This template will produce a quarterly GVW graph for Class 9s .

- Set file information to insure that valid data is available to plot. In order for all of the necessary options to be available, the Data Type - Weight by Vehicle - must be selected. The remaining options in File Information may be changed each time this template is run.
- Check ‘GVW Distribution’ under Weight Graphs.
- In Data Selection pick ‘Quarterly’, a valid year, lane, direction and Class = 9.
- In Graphing Templates click on “New”. Select the new template name and then click on the “Rename” option.
- Place the cursor in the box and type “QTR_GVW_9”. Click on “OK” to save the name.
- Select ›QTR_GVW_9' in the template box and then click on “Capture” under the graphs box.
- To see the graph in the template, click on “Run”.

5.5.3 7-Card vs. 4-Card Volume

The procedure as explicitly outlined is for monthly graphs. A quarterly template should also be created using the same process with Quarterly as the ‘Month’ option and QTR in lieu of MON in the labels.

- Set file information to insure that valid data is available to plot. In order for all of the necessary options to be available, the Data Type - Weight by Vehicle - must be selected. The remaining options in File Information may be changed each time this template is run.
- Check ‘AVC vs. WIM Volume’ under Comparative Graphs.
- In Data Selection pick ‘Monthly’, enter 1-31 for Days, a valid year, lane, direction and Class = 6.
- In Graphing Templates click on “New”. Select the new template name and then click on the “Rename” option.
- Place the cursor in the box and type “MON_VOL_6_8_9_13”. Click on “OK” to save the name.
- Select ‘MON_VOL_6_8_9_13’ in the template box. Then click on “Capture” under the graphs box. Graph 0 will have Class 6 vehicles.
- Change Class to 8 and click on “Capture” to generate Graph 1.
- Change Class to 9 and click on “Capture” to generate Graph 2.
- Change Class to 13 and click on “Capture” to generate Graph 3.
- To see the graphs in the template, click on “Run”.

5.5.4 7-Card vs. 4-Card Class Distribution

The procedure as explicitly outlined is for monthly graphs. A quarterly template should also be created using the same process with Quarterly as the 'Month' option and QTR in lieu of MON in the labels.

- **$** Set file information to insure that valid data is available to plot. In order for all of the necessary options to be available, the Data Type - Weight by Vehicle - must be selected. The remaining options in File Information may be changed each time this template is run.
- **$** Check 'AVC vs. WIM Distribution' under Comparative Graphs.
- **$** In Data Selection pick 'Monthly', enter a valid year, lane, and direction.
- **$** In Graphing Templates click on "New". Select the new template name and then click on the "Rename" option.
- **$** Place the cursor in the box and type "MON_CLASS_4_V_7". Click on "OK" to save the name.
- **$** Select 'MON_CLASS_4_V_7' in the template box. Then click on "Capture" under the graphs box.
- **$** To see the graph in the template, click on "Run".

5.6 Plotting Data Trends

A number of trends can be plotted using appropriate extractions and summaries of data from the ORACLE tables. The list provided here is not intended to be exhaustive. It should be apparent that the yearly data comparisons require processing more than 1 year of traffic data through the new software in order to load the relevant ORACLE tables.

- **$** Monthly/Quarterly/Yearly comparison of GVW distributions (frequency or percentage) for a class: LTPPGVWyyyyxxxxxx. (The yearly comparison requires extractions from multiple LTPPGVW* tables for a site.)
- **$** Monthly/Quarterly comparison of truck volumes (frequency or percentage) for a class: LTPPGVWyyyyxxxxxx. (The yearly comparison requires extractions from multiple LTPPGVW* tables for a site. LTPPVOL7* tables can also be used but they contain far more records to manipulate.)
- **$** Monthly/Quarterly comparison of truck distributions (frequency or percentage) for a class: LTPPVOL7xxxxxx.
- **$** Yearly comparison of truck volumes based on average day/weekday/ weekend day volume for a class: LTPPVOL7yyyyxxxxxx. (The yearly comparison requires extractions from multiple LTPPGVW and LTPPVOL7 tables for a site.)
- **$** Monthly/Quarterly/Yearly comparison of Class 5, 9 and total truck volumes from 4-card data: LTPPD4xxxxxx.

$ Monthly/Quarterly/Yearly comparison of Class 5, 9 and total truck volumes from 7-card data: LTPPVOL7yyyyxxxxx. The yearly comparison requires extractions from multiple LTPPVOL7 tables for a site.

A. LTPP QC System Requirements

Most newly purchased, standard personal computers are sufficient to operate the software. Minimum system requirements recommended for operating the LTPP QC software include:

- **$** Pentium-II 350MHz or higher processor.
- **$** 64 MB system memory
- **$** 8 GB hard disk (for data file storage)
- **$** ORACLE 8.0 or higher (operating locally or on network)
- **$** Mandatory - a Traffic User account in Oracle to separate traffic tables from IMS tables

A.1 Installation Instructions

The software is distributed in a zipped file. The contents should be unzipped and the program added through the Add/Remove Programs function of Control Panel using the setup.exe provided.

Updates are generally done by unzipping a revised executable and copying it over the existing executable.

The software may be installed and run on multiple machines simultaneously.

B. DAT File Requirements for Operation LTPP QC

The DAT files are the group of files referred to elsewhere in this document as reference files. All .dat files must be located in a DAT directory, which must be located in the directory specified in the "Base Data Location" on the PREFS menu. For example:

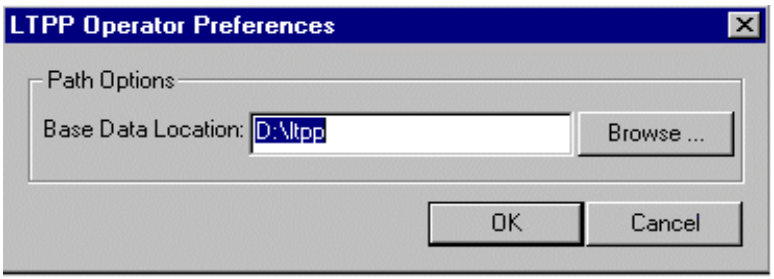

Figure B-17 Example of preferences selection

In this example, the base data location is D:\LTPP. All .dat files must then reside in D:\LTPP\DAT. Note that all user supplied subdirectory names are limited to 8 characters.

The required DAT files for LTPP QC are:

- SHRP.DAT (See section C.)
- DEFSHT.DAT (See section D.)
- NEWSHT.DAT (See section E.)
- FUNCLASS.DAT (for metric data file loading)

  The FUNCLASS.DAT file has a line for each LTPP site. Each line contains an eight character element consisting of (in order) state code, SHRP ID and functional class.

  The file is sorted in state code SHRP_ ID order.

An operator.dat file is created in each user=s WIN NT profile under LTPP subdirectory. This text file has the following :

- ACTIVEFILE=
- LASTFILE= STATE_CODE
- LASTSITE=SHRP_ID (Does not store alpha named sites as such)
- NEWSTYLENAMES=FALSE
- BASEPATH= (from PREFS)

- NEWSHTPATH=(from PREFS)\DAT\NEWSHT.DAT
- DEFSHTPATH=(from PREFS)\DAT\DEFSHT.DAT
- LOGPATH=(from PREFS)\LOGS
- SHRPPATH=(from PREFS)\DAT\SHRP.DAT
- FUNCLASSPATH=(from PREFS)\DAT\FUNCLASS.DAT

C. SHRP.DAT File

Example data:

```
SS SHRP Y M D ID3 ID6 RHO SN DPTH PTYPE DIR LN NUMLTPP NUMNON FLGS SRO REASON
# -- This is a comment line in the SHRP.DAT file
48 0001 0000 00 00 001 000001 2.5 . 8.0 R 7 1 2 2 100 SS3 ORIGINAL PAVEMENT PARAMETERS
48 0001 1991 10 22 001 000001 2.5 . 8.0 R 7 1 2 2 100 SS3 1/4" OVERLAY
48 1039 0000 00 00 039 000239 2.5 3.0 . F 3 1 2 2 100 SS3 ORIGINAL PAVEMENT PARAMETERS
48 1039 1991 05 29 039 000239 2.5 3.0 . F 3 1 2 2 100 SS3 2" OVERLAY
48 1039 1991 09 12 039 000239 2.5 3.0 . F 3 1 2 2 100 SS3 CHIP SEAL COAT
48 1039 1991 07 08 039 000239 2.5 3.0 . F 3 1 2 2 100 SS3 COMPLETE REBUILDING OF SECTION
```

FIELD	TYPE	LEN	DESCRIPTION
SS	INTEGER	2	State FIPS Code
SHRP	INTEGER	4	SHRP 4 digit Id code
Y	INTEGER	4	Effective year
M	INTEGER	2	Effective month
D	INTEGER	2	Effective day
ID3	ALPHA	3	State 3 digit Id code
ID6	ALPHA	6	State 6 digit Id code
RHO	FLOAT	x	Terminal serviceability Index
SN	FLOAT	x	Structural Number
DPTH	FLOAT	x	Pavement Depth
PTYPE	CHAR	1	Pavement type R=rigid or F=flexible
DIR	INTEGER	1	Direction of LTPP Lane (compass direction 1-8)
LN	INTEGER	1	LTPP lane number
NumLTPP	INTEGER	1	Number of lanes in the LTPP direction
NumNON	INTEGER	1	Number of lanes in the Non-LTPP direction.
FLGS	INTEGER	3	3 digit flags field
SRO	ALPHA	3	Data availability code including SRO code and data quality/ quantity indicator.
REASON	ALPHA	x	Construction reason.

Data Entry Rules:

$ All fields must be separated by at least one space and must be contained on one line. All fields must be in the order specified in the format and the record length must not exceed 256 characters. Other than these restrictions the format is fairly free form. The fields do not have to be column aligned, although it is recommended that the SS, SHRP, Y, M, and D fields be column aligned for sorting purposes.

- All fields (except the construction reason field) must be present for each record. If the value of a field is unknown, then the actual value must be replaced by a place holder. The recommended place holder is a dot (period).
- The construction reason may be left out of the record without having to write a place holder character. It is recommended that the construction reason be included for documentation reasons and for the fact that it shows up in the Level 2 and 1 annual summary records.
- Any line beginning with a "#" (pound sign) will be treated as a comment and ignored.
- The effective year, month, and day fields form the effective date of each SHRP.DAT record. This date specifies when the pavement parameters are to become effective for the LTPP section. Each section should have a record with the effective date of 0000-00-00 that states the original pavement parameters. As construction events are performed on the section, a new record should be added to the SHRP.DAT file indicating the date that the new parameters are to become the effective parameters.
- The SHRP.DAT file must be sorted first by state, and then within each state by SHRP ID and then within each SHRP ID by effective date. If the SHRP.DAT file is not sorted in this order, the search algorithm in the LTPP traffic database software will not be able to locate the correct record to use in the statistical calculations. [The DOS sort program will correctly sort the records in this order, if the SS, SHRP, Y, M, and D fields are column aligned.]
- The last line of the file needs to end with a return.

Field definitions:

- ID3 - State 3 digit ID as it would appear in the station identification field in a 4-card or a 7-card. The default of no information is generally represented by three zeros rather than a period.
- ID6 - State 6 digit ID as it would appear in the station identification field in a 4-card or a 7-card. The default of no information is generally represented by six zeros rather than a period.
- SRO - The SRO or data availability code is a three character code. It indicates the relationship of the data collection equipment=s location to the pavement section under study and a rough estimate of the quality and quantity of the data.

The Data Availability Code is written in this order (see Table C-1 for the list of Data Availability Codes):

S, R, O Code for AVC
S, R, O Code for WIM
Data Availability Code

For example, if a permanent, continuously operating AVC device is located at the site, but the portable WIM device is set up at a location downstream of the LTPP test location, the code would be S-R-7 and would be defined as follows:

S - Site Specific AVC
R - Site Related WIM
7 - Continuous operating, permanent AVC with portable WIM for all seasons and weekday/weekend time periods

0 to 9 Code (Amount of Data Collected)	
9	Continuous WIM meeting the ASTM standard.
8	Continuous WIM that does not meet the ASTM standard (or hasn't been tested against the ASTM standard).
7	Permanent classifier operating continuously, with portable WIM for all seasons and weekday/weekend time periods.
6	Continuous vehicle classification with some seasonal WIM.
5	Continuous vehicle classification with limited WIM.
4	Continuous AVC with no WIM data.
3	Continuous ATR volume station, with limited vehicle classification and truck weight data, and a measurement of truck seasonality.
2	Vehicle classification and WIM data with some measure of seasonality.
1	Limited data (only short duration counts) for either vehicle classification or truck weights.
0	Data collected on a different roadway that the LTPP site, including system level estimates.
S/R/O Code (Location of Class and Weight)	
S	Site specific data collection (data collected immediately up- or down-stream from the LTPP site).
R	Site related data collection (data collected on the same road as the LTPP test section, but separated from the test site by some traffic generator).
O	Other (data collected on another highway, or at a location which does not experience the same traffic stream as the LTPP test section.)

D. DEFSHT.DAT File

An entry in the DEFSHT.DAT file consists of a site index and a set of keyword parameters. The site index is simply a line of text that indicates state FIPS code and SHRP ID. The keyword parameters are labels defining every field that may be set on sheets 11, 12, and 13. This section contains two examples of entries in the DEFSHT.DAT file. Refer to sections D.1, D.2 and D.3, and D.4 for a complete list of the valid keyword parameters.

[48 1123] -- Format: [<STATE> <space> <SHRP ID>]

ROUTE*=SH 43
MILEPOST*=109.4
LOCATION*=4 Miles East of Stanton River Bridge

*Each of these are keyword parameters **B** Format: <KEYWORD> = <VALUE>

Each entry may contain any or all of the available keyword parameters. When a sheet is initially created in memory, all fields are set to blank. When the entry is read from the DEFSHT.DAT file, only those fields that have keyword parameters are modified. Consequently, an entry may be created so that the resulting transmittal sheet can have as many or as few fields filled in with default values as the user desires.

Example
The following example shows the entries in the DEFSHT.DAT file for two sites in the state of Idaho. Site 1001 has a permanent Diamond TT2001 vehicle classifier installed using piezo film as the axle sensors. Once a quarter, a Golden River Weighman is used to collect the WIM data. The AVC data is submitted using the FHWA class scheme, while the WIM data is submitted using the 6 digit code. Site 2034 has a permanent PAT DAW200 WIM device installed that generates both 4 and 7 cards in the FHWA class scheme. Since the DAW200 uses a bending plate as the sensor, the vehicle class sensor type (CSENSOR) keyword parameter is set to OTHER and the bending plate sensor is specified using the CSENSOROTHER keyword parameter.

