PENNDOT PARTNERSHIP

PROJECT TASK 39: AUTOMATIC TRAFFIC DATA COLLECTION SYSTEM MODERNIZATION

CAVC CLASSIFICATION SYSTEM

Prepared for

Commonwealth of Pennsylvania
Department of Transportation and
the Mid-Atlantic Universities Transportation Center

by

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One of PennDOT's long-term objectives was to develop a comprehensive and integrated data management process. This objective presented several challenges: weigh-in-motion (WIM) data were not utilized in Pennsylvania, and there are operational difficulties with some of the permanent systems; one system is a strategic highway research program (SHRP) site. In addition, the portable systems are rapidly deteriorating, requiring replacement in the near future. Pennsylvania has begun securing continuous automatic vehicle classification (CAVC) data by installing equipment at 6 of the 19 portable WIM sites. In addition, reliability problems with the axle-sensing components of the system are a major concern.

Recognizing that data management is a primary component in any system, Pennsylvania initiated the design of a database for CAVC data in Paradox. Because of the desirability of merging data from 19 CAVC sites with data from 60 automatic traffic recorder (ATR) sites, PennDOT wanted to convert the ATR database from IBM to Paradox. To meet this objective, MAUTC assisted PennDOT with the tasks of reviewing vehicle classification technology and recommending a course of action for 19 sites regarding CAVC, reviewing portable and semi-permanent technology and recommending a course of action for 19 replacement sites, addressing software requirements and preparing appropriate programming steps for ATR and CAVC data processing and storage, and reviewing literature on environmental detection technology and on vehicle detection technology.

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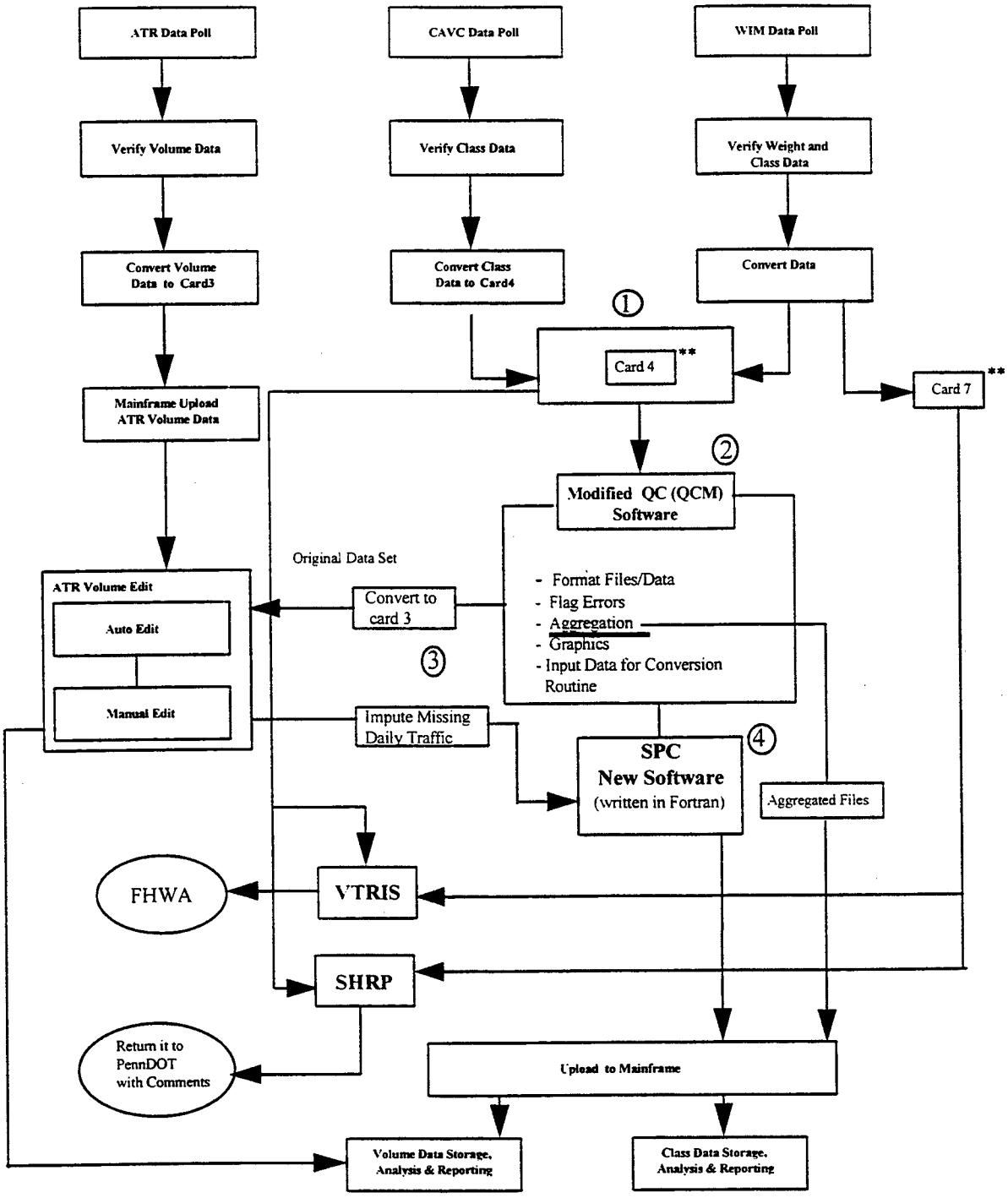
Introduction

