This will need to be a part of the next assessment or evaluation.

The pavement condition is such that it may contribute to an inability to calibrate the system to obtain research quality data. At all the locations the WIM Index value of 0.789 m/km is exceeded. Among the distresses observed that might influence the truck motion are asphalt patches at the pavement joints located approximately 24 feet and 84 feet prior to the leading edge of the loop sensor. These are illustrated in Figure 13-1 and Figure 13-2.

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. However, the existing patches arise above the pavement surface. Until these patches are ground or replaced, it may not be possible to calibrate the system to obtain research quality data.

A review of the speed information collected on-site indicates that the range of truck speeds to be covered during an evaluation is 55 to 75 mph using 10 mph increments. The speed limit at the site is 75 mph.

This site has 2 years of classification data and 6 years of weight data. There is no validation information for this site as of December 2003 upload. **Based on available information and review of the data submitted through last year, this site still needs 5 years of classification data and weight data to meet the need for 5 years of research quality data.**

2 Corrective Actions Recommended

The WIM controller needs to be repaired or replaced. When power was supplied, the system would not initiate start up routines.

All in road sensors need to be replaced.

The power supply main switch is broken and presents a safety hazard. The switch needs to be repaired or replaced.

Due to the presence of electrical short damage on the ground bus bar as illustrated in Figure 15-1, a thorough check of all power service components needs to be performed at the time of system repair or replacement.

Existing landline telephone services need to be reestablished.

The cabinet is severely infested with rodents as illustrated in Figure 15-2 and needs to be completely cleaned.

The cabinet door has been significantly damaged as illustrated in Figure 15-3, and needs to be replaced.

Since the WIM Index values exceeded the recommended threshold, replacement of the pavement is recommended.

Should pavement replacement not be a viable option, grinding or replacement of the patches should be performed, due to their possible effects on truck dynamics in the WIM scale area.

Traffic data for 1995 and 1996 needs to be re-examined. A trend analysis of the data should be done. Particular attention should be paid to the use/existence of classified data for 1995 and 1996. The reasonability of the weight data for 1998 and the use of August 2000 data is also an issue.

3 Equipment inspection and diagnostics

Electrical checks of all WIM system power and communication components including AC service, power supply and telephone service were performed. All power service components appear to be operating properly, with the exception of the power supply main switch, which is broken. Telephone communication equipment is installed, but service is not available. All other power service components appear to be working properly.

Electronic testing of the equipment installed in the pavement indicated that all in road sensors, need to be replaced. The first weighing sensor indicates low resistance to ground, high capacitance values and significant erroneous noise. The second sensor indicates proper sensor operating values, but is providing severely distorted sensor inputs, which

makes proper signal interpretation by the WIM controller impossible. The loop sensor indicates a low resistance to ground.

A visual inspection of all on-site equipment such as the cabinet, cabinet foundation, in-road sensors, conduit, grounding, and power and telephone system components was performed. Rodents have infested the cabinet. The cabinet door has been damaged and environmental effects and burrowing prairie dogs are excavating the ground around the cabinet foundation.

The epoxy covering the first piezo-weighing sensor is deteriorating, as illustrated in Figure 15-4.

All other WIM system and support equipment are in good physical condition.

4 Classification Verification with test truck recommendations

According to the agency it uses the FHWA 13-bin classification scheme from the Traffic Monitoring Guide with one or more additional classes that cannot be determined from currently available information.

A sample with 100 trucks and three hours of visual data was collected at the site. Video was taken at the site to provide ground truth for the evaluation. Because the equipment on site was not functioning, the classification accuracy study could not be performed.

A review of data collected on site indicates that Class 9s constitute 69 percent of the truck population. All other tractor-trailer combinations combined constitute another 6 percent. Class 5 vehicles were slightly more than 10 percent. The remaining 20 percent were single unit trucks.

A review of the site data both collected on site and previously submitted by the agency indicated that Class 9 and Class 5 constitute at least 10 percent of the truck population. Based on this information in addition to the air-suspension 3S2, the second vehicle used for evaluation should be a Class 9 since Class 5s are only slightly above 10 percent. Due to the length of the truck turn around no additional vehicle is required. Since this site is essentially an unloaded site based on data review, using one fully loaded truck and one partially loaded to 45,000 – 55,000 lbs is preferable.

5 Profile Evaluation

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 Long Range Index (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 Short Range Index (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.

Profile data collected at the SPS WIM location by Nichols Consulting Engineers on October 24, 2003 has been processed through the LTPP SPS WIM Index software. This WIM scale is installed on a Portland cement concrete pavement. The results are shown in Table 1.

A total of 8 profiler passes was been conducted over the WIM site. Since the issuance of the LTPP directive on collection of longitudinal profile data for SPS WIM section, the requirements have been a minimum of 3 passes in the center of the lane and one shifted to each side. For this site the RSC has done 4 passes at the center of the lane, 2 passes shifted to the left side of the lane, and 2 passes shifted to the right side of the lane. Shifts to the sides of the lanes are made such that data were collected as close to the lane edges as was safely possible. For each profiler pass, profiles are recorded under the left wheel path (LWP), and the right wheel path (RWP).

Table 1 shows the computed index values for all 8 profiler passes for this WIM site. The average values over the passes at each path are also calculated when three or more passes are completed. These are shown in the right most column of the table. Values above the index limits are presented in italics.

Table 1 Long Range Index (LRI) and Short Range Index (SRI)

Profiler Passes			**Pass 1**	**Pass 2**	**Pass 3**	**Pass 4**	**Ave.**
Center	LWP	LRI (m/km)	*1.562*	*1.445*	*1.372*	*1.592*	***1.493***
		SRI (m/km)	*1.283*	*1.256*	*1.238*	*1.480*	***1.314***
	RWP	LRI (m/km)	*1.480*	*1.318*	*1.383*	*1.350*	***1.383***
		SRI (m/km)	*1.177*	*1.200*	*1.211*	*1.185*	***1.193***
Left Shift	LWP	LRI (m/km)	*1.508*	*1.516*			
		SRI (m/km)	*1.024*	*1.133*			
	RWP	LRI (m/km)	*1.411*	*1.358*			
		SRI (m/km)	*1.266*	*1.150*			
Right Shift	LWP	LRI (m/km)	*1.426*	*1.319*			
		SRI (m/km)	*1.292*	*1.094*			
	RWP	LRI (m/km)	*1.858*	*1.920*			
		SRI (m/km)	*1.273*	*1.347*			

As seen from the table at all the locations the WIM Index value of 0.789 m/km is exceeded. When all values are less than 0.789 it is presumed unlikely that pavement roughness will significantly influence sensor output. Values above that level may or may not influence the reported weights and potentially vehicle spacing. **Based on the profile data analysis, the Colorado SPS-2 WIM site does not meet the requirements for WIM site locations**. If any remedial action is taken it should be done for the entire section. **Grinding may sufficiently reduce the SRI index values below the WIM Index limit**. **Reducing the LRI values may not be possible without reconstruction**.

6 Distress survey and any applicable photos

The pavement appears to be in good condition except for the patches at 24 feet and 84 feet prior to the WIM scale sensors as shown in Figure 13-1 and Figure 13-2 respectively. Figure 13-3 and Figure 13-4 show the pavement condition at the site in the downstream and upstream direction respectively.

7 Vehicle-pavement interaction discussion

A visual inspection of the pavement 425 feet in advance of the WIM area and 75 feet following the WIM area was conducted. No significant pavement distress that would affect the performance of the WIM scales was detected except for the patches.

Although no discernable movements by the trucks passing over the WIM scales could be detected, the patches prior to the WIM scale may affect the dynamics of the trucks as they pass over the WIM scales.

A ramp onto the interstate, located from 158 feet to 1000 feet prior to the WIM scale area, does not appear to affect mainstream traffic flow or truck traffic flow over the WIM scale area. Trucks appear to stay centered in the lane and no daylight can be seen between the tires and any of the sensors as they pass over the WIM scales.

8 Speed data with speed range recommendations for evaluation

Based on the data collected on site the 15^{th} and 85^{th} percentile speeds for Class 9s are 60 and 70 mph respectively. The upper end of the range is below the posted speed limit of 75 mph. This range does not vary significantly for other truck classes. As a result the recommended speeds for test trucks in an evaluation are 55, 65 and 75 mph. The wider range is suggested because there are vehicles traveling at the lower end of the range and 10-mile per hour increments are preferred where possible. Obtaining the highest speed for testing may require using a longer turnaround due to the proximity of the on-ramp.