[16 1001]
ROUTE = US 95
MILEPOST = 230.92
LOCATION = 1.5 MILES SOUTH OF JCT US 12

CCLASS = FHWA
CMAKE = DIAMOND
CMODEL = TT2001
CTYPE = PERM
CSENSOR = FPFILM
WCLASS = 6DIGIT
WMAKE = GOLDEN RIVER
WMODEL = WEIGHMAN
WTYPE = PORT
WSENSOR = CAPPAD

[16 2034]
ROUTE = I84
MILEPOST = 113.6
LOCATION = 4.0 MILES EAST OF BLISS
CCLASS = FHWA
CMAKE = PAT
CMODEL = DAW200
CTYPE = PERM
CSENSOR = OTHER
CSENSOROTHER = BENDING PLATE
WCLASS= FHWA
WMAKE = PAT
WMODEL = DAW200
WTYPE = PERM
WSENSOR = BENDPLATE

D.1 Keywords – General

KEY WORD PARAMETER	VALID VALUES	DESCRIPTION
ROUTE	ANY VALID CHARACTER STRING	HIGHWAY ROUTE THE SHRP SITE IS LOCATED ON
MILEPOST	ANY VALID CHARACTER STRING	MILEPOST ON ROUTE
LOCATION	ANY VALID CHARACTER STRING	DESCRIPTION OF LOCATION OF SITE
BDATE	MM-DD-YYYY, MM-DD-YY, MM/DD/YYYY, MM/DD/YY, MM\DD\YYYY, MM\DD\YY	BEGINNING DATE OF COUNT
BTIME	HH:MM	BEGINNING TIME OF COUNT
EDATE	MM-DD-YYYY, MM-DD-YY, MM/DD/YYYY, MM/DD/YY,	ENDING DATE OF COUNT

	MM\DD\YYYY, MM\DD\YY	
ETIME	HH:MM	ENDING TIME OF COUNT
COMMENT0	ANY VALID CHARACTER STRING	COMMENT LINE #1
COMMENT1	ANY VALID CHARACTER STRING	COMMENT LINE #2
COMMENT2	ANY VALID CHARACTER STRING	COMMENT LINE #3
COMMENT3	ANY VALID CHARACTER STRING	COMMENT LINE #4
COMMENT4	ANY VALID CHARACTER STRING	COMMENT LINE #5
COMMENT5	ANY VALID CHARACTER STRING	COMMENT LINE #6
COMMENT6	ANY VALID CHARACTER STRING	COMMENT LINE #7
COMMENT7	ANY VALID CHARACTER STRING	COMMENT LINE #8
COMMENT8	ANY VALID CHARACTER STRING	COMMENT LINE #9
COMMENT9	ANY VALID CHARACTER STRING	COMMENT LINE #10

D.2 Keywords – Classification Data Transmittal Sheets

CMAKE	ANY VALID CHARACTER STRING	MAKE (MANUFACTURER) OF CLASSIFICATION EQUIPMENT (SHEET 12)
CMODEL	ANY VALID CHARACTER STRING	MODEL OF CLASSIFICATION EQUIPMENT (SHEET 12)
CTYPE	PORT, PERM	TYPE OF CLASSIFICATION COUNT
CCLASS	FHWA, OTHER	TYPE OF CLASSIFICATION SCHEME USED FOR CLASSIFICATION COUNT
CSCHEME	ANY VALID CHARACTER STRING	IF CCLASS=OTHER THEN THIS VALUE GIVES NAME OF SHA SCHEME
CSENSOR	ROADTUBE, PCABLE, PFILM, LOOPS, OTHER	TYPE OF SENSOR USED FOR A CLASSIFICATION COUNTER
CSENSOROTHER	ANY VALID CHARACTER STRING	IF CSENSOR=OTHER, THEN THIS STRING GIVES THE NAME OF THE SENSOR TYPE.
GENERALFACT	NUMBER:NAME:FACTOR:STD	GENERAL ADJUSTMENT FACTORS NUMBER BETWEEN 1 AND 4
CLASSFACT	CLASS:NUMBER:NAME:FACTOR:STD w/ CLASS BETWEEN 1 AND 20; NUMBER BETWEEN 1 AND 4	CLASS SPECIFIC ADJUSTMENT

D.3 Keywords – Weight Data Transmittal Sheets

WMAKE	ANY VALID CHARACTER STRING	MAKE (MANUFACTURER) OF WIM EQUIPMENT
WMODEL	ANY VALID CHARACTER STRING	MODEL OF WIM EQUIPMENT
WTYPE	PORT, PERM	TYPE OF WIM COUNT
WCLASS	FHWA, 6DIGIT, OTHER	TYPE OF CLASSIFICATION SCHEME USED FOR WIM COUNT

WSCHEME	ANY VALID CHARACTER STRING	IF WCLASS-OTHER THEN THIS VALUE GIVES NAME OF SHA SCHEME
WSENSOR	PFILM, CAPPAD, BENDPLATE, HYDRAULIC, BRIDGE, OTHER COUNTER	TYPE OF SENSOR USED FOR A WIM
WSENSOROTHER	ANY VALID CHARACTER STRING	IF WSENSOR=OTHER, THEN THIS STRING GIVES THE NAME OF THE SENSOR TYPE

D.4 Keywords – Volume Data Transmittal Sheets

AXLEFACT	FACTOR:STD DEV	AXLE CORRECTION FACTOR AND STANDARD DEVIATION
COUNTTYPE	ONEWAY, TWOWAY, GPSLANE	TYPE OF VOLUME COUNT
DOWFACT	FACTOR:STD DEV	DAY-OF-WEEK FACTOR AND STANDARD DEVIATION
GPSDISTFACT	FACTOR	GPS LANE DISTRIBUTION FACTOR
GPSDISTSOURCE	ANY VALID CHARACTER STRING	GPS LANE DISTRIBUTION FACTOR SOURCE
OTHERFACT	FACTOR:STD DEV	OTHER FACTOR AND STANDARD DEVIATION
OTHERFACTNAME	ANY VALID CHARACTER STRING	NAME OF THE OTHER FACTOR
SEASONFACT	FACTOR:STD DEV	MONTHLY/SEASONAL FACTOR AND STANDARD DEVIATION
STATEID	ANY VALID NUMBER	STATE ASSIGNED ID CODE
VMAKE	ANY VALID CHARACTER STRING	MAKE (MANUFACTURER) OF VOLUME EQUIPMENT
VMODEL	ANY VALID CHARACTER STRING	MODEL OF VOLUME EQUIPMENT
VTYPE	PORT, PERM	TYPE OF DEVICE INSTALLATION
VSENSOR	ROADTUBE, PCABLE, PFILM, LOOPS, OTHER	TYPE OF SENSOR USED FOR A VOLUME COUNTER
VSENSOROTHER	ANY VALID CHARACTER STRING	IF VSENSOR=OTHER, THEN THIS STRING GIVES THE NAME OF THE SENSOR TYPE

D.5 Key Word Deficiencies

WSENSOR does not appear to have the various types of piezo sensors currently in use. A desirable enhancement would be to add the 5 types of piezo sensors to eliminate entering OTHER for them as well as a generic ceramic piezo sensor. Key words would be as follows:

QPIEZO - Quartz piezo
BFPIEZO - Bare flat piezo
BRPIEZO - Bare round piezo

CFPIEZO - Channelized flat piezo
CRPIEZO - Channelized round piezo
UCPIEZO - Unknown configuration of ceramic piezo.

E. NEWSHT.DAT File Format

The NEWSHT.DAT file format is very similar to the DEFSHT.DAT file. An entry consists of a file index and a set of keyword parameters. It is very important to note that the DEFSHT.DAT file has entries based on **state** and **SHRP site** while the NEWSHT.DAT file has entries based on the SHA file name. The software expects the entries in NEWSHT.DAT to be sorted in ascending order by file name.

A standard entry is of the form:

	Begin	End	Begin	End
[<FILENAME>!]	Date	Date	Time	Time
[C481123.KO1!]	4-3-93	4-3-93	00:00	23:00

An exclamation point following the filename signifies replacement mode. Four positional parameters are defined that follow the file name on the same line. These are begin date, end date, begin time, and end time. The positional parameters are provided so that a single line of text may be entered in to the NEWSHT.DAT file for those files that the begin/end date/times are the only fields that need to be specified to complete creation of transmittal sheets. The positional parameters are optional and do not have to be specified. However, the transmittal sheets cannot be completed without this information. If any are specified, then they must be specified in the order shown. If any one parameter is specified, then all preceding parameters must also be specified. For instance, if it is desired to specify end date, then begin date must also be specified.

If the data has been collected at a location other than that in the DEFSHT.DAT file for the site, then the changes may be noted by using the relevant key words immediately following the file name line. These key word entries must be repeated for every file that has collection information which does not match the DEFSHT.DAT entries. The key words which follow on the next lines are the same as those used for DEFSHT.DAT. A list of the key words and the allowable values is includes in sections D.1-4.

E.1 Example – NEWSHEET to list incoming files

The following Texas SHA files are to be processed through the QC software. The default values for site 1123 listed in the DEFSHT.DAT file are correct and adequate for creating the transmittal sheets for these files. Consequently only the begin/end dates/times need to be specified in the NEWSHT.DAT file. These are specified using the positional parameters so that only one line per file needs to be entered into the NEWSHT.DAT file.

The transmittal sheet for C481123.K01 has been previously entered manually, but several values were entered incorrectly. Therefore, the user chooses to use replacement mode so that the transmittal sheet created by the Level 4 processor will replace the one entered by hand.

```
[C481123.K01!] 9-10-91 9-10-91 00:00 23:00
[C481123.KA1 ] 9-11-91 9-11-91 00:00 23:00
[W481123.K01 ] 9-10-91 9-10-91 00:00 23:00
[W481123.KA1 ] 9-11-91 9-11-91 00:00 23:00
[W481123.KB1 ] 9-12-91 9-12-91 00:00 08:00
```

E.2 Example- NEWSHEET Changing DEFSHT values

This example shows how to override the values in the DEFSHT.DAT file using keyword parameters in the NEWSHT.DAT file. Consider the site entry for site 16 1001 in section D. During the summer quarter, Idaho's Golden River WIM unit was run over by a truck and is no longer operational. They substitute a portable PAT DAW100 for the fall quarter until the Golden River equipment can be repaired. Consequently, the default device type listed in the DEFSHT.DAT file needs to be overridden so that the transmittal sheets for the WIM data files will indicate the correct WIM device. At the same time, comment lines are specified so that the transmittal sheets will reflect the reason for the change in equipment. Also general factors for C161001.L61 were submitted. The NEWSHT file entries are listed below.

```
[C161001.L11] 10-01-91 10-01-91 00:00 23:00
[C161001.L21] 10-02-91 10-02-91 00:00 23:00
[C161001.L31] 10-03-91 10-03-91 00:00 23:00
[C161001.L41] 10-04-91 10-04-91 00:00 23:00

[W161001.L11] 10-01-91 10-08-91 07:00 11:00
WCLASS = FHWA
WMAKE = PAT
WMODEL = DAW100
WSENSOR = PFILM
COMMENT0 = NORMAL GOLDEN RIVER WIM DEVICE WAS DAMAGED BY TRUCK.
COMMENT1 = USING SUBSTITUTE DAW100 DEVICE BORROWED FROM DIST 3.

[C161001.L51] 10-05-91 10-05-91 00:00 23:00
[C161001.L61] 10-06-91 10-06-91 00:00 23:00
GENERALFACT=1:SEASONAL FACTOR:1.0123:.0234
GENERALFACT=2:MACHINE ADJUST FACT:1.1443:.0899

[C161001.L71] 10-07-91 10-07-91 00:00 23:00
```

F. Input and Output File Conventions

F.1 File Naming – Raw Data Files

The file name will be provided by the SHA for each volume count, classification count, or weight session as it is submitted to the RSC for entry into the National Traffic Database. Since original software operated under DOS 3.3, the file name is limited to eight characters with a three-character extension. This convention has NOT changed with the new software. When the SHAs submit data files to the RSC, the file name should be noted on the data transmittal form. The format for a file name is described in the following paragraphs. The software will prevent misnamed files from loading and report the reason to the log file.

The first character of the file name will be a character referencing the type of data collected; W refers to weight data, C to classification data, and V to traffic volume data. The character H is used for HELP files, a file type not supported by the software.

The second through seventh characters of the file name will be the six-digit SHRP site ID number. The first two digits (2-3) are the State Code, and the next four digits (4-7) are the SHRP test site ID number. The eighth character of the file name has been reserved for use by the RSC to describe the data entry, editing, and summarization stage of the data file.

F.2 File Naming – Processed Data Files

The naming of a processed data file varies from that of a raw data file by the addition of a character in front of the file name. The character is either 3, 4, or 7 depending on whether volume, classification or weight data is included in the file. Characters two through eight are identical to characters one through seven of the raw data file. The extensions are identical.

F.3 File Naming – Extensions for Data Files

The three characters of the extension are an index to the starting date (Month, Day, Year) of the count, beginning with the month code as the first character of the extension. The second character of the file name extension is an index to the beginning day. The third character of the extension is the code for the year of the count. Normally, the year code would require two digits to cover the period 1954 to 2025. However, by creating two groups of the years (1954 to 1989 and 1990 to 2025) and by coding the month depending upon which year group it falls into, only one digit is required to cover a period of 72 years. This will generally be sufficient to cover the period of interest to the SHRP LTPP, 1965 to 2010. To illustrate how this works, a count made in November 1988 would be given the month code "A" because it falls in the first year group. On

the other hand, November 1991 would be given the month code "M" because it falls in the second group of years.

The creation of the file name and the use of the one-digit year code are illustrated in the following examples.

Table F-1 File Naming Convention Example - Raw Data File

Example File Name: W123456.MNB

Character(s)	File Entry	Explanation
1	W	Weight Data
2-7	123456	SHRP Site ID Number
2-3	12	State Code
4-7	3456	Test Site Number
8	N/A	Reserved for RSC Processing Code
Extension	File Entry	Explanation
1	M	Month of Count (November in the 1990-2025 period. Codes in Table F-3.)
2	N	Day of Count (24th. Codes in Table F-3.)
3	B	Year of Count (Either 1965 or 2001. Since the month code is M, which falls in the 1990-2025 period, the appropriate year is 2001. Codes in Table F-4.))

Table F-2 File naming convention example - Processed data file

Example File Name: 4C123456.MNB

Character(s)	File Entry	Explanation
1	4	output is 4-card
2	c	Classification Data
3-8	123456	SHRP Site ID Number
3-4	12	State Code
5-8	3456	Test Site Number

Extension	File Entry	Explanation
1	M	Month of Count (November in the 1990-1025 period. Codes in Table F-3.)
2	N	Day of Count (24th. Codes in Table F-3.)
3	B	Year of Count (Either 1965 or 2001. Since the month code is M, which falls in the 1990-2025 period, the appropriate year is 2001. Codes in Table F-4.)