The purpose of this project is to design and implement a comprehensive and integrated automatic traffic data management system for highways. Since the original proposal under the PennDOT/MAUTC Partnership, the project has undergone changes to meet PennDOT's requirements and the project has adhered to the spirit of creating easy-to-use and integrated data management software, rather than to the letter of the proposal per se (i.e., implement routines on a PC platform instead of on the mainframe platform). The tasks identified and completed for the project include:

- ***Data Management***: This allows PennDOT to retrieve ATR, CAVC, and WIM data based on months, year, site, and type of data required for analysis.
- ***Automatic Vehicle Classification***: In consultation with PennDOT, four aggregation schemes were agreed upon to help PennDOT personnel retrieve card 4 data based on the type of aggregation required.
- ***Quality Control***: The QC Interface developed by Chaparral Systems for the LTPP has been modified to flag errors in the data and suggested values are imputed to clean the data.

Figure 1 shows the complete information/data flowchart of the project, from data collection at the WIM/CAVC/ATR stations to data storage, analysis, and reporting. The original QC Interface developed by Chaparral Systems gave only graphical outputs signifying the errors, thereby making it difficult for the personnel to perform operations on the database to correct these errors. Another facet of the original QC was that it could read files in the old (1993 Traffic Monitoring Guide) system format. As seen in the flowchart, these issues have been resolved in the modified version of the QC Interface. The **SPC** routine (called SPC_PSU) developed by the Pennsylvania Transportation Institute (PTI) allows the merging of the aggregated file with the flag file and the lookup table with volume distribution by class, time of day, and day of week to yield a clean data set needed for analysis. As shown in the flowchart, the sequence of operations



** Extraction Routine can be used to Extract Data by Site, Year, Months and Card Type

Figure 1 Design of Automatic Traffic Data Management System

from data collection to data storage, analysis, and reporting includes other characteristics for a comprehensive data management system. These include running the card 4 and card 7 data through VTRIS (Vehicle Travel Information System), a program developed by the FHWA to validate and facilitate editing, summarizing and generating reports on vehicle travel characteristics. Also, the original card 4 and card 7 data sets, after cleaning and analysis, are sent to SHRP for storage in the LTPP database.

Design of Automatic Traffic Data Management System

The following sections describe, in brief, the process undertaken to achieve the desired results. Details regarding the routines developed for the analysis are explained in the appendices to this report. The numbers within circles in figure 1 provide the four-step process for achieving a comprehensive traffic data management system:

① Data from the ATR, CAVC, and WIM data polls are converted to card3, card4 and card7 data files, respectively. If the data are stored in files separated on the basis of sites, months, year, and card type, then the data are ready for analysis. If the data have not been sorted out based on these criteria, then the extraction routine is run, and data are extracted in separate files based on specific site, month, year, and card type. Details regarding the extraction routine can be found in Appendix A.

