

LTPP Bending Plate Weigh-in-Motion System: Model Specifications for Equipment - Hardware and Software

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Long-Term Pavement Performance
Serving your need for durable pavements

LTPP Bending Plate Weigh-in-Motion System Model Specifications for Equipment – Hardware and Software

1.00 Introduction

It is the intent of these specifications to establish the minimum requirements and conditions for the procurement of high speed weigh-in-motion for the purpose of collecting traffic data at Long-Term Pavement Performance (LTPP) Specific Pavement Studies (SPS) sites.

2.00 Proposal Requirements and Conditions

(This section would include all special instructions and requirements in the preparation of proposal documents and bid. It would also include preferences.)

3.00 General

3.10 Plans and Working Drawings

(When plans or working drawings are required, this section will have instructions on who and where they are to be sent.)

3.11 Support

The vendor shall provide full-time on-site direction during weigh-in-motion system installation and system start-up.

3.12 Payments

4.00 High Speed Weigh-In-Motion Electrical System

4.10 Description

The Weigh-In-Motion System (hereafter WIM system) shall include equipment and software for collecting, processing, storing, transmitting and manipulating information related to the counting, classifying and speed monitoring of all vehicles and the weighing of trucks and buses at highway speeds.

4.11 WIM Controller Cabinet

The WIM controller cabinet shall be furnished as part of the WIM system. It shall be a Type 334 with 19" mounting cage. The cabinet shall be wired and have all mounting brackets installed at the WIM vendor's factory.

4.12 Detectors

Loop detector sensors shall be furnished by the WIM vendor and be of the WIM vendor's design. The loop wire shall consist of a conductor wire inside plastic tubing. The conductor shall be no. 14 stranded copper wire with Type THWN insulation. There will be no splices in the roadway. The tubing shall have a maximum outside diameter 0.27 inches and a minimum wall thickness of 0.028 inches. Loop detector lead-in cable shall be furnished by the WIM vendor. The loops shall be installed according to the WIM vendor's recommendation.

5.00 On-site Equipment

The WIM system shall provide for single threshold weighing, and operate over a speed range of 5 mph to 80 mph. Single threshold weighing shall consist of scales in each lane of measurement. The weigh sensors shall cover the entire lane width. The WIM system shall consist of the following components:

1. Wheel scales scale lead-in-cable, frames and mounting hardware for each lane to be instrumented. The scales shall report weigh data for each wheel track (right axle weight and left axle weight). Such wheel data shall be uniform across the total width of the scale. Scales installation shall conform to the details shown on the plans. A representative of the WIM manufacturer shall be on site during the installation of the WIM frames and scales.
 - A. All fasteners used in mounting the wheel scales to the scale frames shall have a minimum diameter of 0.50 inches and have an 180,000 PSI rating or better rating. All fasteners shall be torqued to manufacturer's specifications. A minimum of twelve fasteners will be used.
2. Two inductive loop detectors per lane for measuring speed and vehicle length.
3. A central unit shall be installed in the controller cabinet. The central unit shall include all of the equipment and software to calculate, store and transmit to a host computer all data specified in these specifications. The central unit shall operate on AC power with a DC battery backup system to provide uninterrupted power to the central unit during AC power outages for a minimum of one hour. The system shall be able to operate on solar power if AC power is unavailable. The modem to be installed in the controller cabinet shall be compatible with the host computer modems described elsewhere in these specifications. The user shall have the capability of entering a site designation code up to three characters.
4. All necessary interconnecting cables and miscellaneous materials to make an operational system.

5.10 Functional Requirements

1. The WIM system shall be able to accommodate vehicles and vehicle combinations with up to nine axles and shall automatically determine for each vehicle, by lane of travel.
 - A. Weight of each axle:

Accuracy	MEAN	STD. DEV.
Single axle	±5%	8%
Tandem axle	±5%	6%
Gross weight	±5%	5%

B. Axle spacing, vehicle length and speed:

Accuracy:	MEAN	STD. DEV.
Axle spacing	±6”	12”
Vehicle length	±12”	18”
Speed	±2 mph	2 mph

The WIM system shall provide for calibration features such that the required accuracy required under LTPP standards for equipment performance verification can be met.

C. Vehicle classification:

The WIM system shall provide for a minimum of 15 vehicle classifications. Class T through Class 13 shall be used according to the classification scheme shown in Section 4, Appendix A, of the Federal Highway Administration 3d edition of the Traffic Monitoring Guide, February 1995. Class 14 will identify special vehicles as determined by the user. Class 15 will identify any vehicle not conforming to the classification criteria for Classes 1 through 14. Classification criteria for Classes 1 through 14 shall be programmable by the user.