Comparison of measured speed and speed collected by the WIM equipment could not be accomplished since the equipment is not functioning at present.

9 Traffic Data review: Overall Quantity and Sufficiency

As of March 17, 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 2. **No validation information is available for this site as of the December 2003 upload**.

Table 2 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 a validation/calibration activity. A determination of research quality data is based on the consistency with the validation pattern. Data that follows consistent and rational patterns in the absence of calibration information may be considered nominally of research quality pending validation information with which to compare it. Data that is inconsistent with expected patterns and has no supporting validation information is not considered research quality.

The amount and coverage for the site is shown in Table 3. 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 1995 and 1996 have a sufficient quantity for classification and 1995, 1996 and 1998 for weight data to be considered complete years of data. In the absence of previously gathered validation information it can be seen that at least 5 additional years of research quality classification data and weight data are needed to meet the goal of a minimum of 5 years of research weight data.

Table 3 Amount of Traffic Data Available

Year	Class Days	Months	Coverage	Weight Days	Months	Coverage
1995	227	9	Complete Week	229	9	Complete Week
1996	346	12	Complete Week	351	12	Complete Week
1997	N/A	N/A	N/A	178	6	Complete Week
1998	N/A	N/A	N/A	358	12	Complete Week
1999	N/A	N/A	N/A	99	5	Complete Week
2000	N/A	N/A	N/A	150	9	Complete Week

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, GVW distributions both over all years and by month within years, average daily steering axle weights for Class 9 vehicles, and ESAL graphs.

Based on this review it is recommended that **further investigation be done for classification and weight data for 1995 and 1996. The comparison of the vehicle distributions for the two data types shows inconsistencies. The weight data for those years indicates unusually heavy Class 9s. The 1998 weight data should be reviewed**

in context of years before and since both due to lower weights and the end of shifting peaks. The August 2000 weight data is suspect since only one vehicle class is represented.

9.1 SPS Summary Report

The overall report is the SPS Summary Report. This report uses 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 submissions. 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. Excluded months have no data.

Table 4 SPS Summary Report

Colorado 0200

East Lane 1

Comparison Date Weight - 10-March-1995 Classification – 04-April-1995

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		13.1		542	1.49	12,314	77,666	33,700
MAR 1995			22	543	1.49	12,432	89,663	36,055
APR 1995	29	13.4	30	516	1.61	12,448	89,733	36,093
MAY 1995	31	12.5	31	539	1.45	12,053	89,533	35,658
JUN 1995	30	11.9	30	585	1.09	11,087	73,497	34,184
JUL 1995	24	10.7	24	550	0.79	10,479	69,315	33,455
AUG 1995	27	11.6	27	598	0.70	10,117	66,091	31,056
SEP 1995	23	14.0	23	615	1.06	11,170	81,687	34,303
OCT 1995	17	14.0	17	599	1.13	11,638	85,447	34,890
DEC 1995	24	11.9	25	487	1.40	12,564	89,576	35,885
JAN 1996	19	13.8	20	509	1.44	12,408	89,639	35,891
FEB 1996	25	15.0	26	549	1.28	12,044	85,748	35,467
MAR 1996	31	12.7	31	530	1.17	11,431	82,057	35,047
APR 1996	27	13.1	30	522	0.91	10,658	74,004	33,896
MAY 1996	31	12.0	31	546	0.73	10,092	66,384	33,288
JUN 1996	30	11.5	30	555	0.66	9,647	66,002	30,601
JUL 1996	31	11.4	31	567	0.56	9,282	65,413	29,887
AUG 1996	31	11.4	30	567	0.55	9,295	62,449	29,932
SEP 1996	30	12.8	30	567	0.70	9,773	66,002	30,586
OCT 1996	31	13.9	31	591	0.82	10,289	73,942	33,525
NOV 1996	30	13.6	30	551	0.95	10,978	81,538	34,118
DEC 1996	30	12.2	31	479	1.01	11,318	81,857	34,611
JAN 1997			31	524	1.11	11,176	81,818	34,477
FEB 1997			28	545	1.06	11,173	81,600	34,417

Colorado 0200

East Lane 1

Comparison Date Weight - 10-March-1995 Classification - 04-April-1995

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		13.1		542	1.49	12,314	77,666	33,700
MAR 1997			31	549	0.81	10,503	70,258	33,523
APR 1997			30	571	0.76	10,155	69,987	33,278
NOV 1997			27	564	0.81	10,456	77,557	33,327
DEC 1997			31	522	0.85	10,626	77,904	33,593
JAN 1998			31	453	0.89	10,476	77,627	33,477
FEB 1998			28	372	0.76	10,365	74,111	33,095
MAR 1998			31	526	0.66	9,947	70,078	30,669
APR 1998			30	593	0.60	9,582	69,671	30,150
MAY 1998			31	573	0.47	9,047	62,362	29,530
JUN 1998			30	621	0.47	8,950	62,321	29,412
JUL 1998			25	552	0.39	8,692	61,832	26,915
AUG 1998			30	571	0.40	8,610	61,593	27,023
SEP 1998			30	623	0.37	8,555	61,200	26,777
OCT 1998			31	612	0.53	9,321	69,287	29,558
NOV 1998			30	583	0.63	9,962	70,121	30,407
DEC 1998			31	551	0.67	10,231	73,398	30,713
MAY 1999			31	591	1.27	11,487	81,730	35,163
JUN 1999			28	516	1.17	10,927	78,137	34,737
JUL 1999			18	548	0.92	10,644	77,298	33,800
OCT 1999			16	513	0.99	10,947	77,857	33,953
NOV 1999			6	348	0.97	11,275	78,174	34,202
MAR 2000			24	433	1.10	11,190	81,581	34,761
APR 2000			30	637	1.11	11,092	78,045	34,376
MAY 2000			31	634	1.00	10,834	77,752	34,106
JUN 2000			27	423	0.92	10,591	77,336	33,915
JUL 2000			14	300	0.90	10,300	77,609	34,386
AUG 2000			1					
SEP 2000			10	579	0.87	10,506	77,325	33,199
OCT 2000			3	495	0.69	10,300	74,041	32,905
NOV 2000			10	661	1.09	11,420	78,087	34,143

From the table it can be seen that there is limited classification data. However, from the available data it appears that the percent of Class 9s was essentially the same. From the weight data it appears that the amount of Class 9s is almost similar except in November 1999 and June to August 2000 when the amount is significantly less than the other months. The average ESALs per Class 9s is not consistent for all the years. The reason for this inconsistency is unknown at present. The average steering axle weights are essentially the same for the years although those for 2000 show slightly higher averages and less seasonal variation. The mean loaded weight is essentially similar except from May to September in 1996 and 1998 where the values are significantly less. The mean unloaded weight is almost similar for all the years.

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 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 heavy truck classification data. The individual weeks show essentially the same heavy truck mix. 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 essentially the same. A typical graph for this period is shown in Figure 14-1. There was no significant difference in the mix stability graphed for the weight data for Class 9s as shown in Figure 14-2. However, the classification and weight data mixes are different because the percentage of Class 8s is significantly different. The percent of Class 8s in classification data is almost twice that for the weight data. A similar trend is repeated for the remaining period of 1995 and 1996. Thus, the classification data for 1995 and 1996 may need further investigation.

Figure 14-3 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. From the figure it appears that the data collected by the classifier is significantly higher than the WIM equipment data. In addition to the larger volume of Class 8s found by the classifier, the figure shows how many unknown vehicles were also reported. This number may be inflated by an error in reading columns beyond 51 on 4-card records. Although Figure 14-3 and Figure 14-4 have different scales, it can be seen that the distribution in terms of volumes for weight data has been relatively consistent.

9.3 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 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 on the interstate highway system. 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. In Figure 14-5 the typical pattern is shown in the red line with solid squares. It can be seen from the figure that the loading patterns for all the years are almost the same. However, the percentage of unloaded and loaded vehicles differs. The

loading pattern for 1998 is different with the unloaded peak within the expected range whereas the loaded peak has shifted outside the peak-loaded range. The patterns for 1999 and 2000 are also different since they show a distinct loaded peak not apparent in previous years.