Table F-3 Beginning Date Codes (Month and Day)

Month	1954-1989 Month Code	1990-2025 Month Code	Day of Month		
January	1	C	1- 1st	C - 13th	O - 25th
February	2	D	2 - 2nd	D - 14th	P - 26th
March	3	E	3 - 3rd	E - 15th	Q - 27th
April	4	F	4 - 4th	F - 16th	R - 28th
May	5	G	5 - 5th	G - 17th	S - 29th
June	6	H	6 - 6th	H - 18th	T - 30th
July	7	I	7 - 7th	I - 19th	U - 31st
August	8	J	8 - 8th	J - 20th	
September	9	K	9 - 9th	K - 21st	
October	0	L	0 - 10th	L - 22nd	
November	A	M	A - 11th	M - 23rd	
December	B	N	B - 12th	N - 24th	

Table F-4 Beginning Date Codes (Year)

Year Code	Month Code "1 - B"	Month Code "C - N"	Year Code	Month Code "1 - B"	Month Code "C - N"
0	1954	1990	I	1972	2008
1	1955	1991	J	1973	2009
2	1956	1992	K	1974	2010

Year Code	Month Code "1 - B"	Month Code "C - N"	Year Code	Month Code "1 - B"	Month Code "C - N"
3	1957	1993	L	1975	2011
4	1958	1994	M	1976	2012
5	1959	1995	N	1977	2013
6	1960	1996	O	1978	2014
7	1961	1997	P	1979	2015
8	1962	1998	Q	1980	2016
9	1963	1999	R	1981	2017
A	1964	2000	S	1982	2018
B	1965	2001	T	1983	2019
C	1966	2002	U	1984	2020
D	1967	2003	V	1985	2021
E	1968	2004	W	1986	2022
F	1969	2005	X	1987	2023
G	1970	2006	Y	1988	2024
H	1971	2007	Z	1989	2025

F.4 Sort Order for Input Data

The following is the sort order for traffic records input to the Quality Control program:

Date, Time

F.5 Format Classification Records (4-card)

Columns	No. of Columns	Description	TMG page
1	1	Vehicle classification record code (4)	5-4-1
2-3	2	State code	5-4-1
4-5	2	Functional Classification	5-4-2
6-8	3	Station Identification Number	5-4-2
9	1	Direction of Travel	5-4-2
10-11	2	Year of Data	5-4-3
12-13	2	Month of Data	5-4-6
14-15	2	Day of Month	5-4-6
16-17	2	Hour of day	5-4-6
18-19	2	Number of motorcycles (optional)	4-A-1
20-23	4	Number of passenger cars or all 2-axle, 4-tire single unit vehicles	4-A-1
24-26	3	Number of other 2-axle, 4-tire single unit vehicle	4-A-1
27-28	2	Number of buses	4-A-1
29-31	3	Number of 2-axle, 6-tire single unit trucks	4-A-1
32-33	2	Number of 3-axle single unit trucks	4-A-1
34-35	2	Number of 4 or more axle single unit trucks	4-A-1
36-37	2	Number of 4 or less axle single trailer trucks	4-A-1
38-40	3	Number of 5-axle single trailer trucks	4-A-2
41-42	2	Number of 6 or more axle single trailer trucks	4-A-2
43-44	2	Number of 5 or less axle multi- trailer trucks	4-A-2
45-46	2	Number of 6-axle multi- trailer trucks	4-A-2
47-48	2	Number of 7 or more axle multi- trailer trucks	4-A-2
49	1	Motorcycle reporting indicator	5-4-6
50	1	Vehicle class combination indicator	5-4-6
51	1	Lane of travel	5-4-6
52-80	31	Blank or optional State data	5-4-6

Source: Traffic Monitoring Guide (TMG), 2nd edition, Federal Highway Administration, FHWA-PL-92-017, 1992, pg. 5-4-5.

Codes specific to the 4-card:

Motorcycle reporting indicator - 0 - motorcycles not reported
1 - motorcycles reported

Vehicle class combination indicator -0 - Class 2 & 3 reported separately
1 - Class 2 & 3 reported together

F.6 Format – Classification Records (C-card)

Columns	No. of Columns	Description	TMG Ref
1	1	Vehicle classification record code (C)	6-4-1
2-3	2	State code	6-2-1
4-9	6	Station Identification Number	6-2-3
10	1	Direction of Travel	6-2-3
11	1	Lane of Travel	6-2-3
12-13	2	Year of Data	6-2-3
14-15	2	Month of Data	6-3-1
16-17	2	Day of Data	6-3-1
18-19	2	Hour of Data	6-4-1
20-24	5	Total Volume	6-4-3
25-29	5	Class 1 Count	6-4-3
30-34	5	Class 2 Count	6-4-3
35-39	5	Class 3 Count	6-4-3
40-44	5	Class 4 Count	6-4-3
45-49	5	Class 5 Count	6-4-3
50-54	5	Class 6 Count	6-4-3
55-59	5	Class 7 Count	6-4-4
60-64	5	Class 8 Count	6-4-4
65-69	5	Class 9 Count	6-4-4
70-74	5	Class 10 Count	6-4-4
75-79	5	Class 11 Count	6-4-4
80-84	5	Class 12 Count	6-4-4
85-89	5	Class 13 Count	6-4-4
The record may end here if the FHWA 13 class system is being used			
90-94	5	Class 14 Count	6-4-4
95-99	5	Class 15 Count	6-4-4

The C-card format allows for entries from column 20 on to have either leading zeros or leading blanks. Only one option is allowed in any given record.

F.7 Format – Weight Records (7-card face)

Columns	No. of Columns	Description	TMG Ref Page
1	1	Truck weight record code (7)	5-4-8
2-3	2	State code	5-6-2
4-5	2	Functional Classification	5-6-3
6-8	3	Station Identification Number	5-6-3
9	1	Direction of Travel	5-6-3
10-11	2	Year of Data	5-6-4
12-13	2	Month of Data	5-4-8
14-15	2	Day of Month	5-4-8
16-17	2	Hour of day	5-4-8
18-23	6	Vehicle type code	5-4-8
24-25	2	Body type (optional)*	5-4-10
26	1	Engine type (optional)*	5-4-10
27-28	2	(open)	5-4-10
29-31	3	Registered weight (thousands of pounds)	5-4-10
32	1	Basis of registration	5-4-10
33-34	2	(open)	5-4-10
35	1	Lane of travel	5-4-10
36-40	5	Commodity code (optional)*	5-4-10
41	1	Load status code (optional)*	5-4-10
42-45	4	Total weight of truck or combination	5-4-10
46-48	3	A-axle weight (hundreds of pounds)	5-4-10
49-51	3	B-axle weight (hundreds of pounds)	5-4-10
52-54	3	C-axle weight (hundreds of pounds)	5-4-10
55-57	3	D-axle weight (hundreds of pounds)	5-4-10
58-60	3	E-axle weight (hundreds of pounds)	5-4-10
61-63	3	(A-B) axle spacing (feet and tenths)	5-4-10
64-66	3	(B-C) axle spacing (feet and tenths)	5-4-10
67-69	3	(C-D) axle spacing (feet and tenths)	5-4-10
70-72	3	(D-E) axle spacing (feet and tenths)	5-4-10
73-76	4	Total wheel base	5-4-10
77-79	3	Record serial number (same for continuation record)	5-4-10
80	1	Continuation indicator: 0 = no continuation record 1 = has a continuation record	5-6-32

*Each of these data items has a default value which must be entered when the data item is not collected.

Source: TMG, 2nd edition, pg. 5-4-7.

The six digit code which may be entered for the vehicle type code as an alternative to a state classification system or the FHWA 13 bin system from the TMG is shown in figures F.1 to F.4 taken from the *TMG*, 2nd edition.

Table F-5 Definition of 6-digit Classification Scheme from FHWA Truck Weight Study

Vehicle Type Coding Chart*

Vehicle Type	1st Character	2nd Character	3rd Character	4th Character	5th Character	6th Character
Personal passenger vehicles	basic vehicle type = 0	code = 9	code = 0	Table A; light trailer modifier	code = 0	code = 0
Buses	basic vehicle type = 1	code = 9	code = 0	Table B; axle & tire modifier	code = 0	code = 0
Single unit trucks or tractors	basic vehicle type = 2	Table C; total axles	code = 0	Table A; light trailer modifier	code = 0	code = 0
Tractor + semitrailer	basic vehicle type = 3	total axles on power unit	Table D; total axles on first trailer	code = 0	code = 0	code = 0
Tractor + full trailer	basic vehicle type = 4	total axles on power unit	Table D; total axles on first trailer	code = 0	code = 0	code = 0
Tractor + semitrailer + full trailer **	basic vehicle type = 5	total axles on power unit	Table D; total axles on first trailer	Table D; total axles on second trailer	code = 0	code = 0
Truck + full trailer + full trailer	basic vehicle type = 6	total axles on power unit	Table D; total axles on first trailer	Table D; total axles on second trailer	code = 0	code = 0
Tractor + semitrailer + 2 full trailers	basic vehicle type = 7	total axles on power unit	Table D; total axles on first trailer	Table D; total axles on second trailer	Table D; total axles on third trailer	code = 0
Truck + three full trailers	basic vehicle type = 8	total axles on power unit	Table D; total axles on first trailer	Table D; total axles on second trailer	Table D; total axles on third trailer	code = 0

* See next page for table references.

** Semitrailers pulled by other semitrailers will be considered full trailers.

Table F-6 Tables A, B, C and D for 6-digit Classification Codes

Table A – Light Trailer Modifier

0	No trailer
1	Camp trailer
2	Travel or mobile home
3	Cargo or livestock trailer
4	Boat trailer
5	Towed equipment
6	Towed auto
7	Towed truck
8	"Saddle mount" (Tractors or trailers with front axles on unit ahead)
9	Type trailer not determined

Table B – Axle and Tire Modifier

0	Axle arrangement not recorded
1	Two-axle, four-tire
2	Two-axle, six-tire
3	Three-axle
4	Four or more axles

Table C – Total Axles

0	Panel and pickup
1	Heavy two-axle, four-tire
2	Two-axle, six-tire
3	Three-axle
4	Four-axle
5	Five-axle
6	Six-axle
7	Seven-axle
8	Eight axles or more

Table D – Total Axles on Trailer

1	Single-axle trailer
2	Two-axle trailer
3	Three-axle trailer
4	Four-axle trailer
5	Five-axle trailer
6	Six-axle trailer
7	Two-axle trailer with axles in a spread tandem configuration
8	Three-axle trailer including a spread tandem configuration
9	Four-axle trailer including a spread tandem configuration

F.8 Format – Weight Records (7-card continuation)

Columns	No. of Columns	Description	TMG Ref Page
1-23	23	Same as columns 1-23 of the face record	
24-28	5	(open)	
29-31	3	F-axle weight (hundreds of pounds)	5-4-10
32-34	3	G-axle weight (hundreds of pounds)	5-4-10
35-37	3	H-axle weight (hundreds of pounds)	5-4-10
38-40	3	I-axle weight (hundreds of pounds)	5-4-10
41-43	3	J-axle weight (hundreds of pounds)	5-4-10
44-46	3	K-axle weight (hundreds of pounds)	5-4-10
47-49	3	L-axle weight (hundreds of pounds)	5-4-10
50-52	3	M-axle weight (hundreds of pounds)	5-4-10
53-55	3	(E-F) axle spacing (feet and tenths)	5-4-10
56-58	3	(F-G) axle spacing (feet and tenths)	5-4-10
59-61	3	(G-H) axle spacing (feet and tenths)	5-4-10
62-64	3	(H-I) axle spacing (feet and tenths)	5-4-10
65-67	3	(I-J) axle spacing (feet and tenths)	5-4-10
68-70	3	(J-K) axle spacing (feet and tenths)	5-4-10
71-73	3	(K-L) axle spacing (feet and tenths)	5-4-10
74-76	3	(L-M) axle spacing (feet and tenths)	5-4-10
77-79	3	Record serial number (same as face record)	5-4-10
80	1	Continuation indicator: 2= first continuation record for a vehicle with more than 13 axles 9=last continuation record	5-4-10

** Used only for truck combinations having six or more axles. Immediately follows the face record.
Source: TMG, 2nd edition, pg. 5-4-7.

F.9 Format – Station Description Record (2-Card)

This record provides header information for 2nd edition TMG classification and weight records. There is supposed be one for each direction in the data file at a minimum. It is possible to have one for each lane in each direction. The software currently only recognizes but does not use the data in the card when it comes at the top of 7-card files. The information in here is some of the information used in DEFSHT.DAT.

Column	Width	Alpha/ Numeric	Description	TMG Ref Pg.
1	1	N	Station description record code (2)	5-4-1
2-3	2	N	State Code	5-4-1
4-5	2	N	Functional classification	5-4-2
6-8	3	A	Station identification number	5-4-2
9	1	N	Direction of travel	5-4-2
10-11	2	N	Year of data	5-4-3
12	1	N	Posted route number category	5-4-3
13-17	5	N	Posted route number	5-4-3
18-20	3	N	County code	5-4-3
21-32	12	N	HPMS sample number	5-4-3
33	1	N	HPMS sample section subdivision number	5-4-4
34-35	2	N	Year station was established	5-4-4
36	1	N	Number of lanes in one direction at site	5-4-4
37	1	N	Type of weighing equipment	5-4-4
38	1	N	Method of classification counting	5-4-4
39	1	N	Coordination with enforcement activities	5-4-5
40-45	6	N	Most current AADT figure	5-4-5
46-80	35	A	Location of station (distance and direction from nearest major intersecting route)	5-4-5

Source: Traffic Monitoring Guide (TMG) -2nd edition, Federal Highway Administration, FHWA-PL-92-017, 1992, pg. 5-4-1.

The following are the code ranges for station identification cards for the indicated fields for data collected by the LTPP program. Other values may be appropriate for statewide data collection systems. For the definition associated with each code see the relevant TMG page.

- **$** Number of lanes - 1-5
- **$** Posted route number category - 0-4
- **$** Type of weighing equipment - 0, 5-8
- **$** Method of vehicle classification counting - 0, 3-8
- **$** Coordination with enforcement activities - 1,2

F.10 Format – Weight Records (W-card)

Cols.	No. of Cols.	Description	TMG Page	Cols.	No. of Cols.	Description
1	1	Truck weight record code (W)	6-5-1			
2-3	2	State code	6-2-1			
4-9	6	Station Identification Number	6-2-3			
10	1	Direction of Travel	6-2-3	58-60	3	(E-F) axle spacing **
11	1	Lane of Travel	6-2-3	61-63	3	F-axle weight *
12-13	2	Year of Data	6-2-3	64-66	3	(F-G) axle spacing**
14-15	2	Month of Data	6-3-1	67-69	3	G-axle weight*
16-17	2	Day of Data	6-3-1	70-72	3	(G-H) axle spacing**
18-19	2	Hour of Data		73-75	3	H-axle weight*
20-21	2	Vehicle Class	6-5-3	76-78	3	(H-I) axle spacing**
22-24	3	Open	6-5-3	79-81	3	I-axle weight*
25-28	4	Total Weight of Vehicle	6-5-3	82-84	3	(I-J) axle spacing**
29-30	2	Number of Axles	6-5-3	85-87	3	J-axle weight
31-33	3	A-axle weight*		88-90	3	(J-K) axle spacing**
34-36	3	(A-B) axle spacing**		91-93	3	K-axle weight*
37-39	3	B-axle weight*		94-96	3	(K-L) axle spacing**
40-42	3	(B-C) axle spacing**		97-99	3	L-axle weight*
43-45	3	C-axle weight*		100-102	3	(L-M) axle spacing**
46-48	3	(C-D) axle spacing**		103-105	3	M-axle weight*
49-51	3	D-axle weight*				
52-54	3	(D-E) axle spacing**		Additional fields if needed.		
55-57	3	E-axle weight*				

*Axle weights are to nearest tenth of a metric ton (100 kilograms) without a decimal point.

** Axle spacings are to the nearest tenth of a meter (100 millimeters) without a decimal point.

Source: TMG, 3rd edition, pg. 6-5-2.