The WIM system shall provide sufficient flexibility in spacings and weights (gross, or axle and gross) for each of these classes so that accurate classifying is achievable.

D. Invalid measurements:

An “invalid measurement” code shall be assigned to any vehicle meeting the front axle weight threshold (discussed below) when (1) the left and right wheel weights of any axle have a difference of 40 percent or more; and (2) either of the wheel weights of such axle exceeds 2.0 kip. Both the 40 percent and 2.0 kip values shall be programmable by the operator. Any vehicle assigned an “invalid measurement” code shall not be considered a “Weighed Vehicle” but shall be classified and counted and all vehicle data shall be stored in the vehicle record.

E. Determination of weight violations:

For any vehicle meeting the front axle weight threshold (discussed below), the WIM system shall determine which, if any, axle(s) or axle grouping(s) exceed the weight limits set forth in the “Weight Violation Table” contained in these specifications. Any vehicle with one or more weight violations will be coded as to such a violation or combination of violations. The weight limitations set forth in the “Weight Violation Table” shall be the default settings. Such weights shall be programmable by the user.

2. The central unit of the WIM system shall calculate and store all specified data on a storage medium. The on-site data storage device shall have the capacity to store a

minimum of seven days of vehicle count data and individual vehicle records. The storage device shall be completely solid state with no mechanical components and shall be a type not susceptible to loss of accumulated data should electrical power be interrupted. The central unit shall continue to calculate and store data for all vehicles passing through the system during periods of access, both on-site by portable PC and by the host computer for purposes of programming, real-time view and downloading of data.

The central unit shall store the following data:

- A. Hourly vehicle counts by class and by speed range for each 24-hour period (Class/Count Summary).
 - B. Individual vehicle records for all vehicles with a front axle weight greater than 3.5 kip (hereafter referred to as “truck records”). The front axle weight threshold for truck records shall be programmable by the operator with 3.5 kip as default setting. Each truck record shall include, as a minimum, the following data:
 - ii. Lane Number.
 - iii. Vehicle Number.
 - iv. Speed.
 - v. Vehicle Classification.
 - vi. Weight in kips of each wheel or dual set of wheels by left and right side and by axle number.
 - vii. Spacings in feet between each sequentially numbered axle.
 - viii. Overall length of each vehicle or combination of vehicles in feet.
 - ix. Code for weight violation(s).
 - x. Code for invalid measurement(s).
3. Data shall be calculated and formatted such that all data can be accessed. All required reports can be generated by use of the WIM system application software.
 4. All equipment with exception of the axle sensors and the central unit’s modem shall operate properly within an atmospheric temperature range of -20°F and 122°F .
 5. The central unit’s modem shall be fully compatible with the host computer modem. The modem shall be specified by the WIM vendor.

6.00 High Speed WIM System Application Software

An application program, hereafter referred to as the “system program”, which can be run on the host computer shall be furnished as part of the high speed WIM system. The host computer will be furnished by others and will consist of:

1. Personal computer using Windows 95 or higher.
2. Dot matrix printer (parallel).
3. Universal Data Systems V.3229, or compatible, modem.

The system program shall provide communications between the host computer and the on-site central unit and shall process downloaded data to generate the specific ASCII files. Although referred to herein as a single software program, communications functions and data processing functions may be provided as two separate programs as long as all functional requirements are met. The system program shall be “user friendly”, hierarchical menu driven and shall perform the following applications:

6.10 Communications

1. The communications portion of the system program shall include the following applications:

- A. Real time view:

The real time view application shall provide for the on-line monitoring of traffic. The display on the host computer shall depict the axle configuration of each vehicle passing through the site. The contents and format for the real time display shall be similar to the sample display contained in these specifications. The user shall have the options of displaying either all traffic or only vehicle classifications 4 through 15 as well as the option of displaying a selected individual lane or all lanes.

Printing of the real time data on the host computer printer shall be facilitated by means of an on/off toggle key from the keyboard.

- B. System data programming:

The system data programming application shall provide for on-line modification to the central unit’s software parameters, such as speed and weight calibration factors, vehicle classification parameters, weight violation table parameters, and front axle weight threshold.

- C. Manual downloading:

The manual downloading application shall provide for the downloading of selected daily data files from the storage medium of the central unit to the storage medium of the host computer. The program shall provide for a listing of the daily data files stored in the central unit and shall provide for user selection of the file or files to be downloaded from such a listing. The program shall provide for the downloading of the current day’s data stored as of the time of downloading.