To investigate any seasonal variations the Class 9 GVW distributions are graphed by month by year. As shown in Figure 14-7 and Figure 14-8 it appears that the unloaded peaks are almost the same. However, the loaded peaks are shifting by month through 1998. Beginning with the 1999 data the peaks are essentially stationary. The cause for shift is unknown as is the reason for the change in pattern.

9.4 Axle Distributions

Axle distribution graphs were not needed for this site since the GVW graphs were available for all years.

9.5 ESALs per year

Average ESALs for Class 9 vehicles are a very crude method of identifying loading shifts. Figure 14-9 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. From the figure it is clear that the average ESALs values are not consistent across the years of data. They appear to be cyclic within a year and trending down over time through 1998 with the pattern discontinued in 1999. The cyclical nature tends to imply some seasonality to the site. The trend however may either be real changes in truck weights or an artifact of the data collection process.

9.6 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 14-10 the average steering axle weights were less in summer compared to rest of the year. The reason for this variation is unknown at present but it is another indication of possible seasonality.

10 Updated handout guide and Sheet 17

A copy of the post visit handout has been included following page 20. It includes a current Sheet 17 with all applicable maps and photographs. There are no significant changes in the information provided in the pre-visit handout.

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) (Omitted)

There is not sufficient information to submit a Sheet 16.

13 Distress Photographs

Figure 13-1 Asphalt Patching 24 feet prior to site

Figure 13-2 Asphalt Patching 84 feet prior to site

Figure 13-3 Pavement Condition in Downstream direction

Figure 13-4 Pavement Condition in Upstream direction

14 Traffic Graphs

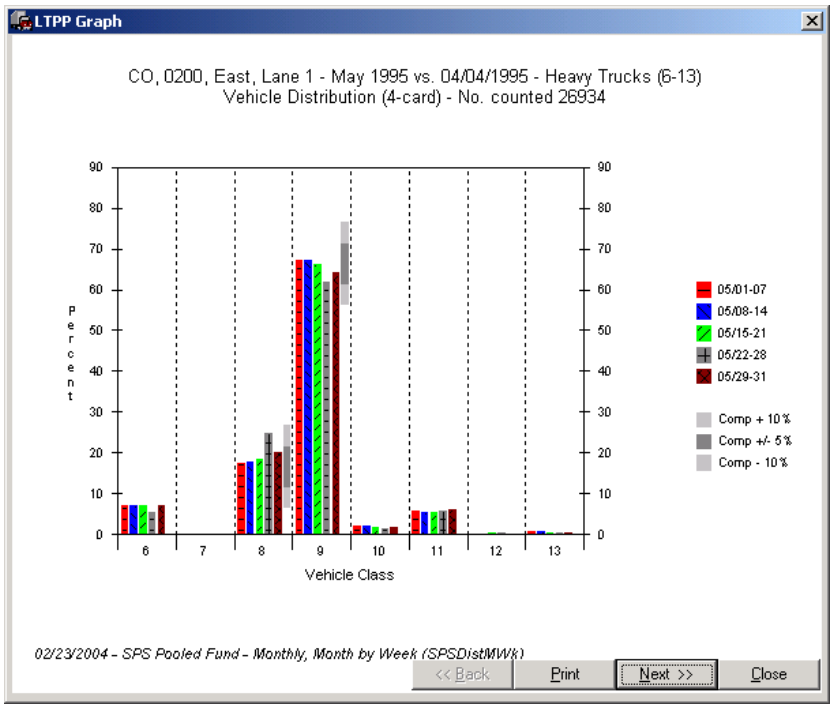


Figure 14-1 Typical Heavy Truck Distribution Pattern for Classification Data for 080200