The vehicle classification expected with this record is either the FHWA 13 bin scheme from the TMG, 3rd edition or a two-digit state classification scheme. The classifications are as follows:

1 - Motorcycles
2 - Passenger cars
3 - Other 2-axle, 4-tire single unit vehicles
4 - Buses
5 - 2-axle, 6-tire single unit trucks
6 - 3-axle single unit trucks
7 - 4 or more axle single unit trucks
8 - 4 or less axle single trailer trucks
9 - 5-axle single trailer trucks
10- 6 or more axle single trailer trucks
11- 5 or less axle multi-trailer trucks
12 - 6-axle multi-trailer trucks
13 - 7 or more axle multi-trailer trucks
(14- unknown or state defined)
(15- unknown)

F.11 Format – Station Description Record (S-Card)

Column	Field Length	Alpha/ Numeric	Description	TMG Ref Pg.
1	1	A	Record type (must be S)	6-2-1
2-3	2	N	FIPS State Code	6-2-1
4-9	6	A	Station ID	6-2-3
10	1	N	Direction of Travel Code	6-2-3
11	1	N	Lane of Travel	6-2-3
12-13	2	N	Year of Data	6-2-3
14-15	2	N	Functional Classification Code	6-2-4
16	1	N	Number of Lanes in Direction Indicated	6-2-4
17	1	A	Sample Type for Traffic Volume	6-2-4
18	1	N	Number of Lanes Monitored for Traffic Volume	6-2-4
19	1	N	Method of Traffic Volume Counting	6-2-4
20	1	A	Sample Type for Vehicle Classification	6-2-5
21	1	N	Number of Lanes Monitored for Vehicle Classification	6-2-5
22	1	N	Method of Vehicle Classification	6-2-5
23	1	A	Algorithm for Vehicle Classification	6-2-5
24-25	2	N	Classification System for Vehicle Classification	6-2-5
26	1	A	Sample Type for Truck Weight	6-2-6
27	1	N	Number of Lanes Monitored for Truck Weight	6-2-6
28	1	N	Method of Truck Weighing	6-2-6
29	1	A	Calibration of Weighing System	6-2-7
30	1	N	Method of Data Retrieval	6-2-7
31	1	A	Type of Sensor	6-2-7
32	1	A	Second Type of Sensor	6-2-8
33-34	2	N	Equipment Make	6-2-8
35-49	15	A	Equipment Model	6-2-9
50-51	2	N	Second Equipment Make	6-2-9
52-66	15	A	Second Equipment Model	6-2-9
67-72	6	N	Current Directional AADT	6-2-10
73-78	6	A	Matching Station ID for Previous Data	6-2-10
79-80	2	N	Year Station Established	6-2-10
81-82	2	N	Year Station Discontinued	6-2-10
83-85	3	N	FIPS County Code	6-2-10
86	1	A	HPMS Sample Type	6-2-10
87-98	12	N	HPMS Sample Number or Kilometerpoints	6-2-10
99	1	N	HPMS Subdivision Number	6-2-10
100	1	N	Posted Route Signing	6-2-11
101-108	8	N	Posted Signed Route Number	6-2-11
109	1	N	Concurrent Route Signing	6-2-11
110-117	8	N	Concurrent Signed Route Number	6-2-11
118-167	50	A	Station Location	6-2-11

Source: Traffic Monitoring Guide (TMG) - 3rd edition, Federal Highway Administration, FHWA, February 1995, pg. 6-2-2.

The following are the additional code ranges for station identification cards for the indicated fields for data collected by the LTPP program. Other values may be appropriate for statewide data collection systems. For the definition associated with each code see the relevant TMG page.

Sample type for traffic volume - T, N
Method of traffic volume counting - 1-3
Sample type for vehicle classification - H, N
Method of vehicle classification - 1-3
Algorithm for vehicle classification - A-H, K-N, Z
Classification system for vehicle - 1-5, 13-15 and others TBD
Sample type for truck weight - B, L, T, N
Method of truck weighing - 1,2,4,5
Calibration of the weighing system - A-D, M, S-U, Z
Method of data retrieval - 1,2
Type of sensor - A-I, K-M, P-X, Z
Equipment make - 0-18, 21, 23, 24, 30-63, 99
HPMS sample type - Y, N

All text fields in this record are left justified.

F.12 Codes used in TMG card submissions

DIRECTION

1 - North	2- Northeast	3 – East	4 - Southeast
5 - South	6 - Southwest	7 - West	8 - Northwest

FUNCTIONAL CLASS

RURAL		URBAN	
Code	Functional Classification	Code	Functional Classification
01	Principal Arterial - Interstate	11	Principal Arterial - Interstate
02	Principal Arterial - Other	12	Principal Arterial - Other Freeways or Expressways
		14	Principal Arterial - Other
06	Minor Arterial	16	Minor Arterial
07	Major Collector	17	Collector
08	Minor Collector		
09	Local System	19	Local System

LANE OF TRAVEL OR MAINLINE LANE OF TRAVEL

0 = combined lanes
1 = outside (rightmost) lane
2 = next to outside lane, ...
to 9 = inside lane

F.13 Format – Weight Records (HELP-card)

Field			Length	Format	Starts in Column
L	=	LANE	1	n	2
LD	=	LANE DIRECTION	2	nn	4
MO	=	MONTH	2	nn	7
DD	=	DAY	2	nn	10
YY	=	YEAR	2	nn	13
HH	=	HOUR	2	nn	16
MN	=	MINUTE	2	nn	19
SS	=	SECOND	2	nn	22
HS	=	HUNDREDTHS OF SECONDS	2	nn	25
VEHNUM	=	VEHICLE NUMBER	6	nnnnnn	28
NA	=	NUMBER OF AXLES	2	nn	35
CL	=	CLASS	2	nn	38
GROS	=	GROSS WEIGHT * 10	4	nnnn	41
LENG	=	OVERALL LENGTH * 10	4	nnnn	46
SPED	=	SPEED * 10	4	nnnn	51
SP1	=	AXLE SPACING 12 * 10	3	nnn	56
SP2	=	AXLE SPACING 23 * 10	3	nnn	60
SP3	=	AXLE SPACING 34 * 10	3	nnn	64
SP4	=	AXLE SPACING 45 * 10	3	nnn	68
SP5	=	AXLE SPACING 56 * 10	3	nnn	72
SP6	=	AXLE SPACING 67 * 10	3	nnn	76
SP7	=	AXLE SPACING 78 * 10	3	nnn	80
SP8	=	AXLE SPACING 89 * 10	3	nnn	84
WT1	=	WEIGHT OF AXLE 1 * 10	3	nnn	88
WT2	=	WEIGHT OF AXLE 2 * 10	3	nnn	92
WT3	=	WEIGHT OF AXLE 3 * 10	3	nnn	96
WT4	=	WEIGHT OF AXLE 4 * 10	3	nnn	100
WT5	=	WEIGHT OF AXLE 5 * 10	3	nnn	104
WT6	=	WEIGHT OF AXLE 6 * 10	3	nnn	108
WT7	=	WEIGHT OF AXLE 7 * 10	3	nnn	112
WT8	=	WEIGHT OF AXLE 8 * 10	3	nnn	116
WT9	=	WEIGHT OF AXLE 9 * 10	3	nnn	120

A HELP file is a file in comma separated value format with all numeric fields. HELP stands for highway electronic license plate and refers to one of the earliest commercial vehicle ITS applications. All numbers are right justified within a field. Fields are comma delimited. Each record starts with a "<" and ends with a ">". All weights are in tenths of kips. All spacings are in tenths of feet. Values are multiplied to produce integers in the record.

F.14 Format – ATR Station Record (1-Card)

Column	Field Length	Alpha/ Numeric	Description
1	1	N	Record Type: 1 = ATR Station
2-3	2	N	FIPS State Code
4-5	2	N	Functional Classification Code
6-11	6	A	Station Identification
12	1	N	Direction of Travel
13	1	N	Lane of Travel
14	1	N	Posted Route Signing
15-20	6	N	Posted Signed Route Number
21	1	N	Concurrent Route Signing
22-27	6	N	Concurrent Signed Route Number
28-30	3	N	FIPS County Code
31-42	12	N	HPMS Sample Number or Kilometerpoints
43	1	N	HPMS Subdivision Number
44-45	2	N	Year Station Established
46-47	2	N	Year Station Discontinued
48	1	N	Method of Data Retrieval
49-50	2	N	Equipment Make
51-100	50	A	Location of Station

Source: Traffic Monitoring Guide (TMG), 2nd edition, Federal Highway Administration, FHWA-PL-92-017, 1992, pg. 3-2-3

This format is provided for information only. LTPP does not currently or in the future expect to process this record format, since the data associated with it is not useful for LTPP research needs.

F.15 Format – Volume data records (3-card)

Column	Field Length	Alpha/ Numeric	Description
1	1	N	Record Identification: 3 = ATR data
2-3	2	N	FIPS State Code (TMG pg. 5-4-1)
4-5	2	N	Functional Classification
6-11	6	N	Station Identification Number
12	1	N	Direction of Travel (TMG 5-4-2)
13	1	N	Mainline Lane of Travel
14-15	2	N	Year of Data (last 2 digits)
16-17	2	N	Month of Data (01-12)
18-19	2	N	Day of Month of Data (01-31)
20	1	N	Day of Week (1 = Sunday ...7= Saturday)
21-25	5	N	Traffic Volume Counted, 00:01 **B** 01:00
26-30	5	N	Traffic Volume Counted, 01:01 **B** 02:00
...	A	A	(hourly traffic volumes counted)
136-140	5	N	Traffic Volume Counted, 23:01 **B** 24:00
141	1	N	Footnotes (0 = No restrictions, 1 = Construction or other activity affected traffic flow)

Source: Traffic Monitoring Guide (TMG) -
2nd edition, Federal Highway Administration, FHWA-PL-92-017, 1992, pg. 3-2-4.
3rd edition, Federal Highway Administration, FHWA, February 1995, pg. 6-3-3.

This data record type contains no useful information about trucks. It is only useful in expanding sampled AVC data to full year estimates. For a full discussion of its use see the LTPP traffic analysis software documentation.
3-card specific codes:

DAY OF WEEK (3-card only)

1 = Sunday, 2 = Monday, 3 = Tuesday, 4 = Wednesday, 5 = Thursday,
6 = Friday, 7 = Saturday

G. ORACLE Tables

There are six different types of ORACLE tables created by this program. One is a unique table, LTPPFILETRACKER. Two are input file specific, two are year specific for a site and one is site specific. The existence of ORACLE tables makes it possible to generate statistics about data submitted and processed that previously required a significant amount of labor to generate. While the reports have not been incorporated in the software, a discussion of the possibilities is contained in section G.8.

ORACLE RTDB tables are created in the user account where processing takes place. A traffic user account should be created by the ORACLE DBA and used by all traffic processing personnel to ensure that all traffic tables are created in the same account. This will segregate the traffic tables from the other IMS tables, minimizing the impact on the IMS database. The traffic user account should be created with storage parameters that will allow the thousands of small tables currently required by this software. Be sure that database administrator is aware of their existence to insure backups are made and to avoid accidental deletions.

G.1 LTPPFILETRACKER

This table is used to track the loading of files and the steps in the processing. A description of the table appears below. The information in this table is displayed in the File Tracker Module to locate the analysis data and to permit file selection for Plett-Plots. It is used in the Graph Manager to identify data which can be graphed. It stores the number of records and days of data from each file loaded. It also stores the information on the processing steps. The table description is followed by variable definitions.

SQLWKS> desc ltppfiletracker;

Column Name	Null?	Type
FILENAME		VARCHAR2(32)
STATE_CODE		NUMBER
SHRP_ID		CHAR(4)
VERSION		VARCHAR2(4)
ARCHIVEDIN		VARCHAR2(512)
STARTDATE		DATE
ENDDATE		DATE
PROCESSED		DATE
RECORDQC		NUMBER
DAILYQC		NUMBER
QCREPORT		NUMBER
COMMENTS		VARCHAR2(2000)
REPORTSENT		NUMBER
REPORTRECV		NUMBER
PURGESAPPLIED		NUMBER

```
Column Name                    Null?                    Type
------------------------------ ------------------------ ---------
FILETYPE                                                VARCHAR2(32)
DAYS                                                    NUMBER
RECORDS                                                 NUMBER
```

FILENAME - The name of the input data file where an underscore replaces the period between the eight character file name and its extension.

STATE_CODE - FIPS state code; incomplete loads/ bad data will be represented by 00.

SHRP_ID - SHRP_ID; incomplete loads/ bad data will be represented by 0000.

VERSION - Which of potentially multiple loads of this data the information in this record represents.

ARCHIVEDIN - The subdirectory where the output file is located including the name of the output file.

STARTDATE - The first date for data exists in the input file. The year is currently reported in two digit format. Invalid loading attempts result in a date of 01-Jan-2025.

ENDDATE - The last date for which data exists in the input file. The year is currently reported in two digit format. Invalid loading attempts result in a date of 01-Jan-2025.

PROCESSED - The date the file was loaded. The year is currently in reported in two digit format. This value is automatically assigned by the software. Invalid loading attempts are characterized by 01-01-2025.

RECORDQC - A 0/1 variable assigned by the software as 1 when the record level QC process is successful.

DAILYQC - A 0/1 variable assigned by the software as 1 when the Daily QC process is successfully completed.

QCREPORT - A 0/1 variable assigned by the software as 0 when the file is loaded. A value of 1 is assigned after the user checks the QC report box in the processing box and applied that change.

COMMENTS - Comments entered in the comments box of the LTPP File Tracker dialog box. The user must apply the comments in order for them to be stored in the table. A maximum of 2000 characters is allowed.

REPORTSENT - A 0/1 variable assigned by the software as 0 when the file is loaded. A value of 1 is assigned after the user checks the 'QC Report Sent' box in the processing box and applies that change.

REPORTRECV - A 0/1 variable assigned by the software as 0 when the file is loaded. A value of 1 is assigned after the user checks the 'Report Received' box in the processing box and applies that change.

PURGESAPPLIED - A 0/1 variable assigned by the software as 0 when the file is loaded. A value of 1 is assigned after the user applies a purge.
FILETYPE - A label indicating what the original file type was, 4-card, 7-card, C-card or W-card.
DAYS - The number of days of data in the file including any with errors.
RECORDS - The number of records in the file including any with errors. Continuation cards are not included in the count.

G.2 LTPPD4 tables

LTPPD4 tables contain a record for every day of AVC data provided for all years. There is one such file for each site. The naming convention is LTPPD4xxxxxx where xxxxxx is the STATE_CODE and SHRP_ID for the site. The table structure is as follows.

SQLWKS> desc ltppd4xxxxxx;

```
Column Name             Null?                    Type
----------------------- ------------------------ ---------
FILENAME                                         VARCHAR2(32)
STATE_CODE                                       NUMBER
FUNC_CLASS                                       NUMBER
STATION                                          VARCHAR2(6)
DIRECTION                                        NUMBER
YEAR                                             NUMBER
MONTH                                            NUMBER
DAY                                              NUMBER
HOUR                                             NUMBER
LANE                                             NUMBER
ERROR                                            NUMBER
PURGE                                            NUMBER
VOLUME1                                          NUMBER
VOLUME2                                          NUMBER
VOLUME3                                          NUMBER
VOLUME4                                          NUMBER
VOLUME5                                          NUMBER
VOLUME6                                          NUMBER
VOLUME7                                          NUMBER
VOLUME8                                          NUMBER
VOLUME9                                          NUMBER
VOLUME10                                         NUMBER
VOLUME11                                         NUMBER
VOLUME12                                         NUMBER
VOLUME13                                         NUMBER
VOLUME14                                         NUMBER
VOLUME15                                         NUMBER
VOLUME16                                         NUMBER
VOLUME17                                         NUMBER
```

```
Column Name             Null?                    Type
----------------------- ------------------------ ---------
VOLUME18                                         NUMBER
VOLUME19                                         NUMBER
VOLUME20                                         NUMBER
```

Note that the table does not have any fields with non-null requirements. Thus there is the potential for duplicate records based on DIRECTION, YEAR, MONTH, DAY, HOUR, and LANE particularly when the data is split across two data files. FILENAME is the name of the input file. HOUR represents the first hour of the day found in the file. All other elements except PURGE are read and summed or assigned using summary.dat file created from classification records. ERROR is the code for any error encountered in a DAY's records. The error may be record level or daily in nature. Only records with non-critical errors (EDIT_1 codes other than C or Q) are included in the summarization. There must be 24 hours in a day to create a record in the table. PURGE is a 0/1 field indicating if that day's data has been purged so that it will be omitted from the analysis. Zero is not purged. One is purged. Purges are applied at the daily level by design. Data beyond column 51 on 4-cards is found in VOLUME14-VOLUME20 as applicable.