- D. Automatic downloading:

The automatic downloading applications shall provide for unattended downloading of daily data files stored in the central unit’s storage medium to the storage medium of the host computer. The program shall provide the following:

- i. User's input for the date and time that unattended downloading is to begin.
- ii. Downloading of all daily files not previously downloaded by the automatic downloading application.
- iii. At least three attempts to make telephone connection with the central unit.
- iv. At least three attempts to download files from the central unit before aborting download.
- v. Discontinuation of telephone connection after downloading of files from the central unit (or after an abort) and returning the host computer to a standby mode.

E. History file:

The history file application shall create a daily file, which chronologically records events occurring during manual and automatic downloading sessions. Such events shall include, but not be limited to, modem result messages, start and end time of each file download and any pertinent messages generated by the program. The program shall provide for either:

- i. The history file shall be in the form of an ASCII text file which can be viewed or sent to the printer or,
- ii. A menu selection which shall provide for a listing of available history files and user selection of a file to be sent to the printer in the form of a report.

2. The communications portion of the system program shall meet the following functional requirements:

A. Host computer's modem configuration:

The program shall initialize the host computer's modem so that all necessary operating characteristics are set.

B. Baud rate:

The program will provide for operation at a minimum rate of 9600 baud.

C. Error control:

The program shall not in any way disable the modems' error-checking features, which prevent phone-line noise from corrupting data during file downloading.

D. File downloading monitoring:

The program shall display a window that allows the user to monitor the progress of file downloading. The program shall also provide for the abort of a file download.

6.20 Report Preparation

The report preparation application shall generate specified reports using the downloaded data. Such reports shall be sent to the host computer printer or to file. The program shall prepare the following reports:

1. From vehicle class/count summary file:
 - A. Distribution of class and speed counts by lane.
 - B. Distribution of vehicle counts by hour of day by lane.
 - C. Distribution of vehicle classifications by hour of day.
 - D. Distribution of vehicle classifications by day of month.
 - E. Distribution of vehicles by speed by hour of day.

2. From individual truck records file:
 - A. Distribution of truck record data by lane.
 - B. Distribution of weight violations and invalid measurements of vehicle classifications 4 through 15.
 - C. Distribution of weight violations by hour of day for vehicle classifications 4 through 14.
 - D. Distribution of overweight vehicles by hour of day for vehicle classifications 4 through 14.
 - E. Distribution of gross weights for vehicle classifications 4 through 14.
 - F. Distribution of 18 kip equivalent single axle loadings (ESALS) by hour of day for vehicle classifications 4 through 14.
 - G. Distribution of axles by groups (single, tandem, tridem) by hour of day for vehicle classifications 4 through 14.
 - H. Program provides for user input of:
 - i. Pavement type:
 - (1) flexible pavement and structural number; or,
 - (2) rigid pavement and slab thickness.
 - ii. Vehicle status:
 - (1) "all" weighed vehicles (default); or,
 - (2) "legal only" weighed vehicles; or,
 - (3) "overweight only" weighed vehicles.
 - I. Distribution of trucks by day of month for classifications 4 through 15.

The reports shall include all information contained in and formatted similarly to the sample reports contained in these specifications. The reports shall be printed in condensed print when necessary to fit on 8-1/2 inch x 11-inch sheets.

Determination of 18 kip equivalent single axle loads shall be in accordance with the methodology of the 1993 AASHTO Pavement Design Guide.

The program shall provide for the generation of reports in the following two modes:

1. Manual Mode:

For daily reports the program shall provide for user selection of the date and the specific report. For monthly reports, the program shall provide for user selection of the month/year and the specific report. The selected month report shall include the data from all downloaded daily data files resident with the system program on a directory or subdirectory of the host computer's storage medium. The program shall also provide for user selection of the lane or lanes to be covered by the specific report (not applicable to the "Distribution of Class and Speed Counts by Lane", the "Distribution of Vehicle Counts by Hour of Day by Lane" and the "Distribution of truck Record Data by Lane" reports).

The default shall be "all lanes." The printed report shall note which lanes are represented.

2. Automatic Mode:

The program shall provide for user designation of one or a combination of the specific daily reports for automatic processing. User selection of lane or lanes is not required (the "all lanes" default may be used). User selection of vehicle status for the 18 kip ESAL report is not required (the "all" weighed vehicles default may be used). Such designations shall be effected by means of either:

- A. An ASCII text file, which can be revised with text editor or word processor, supplied with a "Sample" designation; or,
- B. A menu selection, which shall provide for user input designation.