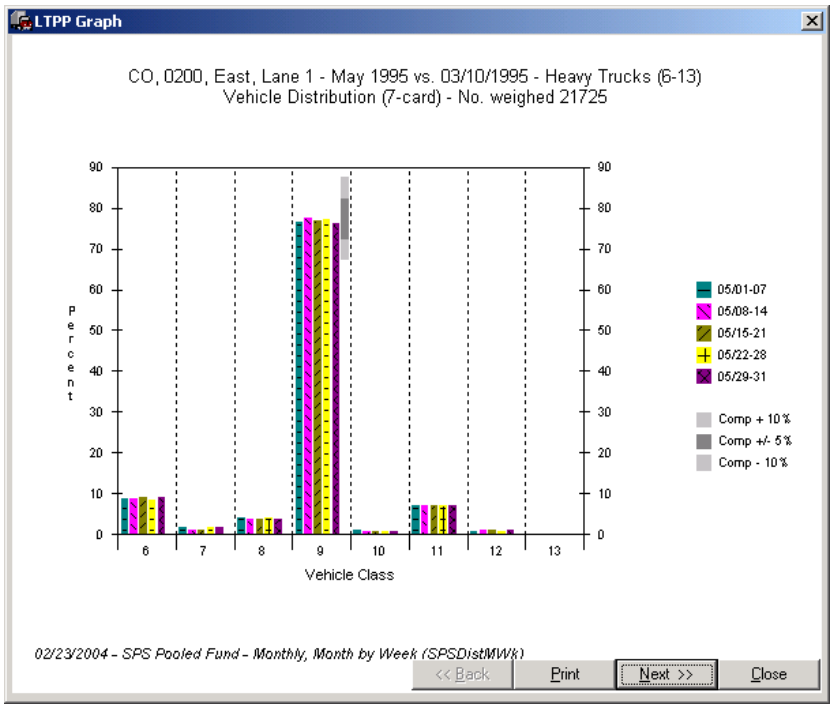


Figure 14-2 Typical Heavy Truck Distribution Pattern for Weight Data for 080200

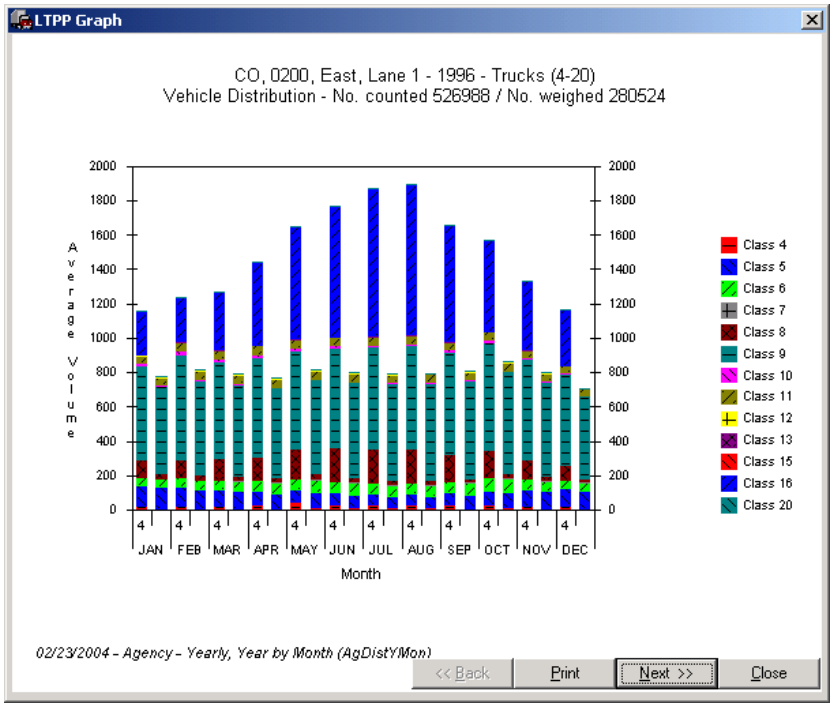


Figure 14-3 Vehicle Distribution by Month for the Year 1996 for 080200

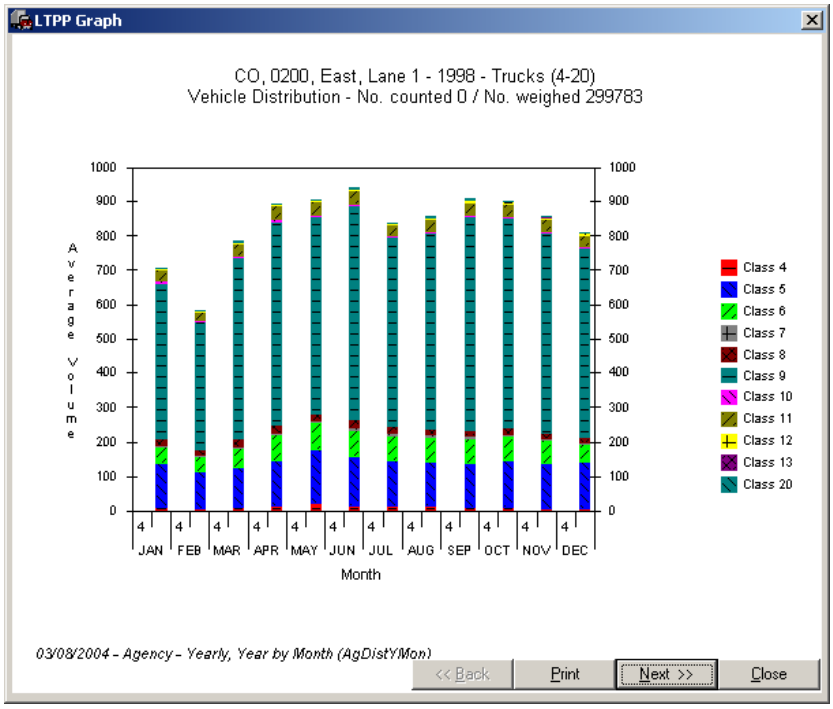


Figure 14-4 Vehicle Distribution by Month for the year 1998 for 080200

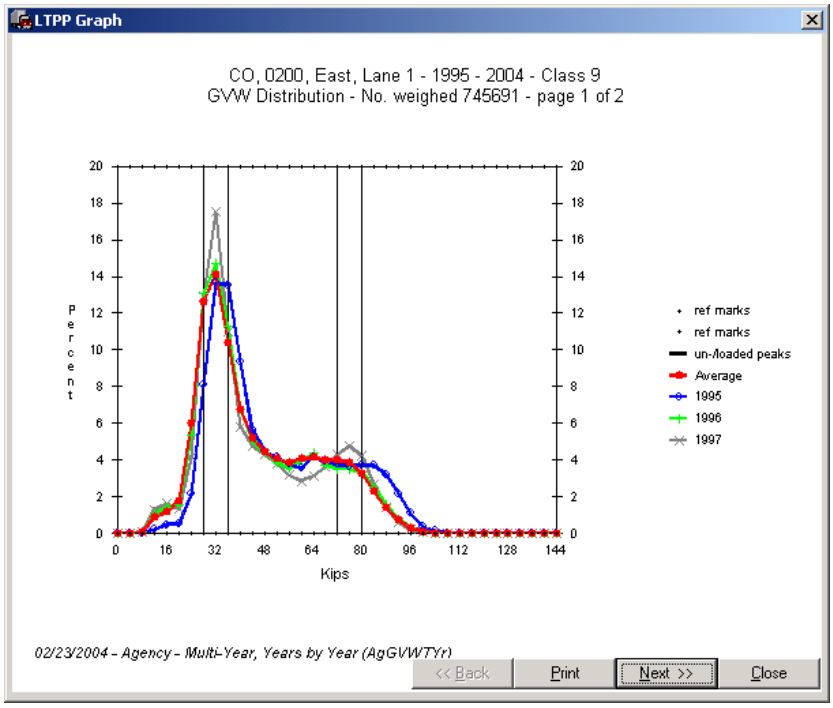


Figure 14-5 Class 9 GVW Distribution - 1995 to 1997 for 080200

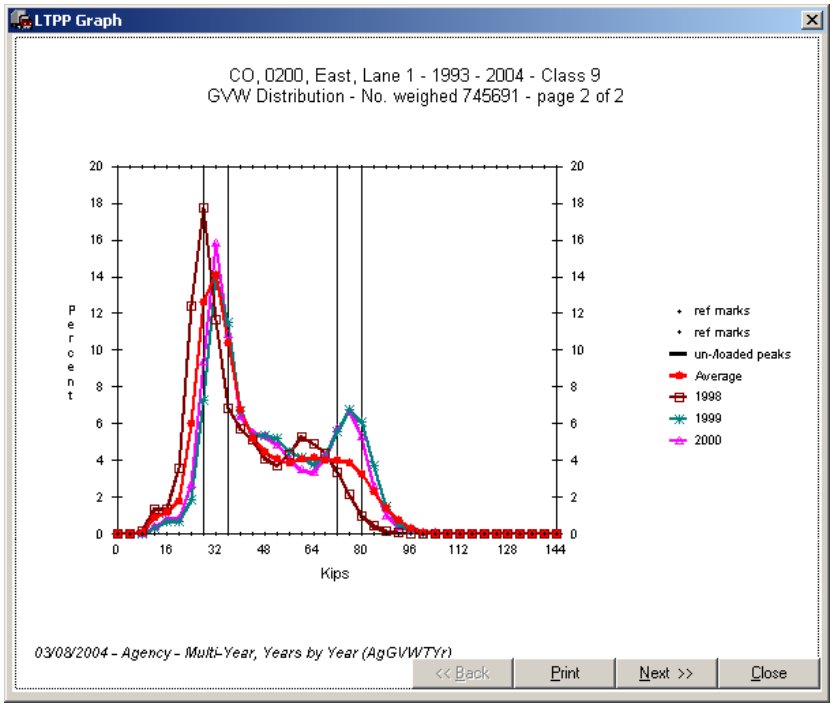


Figure 14-6 Class 9 GVW Distribution for 1998-2000 for 080200

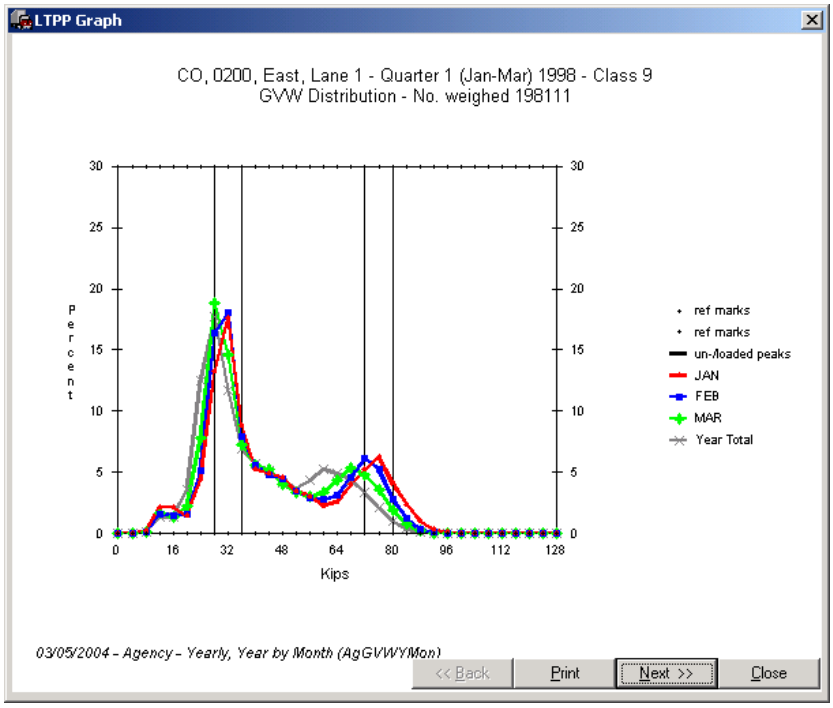


Figure 14-7 Class 9 GVW Distribution - January to March 1998 for 080200

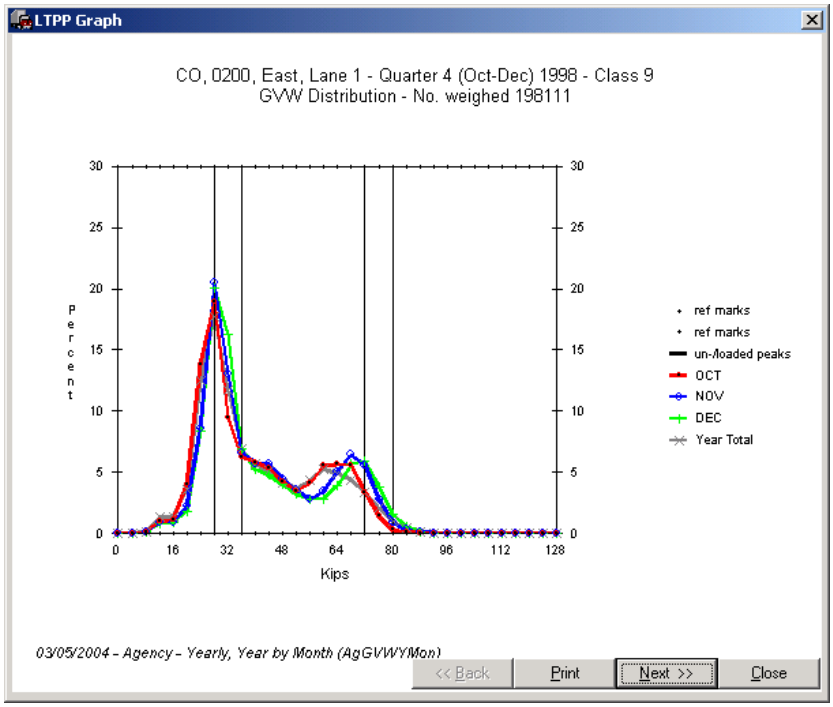


Figure 14-8 Class 9 GVW Distribution - October to December 1998 for 080200

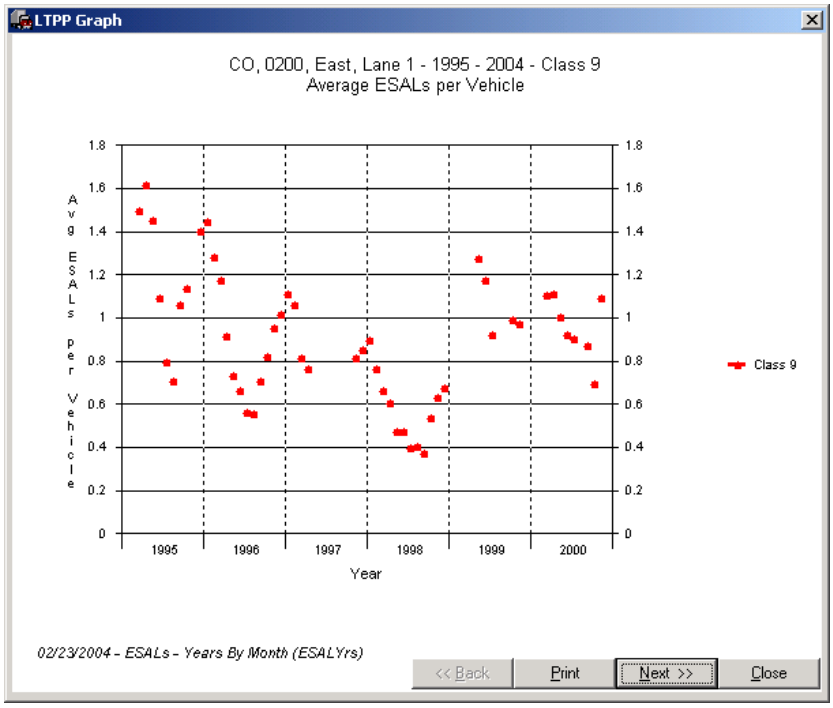


Figure 14-9 Average Class 9 ESALs for site from 1995 to 2000 for 080200

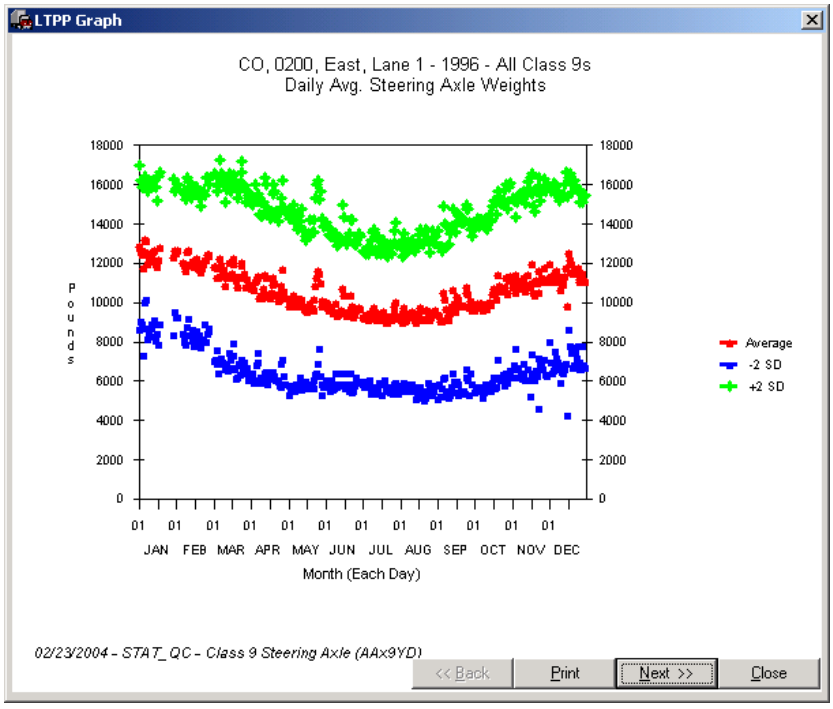


Figure 14-10 Average Daily Class 9 Steering Axle Weight - 1996 for 080200

15 Equipment Photos

Figure 15-1 Damage inside the cabinet of 080200

Figure 15-2 Damage inside the cabinet due to rodent infestation at 080200