At least one calendar day of good data must exist for this table to exist for a site.

G.3 LTPPVOL7 tables

LTPPVOL7 tables are the WIM record equivalent of the LTPPD* tables. Unlike the LTPPD* tables they are yearly rather than for the site as a whole. The table naming convention is LTPPVOL7yyyyxxxxxx where yyyy is the 4-digit year and xxxxxx is the STATE_CODE, SHRP_ID combination for the site. These tables contain a summary of the volumes by vehicle class for a given MONTH, DAY, LANE, and DIRECTION. They have no non-null fields. Since weight data may be collected in two different files for the same day, there is the potential for duplicate records. FILENAME is exactly that. CNT1- CNT20 reflect the number of vehicles in each of the 20 bins possible. Generally, for U.S. data the count values should be 1-15 to reflect use of the 13-bin FHWA system with 15 representing vehicles tagged as invalid. There is a one to one correspondence between the number in the field name and the bin number. This table does not have ERROR characteristics in it. Records with critical errors as identified by EDIT_1 codes on the output files are excluded from counts in this table. A description of the table appears below.

SQLWKS> desc ltppvol7yyyyxxxxxx;

Column Name	Null?	Type
FILENAME		VARCHAR2(32)
MONTH		NUMBER
DAY		NUMBER
LANE		NUMBER
DIRECTION		NUMBER
PURGE		NUMBER
CNT1		NUMBER
CNT2		NUMBER
CNT3		NUMBER
CNT4		NUMBER
CNT5		NUMBER
CNT6		NUMBER
CNT7		NUMBER
CNT8		NUMBER
CNT9		NUMBER
CNT10		NUMBER
CNT11		NUMBER
CNT12		NUMBER
CNT13		NUMBER
CNT14		NUMBER
CNT15		NUMBER
CNT16		NUMBER
CNT17		NUMBER
CNT18		NUMBER
CNT19		NUMBER
CNT20		NUMBER

G.4 LTPPGVW tables

The LTPPGVW tables store gross vehicle weight distributions for a given year at a site for each vehicle class on a monthly basis by lane. The table is described below. The table naming convention is LTPPGVWyyyyxxxxxx where yyyy is the 4 digit year and xxxxxx is the STATE_CODE, SHRP_ID combination for the site. An input file for each set of weight distributions is identified in the table If more than one file has data for a month, the last file loaded will show in FILENAME. There will be duplicate records for a month if the data is split across two or more weight files. Each bin covers a 4 kip interval with a maximum vehicle weight of 204,000 pounds. There is no provision for including PURGE or ERROR characteristics in this file. If purges are applied to a weight file, this table is not updated. Records with critical errors as identified by EDIT_1 codes on the output files are not included in these numbers.

SQLWKS> desc ltppgvwyyyyxxxxxx;

Column Name	Null?	Type	Column Name	Null?	Type
FILENAME		VARCHAR2(32)	DIRECTION		NUMBER
MONTH		NUMBER	VEHICLE_CLASS		NUMBER
LANE		NUMBER	BIN1		NUMBER

Column Name	Null?	Type	Column Name	Null?	Type
BIN2		NUMBER	BIN26		NUMBER
BIN3		NUMBER	BIN27		NUMBER
BIN4		NUMBER	BIN28		NUMBER
BIN5		NUMBER	BIN29		NUMBER
BIN6		NUMBER	BIN30		NUMBER
BIN7		NUMBER	BIN31		NUMBER
BIN8		NUMBER	BIN32		NUMBER
BIN9		NUMBER	BIN33		NUMBER
BIN10		NUMBER	BIN34		NUMBER
BIN11		NUMBER	BIN35		NUMBER
BIN12		NUMBER	BIN36		NUMBER
BIN13		NUMBER	BIN37		NUMBER
BIN14		NUMBER	BIN38		NUMBER
BIN15		NUMBER	BIN39		NUMBER
BIN16		NUMBER	BIN40		NUMBER
BIN17		NUMBER	BIN41		NUMBER
BIN18		NUMBER	BIN42		NUMBER
BIN19		NUMBER	BIN43		NUMBER
BIN20		NUMBER	BIN44		NUMBER
BIN21		NUMBER	BIN45		NUMBER
BIN22		NUMBER	BIN46		NUMBER
BIN23		NUMBER	BIN47		NUMBER
BIN24		NUMBER	BIN48		NUMBER
BIN25		NUMBER	BIN49		NUMBER
			BIN50		NUMBER

G.5 LTPPRC tables

LTPPRC tables are used to stored erroneous classification records for a specific input file. A table is created even if there are no errors in the file. The naming convention is LTPPRCxxxxxx_ext_v where xxxxxx is the combination of STATE_CODE, SHRP_ID. Ext is the extension for the input file and v is the version counter for loading the data into the database. A full day's records will be stored when the error is the result of a 24 hour interval evaluation such as 1 a.m. > 1 p.m. volumes. A partial day's records will be stored when more or less than 24 hours of data are found for a file. Inspection of the error tables for consecutively labeled data files may be used in conjunction with the appropriate LTPPD* file to determine if a complete day's worth of data has been split across two files. FILENAME is null since the source file is identified in the file name. FUNC_CLASS is functional classification. Although there are no non-null fields, there should be no duplicate records in this table if the source file was correctly prepared. A duplicate for DIRECTION, DAY, HOUR and LANE may occur when clocks are turned back for daylight saving's time. All other fields but ERROR and PURGE are read directly from the summary.dat file for the classification files. ERROR uses the same codes as the LTPPD

file. PURGE is 0 (keep the data) or 1 (eliminate the data) depending on whether or not it is to be used in further calculations. The table structure is shown below.

SQLWKS> desc ltpprcxxxxxx_ext_v;

Column Name	Null?	Type
FILENAME		VARCHAR2(32)
STATE_CODE		NUMBER
FUNC_CLASS		NUMBER
STATION		VARCHAR2(6)
DIRECTION		NUMBER
YEAR		NUMBER
MONTH		NUMBER
DAY		NUMBER
HOUR		NUMBER
LANE		NUMBER
ERROR		NUMBER
PURGE		NUMBER
VOLUME1		NUMBER
VOLUME2		NUMBER
VOLUME3		NUMBER
VOLUME4		NUMBER
VOLUME5		NUMBER
VOLUME6		NUMBER
VOLUME7		NUMBER
VOLUME8		NUMBER
VOLUME9		NUMBER
VOLUME10		NUMBER
VOLUME11		NUMBER
VOLUME12		NUMBER
VOLUME13		NUMBER
VOLUME14		NUMBER
VOLUME15		NUMBER
VOLUME16		NUMBER
VOLUME17		NUMBER
VOLUME18		NUMBER
VOLUME19		NUMBER
VOLUME20		NUMBER

G.6 LTPPRW tables

The LTPPRW table serves the same function for weight files as the LTPPRC table serves for classification files, storage of erroneous records. A description of the table is shown below. The naming convention is LTPPRWxxxxxx_ext_v is nearly identical to that for LTPPRC tables. Unlike the LTPPRC tables there is no FILENAME field. All other elements are read directly from the summary.dat file except for PURGE. The list of possible errors for a weight file is different from those for a classification file. PURGE is 0/1 valued. Zero is for a record that has

not been removed. One is for a record that has been removed. The PURGE information does not reflect the coding in the processed data file for critical errors with EDIT_1 codes of C. If a record has a continuation card, the information from both records is included in a single record in this table.

SQLWKS> desc ltpprwxxxxxx_ext_v;

Column Name	Null?	Type
STATE_CODE		NUMBER
FUNC_CLASS		NUMBER
STATION		VARCHAR2(6)
DIRECTION		NUMBER
YEAR		NUMBER
MONTH		NUMBER
DAY		NUMBER
HOUR		NUMBER
ERROR		NUMBER
VEHICLE_CLASS		NUMBER
BTYPE		NUMBER
ETYPE		NUMBER
REGWEIGHT		NUMBER
BREG		NUMBER
LANE		NUMBER
COMMOD		NUMBER
LOAD		NUMBER
TOTWEIGHT		NUMBER
TOTWHEEL		NUMBER
SERIAL		NUMBER
PURGE		NUMBER
WEIGHT_A		NUMBER
WEIGHT_B		NUMBER
WEIGHT_C		NUMBER
WEIGHT_D		NUMBER
WEIGHT_E		NUMBER
WEIGHT_F		NUMBER
WEIGHT_G		NUMBER
WEIGHT_H		NUMBER
WEIGHT_I		NUMBER
WEIGHT_J		NUMBER
WEIGHT_K		NUMBER
WEIGHT_L		NUMBER
WEIGHT_M		NUMBER
SPACE_AB		NUMBER
SPACE_BC		NUMBER
SPACE_CD		NUMBER
SPACE_DE		NUMBER
SPACE_EF		NUMBER
SPACE_FG		NUMBER
SPACE_GH		NUMBER

Column Name	Null?	Type
SPACE_HI		NUMBER
SPACE_IJ		NUMBER
SPACE_JK		NUMBER
SPACE_KL		NUMBER
SPACE_LM		NUMBER

G.7 LTPPERRORCOUNT

The LTPPERRORCOUNT table is a working table used for accumulating data in the preparation of the QC cover sheet. It is empty otherwise.

SQLWKS> desc ltpperrorcount;

Column Name	Null?	Type
ERROR	NOT NULL	NUMBER
LANE	NOT NULL	NUMBER
DIRECTION	NOT NULL	NUMBER
MONTH	NOT NULL	NUMBER
DAY	NOT NULL	NUMBER

G.8 Codes for ERROR in ORACLE tables

The following are the reasons associated with a value of ERROR in the traffic QC software ORACLE tables.

REASON	CODE	REASON	CODE
EDITFLAG_OK	0	BAD_SITE	22
BAD_CARDTYPE	1	BAD_EQUIP	23
BAD_ID6	2	BAD_COUNTMETHOD	24
BAD_ID3	3	BAD_ENFORCEMETHO	25
CONSECHEADERRECS	4	BAD_OPTCLASS	26
BAD_DAY	5	BAD_HOUR	27
BAD_WEEKDAY	6	BAD_BODYTYPE	28
BAD_STATE	7	BAD_ENGINETYPE	29
BAD_STATION	8	BAD_COMMODITY	30
BAD_FUNC	9	BAD_MCYCLERPT	31
BAD_VEHTYPE	10	BAD_REGWEIGHT	32
BAD_TOTWTSUB	11	BAD_BASISREG	33
BAD_TOTWHEELSUB	12	BAD_LOADSTATUS	34
BAD_WEIGHT	13	BAD_VEHCOMBO	35
BAD_SPACE	14	BAD_MINUTE	36
BAD_LANE	15	BAD_SECOND	37
BAD_SERIAL	16	BAD_HUNDRETH	38
BAD_CONT	17	BAD_NUMAXLES	39
BAD_VOLUME	18	BAD_RECORDLEN	40
BAD_METHOD	19	BAD_DATESEQ	41
BAD_ATR	20	BAD_ALLWEIGHTS	42
BAD_ROUTE	21	BAD_ALLSPACES	43

REASON	CODE	REASON	CODE
BAD_DIRECTION	44	BAD_YEAR	54
BAD_TOTALWGT	45	BAD_NUMAX	55
BAD_TOTALSPACE	46	BAD_TIME	56
BAD_ROUTECAT	47	BAD_SPEED	57
BAD_COUNTY	48	BAD_MONTH	58
BAD_HPMS	49	BAD_DATE	59
BAD_AADT	50	CONSEC_ZERO_VOLS	60
BAD_FOOTNOTE	51	CONSEC_STATIC_VOLS	61
BAD_YRESTAB	52	ONE_AM_ONE_PM	62
BAD_YRDISC	53	MISSING_HOUR_VOL	63

G.9 Statistics Possible Using ORACLE Tables

The following statistics can be created for sites where all data for a given year has been processed through the new software.

- Number of days of class data received: LTPPD4 table
- Number of records of class data received: LTPPD4 table and LTPPC tables (or LTPPFILETRACKER)
- Number of days of WIM data received: LTPPVOL7 table
- Number of records of WIM data received: LTPPVOL7 table and LTPP RW tables (or LTPPFILETRACKER)
- Number of days of class data received vs. accepted for processing: Using the LTPPD4 table and the LTPPRC tables for a site for a given year.
- Number of records of class data received vs. accepted for processing: Using the LTPPD4 table and the LTPPRC tables for a site for a given year.
- Number of records of WIM data received vs. accepted for processing: Using the LTPPVOL7 table, and the LTPPRW tables for a site for a given year.
- Number of files for which QC reports have been sent: LTPPFILETRACKER
- Number of files for which QC reports have been received back: LTPPFILETRACKER
- Number of sites for which QC reports have been sent: LTPPFILETRACKER
- Number of sites for which QC reports have been received back: LTPPFILETRACKER
- Number of sites for which traffic data has been received generally (or by type) (by state) (by year): Using LTPPFILETRACKER and EXPERIMENT_SECTION
- Distribution of errors in classification data by type: LTPPD4
- Percentage of invalid weight records in a file at a site: Using LTPPVOL7 and LTPPRW tables
- Distribution of weight errors by type: LTPPRW tables
- Distribution of vehicles by class: :LTPPVOL7, LTPPD4 and LTPPGVW tables
- Days of purged data: LTPPVOL7 and LTPPD4

H. Processing Resubmitted Raw Data

There are three basic cases under which a data resubmission occurs. In the first instance, data submitted was submitted in 1999 or later and processed only with the new software and a determination is made somewhere in the QC process that the information is in error. The second case is where, for whatever reason, a decision is made to reduce the data processing by handling the LTPP lane only. The third is the result of an in depth data review which calls into question data received and processed prior to 2000. In this instance the new software has no record of previous submissions in the current directory structure. Each case must be treated differently.

H.1 Data processed only by the NT software

A multi-step process must be used to eliminate all information which might confuse the QC process. However, not all data will be removed during this process in order to retain the data trail. A record will be retained in the ORACLE table that the data was loaded and subsequently modified substantially at the raw data file level. The steps are as follows:

1. Identify the file name, date and first and last records of the file being replaced (the original raw data file). Make a note of this information for use in subsequent steps.
2. Erase the output file from the relevant AVC4 or WIM7 subdirectory using WIN NT Explorer, File Manager or other appropriate tool.
3. Determine which summary.dat file(s) contain information from the input file. Summary.dat files which have data only from the input file (all data for the month was in a single input file) may be erased. For all other summary.dat files which have data from more than one input file, open a text editor. Using the text editor, erase all records which have data from the raw data file being replaced. The records to be removed will all start with the file name of the raw data file except the continuation records. They are left justified data and should be removed with their companion face cards. Save each non-empty file as summary.dat in its original directory.
4. If the input file was a classification file there is one SQL which must be created. It is of the form – “delete from LTPPD4xxxxxx where FILENAME = ‘filename’ “ where xxxxxx is the appropriate STATE_CODE, SHRP_ID combination and filename is the exact name (upper case) of the file which has the data to be removed. Note that filenames in ORACLE tables for traffic use underscore not period to separate a filename from its extension. The SQL and its output should be spooled under a name of the format Dextmm-dd-yyyy.sql where ext is the extension of the file being replaced and mm-dd-yyyy is the date the action was taken. The output should be saved in the AVC4 directory for future reference. Permission is not needed to run this SQL.