② Once the data have been sorted by site, year, months, and card type, the program is run through the modified QC Interface, herein called QCM, and a graph catalog and the following files are created:

- *Flag file*: This file contains the errors in the data set that have been flagged based on equipment or system errors. Data are flagged based on the following criteria: (1) volumes at 1 a.m. are greater than volumes at 1 p.m., (2) same volumes are "observed"

for four or more consecutive hours, (3) zero volumes are "observed" for eight or more consecutive hours and, (4) missing data. The next section describes the importance of this file.

- *Aggregated files*: In consultation with PennDOT, four aggregation schemes have been developed for vehicle classification. The routine creates all the four aggregation schemes, with erroneous data, and one file, with all 13 FHWA vehicle classes, is used as an input for the next routine called **SPC_PSU**.

- *Card 3 Conversion file*: The input data file for conversion from card 4 to card 3 is created based on the year, month, day, direction, and lane of travel.

Detailed instructions for the creation of these files are provided in Appendix B. Also, sample graphs created in this routine are found in Appendix C.

③ Once the input file for the conversion of the card 4 data file to card 3 data file has been completed, the routine TMG3 is run. This creates a card 3 data set, and missing traffic data can be imputed to get a complete volume data set.

④ Once the data set is ready for aggregation, it is run through the **SPC_PSU** routine to create the scheme 1 file based on a lookup table, the diagnostics files, and the missing data imputed. The file containing the suggested values for each error diagnosed is run through the **SPC_AGG** routine, giving aggregated files for the four schemes. Users can provide directory and file names of output.

- Scheme 1: All 13 classes maintained individually.
- Scheme 2: Add classes 1 through 3 and classes 4 through 13.
- Scheme 3: Add classes 1 through 3, 4 through 8 and 9 through 13.
- Scheme 4: Add together classes 1 through 3, 4 and 5, 6 through 8, and 9 through 13.

While these are the main features of the Automatic Traffic Data Management Scheme, it is possible to use the unmodified card 4 and card 7 data in VTRIS. Appendix D shows the VTRIS

outputs. The next section deals with the SPC for missing values. Appendix E presents the results of running gross vehicle weight analysis for both the unmodified QC and QCM. As can be seen from the graphs, the results are exactly the same, and this serves to verify that the Penn State modifications to the QC software did not eliminate or substitute any of the original software capabilities; instead, they enhanced and enriched the QC, providing more capabilities.

SPC for Missing Values

In this section the routines to create suggested values (Task 3 and associated scope of work modifications) for missing data are described. The Continuous Automatic Vehicle Classification data editing scheme with provision for inputting suggested values is documented here. Recall that the QCM is used to first create four aggregation schemes as required by PennDOT:

- Scheme 1: All 13 classes maintained individually.
- Scheme 2: Add classes 1 through 3 and classes 4 through 13.
- Scheme 3: Add classes 1 through 3, 4 through 8 and 9 through 13.
- Scheme 4: Add together classes 1 through 3, 4 and 5, 6 through 8, and 9 through 13.

Then the QCM is used to flag the data for errors based on the following four criteria:

- Volume at 1 a.m. greater than volume at 1 p.m.
- Equal and greater than zero volumes for 4 or more consecutive hours.
- Zero volumes for 8 or more consecutive hours.
- Missing data for some or all hours of a day.

At this point of the process, values need to be found for erroneous or missing data items. These are produced in the form of suggested values, which the PennDOT operators review and communicate to the software the type of action chosen.

Error Data Suggested Values

In conjunction with the QCM, two other routines were developed, SPC_PSU and SPC_AGG to remove the erroneous data and update the original records. In addition, the data are also aggregated in the four schemes mentioned above. Figure 2 shows a flowchart of the sequence of operations to update the four aggregation schemes with suggested values.

After the QCM is run it produces six files, one file called *Flags.out*, one file called *TMG3.out* and four files called *scheme1.out, scheme2.out, scheme3.out,* and *scheme4.out*. These files are saved under the c:\output directory. Before running the QCM, the operator should create a directory c:\output. The file *Flags.out* contains the errors caught by the QC software. Figure 3 shows the *Flags.out* file. The files with the four aggregation schemes are shown in Figures 4 through 7. The files in the figures show a portion of the file associated with scheme 1, scheme 2, scheme 3 and scheme 4 files, respectively.