Figure 15-3 Damage to the cabinet door at 080200

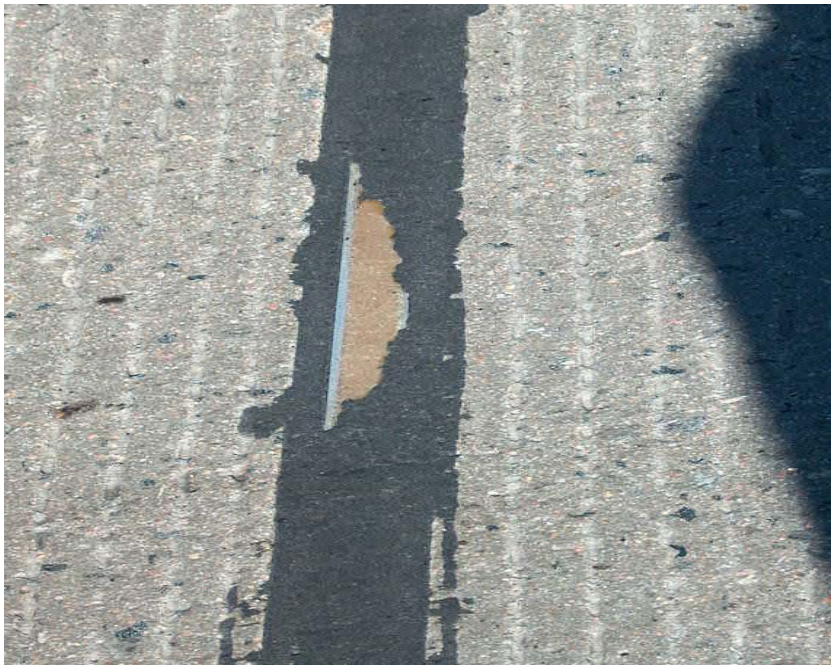


Figure 15-4 Epoxy break out at first piezo weighing sensor at 080200

POST VISIT HANDOUT GUIDE FOR SPS WIM FIELD ASSESSMENT

STATE: Colorado

SHRP ID: 0200

Figures

1. General Information

SITE ID: *080200*

LOCATION: *Interstate 76 East at M.P. 20.181*

VISIT DATE: *March 17, 2004*

VISIT TYPE: *Assessment*

2. Contact Information

POINTS OF CONTACT:

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

Highway Agency: *Ahmad Ardani, 303-757-9978, ahmad.ardani@dot.state.co.us*

Skip Outcalt, 303-757-9984, skip.outcalt@dot.state.co.us

Dave Price, 303-757-9976, david.price@dot.state.co.us

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

FHWA Division Office Liaison: *Jean Wallace, 303-969-6730, Jean.wallace@fhwa.dot.gov*

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

3. Agenda

BRIEFING DATE: ***Held Tuesday, March 16, 2004 starting at 9.00 a.m.*** *at Building B, Room 606, in the Pike's Peak Conference Room, Colorado DOT's Empire Park offices, 1325 S. Colorado Blvd., Denver, CO.*