5. If the input file was a weight file there are two SQLs which must be created. The first is of the form – “delete from LTPPVOL7yyyyxxxxxx where FILENAME = ‘filename’ ” where yyyy is the year for the source file and xxxxxx is the appropriate STATE_CODE, SHRP_ID combination. Filename is the exact name (upper case) of the file which has the data to be removed. The SQL and its output should be spooled under a name of the format Vextmm-dd-yyyy.sql where ext is the extension of the file being replaced and mm-dd-yyyy is the date the action was taken. The output should be saved in the WIM7 directory for future reference. The second is of the form – “delete * from LTPPGVWyyyyxxxxxx where MONTH IN (a,b,c)” where yyyy is the year for the source file, xxxxxx is the appropriate STATE_CODE, SHRP_ID combination and A,B and C represent the month(s) of data included in the file to be reprocessed. Since the last file used is the name assigned to a month’s data, the file name present in the file may or may not identify all of the data to be reprocessed. There is no way short of reprocessing all the weight data with dates in the relevant months to guaranteed the validity of the weight graphs. The SQL and its output should be spooled under a name of the format Gextmm-dd-yyyy.sql where ext is the extension of the file being replaced and mm-dd-yyyy is the date the action was taken. The output should be saved in the WIM7 directory for future reference. Permission is not needed to run these SQLs.
6. Select the File Tracker option from the main menu. Select the version of the loaded file that is being replaced. It should be the highest number version. This version and its error files are NOT being removed. A record of the processing is being maintained. The record will be kept in the LTPPFILETRACKER table. The comments section (View/Edit File Comments) should be annotated in a fashion similar to the following and the comments APPLIED to insure they are recorded in the database.

   'input file' was replaced on 'DATE'. The AVC4 summary.dat files for yyyy for the months of mmm, mmm... were erased. The summary.dat files for yyyy for the months of mmm, mmm ... were modified. 'output file' was erased. Changes to the LTPPD* table were made using Dextmm-dd-yyyy.sql
   OR
   'input file' was replaced on 'DATE'. The WIM7 summary.dat files for yyyy for the months of mmm, mmm... were erased. The summary.dat files for yyyy for the months of mmm, mmm ... were modified. 'output file' was erased. Changes to the LTPPVOL7 table and LTPPGVW table where made using Vext-mm-dd-yyyy.sql and Gext-mm-dd-yyyy.sql.

Note that the record pertaining to the original loading of this data file and the error file associated with it are NOT being removed.

H.2 Going from all lanes to LTPP lane only

The software will permit loading of all lanes or only the LTPP lane. If it is decided to change already processed files from all lanes and to only the LTPP lane, the only way to clean up the traces is to treat the condition as a resubmittal of data and use the instructions of the section above.

H.3 Data not previously processed by the NT software

If one or more files processed by the old software is replaced, all files of that type or none of the remainder need to be processed through the new QC software. If a QC packet from the QC software is desired then all files of the type must be processed through the new QC software. If a QC packet from the traffic analysis software is satisfactory, then the replaced file should be processed through the QC software and all remaining files processed according to LTPP traffic analysis software instructions.

I. Data Evaluation and Error Identification

There are several steps is evaluating inputs. The first is verification that the file will load. Some of the checks at that step are identified in section I.5. The actual evaluation of data is done on the 4-card and 7-card versions of records. This means that error checking on data in c-card and w-card formats will not catch errors such as alphas in numeric fields or duplication of data within a record line in these formats. Error checking may not catch data duplication within a line for 4-card or 7-card records either. Within a record error checking is for rational rather than “correct” values. Thus there is limited logic to verify that a 6-digit truck identifier actually represents a truck vehicle. Additionally, there is no checking currently being done to verify that the number of axles and spaces is consistent with each other and with the identified vehicle class.

The logic for checking errors is such that the first error found is the error identified with the record. In loading files, several attempts may need to be made to eliminate all problems preventing file loading.

Several of the following sub-sections list the allowable ranges, the valid values, the severity of an error and the error number or flag associated with it. The allowable ranges (Min, Max) are those of the original software. The Valid Data is what the current version of the software expects for critical elements. Where there is no difference between the two ranges groups, Valid Data is blank. Severity of an error indicates whether the data from the record should be included in the summaries found in the LTPPD4*, LTPPVOL7* and LTPPGVW* tables. All critical errors are omitted from the summaries. All records with errors are included in the LTPPR* tables and the record counts for LTPPFILETRACKER. Error numbers are used in the LTPPR* tables to identify why the record was rejected. Flags are used to attach reasons to output data files. The flags and the error numbers should match.

I.1 Card 4 Range Check Parameters

The state codes identified are all of those which actually could be encountered by the LTPP program for the states and provinces.

The functional class values represent the systems on which LTPP data is collected. LTPP does not expect data from local streets.

The value of 10 and 11 is used to differentiate between the 4-card and the c-card formats (and 7-card and w-card formats) on loading. The values in the relevant columns are mutually exclusive. For 4- and 7-card the allowable value are 00-09 and 89-99 for C-and W-card the allowable

values are 10-88. The C-/W-card limits will permit loading of data collected in 0, the code for all lanes. However, this value of lane will be flagged as a critical and the record omitted from processing for annual estimates. For data submitted on a two-lane roadway, where the code for lane is 0, it is strongly recommended that subject to verification of this condition that a copy of original data file be modified and loaded with lane=1. That change, if made, MUST be entered in LTPPFILETRACKER comments and the PURGE file for that site even if no purges are made.

The software makes no provision for verifying that the maximum number of days in a month represents the maximum number possible.

Field	Min	Max	Valid Data	Field Type	Severity	Flag	Error
CARD TYPE	4	4	4	Numeric	Critical	A	1
STATE	1	90	1,2,4-6,8-56, 72,81-90	Numeric	Critical	G	7
FUNC CLASS	0	99	1,2,6,7,8,11 12,14,16,17	Numeric	Non Critical	I	9
STATION	0	999	alphanumeric	Alpha	Non Critical	C	3
DIRECTION	1	8	1-8	Numeric	Critical	0	44
YEAR	0	99	89-07	Numeric	Critical	!	54
MONTH	1	12		Numeric	Critical	$	58
DAY	1	31		Numeric	Critical	.	5
HOUR	0	24	0-23	Numeric	Critical	a	27
CLASS 1	0	99		Numeric	Critical	R	18
CLASS 2	0	9999		Numeric	Critical	R	18
CLASS 3	0	999		Numeric	Critical	R	18
CLASS 4	0	99		Numeric	Critical	R	18
CLASS 5	0	999		Numeric	Critical	R	18
CLASS 6	0	99		Numeric	Critical	R	18
CLASS 7	0	99		Numeric	Critical	R	18
CLASS 8	0	99		Numeric	Critical	R	18
CLASS 9	0	999		Numeric	Critical	R	18
CLASS 10	0	99		Numeric	Critical	R	18
CLASS 11	0	99		Numeric	Critical	R	18
CLASS 12	0	99		Numeric	Critical	R	18
CLASS 13	0	99		Numeric	Critical	R	18
MCYCL RPT	0	1		Numeric	Non Critical	e	31
VEH COMBO	0	1		Numeric	Non Critical	i	35

Field	Min	Max	Valid Data	Field Type	Severity	Flag	Error
LANE	0	9	1-8	Numeric	Critical	O	15
CLASS 14	0	99		Alpha	Critical	R	18
CLASS 15	0	99		Alpha	Critical	R	18
CLASS 16	0	99		Alpha	Critical	R	18
CLASS 17	0	99		Alpha	Critical	R	18
CLASS 18	0	99		Alpha	Critical	R	18
CLASS 19	0	99		Alpha	Critical	R	18
CLASS 20	0	99		Alpha	Critical	R	18

I.2 Card 7 Range Check Parameters

The comments made on the various data elements for 4-card checks also apply to 7-card data. It is particularly important to note the restriction on the value of lane. The range data checking allows for 3 records to describe a truck. This is a truck with 14 or more axles. However, the software does not make any provision for a truck with more than 13 axles worth of data to write out error records. These records will be handled as follows:

- be flagged with a critical error and omitted from summary processing
- the RW record will have all zero axle weights and spaces
- the error code will be 55, the record flag will be *

A somewhat more rigorous check on the 6-digit classification is made than is used in both the previous versions of this software and the VTRIS software. The checks can be summarized as shown below:

A valid vehicle classification can be (and is) determined without use of DEFSHT.dat. For the 6-digit case to completely process two items of information are needed: the value of each position in the classification and the number of axles calculated on the basis of the values in each position for groups 3-8 only.

090001-090900	if the 3rd, 5th and 6th digits = 0, vehicle_class = 2; otherwise vehicle_class=15
090901-099999	vehicle_class = 15
100000-150000	if the 4th, 5th and 6th digits=0, vehicle_class is two left digits; otherwise vehicle_class=15
150001-189999	vehicle_class=15
190000-190400	if the 3rd, 5th and 6th digits = 0, vehicle_class = 4; otherwise vehicle_class=15
190401-199999	vehicle_class = 15
200000-280900	if the 3rd, 5th and 6th digits = 0

	If the 2nd digit = 0 or 1, vehicle_class = 3 If the 2nd digit = 2, vehicle_class = 5 If the 2nd digit = 3, vehicle_class = 6 if 4 <= 2nd digit<= 8, vehicle_class = 7 otherwise vehicle_class = 15
260901-320999	vehicle_class = 15
321000-349000	if the 4th, 5th and 6th digits = 0 the number of axles must be computed (numaxles) otherwise the numaxles is set to 20; if 3 <= numaxles <5, vehicle_class = 8 if numaxles = 5, vehicle_class = 9 if 5< numaxles <11, vehicle_class = 10. In any other case vehicle_class = 15.
349001-421999	vehicle_class = 15
422000-449000	same as 321000-349000 except that minimum number of axles for vehicle_class 8 = 4 not 3.
449001-521099	vehicle_class = 15
521100-549900	if the 5th and 6th digit = 0, the number of axles must be computed (numaxles) otherwise the numaxles is set to 20; if numaxles = 5, vehicle_class = 11 if numaxles = 6, vehicle_class = 12 if 6 < numaxles < 13, vehicle_class = 13 In any other case vehicle_class = 15.
549901-622199	vehicle_class = 15
622200-649900	same as 521100-549900 except the numaxles = 5 is not a possibility.
649901-721219	vehicle_class = 15
721220-749990	if the 6th digit = 0, the number of axles must be computed (numaxles) otherwise the numaxles is set to 20; if 7 <= numaxles <16, vehicle_class = 13 In any other case vehicle_class = 15.
749991-822219	vehicle_class = 15
822220-849990	same as 721220-749990 except the minimum number of axles is 8.

Additionally, the total wheel base and the gross vehicle weight are checked to verify that the sum of the individual inputs is with 15 percent of the respective totals.

Field	Min	Max	Valid Data	Field Type	Severity	Flag	Error
CARD TYPE	7	7		Numeric	Critical	A	1
STATE	1	90	1,2,4-6,8-56, 72,81-90	Numeric	Critical	G	7
FUNC CLASS	0	99	1,2,6,7,8,11 12,14,16,17	Numeric	Non Critical	I	9
STATION	0	999	alpha char	Alpha	Non Critical	C	3
DIRECTION	0	9	1-8	Numeric	Critical	0	44
YEAR	0	99	89-07	Numeric	Critical	!	54
MONTH	1	12		Numeric	Critical	$	58
DAY	1	31		Numeric	Critical	.	5
HOUR	0	24	0-23	Numeric	Critical	a	27
VEH TYPE	1	849990	see note	Numeric	Critical	J	10
BODY TYPE	0	99		Numeric	Non Critical	b	28
ENGINE TYPE	0	9		Numeric	Non Critical	c	29
REG WEIGHT	0	999		Numeric	Non Critical	f	32
BASIS OF REG	0	9		Numeric	Non Critical	g	33
LANE	0	9	1-8	Numeric	Critical	O	15
COMMODITY	0	99999		Numeric	Non Critical	d	30
LOAD STATUS	0	9		Numeric	Non Critical	h	34
TOT WEIGHT	0	9999		Numeric	Critical	f	45
WEIGHT A	1	400	10-400	Numeric	Critical	M	13
WEIGHT B	1	400	10-400	Numeric	Critical	M	13
WEIGHT C	0	400		Numeric	Critical	M	13
WEIGHT D	0	400		Numeric	Critical	M	13
WEIGHT E	0	400		Numeric	Critical	M	13
SPACE A-B	0	450	0, 19-450	Numeric	Critical	N	14
SPACE B-C	0	450	0, 19-450	Numeric	Critical	N	14
SPACE C-D	0	450	0, 19-450	Numeric	Critical	N	14
SPACE D-E	0	450	0, 19-450	Numeric	Critical	N	14
WHEEL BASE	0	8900		Numeric	Critical	Z	46
SERIAL	0	999	1-999	Numeric	Non Critical	P	16
CONTIN.	0	9	0,1,(2,9)	Numeric	Critical	Q	17

I.3 Continuation card 7 range check parameters

The range checks on a continuation card are the same as for a face card. The sole difference is the allowable values for the continuation field.

Field	Min	Max	Valid Data	Field Type	Severity	Flag	Error
CARD TYPE	7	7		Numeric	Critical	A	1
STATE	1	90	1,2,4-6,8-56,	Numeric	Critical	G	7

Field	Min	Max	Valid Data	Field Type	Severity	Flag	Error
			72,81-90				
FUNC CLASS	0	99	1,2,6,7,8,11 12,14,16,17	Numeric	Non Critical	i	9
STATION	0	999	alpha char	Alpha	Non Critical	C	3
DIRECTION	1	8		Numeric	Critical	0	44
YEAR	0	99	89-07	Numeric	Critical	!	54
MONTH	1	12		Numeric	Critical	$	58
DAY	1	31		Numeric	Critical	.	5
HOUR	0	24		Numeric	Critical	a	27
VEH TYPE	1	849990	see note	Numeric	Critical	j	10
BODY TYPE	0	99		Numeric	Non Critical	b	28
ENGINE TYPE	0	9		Numeric	Non Critical	c	29
AXLE F	0	400		Numeric	Critical	M	13
AXLE G	0	400		Numeric	Critical	M	13
AXLE H	0	400		Numeric	Critical	M	13
AXLE I	0	400		Numeric	Critical	M	13
AXLE J	0	400		Numeric	Critical	M	13
AXLE K	0	400		Numeric	Critical	M	13
AXLE L	0	400		Numeric	Critical	M	13
AXLE M	0	400		Numeric	Critical	M	13
SPACE E-F	0	450	0, 19-450	Numeric	Critical	N	14
SPACE F-G	0	450	0, 19-450	Numeric	Critical	N	14
SPACE G-H	0	450	0, 19-450	Numeric	Critical	N	14
SPACE H-I	0	450	0, 19-450	Numeric	Critical	N	14
SPACE I-J	0	450	0, 19-450	Numeric	Critical	N	14
SPACE J-K	0	450	0, 19-450	Numeric	Critical	N	14
SPACE K-L	0	450	0, 19-450	Numeric	Critical	N	14
SPACE L-M	0	450	0, 19-450	Numeric	Critical	N	14
SERIAL	0	999	1-999	Numeric	Non Critical	P	16
CONTIN.	0	9	(0,1,)2,9	Numeric	Critical	Q	17

I.4 QC Edit Flag Codes

Each record processed through the QC process will have a two character edit code appended to it. This code indicates to the analysis software whether or not the record is to be included in summary statistics. The first character indicates the severity of the error. Table I.1 shows the possible values for the first character.