The files *Flags.out* and *Scheme1.out* are run through the routine SPC_PSU along with a "look-up table" with volume distribution by class, time of day, and day of week. Also, in this same routine, the file *header1.txt* is used to create the table format and header. Details regarding the creation of the look-up table are provided in Appendix F. The routine is designed to give a file with suggested values. The way this is accomplished is as follows:

When the files *Flags.out* and *Scheme1.out* are run through the routine, the routine looks for the starting and ending time of the errors in the *Flags.out* file. Based on the time and day of week of the error, the routine refers to the look-up table and suggests a value for the error based on the proportion for each class for the same time and day of week present in the look-up table. In Figure 7, columns are the vehicle classes and the rows are the hours of the day based on the day of week. Each cell represents the vehicle class as a fraction of the total number of the vehicles for that day of the week. The first 24 rows are for the first day, Sunday, of the week; the next 24 rows for the second day, Monday, of the week, and so on until the seventh day of the

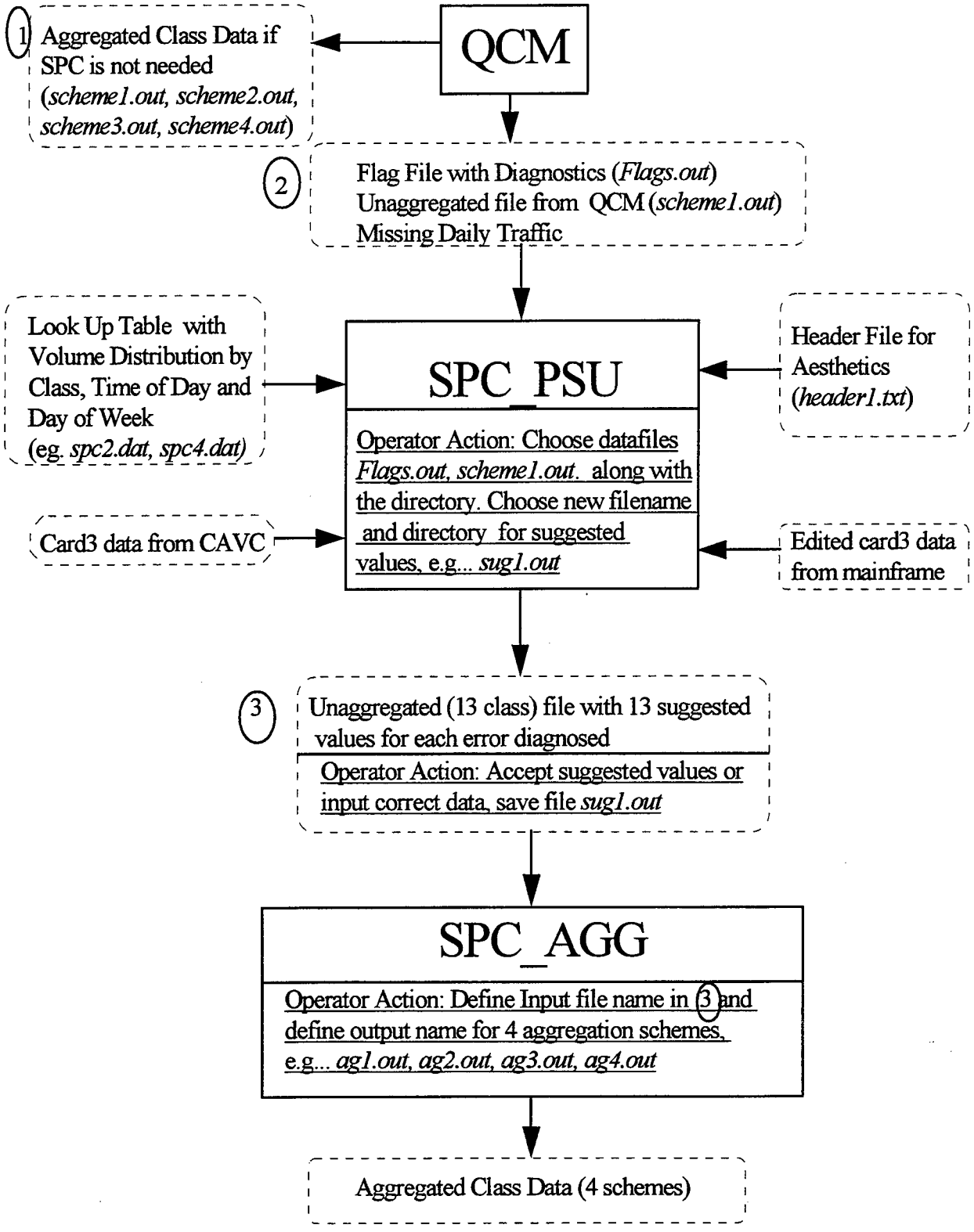


Figure 2. Flowchart for Suggested Values

ERROR DATA CAUGHT BY QC SOFTWARE

OBS	SHRPID	DIRECT	LANE	YEAR	MONTH	DAY	DOW	EDIT	STTIME	ENDTIME	NUMB
1	5	7	1	1994	6	2	5	4+ Consec Nonzeros	5	11	6
2	5	7	2	1994	6	2	5	4+ Consec Nonzeros	5	11	6