ON SITE PERIOD: *March 17, 2004 beginning at 9.00 a.m.*

TRUCK ROUTE CHECK: *Done. See truck route.*

4. Site Location/ Directions

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

DIRECTIONS TO THE SITE: *Approx. 0.44 miles East of E. 136th Ave Overpass*

MEETING LOCATION: *March 17, 2004 on site beginning at 9.00 a.m.*

WIM SITE LOCATION: *Interstate 76 East at M.P. 20.181 (Latitude: 39.94867^{0} and Longitude: -104.77953^{0})*

WIM SITE LOCATION MAP: *See Figure 4.1*

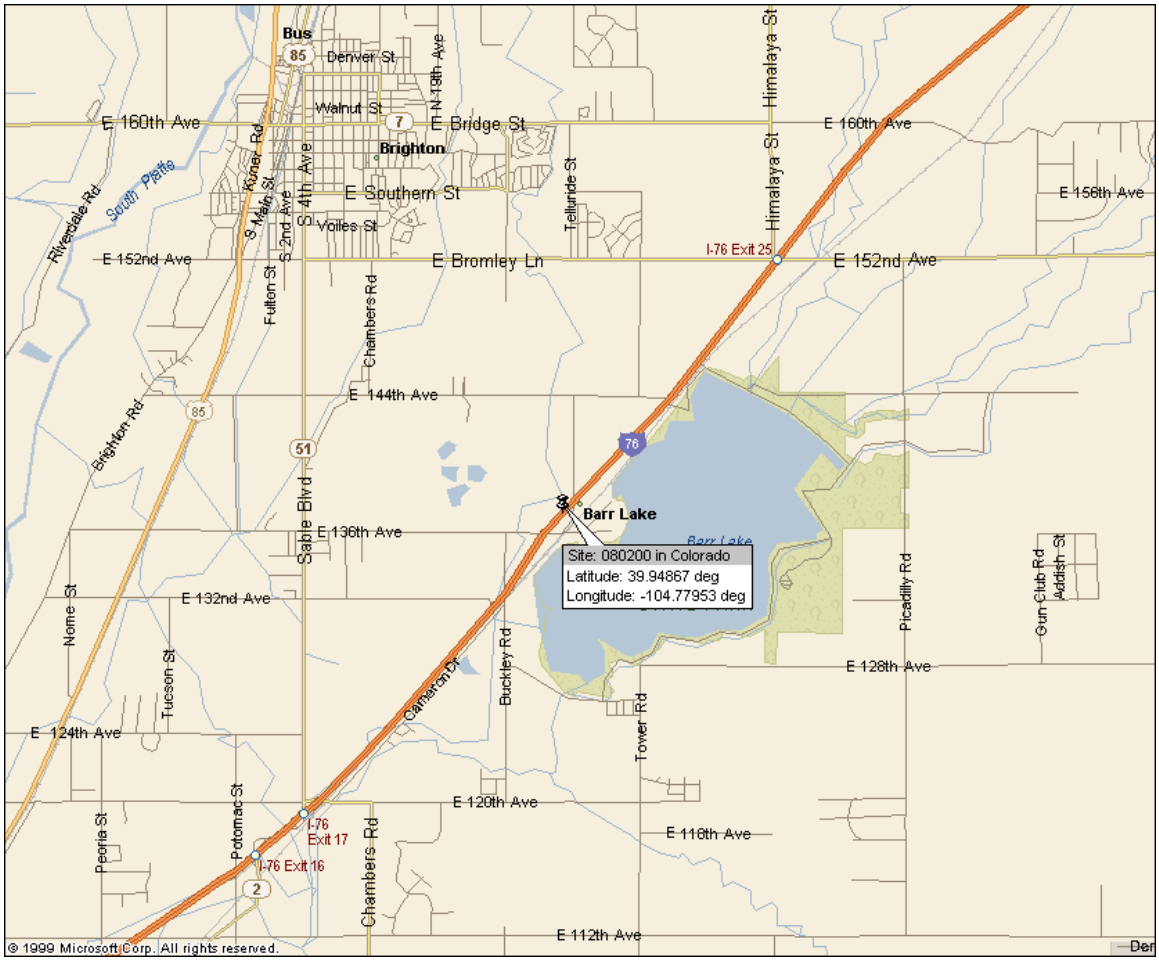


Figure 4.1: Site 080200 in Colorado

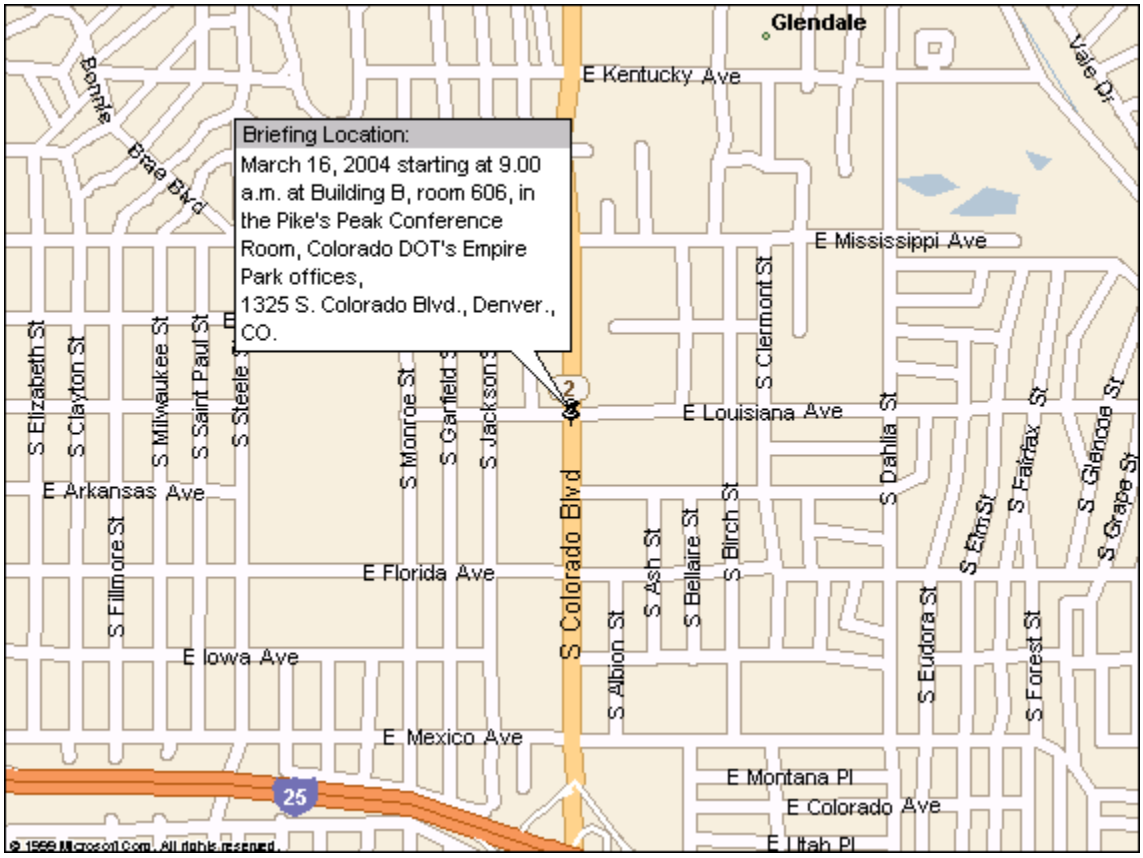


Figure 4.2: Briefing Location of 080200 in Colorado

5. Truck Route Information

ROUTE RESTRICTIONS: *None.*

SCALE LOCATION: *Pilot Travel Center, I-70, exit 276A; Latitude: 39.78113^0, Longitude: -104.9490^0; Proprietor - Chuck Hall, Phone No: (303) 292-6303, open 24 hours and 7days a week, $8.00 per weight.*

TRUCK ROUTE:

- *Eastbound: 0.42 miles to exit 21*
  - *Left at bottom of ramp*
  - *Travel under I-76*
  - *Take left onto I-76 westbound on ramp*

- *Westbound: 3.4 miles to exit 16*
  - *Take left at top of ramp*
  - *Travel over I-76*
  - *Take left onto I-76 eastbound on ramp (traffic light)*

6. Figure 5.1: Truck route of 080200 in Colorado

Sheet 17 – Colorado (080200)

1.* ROUTE ___I-76_____MILEPOST ___20.181__LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade ___<_1____ % Sag vertical Y / N
Nearest SPS section upstream of the site _0_8_ _0_2_ _2_1_ ___
Distance from sensor to nearest upstream SPS Section ___ _1__ _1__ _1__ 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 _____03-17-04_____Distress Photo Filename
__Pave_Cond_1_TO_4_08_27A_0200_03_17_04.JPG_____
Date _____03-17-04_____Distress Photo Filename
__Pave_Cond_2_TO_4_08_27A_0200_03_17_04.JPG_____
Date _____03-17-04_____Distress Photo Filename
__Downstream_TO_4_08_27A_0200_03_17_04.JPG_____

6. * SENSOR SEQUENCE _____Loop-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 __on ramp starts 1000’ prior to site, ends 158’ prior to site_____
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 _105_ __ ft

Distance from system __ _120_ __ ft

TYPE _____M_____

CABINET ACCESS controlled by LTPP / STATE / JOINT?