Upon selection of automatic mode of report preparation by the user, the program shall send to the printer all pre-designated reports for all downloaded daily data files resident with the system program on a directory or subdirectory of the host computer's storage medium.

The designated reports shall remain in effective for subsequent automatic mode sessions unless report designation, is revised by the user.

6.30 Truck Record Batch Print

The truck record batch print application shall provide for the display of, all on/off printer-toggle of, individual truck records. The program shall provide for a listing of the daily truck records files available on the storage medium of the host computer and the user's selection of one of those files. The program shall also provide for the user's selection of the vehicle class or classes for which individual truck records will be displayed or printed as well as the starting hour of day.

The user shall have the following options in viewing and printing the individual truck records.

1. Scroll and print continuously all records for the selection of class(es); user has capability to stop/resume scrolling or terminates program.

2. Scroll each record one at a time; user has capability to:
 1. Print displayed record and display next record.
 2. Display next record.
 3. Terminate program.

An example of the truck record batch print is included in these specifications. (See Appendix A.)

6.40 ASCII Export Utility

The ASCII export utility application shall allow the user to generate specified ASCII files using downloaded files. The user will have the choice of:

1. From vehicle class/count summary file:
 - A. ASCII classification file.
 - B. ASCII speed file.
2. From individual truck record file:
 - A. ASCII truck record file

The file formats for these files are contained in Appendix A.

6.50 TRAFFIC MONITORING GUIDE Files Utility

The TMG files utility shall allow the user to generate ASCII files conforming to the instructions contained in Section 6 of the FHWA Traffic Monitoring Guide 3rd edition using downloaded files.

6.60 Data Files

Notwithstanding the method of data manipulation and formatting used by the central unit, data files shall conform to the following:

1. Individual daily data files shall be created and stored in the storage medium of the central unit. Each daily data file shall include data for each 00:00 hour through a 23:59 hour period and shall have a file name which uniquely identifies the file as to site designation, date, and file contents (i.e., class/count summary data, individual truck record data, or both).
2. The daily data files shall be created at the start of each day. Data for each vehicle shall be filed within one hour of the vehicle's passing through the site, and the current day's files shall be accommodative to efficient use of storage medium space and rapid downloading via modem to the host computers.
3. Daily files containing class/count summary data and individual truck records data may be created in the storage medium of the central unit as two separate daily files or as one daily file. However, if one daily file is created and downloaded as such, the system program shall create two separate daily files, each with a file

name which uniquely identifies it as to site, date and whether it is a vehicle class/count summary file or an individual truck records file.

7.00 Acceptance Test

The WIM Vendor shall demonstrate that the WIM system is available for use by the Department of Transportation by successfully completing the acceptance test for each lane of data collection.

The acceptance test shall consist of the following:

1. Continuous operation of WIM system on-site equipment for 15 consecutive days. Failure of the system to record and store data meeting the requirements set forth in these specifications for an accumulated time exceeding 3 hours during the 15 day-period shall be cause for the acceptance test to be repeated.
2. Testing of the WIM system application software during the above noted 15 day-period and the full working day following the 15 day-period. Failure of the software to perform any application meeting the requirements set forth in these specifications shall be cause for the acceptance test to be repeated.
3. Unavailability shall be the failure of the system to pass the acceptance test. Failure of the host computer or its peripheral equipment or of a communication line not furnished by the WIM vendor to transmit data may be considered not to render the system unavailable, provided that the WIM vendor demonstrates to the satisfaction of the Engineer that the failure is not caused by any of the WIM vendor furnished equipment.

8.00 Maintenance and Operations Manuals

The WIM vendor shall furnish a maintenance manual for the central unit, including vehicle detector sensor units and an operation manual for the system. The maintenance manual and operation manual may be combined into one manual. The manual(s) shall include, but need not be limited to, the following items:

1. Specifications.
2. Design characteristics.
3. General operation theory.
4. Function of all controls.
5. Trouble shooting procedure (diagnostic routine).
6. Block circuit diagram.
7. Geographical layout of components.
8. Schematic diagrams, signal responses and acceptable thresholds.
9. List of component parts with stock numbers.
10. Documentation for application software.

9.00 Warranty

The wheel scales, lead-in cables, frames, and mounting hardware provided shall include the manufacturer or suppliers' 5-year warranty. All other equipment specified under on-site equipment of these specifications shall include the manufacturers or suppliers' 2-year warranty.