3	5	3	1	1994	6	2	5	4+ Consec Nonzeros	5	11	6
4	5	3	2	1994	6	2	5	4+ Consec Nonzeros	5	11	6
5	5	7	1	1994	6	3	6	8+ Consec Zeros	2	12	10
6	5	3	2	1994	6	3	6	8+ Consec Zeros	2	12	10
7	5	3	1	1994	6	3	6	8+ Consec Zeros	2	12	10
8	5	3	2	1994	6	3	6	8+ Consec Zeros	2	12	10
9	5	7	1	1994	6	1	4	Time Check	2	14	2

Figure 3 *Flags.out* File

week. With values derived using the look-up table, a new file is created with suggested values for the errors. This is indicated in Figure 8, where a portion of a suggested-values table is shown. In the column labeled errors, the number 1 indicates the error caught by the QC software. If no change is needed, i.e., a value can be accepted as is, then the 1 should be changed to 0. If the person using the routine feels that change is needed to reflect the true data, then that user can go ahead and make the changes. Once the changes have been made, the file should be saved, with either the same or a new name. Changes can also be made anywhere in the data file on an as-needed basis by the operator. This allows any type of data editing (manual, semiautomatic) and allows for imputation of simulated data (the suggested values).

After work on the file containing the suggested values is done, the routine SPC_AGG is run and new files are created for the four aggregation schemes. Figures 9 through 12 show portions of the final aggregated files for the four schemes. The column ***mark*** indicates the row for which suggested values were imputed or changes were made by an operator.