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

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

11. * POWER

Distance to cabinet from drop ___ _900__ ___ ft Overhead / underground / solar / AC in cabinet?

Service provider _____N/A_____Phone number_____N/A_____

12. * TELEPHONE

Distance to cabinet from drop ___ _910__ ___ ft Overhead / underground / cell?

Service provider _____N/A_____Phone Number_____N/A_____

13.* SYSTEM (software & version no.)-_____1060 WIM_____

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

14. * TEST TRUCK TURNAROUND time __11___ minutes DISTANCE _7.64_ mi.

15. PHOTOS FILENAME

Power source _Power_Service_Box_TO_4_08_27A_0200_03_17_04.JPG____

Phone source _Phone_Service_Box_TO_4_08_27A_0200_03_17_04.JPG__

Cabinet exterior _Cabinet_Exterior_TO_4_08_27A_0200_03_17_04.JPG_____

Cabinet interior _Cabinet_Interior_TO_4_08_27A_0200_03_17_04.JPG _____

Weight sensors _Leading_Weight_Sensor_TO_4_08_27A_0200_03_17_04.JPG

Classification sensors _ Trailing_Weight_Sensor_TO_4_08_27A_0200_03_17_04.JPG

Other sensors _____

Description_____

Downstream direction at sensors on LTPP lane _

Downstream_TO_4_08_27A_0200_03_17_04.JPG _____

Upstream direction at sensors on LTPP lane _

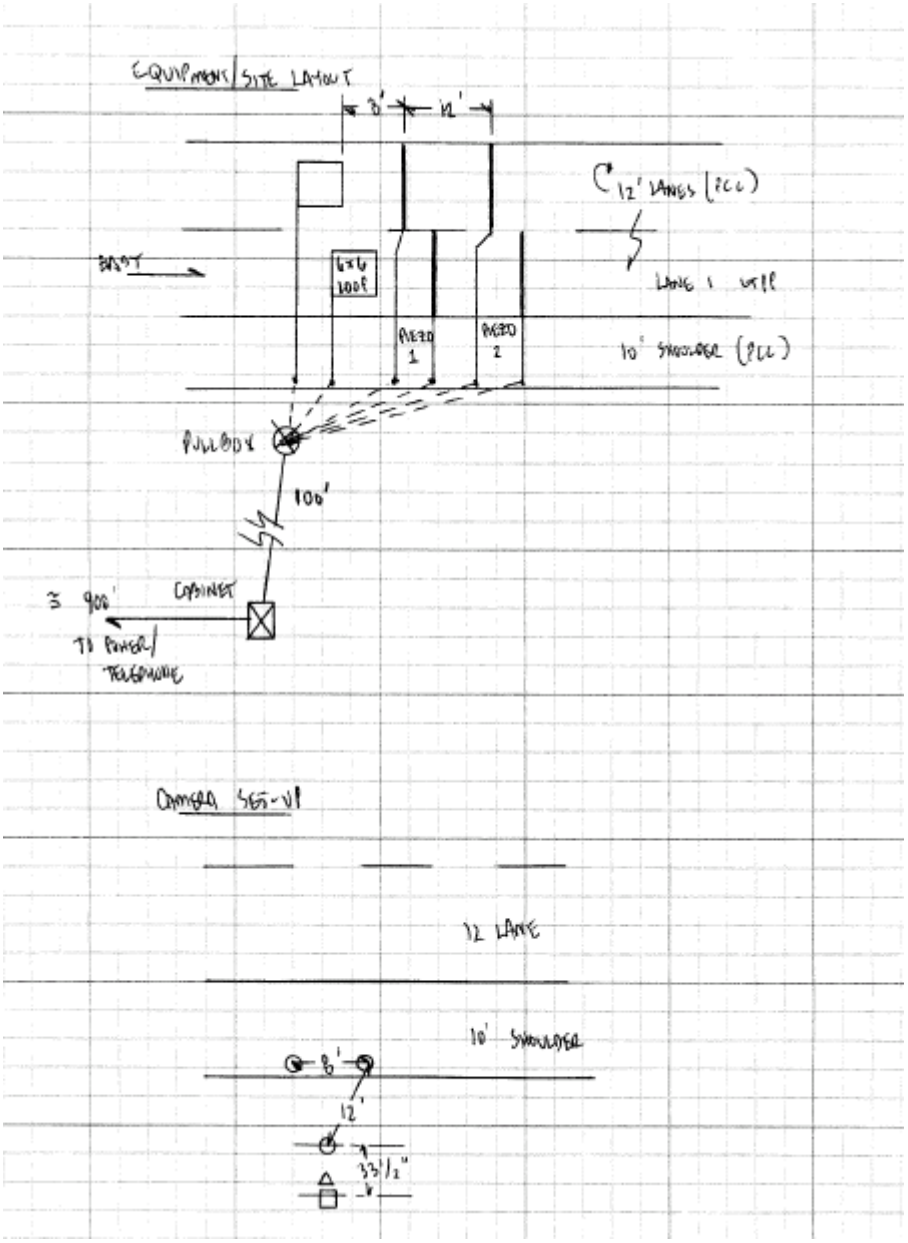
Upstream_TO_4_08_27A_0200_03_17_04.JPG _____

COMMENTS __ GPS Coordinates: Latitude: 39.94867^0 and Longitude: -104.77953^0__
_____
_____
_____Speed Limit is 75 mph_____
_____
_____Equipment installed in cabinet is not operational_____
_____
_____Closest amenities:_____
_____Exit 16: Shell Gas, Blimpie sub shop_____
_____
_____Exit 10: Conoco Gas, Blimpie sub shop, Super 8 Motel, Holiday Inn Express (High Speed Limit)_____
_____
_____
_____ Test Truck Recommendations:_____
_____Types of Trucks: Two Class 9s_____ _____
_____Truck 1: Class 9, 72,000 to 80,000 legal limit on gross and axles, air_____ suspension; _____
_____Truck 2: Class 9, 45,000 to 55,000 lbs_____
_____
_____ Expected Speeds: 55, 65 and 75 mph_____
_____
_____
_____