The warranty shall include all parts and installation costs necessary to make the repairs. Such warranty periods shall begin upon satisfactory completion of the acceptance test of the weight-in-motion system.

Appendix A
Sample Reports

DISTRIBUTION OF CLASS AND SPEED COUNTS BY LANE

SITE DESIGNATION:

DATE:

CLASS	1		2		3		4		5		6		ALL LANES	
	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%
1	0	0.0	0	0.0					0	0.0	6	0.0	6	0.0
2	22521	82.4	24464	82.7					28540	90.6	23974	87.6	99499	85.9
3	2687	9.8	2395	8.1					2324	7.4	1919	7.0	9325	8.1
4	14	0.1	21	0.1					16	0.1	13	0.0	64	0.1
5	1152	4.2	1297	4.4					486	1.5	56	0.2	2991	2.6
6	82	0.3	101	0.3					9	0.0	917	3.3	1109	1.0
7	1	0.0	3	0.0					0	0.0	24	0.1	28	0.0
8	280	1.0	402	1.4					3	0.0	32	0.1	717	0.6
9	340	1.2	544	1.8					4	0.0	0	0.0	888	0.8
10	10	0.0	1	0.0					0	0.0	1	0.0	4	0.0
11	84	0.3	104	0.4					0	0.0	0	0.0	188	0.2
12	3	0.0	5	0.0					0	0.0	0	0.0	8	0.0
13	1	0.0	0	0.0					0	0.0	0	0.0	1	0.0
14	28	0.1	46	0.2					0	0.0	0	0.0	74	0.1
15	142	0.5	206	0.7					127	0.4	434	1.6	909	0.8
TOTAL	27337	100.0	29589	100.0					31509	100.0	27376	100.0	115811	100.0
SPEED (MPH)														
1- 5	2	0.0	6	0.0					2	0.0	4	0.0	14	0.0
6-10	0	0.0	0	0.0					4	0.0	10	0.0	14	0.0
11-15	10	0.0	5	0.0					32	0.1	28	0.1	75	0.1
16-20	48	0.2	33	0.1					75	0.2	88	0.3	244	0.2
21-25	271	1.0	280	0.9					269	0.9	179	0.7	999	0.9
26-30	641	2.3	615	2.1					480	1.5	349	1.3	2085	1.8
31-35	1047	3.8	838	2.8					731	2.3	606	2.2	3222	2.8
36-40	1165	4.3	1073	3.6					1077	3.4	891	3.3	4206	3.6
41-45	1645	6.0	913	3.1					927	2.9	997	3.6	4482	3.9
46-50	5140	18.8	2063	7.0					1027	3.3	893	3.3	9123	7.9
51-55	9487	34.7	5641	19.1					2508	8.0	1147	4.2	18783	16.2
56-60	5613	20.5	13537	45.8					14134	44.9	3243	11.8	36527	31.5
61-65	1872	6.8	3284	11.1					7211	22.9	9701	35.4	22068	19.1
66-70	277	1.0	1170	4.0					2749	8.7	6614	24.2	10810	9.3
71-75	79	0.3	90	0.3					234	0.7	2240	8.2	2643	2.3
76-80	24	0.1	34	0.1					45	0.1	327	1.2	430	0.4
81-85	13	0.0	7	0.0					4	0.0	51	0.2	75	0.1
86-90	3	0.0	0	0.0					0	0.0	8	0.0	11	0.0
91-95	0	0.0	0	0.0					0	0.0	0	0.0	0	0.0
96-100	0	0.0	0	0.0					0	0.0	0	0.0	0	0.0
> 100	0	0.0	0	0.0					0	0.0	0	0.0	0	0.0
TOTAL	27337	100.0	29589	100.0					31509	100.0	27376	100.0	115811	100.0
AVG. SPEED	51		55						57		61		56	

"COUNT" entries for example only

DISTRIBUTION OF VEHICLE COUNTS BY HOUR OF DAY BY LANE

=====

SITE DESIGNATION:
 DATE:

=====

HOURLY SUMMARY

LANE NUMBER <number of lanes varies with contract requirements>

HOURLY SUMMARY	LANE NUMBER <number of lanes varies with contract requirements>						HOURLY TOTALS
HOURLY SUMMARY	1	2	3	4	5	6	HOURLY TOTALS
00-01							
01-02							
02-03							
03-04							
04-05							
05-06							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							
=====							
06-07							
07-08							
08-09							
09-10							
10-11							
11-12							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							
=====							
12-13							
13-14							
14-15							
15-16							
16-17							
17-18							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							
=====							
18-19							
19-20							
20-21							
21-22							
22-23							
23-24							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							
=====							