Aggregation scheme #1 for CAVC

SHRPID	DIRECTN	RLANE	YR	MN	DAY	DOW	TIME	CLASS1	CLASS2	CLASS3	CLASS4	CLASS5	CLASS6	CLASS7	CLASS8	CLASS9	CLASS10	CLASS11	CLASS12	CLASS13
1	3	2	1994	1	10	2	0	0	4	0	0	0	0	0	2	20	0	0	1	0
1	3	1	1994	1	10	2	0	1	15	2	1	0	2	1	0	38	16	1	1	83
1	7	2	1994	1	10	2	0	0	2	0	1	0	0	0	0	5	0	0	0	0
1	7	1	1994	1	10	2	0	0	30	5	1	3	0	0	0	58	1	5	0	0
1	3	2	1994	1	10	2	1	0	2	3	0	0	1	0	1	12	1	0	1	0
1	3	1	1994	1	10	2	1	0	8	2	1	1	3	0	3	51	19	2	0	44
1	7	2	1994	1	10	2	1	0	4	0	0	0	0	0	0	3	0	0	0	0
1	7	1	1994	1	10	2	1	0	20	3	0	2	3	0	2	42	3	6	0	0
1	3	2	1994	1	10	2	2	0	4	0	1	1	1	0	0	12	0	1	0	0
1	3	1	1994	1	10	2	2	0	12	6	0	1	2	0	1	51	7	1	0	37
1	7	2	1994	1	10	2	2	0	4	0	0	0	1	0	1	0	0	0	0	0
1	7	1	1994	1	10	2	2	0	16	3	0	1	0	0	0	56	1	12	0	0
1	3	2	1994	1	10	2	3	0	0	0	0	0	0	0	1	14	0	1	1	0
1	3	1	1994	1	10	2	3	0	9	3	0	1	2	0	0	25	13	3	0	43
1	7	2	1994	1	10	2	3	0	0	2	0	0	0	0	0	5	0	0	0	0
1	7	1	1994	1	10	2	3	0	19	0	0	5	2	1	1	35	0	10	0	0
1	3	2	1994	1	10	2	4	0	3	1	0	0	1	0	0	9	0	1	0	0
1	3	1	1994	1	10	2	4	0	18	13	0	0	2	0	1	27	6	0	0	30
1	7	2	1994	1	10	2	4	0	2	0	0	0	1	0	0	6	0	1	0	0
1	7	1	1994	1	10	2	4	0	21	5	0	4	4	2	4	49	2	5	0	0
1	3	2	1994	1	10	2	5	0	2	1	1	1	0	0	0	12	0	0	0	0
1	3	1	1994	1	10	2	5	0	22	7	0	2	3	0	4	36	5	3	0	37
1	7	2	1994	1	10	2	5	0	8	2	1	0	2	0	0	2	0	0	0	0
1	7	1	1994	1	10	2	5	0	21	8	0	7	5	0	4	39	2	6	0	0
1	3	2	1994	1	10	2	6	0	8	0	0	0	0	0	1	11	0	2	0	0
1	3	1	1994	1	10	2	6	0	42	11	2	2	4	0	0	31	14	7	0	29
1	7	2	1994	1	10	2	6	0	5	6	0	0	0	0	0	2	0	0	0	0
1	7	1	1994	1	10	2	6	0	39	15	0	3	3	5	4	41	1	5	0	0
1	3	2	1994	1	10	2	7	0	14	3	0	0	0	0	0	15	0	3	0	0
1	3	1	1994	1	10	2	7	4	56	21	2	4	3	4	2	31	5	2	1	33

Figure 4 *Scheme1.out* File

Aggregation scheme #2 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_13
1	3	2	1994	1	10	2	0	4	23
1	3	1	1994	1	10	2	0	18	143
1	7	2	1994	1	10	2	0	2	6
1	7	1	1994	1	10	2	0	35	68
1	3	2	1994	1	10	2	1	5	16
1	3	1	1994	1	10	2	1	10	124
1	7	2	1994	1	10	2	1	4	3
1	7	1	1994	1	10	2	1	23	58
1	3	2	1994	1	10	2	2	4	16
1	3	1	1994	1	10	2	2	18	100
1	7	2	1994	1	10	2	2	4	2
1	7	1	1994	1	10	2	2	19	70
1	3	2	1994	1	10	2	3	0	17
1	3	1	1994	1	10	2	3	12	87
1	7	2	1994	1	10	2	3	2	5
1	7	1	1994	1	10	2	3	19	54
1	3	2	1994	1	10	2	4	4	11
1	3	1	1994	1	10	2	4	31	66
1	7	2	1994	1	10	2	4	2	8
1	7	1	1994	1	10	2	4	26	70
1	3	2	1994	1	10	2	5	3	14
1	3	1	1994	1	10	2	5	29	90
1	7	2	1994	1	10	2	5	10	5
1	7	1	1994	1	10	2	5	29	63
1	3	2	1994	1	10	2	6	8	14
1	3	1	1994	1	10	2	6	53	89
1	7	2	1994	1	10	2	6	11	2
1	7	1	1994	1	10	2	6	54	62
1	3	2	1994	1	10	2	7	17	18
1	3	1	1994	1	10	2	7	81	87
1	7	2	1994	1	10	2	7	23	9
1	7	1	1994	1	10	2	7	90	79
1	3	2	1994	1	10	2	8	20	19
1	3	1	1994	1	10	2	8	99	118
1	7	2	1994	1	10	2	8	21	11
1	7	1	1994	1	10	2	8	84	101