COMPLETED BY _____Dean J. Wolf_____

PHONE __301-210-5105__DATE COMPLETED _0_ _3_ /_1_ _7_ / _2_ _0_ _0_ _4_

Sketch of equipment layout



Site Map

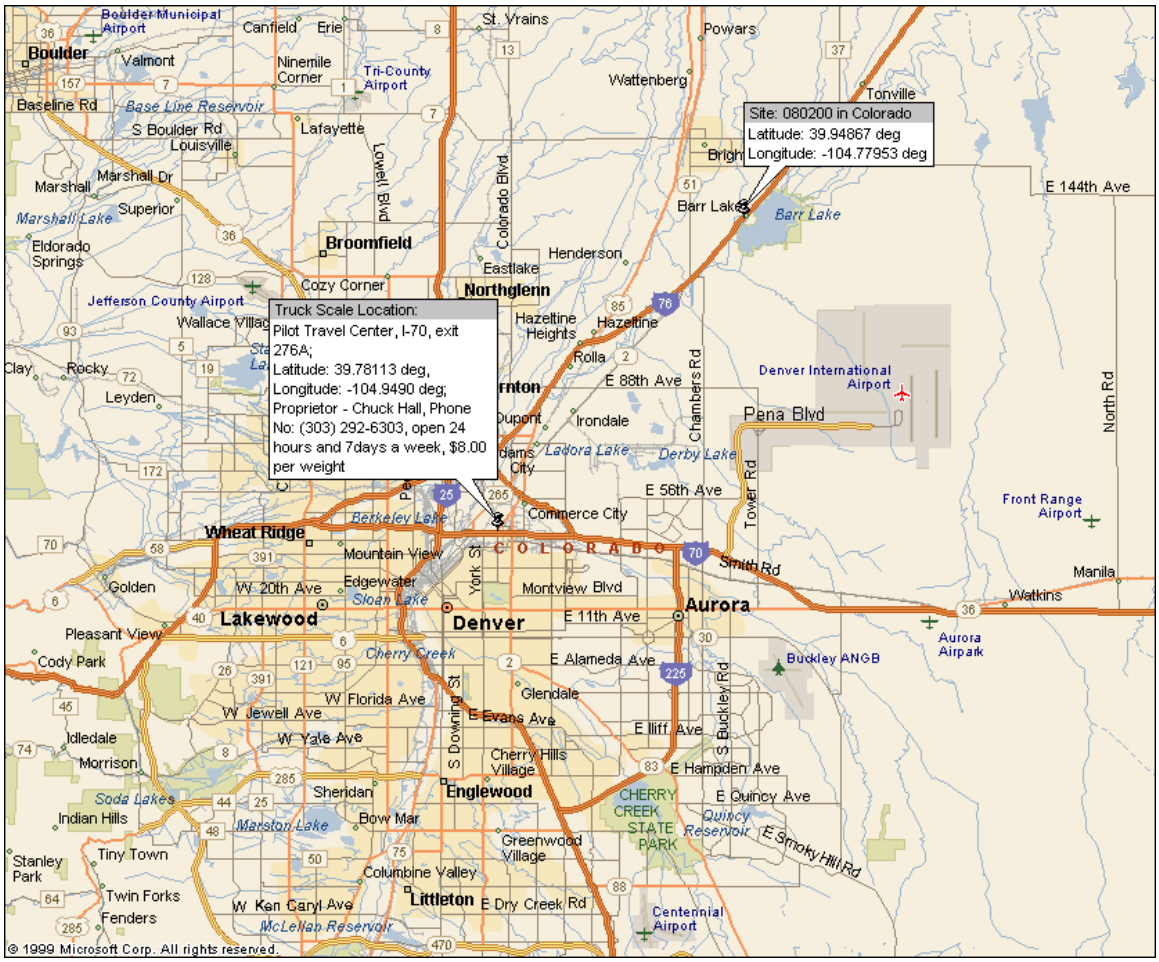


Figure 6.1: Site Map of 080200 in Colorado

Pave_Cond_1_TO_4_08_27A_0200_03_17_04.JPG

Pave_Cond_2_TO_4_08_27A_0200_03_17_04.JPG

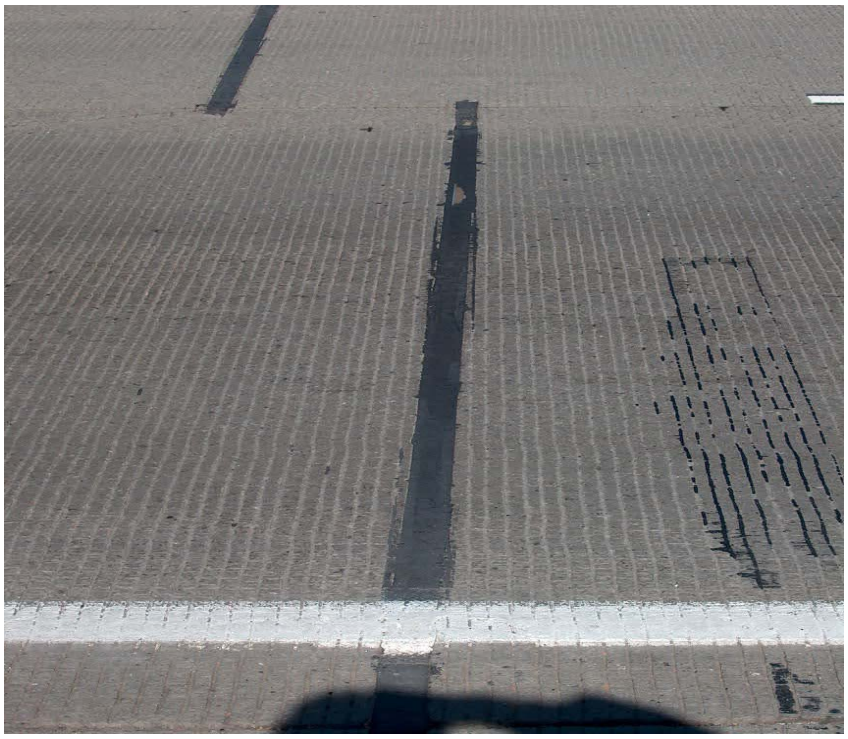
Downstream_TO_4_08_27A_0200_03_17_04.JPG

Power_Service_Box_TO_4_08_27A_0200_03_17_04.JPG

Phone_Service_Box_TO_4_08_27A_0200_03_17_04.JPG

Cabinet_Exterior_TO_4_08_27A_0200_03_17_04.JPG

Cabinet_Interior_TO_4_08_27A_0200_03_17_04.JPG



Leading_Weight_Sensor_TO_4_08_27A_0200_03_17_04.JPG

Trailing_Weight_Sensor_TO_4_08_27A_0200_03_17_04.JPG

Downstream_TO_4_08_27A_0200_03_17_04.JPG

Upstream_TO_4_08_27A_0200_03_17_04.JPG

Sheet 18 STATE_CODE _0_ _8_

LTPP Traffic Data

WIM SITE COORDINATION SPS Project_ID _0_ _2_ _0_ _0_

1. Equipment –
   - Maintenance – contract with purchase / separate contract LTPP / separate contract State / state personnel
     Contact _____Dave Price (303) 757-9976 _____

   - 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 __7___ 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)
     Pilot Travel Center, I-70, exit 276A; Latitude: 39.78113^0, Longitude: -104.9490^0; Proprietor - Chuck Hall, Phone No: (303) 292-6303, open 24 hours and 7days a week, $8.00 per weight

   - Profiling – short wave -- permanent / temporary site marking

WIM SITE COORDINATION SPS Project_ID _0_ _2_ _0_ _0_

-- long wave – permanent / temporary site marking

- Pre-visit data
  - Classification and speed: Contact ____ Dave Price (303) 757-9976 _____
  --Typical operating conditions (congestion, high truck volumes)
  Contact _ Dave Price (303) 757-9976 _____
  -- Equipment operational status: Contact _ Dave Price (303) 757-9976 _____

- Access to cabinet
  State only / Joint / LTPP Key / Combination

- State personnel required on site Y / N
Contact information _____

- 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 __7___ 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 _____

WIM SITE COORDINATION SPS Project_ID _0_ _2_ _0_ _0_

Drivers State / LTPP
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 ___ Dave Price (303) 757-9976 _____
  -- Equipment operational status: Contact __ Dave Price (303) 757-9976 ___

- Access to cabinet
  State only / Joint / LTPP Key / Combination

- State personnel required on site Y / N
Contact information ____ Dave Price (303) 757-9976 _____

- 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 __Ahmad Ardani (303) 757-9978_

- Notice for straightedge and grinding check - ___2_ days / weeks
On site lead to direct / accept grinding – State / LTPP

- WIM Calibration - advance notice required __7__ days / weeks
  Number of lanes -- ___4___
  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:
_____

- Profiling – straight edge -- permanent / temporary site marking
  -- long wave – permanent / temporary site marking

- Pre-visit data
  – Classification and speed: Contact _ Dave Price (303) 757-9976 _____
  -- Equipment operational status: Contact __ Dave Price (303) 757-9976 _____

- Access to cabinet
  State only / Joint / LTPP Key / Combination

- State personnel required on site Y / N
  Contact information _____ Dave Price (303) 757-9976 _____

- Enforcement Coordination required: Y / N
  Contact information _____

- Traffic Control Required: Y/ N
  Contact information _____

- Authorization to calibrate site -- State only / LTPP

- Special conditions _____

6. Special conditions
   - Funds and accountability
   - Reports
   - Other