DAILY SUMMARY

DAILY COUNTS BY LANE

DAILY SUMMARY	DAILY COUNTS BY LANE						DAILY TOTALS
DAILY SUMMARY	1	2	3	4	5	6	DAILY TOTALS
-----	-----	-----	-----	-----	-----	-----	-----

=====							
=====							

DISTRIBUTION OF TRUCK RECORD DATA BY LANE <report to cover all records contained in truck records file>

SITE DESIGNATION:
DATE:

LANE NUMBER <number of lanes varies with contract requirements>

CLASS	1		2		3		4		5		6		ALL LANES	
	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%
1	0	0.0	0	0.0					0	0.0	0	0.0	0	0.0
2	0	0.0	0	0.0					0	0.0	0	0.0	0	0.0
3	152	3.7	342	14.7					87	4.0	74	1.9	655	5.2
4	18	0.4	13	0.6					3	0.1	5	0.1	39	0.3
5	560	13.6	354	15.2					306	14.2	574	14.7	1794	14.3
6	129	3.1	67	2.9					66	3.1	104	2.7	366	2.9
7	3	0.1	0	0.0					0	0.0	27	0.7	30	0.2
8	350	8.5	134	8.8					278	12.9	357	9.1	1119	8.9
9	1775	43.1	918	39.4					961	44.4	1698	43.5	5352	42.7
10	3	0.1	1	0.0					4	0.2	4	0.1	12	0.1
11	783	19.0	332	14.2					302	14.0	754	19.3	2171	17.3
12	56	1.4	30	1.3					32	1.5	68	1.7	186	1.5
13	5	0.1	2	0.1					0	0.0	7	0.2	14	0.1
14	122	3.0	34	1.5					37	1.7	104	2.7	297	2.4
15	158	3.8	66	2.8					78	3.6	128	3.3	430	3.4
TOTAL	4121	100.0	2330	100.0					2161	100.0	3907	100.0	12520	100.0

LANE NUMBER

STATUS	1		2		3		4		5		6		ALL LANES	
	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%
LEGAL	3353	81.4	1866	80.1					1976	91.4	3076	78.7	10271	82.0
OVR 'WT	662	16.0	384	16.5					127	5.9	715	18.3	2249	18.0
INVALID	106	2.6	80	3.4					59	2.7	116	3.0	361	2.9

Note:
The line items under "STATUS" are to be based upon the Contractor's coding scheme for weight violation and invalid measurements. If the coding system identifies invalid measurements other than imbalance (such as "out-of-range" values, system errors, etc.), each unique type of invalid measurement should be broken down as a "STATUS" line item.

TOTAL	4121	100.0	2330	100.0					2162	100.0	3907	100.0	12520	100.0
-------	------	-------	------	-------	--	--	--	--	------	-------	------	-------	-------	-------

DISTRIBUTION OF WEIGHT VIOLATIONS AND INVALID MEASUREMENTS FOR VEHICLE CLASSIFICATIONS 4 THROUGH 15

SITE DESIGNATION: _____ LANE NO's <display user's entry as to selected lane(s)>
 DATE: _____

CLASS	TOTAL VEHICLES COUNTED	VEHICLES WITH INVALID MEASUREMENTS	TOTAL VEHICLES WEIGHED	TOTAL VEHICLES OVERWEIGHT	PERCENT VEHICLES OVERWEIGHT	***** NUMBER OF ***** ***** WEIGHT VIOLATIONS *****			
						AXLE	TANDEM	GROSS	BRIDGE
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
TOTALS									

PERCENT VEHICLES NOT CLASSIFIED (CLASS 15) : _____

PERCENT VEHICLES WITH INVALID MEASUREMENTS : _____

Notes:

"Percent Vehicles Not Classified" = Class 15 Total Vehicle Count / Total Vehicles Counted
 "Percent Vehicles With Invalid Measurements" = Total Vehicles With Invalid Measurements / Total Vehicles Counted
 "Vehicles Counted" - "Vehicles With Invalid Measurements" = "Vehicles Weighed"

All weight and weight violation reporting and calculations based on data for "weighed vehicles"

DISTRIBUTION OF WEIGHT VIOLATIONS BY HOUR OF DAY FOR VEHICLE CLASSIFICATIONS 4 THROUGH 14

=====
 SITE DESIGNATION: LANE NO's <display user's entry as to selected lane(s)>
 DATE:
 =====