Figure 5 *Scheme2.out* File

Aggregation scheme #3 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_8	C9_13
1	3	2	1994	1	10	2	0	4	2	21
1	3	1	1994	1	10	2	0	18	4	139
1	7	2	1994	1	10	2	0	2	1	5
1	7	1	1994	1	10	2	0	35	4	64
1	3	2	1994	1	10	2	1	5	2	14
1	3	1	1994	1	10	2	1	10	8	116
1	7	2	1994	1	10	2	1	4	0	3
1	7	1	1994	1	10	2	1	23	7	51
1	3	2	1994	1	10	2	2	4	3	13
1	3	1	1994	1	10	2	2	18	4	96
1	7	2	1994	1	10	2	2	4	2	0
1	7	1	1994	1	10	2	2	19	1	69
1	3	2	1994	1	10	2	3	0	1	16
1	3	1	1994	1	10	2	3	12	3	84
1	7	2	1994	1	10	2	3	2	0	5
1	7	1	1994	1	10	2	3	19	9	45
1	3	2	1994	1	10	2	4	4	1	10
1	3	1	1994	1	10	2	4	31	3	63
1	7	2	1994	1	10	2	4	2	1	7
1	7	1	1994	1	10	2	4	26	14	56
1	3	2	1994	1	10	2	5	3	2	12
1	3	1	1994	1	10	2	5	29	9	81
1	7	2	1994	1	10	2	5	10	3	2
1	7	1	1994	1	10	2	5	29	16	47
1	3	2	1994	1	10	2	6	8	1	13
1	3	1	1994	1	10	2	6	53	8	81
1	7	2	1994	1	10	2	6	11	0	2
1	7	1	1994	1	10	2	6	54	15	47
1	3	2	1994	1	10	2	7	17	0	18
1	3	1	1994	1	10	2	7	81	15	72
1	7	2	1994	1	10	2	7	23	2	7
1	7	1	1994	1	10	2	7	90	22	57
1	3	2	1994	1	10	2	8	20	2	17
1	3	1	1994	1	10	2	8	99	28	90
1	7	2	1994	1	10	2	8	21	5	6
1	7	1	1994	1	10	2	8	84	33	68
1	3	2	1994	1	10	2	9	25	9	20

Figure 6 *Scheme3.out* File

Aggregation scheme #4 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_5	C6_8	C9_13
1	3	2	1994	1	10	2	0	4	0	2	21
1	3	1	1994	1	10	2	0	18	1	3	139
1	7	2	1994	1	10	2	0	2	1	0	5
1	7	1	1994	1	10	2	0	35	4	0	64
1	3	2	1994	1	10	2	1	5	0	2	14
1	3	1	1994	1	10	2	1	10	2	6	116
1	7	2	1994	1	10	2	1	4	0	0	3
1	7	1	1994	1	10	2	1	23	2	5	51
1	3	2	1994	1	10	2	2	4	2	1	13
1	3	1	1994	1	10	2	2	18	1	3	96
1	7	2	1994	1	10	2	2	4	0	2	0
1	7	1	1994	1	10	2	2	19	1	0	69
1	3	2	1994	1	10	2	3	0	0	1	16
1	3	1	1994	1	10	2	3	12	1	2	84
1	7	2	1994	1	10	2	3	2	0	0	5
1	7	1	1994	1	10	2	3	19	5	4	45
1	3	2	1994	1	10	2	4	4	0	1	10
1	3	1	1994	1	10	2	4	31	0	3	63
1	7	2	1994	1	10	2	4	2	0	1	7
1	7	1	1994	1	10	2	4	26	4	10	56
1	3	2	1994	1	10	2	5	3	2	0	12
1	3	1	1994	1	10	2	5	29	2	7	81
1	7	2	1994	1	10	2	5	10	1	2	2
1	7	1	1994	1	10	2	5	29	7	9	47
1	3	2	1994	1	10	2	6	8	0	1	13
1	3	1	1994	1	10	2	6	53	4	4	81
1	7	2	1994	1	10	2	6	11	0	0	2
1	7	1	1994	1	10	2	6	54	3	12	47
1	3	2	1994	1	10	2	7	17	0	0	18
1	3	1	1994	1	10	2	7	81	6	9	72
1	7	2	1994	1	10	2	7	23	1	1	7
1	7	1	1994	1	10	2	7	90	6	16	57
1	3	2	1994	1	10	2	8	20	0	2	17
1	3	1	1994	1	10	2	8	99	9	19	90
1	7	2	1994	1	10	2	8	21	2	3	6
1	7	1	1994	1	10	2	8	84	10	23	68
1	3	2	1994	1	10	2	9	25	4	5	20
1	3	1	1994	1	10	2	9	104	10	12	116
1	7	2	1994	1	10	2	9	32	0	3	13
1	7	1	1994	1	10	2	9	111	8	26	82
1	3	2	1994	1	10	2	10	30	1	2	17
1	3	1	1994	1	10	2	10	128	10	20	104
1	7	2	1994	1	10	2	10	29	0	2	7
1	7	1	1994	1	10	2	10	123	7	19	98
1	3	2	1994	1	10	2	11	43	0	7	20
1	3	1	1994	1	10	2	11	96	11	17	118