Table 5-8 Edit_1 Codes

Edit Flag Name	First Edit Flag Character
EDITFLAG_OK	_ (UNDERSCORE)

Edit Flag Name	First Edit Flag Character
NONCRITICAL_ERROR	N
CRITICAL_ERROR	C

The second character identifies the problem with the record. Table I.2 shows the possible values of the second character. Only one error can be reported per record. Error codes r-z, &, #, ^, ~, |, >, < and ? are associated with purging data.

Table 5-9 Edit_2 Codes

Second Edit Flag	Edit Flag Name
_	EDIT FLAG OK
A	INVALID CARD TYPE IDENTIFIER
B	6 DIGIT STATION ID
C	3 DIGIT STATION ID
D	FAULTY CONSECUTIVE HEADER RECS
E	INVALID DAY SPECIFIED
F	INVALID WEEKDAY SPECIFIED
G	INVALID STATE ID
H	INVALID STATION ID
I	INVALID FUNCTIONAL CLASS
J	INVALID VEHICLE TYPE
K	INVALID TOTAL WEIGHT
L	INVALID TOTAL AXLE SPACING
M	INVALID AXLE WEIGHT
N	INVALID AXLE SPACING
O	INVALID LANE
P	INVALID SERIAL NUMBER
Q	CONTINUATION CARD
R	INVALID VOLUME
S	INVALID METHOD
T	INVALID ATR
U	INVALID ROUTE
V	INVALID SITE
W	INVALID EQUIPMENT TYPE
X	INVALID COUNT METHOD
Y	INVALID ENFORCEMENT METHOD
Z	INVALID OPTCLASS
a	INVALID HOUR
b	INVALID BODY TYPE
c	INVALID ENGINE TYPE
d	INVALID COMMODITY
e	INVALID MCYCLERPT
f	INVALID REG WEIGHT
g	INVALID BASIS REGISTRATION
h	INVALID LOAD STATUS
i	INVALID VEHICLE COMBO
j	INVALID MINUTE
k	INVALID SECOND
l	INVALID HUNDRETH OF SECOND
m	INVALID NUMBER OF AXLES
n	INVALID RECORD LENGTH
o	INVALID TIME/DATE SEQUENCE
p	INVALID ALL AXLE WEIGHTS
q	INVALID ALL AXLE SPACINGS
r	8+ CONSECUTIVE ZEROS
s	TIME CHECK
t	MISSING DATA
u	ZERO DATA
v	IMPROPER DIRECTION DESIGNATION
w	IMPROPER LANE DESIGNATION
x	7 CARD GREATER THAN 4 CARD DAILY VOLUME BY SIGNIFICANT DIFFERENCE
y	4+ CONSEC NONZEROS
z	4 CARD GREATER THAN 7 CARD DAILY VOLUME BY SIGNIFICANT DIFFERENCE
0	INVALID DIRECTION
1	INVALID TOTAL WEIGHT

Second Edit Flag	Edit Flag Name
2	INVALID TOTAL SPACE
3	INVALID ROUTE CATEGORY
4	INVALID COUNTY
5	INVALID HPMS SAMPLE SECTION
6	INVALID AADT
7	INVALID FOOTNOTE
8	INVALID YEAR ESTABLSHED
9	INVALID YEAR DISCONTINUED
!	INVALID YEAR
*	INVALID NUMBER OF AXLES (>13)
@	INVALID TIME
%	INVALID SPEED
$	INVALID MONTH
.	INVALID DATE

Second Edit Flag	Edit Flag Name
,	8+ CONSECUTIVE ZERO VOLUMES
?	4+ CONSECUTIVE STATIC VOLUMES
/	1 AM VOLUME > 1 PM VOLUME
)	MISSING HOURLY VOLUME
+	ZERO DAILY VOLUME
&	OVER CALIBRATED
#	UNDER CALIBRATED
^	LARGE % OF VEHICLES > 80 KIPS
~	LARGE % OF VEHICLES < 12 KIPS
|	LOWER VOLUMES THAN EXPECTED – POSSIBLE SENSOR PROBLEM
>	MISCLASSIFICATION ERROR
<	ATYPICAL PATTERN
?	USER ENTERED

I.5 File Fatal Flaws

The following rules are incorporated in the QC software with respect to accepting files for loading and processing. A failure results in a file that doesn't load. The advantage of stopping the loading process is that none of the output files or ORACLE tables will exist. The file can be edited and reloaded. The version number will increase but that has no impact on the rest of the processing.

- **$** Records must start with C, W, 2, 4 or 7.
- **$** All records in the file must match the first data record. The exception is 2-cards followed by 7-cards.
- **$** File type (c,w) must match record type (4,C or 7,W respectively) where the record type is recognized as valid.
- **$** State code in the file must match the state code in the file name.
- **$** The month and year of the file extension must match the month and year of the first data record.
- **$** The first record read in the file must have all valid (non-null entries)
- **$** Blank lines including the last line of a file.
- **$** Year must be constant. Month and day must be constant or increasing.

The following individual record errors will stop loading. the line number of the failure will appear in the log.

- All records in a 4-card file must be the same length as the first record in a file.
- The length of a converted c-card must be the same as the first record converted in the file.
- A 7-card must have 80 columns.
- A w-card must have the same characters in the first three columns. (This is a very weak check.)

J. Log Files

J.1 Log File Names and Location

Log files for the TRF QC software are written to the LOGS subdirectory. The LOGS subdirectory is located as a first tier subdirectory in the user's preferred directory (PREFS). It has a subdirectory for each year that processing occurs. Within that subdirectory are stored all of the log files. The naming convention for log files is YYMMDDLX.log where X is the level of processing. 4 is for QC processing, 3 for creation of daily summaries, 2 for annual summaries by vehicle class and 1 for annual summaries combining all classes. YYMMDD refers to the day the log was created. Log files are appended, not overwritten with each successive batch of files loaded on a given day. The log file is tab delimited ASCII.

J.2 Log File Contents

The log file reports the success or failure of loading a data file. A failed attempt to load a file will be include the reason. For each batch of files loaded the number of successfully and unsuccessfully loaded will be summarized at the end of the file list.

Note: A file that fails to load or process completely may show up in LTPP File Tracker with state XX since if was entered in LTPPFILETRACKER[15] with STATE_CODE 00. It will have a processed date of 01/01/2025. Another outcome may be the creation of the directory NoRegion in the user specified directory with state = XX, site = 001000 and year = 0.

If a record is not found in the SHRP.DAT file for a given site, the file will not load. The subdirectories will be created if the state in the file name is valid but the SHRP ID is not.

A message - "Failed to create directory path for index files" will appear if an invalid state code is used. That message will be followed by the same SHRP.DAT message.

A case of no errors captured and no file loaded (Load failed) indicates that the attempt to create directories, write index files, summary.dat files or output files failed. Verify preferences and the amount of space in the output directory before proceeding.

[15] See section G.1 for a description of this table.

A case of no record in the output log of any type without the program aborting implies that more files were included in the list for loading then the software could handle. The maximum is approximately 70 depending on the path length.

Below are listed the various warning and error messages that will be printed into the raw data QC process log file.

File "filename" ext/date do not match 1st record Adate@ - The date of the first record in the file does not match that of the extension. The data on the first record is printed out to assist in renaming the file.

File name inconsistent with file type - The first character of the file name and the record type in the file are inconsistent.

Input file contains no loadable data matching criteria - The loading is being done with LTPP Lane only selected and the lane or direction in the file does not match the lane and or direction for the LTPP section in the SHRP.DAT file.

Record format does not appear valid OR Record format does not appear valid for a 3-card (4-card, 7-card, C-card, W-card) - In each case the data in columns 11 and 12 does not match the expected values. For 3-, 4- and 7-cards this is 00-09, 89-99. For C-and W-cards this is 10-88.

Input data lines must begin with a (4, 7, C, W) - In each case a record begins with a character that does not match the rest in the file. This includes spaces and line feed characters which produce blank last lines.

State value does not match file content - The state in the name and the state in the first record in the file must be the same. This message will also appear when an attempt is made to load a HELP file.

Attempt to load invalid data file - The data file matches no recognized record type.

Too many station ID cards - More than eight 2-cards at the beginning of the file.

Input contains station ID card only - no loadable data - The file consists of a 2-card (possibly part of an HPMS submission).

Error encountered during database processing - Processing of the summary.dat records to create the ORACLE tables could not be completed for any one of a number of reasons.

Input data line, invalid length line # - A 4-card or C-card with a length not matching that of the first record or a 7-card with other than 80 characters was encountered. Edit or remove the line and reload the file.

3-cards currently not supported - An attempt was made to load a file with 3 cards.

Record format does not appear valid - A validation check failed on the record type somewhere after the first record in the file. See the record specific error message above for review criteria.

Failed to find FUNCLASS.DAT for metric conversion. - The file is missing from the DAT directory and the file will not load. This message is relevant to C-card and W-card files only.

Attempt to store a day of volumes not found in volume array - a value for day larger than allowed by the program has been encountered.

Error splicing summary.dat - The input file contains an invalid date, probably a month. Check for summary.tmp file.

Card file is no longer available for loading. – Data set was selected for loading but user tried to select files in more than one directory. Only files from the last directory selected will load.

Failed to Locate DEFSHT.DAT information. Load succeeded.

Failed to Locate NEWSHT.DAT information. Load succeeded. - The files will be completely processed in either case except that the index file will not be created properly. This is a non-fatal error.

K. LTPP QC Program Error Descriptions

A variety of error messages can appear that are specific the use of the LTPP QC software, in addition to error messages that may be produced by ORACLE or Microsoft Windows **J**. The following is a list of error messages and descriptions of the problem at hand.

$ Failed to load SHRP DAT information!
The SHRP.DAT file could not be located during the data loading process. The Base Data Directory may be specified incorrectly in the User Preferences menu.

$ Failed to load default DAT sheet!
The DEFSHT.DAT file could not be located during the data loading process. The Base Data Directory may be specified incorrectly in the User Preferences menu.

$ Failed to load new DAT sheet!
The NEWSHT.DAT file could not be located during the data loading process. The Base Data Directory may be specified incorrectly in the User Preferences menu.

$ Error creating archive directory.
The program loaded a data file and attempted to create the archive directory and file but was unable to. The specified directory name length may be too long for Microsoft Windows, or permissions on directories within the Base Data Path may be incorrect.

$ A connection could not be made to the file tracker database.
A connection to the database exists, but the connection to the LTPP File Tracker has been dropped. Disconnect from the database and reconnect.

$ Failed to create directory path for saving data file.
The QC software creates a lengthy directory structure under the Base Data Path in the User Preferences. During data loading, the directory failed to be created. Possible causes are directory/user permissions, or the length of the final directory name exceeded a given limit.

$ Unable find specified file in file tracker.
The software believes a given file was loaded and should exist in the LTPP File Tracker, but the entry does not exist. This error may arise if an entry is deleted from the file

tracker and subsequently used in a menu that was already open. All menus containing reference to that file must be closed and the file reloaded (if desired).

$ Couldn't open a temporary file for processing.
Microsoft Windows failed to allocate a temporary file processing. Possible causes are that the TEMP directory doesn't exist, the number of files in the location is at a maximum limit, or the hard disk is full.

$ Unable to find file tracker entry.
The software believes a given file was loaded and should exist in the LTPP File Tracker, but the entry does not exist. This error may arise if an entry is deleted from the file tracker and subsequently used in a menu that was already open. All menus containing reference to that file must be closed and the file reloaded (if desired).

$ Unable to retrieve file tracker entries.
The program could not find the LTPP File Tracker (table LTPPFILETRACKER) in the database. Permissions may be set improperly on the table, or the table may have been deleted while the software was in use.

$ Couldn't open archived file for updating. Purges partially applied.
Apply Purges operation was attempted, but the archived data file was not located. It was probably moved or deleted. Use the LTPP File Tracker to browse for the file. If it cannot be found, then the file was permanently deleted and must be reloaded into the software from the original data file.

$ Failed to delete archived file before overwrite. Purge failed.
The QC software must read and rewrite the archived data file when purges are applied. The above error is produced because the software could not delete and rewrite the file, probably due to permission problems.

$ Input file "<name>" is same as output file!
An archived (previously processed) data file was loaded into the software. This operation is forbidden.

$ Failed to locate SHRP.DAT information for file <name>.
The data collection site information could not be located in the SHRP.DAT file.

$ Card file "<name>" is no longer available for loading.

During the loading operation, the specified input file name was deleted or became no longer available.

$ Failed to process sheet information for this file!
The sheet information (11, 12, or 13) failed to be produced. This can occur if there is a failure to read, write, or update the CINDEX binary files used to store sheet information pertaining to input data files. Permissions may be set improperly on the directories within the Base Data Path directory structure.

$ Card type consistency error. Discarding data!
During the loading process, a card type (C, W, 4, 7) inconsistency was encountered, and the type of data can no longer be confirmed. The input data file is discarded, and the loaded process for that file discontinued.

$ Data file corrupted. Discarding data!
During the loading process, a problem with the file (probably incomplete data) was encountered. The file loading process is discontinued and all data discarded.

$ Unable to open FUNCLASS.DAT file for card conversion.
The FUNCLASS.DAT file could not be located, which contains the functional classification codes for the specified SHRP ID. This is used only during conversion from C & W to 4 & 7 cards. The data cannot be converted without this DAT file.

$ Functional classification not found in FUNCLASS.DAT.
The FUNCLASS.DAT file exists, but the site could not be located in the file and, therefore, the functional classification code is not found.

$ Invalid compliment data file selected.
A comparative graph option was selected on the Graph MGR menu, and the user was prompted for an input weight file, but no complimentary data file was provided.

$ Error Getting Logical DriveStrings!
The program requested physical drive (hard disk, floppy, CD ROM) information from Microsoft Windows, but none was returned. The only cause could be that Windows does not currently want to cooperate.

$ Error Getting SystemFileInfo!

The QC software attempted to get iconic images represented the physical drives on your computer, but failed. No probable cause.

$ Cannot retrieve the Handle of SystemImageList!
Iconic images for directories and files on your computer were not locatable. There may be a problem with memory sharing at the current time on your computer. Try restarting the program or rebooting the computer to free system resources.

$ Selected data file does not contain weight data.
The user specified a complimentary input weight file for comparative graphing with the Graph MGR, but the input data file is not a weight data file.

$ One or both files contain no data.
The comparative graphing option was specified on the Graph MGR, and two input files were given, but one or both contain no data.

$ Couldn't create profile directory: <name>
The program attempted to create an initial user profile (used for custom program settings), but it couldn=t be created. User profiles are typically stored in the standard user profiles directory. Have the systems administrator validate this directory and permissions.

$ Couldn't write profile to: <name>
The program was able to create a directory for the user profile, but an operator.dat file couldn=t be created in the directory.

$ Unable to read operator profile. Check permissions.
The program was unable to load the existing operator.dat file.

$ Bad profile entry detected! Defaulting.
The program encountered an invalid user profile entry and is using the default setting internal to the program.