HOURLY SUMMARY

HOUR	TOTAL VEHICLES WEIGHED	TOTAL VEHICLES OVERWEIGHT	PERCENT VEHICLES OVERWEIGHT	NUMBER OF			
				AXLE	TANDEM	GROSS	BRIDGE
00-01							
01-02							
02-03							
03-04							
04-05							
05-06							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							
06-07							
07-08							
08-09							
09-10							
10-11							
11-12							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							
12-13							
13-14							
14-15							
15-16							
16-17							
17-18							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							
18-19							
19-20							
20-21							
21-22							
22-23							
23-24							
-----	-----	-----	-----	-----	-----	-----	-----
QTR TOTALS							

=====
 DAILY SUMMARY

	TOTAL VEHICLES WEIGHED	TOTAL VEHICLES OVERWEIGHT	PERCENT VEHICLES OVERWEIGHT	NUMBER OF			
				AXLE	TANDEM	GROSS	BRIDGE
-----	-----	-----	-----	-----	-----	-----	-----

=====
 =====

DISTRIBUTION OF OVERWEIGHT VEHICLES BY HOUR OF DAY FOR VEHICLE CLASSIFICATIONS 4 THROUGH 14

SITE DESIGNATION: LANE NO's <display user's entry as to selected lane(s)>
 DATE:

HOURLY SUMMARY

NUMBER OVERWEIGHT VEHICLES

HOURLY SUMMARY	TOTAL VEH'S WEIGHED	TOTAL VEH'S OVERWT	PERCENT VEH'S OVERWT	4	5	6	7	8	9	10	11	12	13	14
00-01														
01-02														
02-03														
03-04														
04-05														
05-06														

QTR TOTALS

06-07														
07-08														
08-09														
09-10														
10-11														
11-12														

QTR TOTALS

12-13														
13-14														
14-15														
15-16														
16-17														
17-18														

QTRTOTALS

18-19														
19-20														
20-21														
21-22														
22-23														
23-24														

QTR TOTALS

DAILY SUMMARY

NUMBER OVERWEIGHT VEHICLES

TOTAL VEH'S WEIGHED	TOTAL VEH'S OVERWT	PERCENT VEH'S OVERWT	4	5	6	7	8	9	10	11	12	13	14
---------------------	--------------------	----------------------	---	---	---	---	---	---	----	----	----	----	----

=====

DISTRIBUTION OF 18 KIP ESALS BY HOUR OF DAY FOR VEHICLE CLASSIFICATIONS 4 THROUGH 14
 FOR _____ <display user's entries as to pavement type and str. no. or slab thickness>

SITE DESIGNATION: _____ LANE NO's <display user's entry as to selected lane(s)>
 DATE: _____ VEH STATUS <display user's entry as to "LEGAL ONLY", "OVWT ONLY" or "ALL" (default)>

HOURLY SUMMARY

HOUR	TOTAL VEH'S WEIGHED	TOTAL ESALS	ESALS BY HOUR BY CLASS											
			4	5	6	7	8	9	10	11	12	13	14	
00-01														
01-02														
02-03														
03-04														
04-05														
05-06														
QTR TOTALS														
06-07														
07-08														
08-09														
09-10														
10-11														
11-12														
QTR TOTALS														
12-13														
13-14														
14-15														
15-16														
16-17														
17-18														
QTR TOTALS														
18-19														
19-20														
20-21														
21-22														
22-23														
23-24														
QTR TOTALS														

DAILY SUMMARY

	TOTALS	4	5	6	7	8	9	10	11	12	13	14
VEH'S WEIGHED :												
18 KIP ESALS :												
AVERAGE ESAL :												

=====

ASCII SPEED FILE FORMAT

FIELD	LENGTH	STARTS IN COLUMN
Lane	2	1
Hour	2	4
Count, 0-35 MPH	4	7
Count, 36-40 MPH	4	12
Count, 41-45 MPH	4	17
Count, 46-50 MPH	4	22
Count, 51-55 MPH	4	27
Count, 56-60 MPH	4	32
Count, 61-65 MPH	4	37
Count, 66-70 MPH	4	42
Count, 71-75 MPH	4	47
Count, 76-80 MPH	4	52
Count, 81-85 MPH	4	57
Count, >85 MPH	4	62

ASCII CLASSIFICATION FILE FORMAT

FIELD	LENGTH	STARTS IN COLUMN
Lane	2	1
Hour	2	4
Count, Class 1	4	7
Count, Class 2	4	12
Count, Class 3	4	17
Count, Class 4	4	22
Count, Class 5	4	27
Count, Class 6	4	32
Count, Class 7	4	37
Count, Class 8	4	42
Count, Class 9	4	47
Count, Class 10	4	52
Count, Class 11	4	57
Count, Class 12	4	62
Count, Class 13	4	67
Count, Class 14	4	72
Count, Class 15	4	77

For the above two files :

Each field shall be comma delimited.
 For each day's file, there is one record
 for each lane for each hourly period.

ASCII TRUCK RECORD FILE FORMAT

FIELD	LENGTH	DECIMAL PLACES	STARTS IN COLUMN
LANE	1		1
MONTH	2		3
DAY	2		6
YEAR	2		9
HOUR	2		12
MINUTE	2		15
SECOND	2		18
VEHICLE NO.	5		21
CLASS	2		27
GROSS WEIGHT	6	1	30
LENGTH	6	1	37
SPEED	5	1	44
VIOLATION CODE	3		50
AXLE 1 RT. WEIGHT	4	1	54
AXLE 1 LT. WEIGHT	4	1	59
AXLE 2 RT. WEIGHT	4	1	64
AXLE 2 LT. WEIGHT	4	1	69
AXLE 1-2 SPACING	4	1	74
AXLE 3 RT. WEIGHT	4	1	79
AXLE 3 LT. WEIGHT	4	1	84
AXLE 2-3 SPACING	4	1	89
AXLE 4 RT. WEIGHT	4	1	94
AXLE 4 LT. WEIGHT	4	1	99
AXLE 3-4 SPACING	4	1	104
AXLE 5 RT. WEIGHT	4	1	109
AXLE 5 LT. WEIGHT	4	1	114
AXLE 4-5 SPACING	4	1	119
AXLE 6 RT. WEIGHT	4	1	124
AXLE 6 LT. WEIGHT	4	1	129
AXLE 5-6 SPACING	4	1	134
AXLE 7 RT. WEIGHT	4	1	139
AXLE 7 LT. WEIGHT	4	1	144
AXLE 6-7 SPACING	4	1	149
AXLE 8 RT. WEIGHT	4	1	154
AXLE 8 LT. WEIGHT	4	1	159
AXLE 7-8 SPACING	4	1	164
AXLE 9 RT. WEIGHT	4	1	169
AXLE 9 LT. WEIGHT	4	1	174
AXLE 8-9 SPACING	4	1	179
VENDOR SPECIFIC OPTIONAL FIELDS			184

This file shall include every "truck record" contained in the daily data file. Each field shall be comma delimited and padded with blanks to complete the fixed logical record length.

For axle weight only weighing (in lieu of right and left wheel weighing), either the "AXLE n RT. WEIGHT" or the "AXLE n LT. WEIGHT" field may be used for the "AXLE n WEIGHT".

REAL TIME VIEW
=====

Veh No.: _____ Class: _____ Lane: _____ Speed: _____
Time: _____ Date: _____ Vehicle Length: _____
Invalid Measurement Code: _____ Wt. Violation(s): _____

	AXLE NO.								
TOTALS	1	2	3	4	5	6	7	8	9
Ax. Wt. 76.1 (kip)	10.9	15.0	16.2	17.2	16.8				
Ax. Sp. 56.9 (ft)	11.8	4.5	36.4	4.2					

Note: Entries following Axle Wt. and Axle Space are for example purposes only.

TRUCK RECORD BATCH PRINT

=====

Site Designation: _____ Lane: _____ Time: _____ Date: _____ Speed: _____

Vehicle No.: _____ Class: _____ Invalid Code: _____ Veh. Wheelbase: _____ Veh. Length: _____

Gross Wt.(kips): _____ Weight Violation(s): _____

Axle No.	1	2	3	4	5	6	7	8	9
Rt. Wheel Wt.(kip)	5.4	7.3	8.0	8.5	8.3				
Lt. Wheel Wt.(kip)	5.5	7.7	8.2	8.7	8.5				

Axle Wt.(kips)	10.9	15.0	16.2	17.2	16.8				
Axle Space (feet)		11.8	4.5	36.4	4.2				

Note: Entries following Axle Wt. and Axle Space are for example purposes only.

WEIGHT VIOLATION TABLE

=====

(All weights in pounds)

AXLE WEIGHT

Axle No. 1	-----	12500
All other axles	-----	20000

TANDEM AXLE WEIGHT

Two consecutive axles with an axle spacing not exceeding 8.4 feet	-----	34000
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GROSS VEHICLE WEIGHT

All vehicles	-----	80000
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BRIDGE WEIGHT

See page following ----