$ Failed to open daily data table.
The program attempted to open the daily summary ORACLE table for the specified data file, but the table could not be opened. It may have been deleted, or the table permissions may be incorrect.

$ Failed to open record data table.

The program attempted to open the record level ORACLE table for the specified data file, but the table could not be opened. It may have been deleted, or the table permissions may be incorrect.

$ Couldn't scan archive directory for data files.
The program attempted to apply purges to data files which are not present. Check PREFS for the expected subdirectory path for SHRP.DAT. Check the output directories for the actual existence of the files.

$ End day must be equal to or greater than start day.
The range of day values entered manually has the value of the last day less than the value of the first day. The range must be specified within a month from lowest to highest day in the interval.

L. Issues

L.1 Support volume files

Current software does not support 3-cards which provide information only on total volumes by hour. This is required only if reprocessing of pre-1999 data is required or it is determined there are sufficient sites with continuous ATR data and sampled AVC to make it worth providing additional information for the analysis software.

L.2 Support HELP files

This is a capability lost on conversion. HELP files are thought to have been used only by the Canadian provinces. They are a truck weight record format. This is needed either if new data is received in this format or pre-1999 data must be processed.

L.3 SHRP.DAT as an ORACLE table

Much of the data in SHRP.DAT is redundant due to existence of the information in the IMS. It needs to be determined which items of information are essential to the processing software and which can be eliminated. Of those that are essential, a determination must then be made as to which are unique to the traffic software's needs and which exist in other parts of the database. Finally a table to hold all of the site constants needs to be developed.

Duplicate data:

- **$** State_Code and SHRP_ID to verify that the site exists in **EXPERIMENT_SECTION**.
- **$** Effective year, month, day are in **EXPERIMENT_SECTION** as CN_ASSIGN_DATE since they are used for ESAL calculations. Additional records have customarily been added when CONSTRUCTION_NO has changed because it indicates a structure change and therefore a change in either SN or D for the relevant ESAL equation.
- **$** Direction of LTPP lane - INV_?, SPS_?. Used for identifying which data should be read and stored when LTPP lane only is selected in the QC software. (This should remain duplicate to verify that the data submitted is in fact for the LTPP lane.)
- **$** Number of lanes in the LTPP direction - INV_?
- **$** Number of lanes in the non-LTPP direction ?
- **$** Construction reason - RHB_? And various rehabilitation and maintenance tables which indicated what work was done at the time the CONSTRUCTION_NO value changed.

Unique data:

- State 3 digit ID is station number for the site from the perspective of traffic personnel in 2nd edition TMG files
- State 6 digit ID is station number for the site from the perspective of traffic personnel in 3rd edition TMG files
- Terminal serviceability index used for computing ESALs
- Structural number used for computing ESALs. It can be derived from IMS data and will be for the ESAL calculations that are actually loaded into the IMS. Possible source of this number for an analysis software input table is the intermediate values table used to generate ESAL values.
- Pavement depth used for computing ESALs. It can be derived from IMS data and will be for the ESAL calculations that are actually loaded into the IMS. Possible source of this number for an analysis software input table is the intermediate values table used to generate ESAL values.
- Pavement type (rigid or flexible) used for selecting ESAL equation. It can be derived from **TST_L05B** or **EXPERIMENT_SECTION** in the IMS.
- LTPP lane number - Used for identifying which data should be read and stored when LTPP lane only is selected in the QC software.
- 3 digit flags field ?
- Data availability code - relationship of AVC and WIM data collection locations with respect to the LTPP section and a rough quality and quantity assessment based on equipment and data received.

L.4 DEFSHT.DAT in ORACLE

This is a site specific equipment and data collection format table. It is currently maintained using a text editor. Putting it into ORACLE would make maintenance of the table easier. It could also be derived in part from Traffic Sheet 14 and Sheet 15 information which is not yet being considered for inclusion in the IMS.

L.5 Elimination of NEWSHT.DAT

Creation of this file as ASCII text requires opening and reading the first and last record of each file when transmittal sheets are not received with the data. It needs to be determined what the information in the file is used for other than putting starting and ending dates and times in the transmittal sheet files. If that is the sole purpose, then modification of the software to get this information while reading the first and last data record (not station identification card) should be considered. Since the user currently selects the files to be loaded, this file serves no purpose in that function. The information in NEWSHT can be derived from tables developed by the QC software if need for analysis.

L.6 Transmittal sheets (*.inx file) in ORACLE

The transmittal sheets are currently stored in a single binary file for the site. The records are written in the order the files are read by the QC software. However, the analysis file expects them to be in sorted data order and possible in a type order as well. This file can be eliminated from the process by the direct use of DEFSHT.DAT, SHRP.DAT and LTPPFILETRACKER>

L.7 Processed raw data files in ORACLE

Currently processed raw data files are written back out into ASCII files as 4-card or 7-card files whose data matches the raw input files as if they were originally 4-card or 7-card files. Writing these files out in an ORACLE table would make them more accessible to users and easier to query and manipulate. It would also make it possible to check for duplicates on loading data.

L.8 Log file for processing

The file has currently been revised to report only loading activity whether or not it is successful. All statistics previously included may be generated using SQL and the various LTPPR* tables.

L.9 Consolidate GVW tables to one per site

The software currently produces one ORACLE table per year per site with GVW information. This table is used for graphing purposes. Consideration should be given to reducing the number of tables and being able to manipulate the GVW data without having to locate multiple files for a site.

L.10 Consolidate VOL7 files to one per site

The software currently produces one ORACLE table per year per site with VOL7 information. This table is used for graphing purposes. Consideration should be given to reducing the number of tables and being able to manipulate the VOL7 data without having to locate multiple files for a site.

L.11 Consolidate error tables

Currently every time a file is read it generates a new ORACLE table for error storage whether or not any errors exist. This creates large numbers of files used for little but indicating that the processing has been accomplished.. It would be worth investigating the implications of reducing the error tables to three per site (1-WIM, 1-AVC, 1-VOL) or even three per site per year.

L.12 Create a duplicate checking process

Incorporate a duplicate checking process prior to the analysis software. This can be incorporated with the conversion of all files to indexed ORACLE tables.

L.13 Pre-processor

The software currently requires data be sorted in a specific order and that all records be valid for the file type. A pre-processor would do a pre-loading clean-up. It might be just as much or even less effort to change the software function to skip records which were inconsistent with type (too long or too short) and handle the data without having it in sorted order. This can be avoided entirely by loading the inputs into an indexed ORACLE table.

Another thing that would be useful is the ability of some software tool to open read and then rename files as received from highway agencies. This would save staff enormous amounts of time and make it easier to acquire data in a timely fashion. This might be worth development independently of any QC software refinements. Alternative a module could be added that would, on encountering an invalid file name, create the output file name from file content and the use of SHRP.DAT information, specifically ID3 and ID6.

L.14 Support Site ID cards

The software has limited capability to read files with 2-cards (7-card files only). It would help reduce the amount of pre-processing if 2-cards could be header records on 4-card files. Similarly, the ability to use S-cards as header lines for C-cards and W-cards would be useful. This is a medium priority activity to reduce the amount of preprocessing required. This would be useful for product development purposes.

A very, very low priority associated with processing 3-cards (volume records) would be including 1-cards (the station ID card for this record type) as possible headers for those files.

L.15 Alpha characters in SHRP_ID

The file naming convention is rigid even for LTPP. As currently coded the software only permits an alphabetic character in the first position of SHRP_ID. Having any character in that variable be alphabetical would improve product possibilities.

L.16 Loading robustness

The software currently will not load files with extra CR/LF characters at the end of the file (with or without leading blanks). It would help if the software would ignore such lines as valid but data free records.

L.17 Purge Conditions

Add an appendix to the QC manual on clear and fuzzy cases for applying purges beyond the information in section particularly as regards the SPS data collection locations.. In addition,

purge conditions for the SPS sites must be described and additional codes added on an as needed basis.

The ERROR information in the ORACLE tables currently reflects the QC process. The PURGE reason is not present. Changing either the PURGE value to a number code for PURGE reason or modifying the value of ERROR for purged data would eliminate the need to look at PURGE files.

Another possibility is to consider putting the PURGE files in ORACLE with the capability of undoing PURGES being added concurrently.

M. Transmittal Sheets

There are three types of transmittal sheets: volume, classification, and weight. They are referred to as sheets 11, 12 and 13 respectively due to their numbering in the *LTPP Traffic Data Collection Guide.* A transmittal sheet is submitted for every data file sent by an agency. It comes in hard copy. Data is extracted from it to create or modify the various *.dat files used by the QC software.

When data is read into the QC software an electronic version of the transmittal sheet is created. There is one per file read. All transmittal sheets for a file go into a single binary file with the name xxxxxx5.inx where xxxxxx represents STATE_CODE, SHRP_ID for the site. The file is composed of three types of records of varying lengths and composition. The single variable they all have in common is the first one, referred to as SheetNum which creates the unique key for a record within a file.

The SheetNum field in the three sheets is used for accessing data within the .inx file. It is built as follows by column:

1 - 2 = 11, 12, 13 (depending on type of sheet)
3 - 6 = nn.0 (MM.0)
7-10 = nn.0 (DD.0)
11-14 = nn.0 (YY.0)
15-20 = 000000

The values for month, day and year should never have any value after the decimal, so are expected to always be 0. It possible that this capability was included to permit updating the sheet by version or multiple loads of files.

M.1 Sheet 12

Sheet 12 is used with classification data.

SheetNum[20] - alpha - Unique key described above.
ShrpId[10] - alpha - /* All others are DUP */
StateId[6] - alpha - This is presumably the station identification assigned by the state to the site.
StateCode[4] - alpha -
HwyRoute[12] - alpha -
Milepost[12] - alpha - presumably with embedded decimal point.
Location[33] - alpha -

Filename[14] - alpha
DiskId[14] - alpha - presumably the volume label for the media on which the disk was received.
BeginDate - of the form MmDdYy - This should be formatted to report a 4-digit year when converted into an ORACLE table element.
MmDdYy EndDate - of the form MmDdYy - This should be formatted to report a 4-digit year when converted into an ORACLE table element.
BeginTime - of the form HhMm -
EndTime - of the form HhMm -
TypeOfCount - alpha - coded for 2-way, 1-way or LTPP lane only.
VehClassMethod - alpha - either FHWA (13 class) or agency
VehClassOtherStr[4] - alpha - name of agency scheme.
AvcEquip - alpha - coded either port(able) or perm(anent); No code provided for manual even though LTPP Traffic DCG indicates that is an option.
SensorType - alpha - type of sensor used for volume counter (road tube, piezo cable, piezo film, loops, other)
SensOtherStr[16]- alpha - name of sensor not included in list of expected types.
CounterType[16] - alpha -
NameModel[16] - alpha - model of volume equipment
AdjustFact GenAdjust[NUMADJUSTFACT] - alpha - a number with an embedded decimal is what should exist for non-null entries. This is a factor that applies to all classes in the count. Where the number of them that should exist is entered isn=t obvious from the file description.
AdjustFact ClassAdjust[25][NUMADJUSTFACT] - alpha -
VehClass[25][4] - alpha -
MoreVehClass - alpha -
Comments[10][64] - alpha - 10 64-character comment lines, presumably with a different comment on each line.

M.2 Sheet 13

Sheet 13 is used with weight data.

SheetNum[20] - alpha - Unique key described above.
ShrpId[10] - alpha - /* All others are DUP */
StateId[6] - alpha - This is presumably the station identification assigned by the state to

the site.
StateCode[4] - alpha -
HwyRoute[11] - alpha -
Milepost[11] - alpha - presumably with embedded decimal point.
Location[31] - alpha -
Filename[13] - alpha
DiskId[13] - alpha - presumably the volume label for the media on which the disk was received.
BeginDate - of the form MmDdYy - This should be formatted to report a 4-digit year when converted into an ORACLE table element.
MmDdYy EndDate - of the form MmDdYy - This should be formatted to report a 4-digit year when converted into an ORACLE table element.
BeginTime - of the form HhMm -
EndTime - of the form HhMm -
Classmethod - alpha - either FHWA (13 class), FHWA truck weight study (6- digit) or agency;
Methodname - alpha - name of agency scheme.;
ScaleType alpha - coded either port(able) or perm(anent)
ScaleTypeOtherStr[18] - alpha - for another type of static scale used which does not measure loads at highway speeds.
CounterType[18] - alpha -
NameModel[18] - alpha - model of volume equipment
SensorType - alpha - type of sensor used for volume counter (bending plate, piezo cable, piezo film, other)
SensOtherStr[18]- alpha - name of sensor not included in list of expected types.
Comments[10][64] - alpha - 10 64-character comment lines, presumably with a different comment on each line.

M.3 Sheet 11

Sheet 11 is included even though the QC Software currently only addresses Sheets 12 and 13.

SheetNum[20] - alpha - Unique key described above.
ShrpId[10] - alpha - /* All others are DUP */
StateId[6] - alpha - This is presumably the station identification assigned by the state to the site.
StateCode[4] - alpha -

HwyRoute[11] - alpha -
Milepost[11] - alpha - presumably with embedded decimal point.
Location[32] - alpha -
Filename[15] - alpha
DiskId[15] - alpha - presumably the volume label for the media on which the disk was received.
BeginDate - of the form MmDdYy - This should be formatted to report a 4-digit year when converted into an ORACLE table element.
MmDdYy EndDate - of the form MmDdYy - This should be formatted to report a 4-digit year when converted into an ORACLE table element.
BeginTime - of the form HhMm -
EndTime - of the form HhMm -
TypeOfCount - alpha - coded for 2-way, 1-way or LTPP lane only.
DevType - alpha -
SensorType - alpha - type of sensor used for volume counter (road tube, piezo cable, piezo film, loops, other)
SensOtherStr[18] - alpha - name of sensor not included in list of expected types.
NameModel[18] - alpha - model of volume equipment
CounterType[18] - alpha - coded either port(able) or perm(anent)
AxleCorrFact[9] - alpha - a number with an embedded decimal is what should exist in non-null fields. This value indicates the number of axles per vehicle that are expected at the site to estimate daily traffic.
AxleCorrStd[9]- alpha - a number with an embedded decimal is what should exist in non-null entries. The standard deviation of AxleCorrFact.
MonthlyFact[9]- alpha - a number with an embedded decimal is what should exist in non-null entries. This value is a multiplier used to adjust the data when factoring to a full year estimate when this is the only data available.
MonthlyStd[9]- alpha - a number with an embedded decimal is what should exist in non-null entries. The standard deviation of MonthlyFact.
DayOfWeekFact[9]- alpha - a number with an embedded decimal is what should exist in non-null entries. This value is a multiplier used to adjust the data to the average day of week when factoring to a full year estimate when this is the only data available.
DayOfWeekStd[9]- alpha - a number with an embedded decimal is what should exist for non-null entries. The standard deviation of DayOfWeekFact
OtherFact[9]- alpha - a number with an embedded decimal is what should exist in non-null entries. Any other factor applied by the agency to adjust the data in expanding a sample to a year.
OtherStd[9]- alpha - a number with an embedded decimal is what should exist in non-null entries. The standard deviation of OtherFact.
OtherFactStr[28]- alpha - a description of OtherFact
DistFactGps[8]- alpha - a number with an embedded decimal is what should exist for

non-null entries. This is the percentage of the count in the LTPP lane if more than one lane is included in the data.
DistFactSource[45]- alpha - description of how the lane distribution factor was developed.
Comments[10][64] - alpha - 10 64-character comment lines, presumably with a different comment on each line.