Figure 7 *Scheme4.out* File

Aggregation scheme #1 for CAVC With Suggested Values

SHRPICD	DIRECT	LEAN	YR	MN	DAYWK	OMEGA	TIME	CLAS1	CLAS2	CLAS3	CLAS4	CLAS5	CLAS6	CLAS7	CLAS8	CLAS9	CCLAS1	CCLAS2	CCLAS3	CCLAS4	CEROR	SUGC1	SUGC2	SUGC3	SUGC4	SUGC5	SUGC6	SUGC7	SUGC8	SUGC9	SUGC10	SUGC11	SUGC12	SUGC13	SUGC14
5	7	2	1994	6	1	4	0	0	14	0	0	0	0	0	2	5	0	0	0	0	0													
5	7	1	1994	6	1	4	0	0	42	4	2	0	1	0	19	55	1	2	0	0	0													
5	3	2	1994	6	1	4	0	0	6	2	0	0	1	0	1	17	0	0	0	0	0													
5	3	1	1994	6	1	4	0	0	37	5	0	3	1	0	2	61	0	5	0	0	0													
5	7	2	1994	6	1	4	1	0	5	0	0	1	1	0	7	4	0	0	0	0	0													
5	7	1	1994	6	1	4	1	0	32	8	0	3	1	0	21	61	0	1	0	0	1	0	48	12	1	7	5	0	11	284	5	17	3	14
5	3	2	1994	6	1	4	1	0	3	1	0	1	0	0	0	8	0	0	1	0	0													
5	3	1	1994	6	1	4	1	0	22	3	1	0	0	0	4	50	0	2	0	0	0													
5	7	2	1994	6	1	4	2	0	7	0	0	0	0	0	3	7	0	0	0	0	0													
5	7	1	1994	6	1	4	2	1	13	2	2	0	2	0	25	85	0	1	0	0	0													
5	3	2	1994	6	1	4	2	0	5	1	1	0	0	0	0	4	0	0	0	0	0													

Figure 8 Aggregation Scheme for CAVC with Suggested Values

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	CLASS1	CLASS2	CLASS3	CLASS4	CLASS5	CLASS6	CLASS7	CLASS8	CLASS9	CLASS10	CLASS11	CLASS12	CLASS13	MARK
5	7	2	1994	6	1	4	0	0	14	0	0	0	0	0	2	5	0	0	0	0	
5	7	1	1994	6	1	4	0	0	42	4	2	0	1	0	19	55	1	2	0	0	
5	7	2	1994	6	1	4	0	0	6	2	0	0	1	0	1	17	0	0	0	0	
5	7	1	1994	6	1	4	0	0	37	5	0	3	1	0	2	61	0	5	0	0	
5	7	2	1994	6	1	4	1	0	5	0	0	1	1	0	7	4	0	0	0	0	
5	7	1	1994	6	1	4	1	0	48	12	1	7	5	0	11	284	5	17	3	14	*
5	3	2	1994	6	1	4	1	0	3	1	0	1	0	0	0	8	0	0	1	0	
5	3	1	1994	6	1	4	1	0	22	3	1	0	0	0	4	50	0	2	0	0	
5	7	2	1994	6	1	4	2	0	7	0	0	0	0	0	3	7	0	0	0	0	
5	7	1	1994	6	1	4	2	1	13	2	2	0	2	0	25	85	0	1	0	0	
5	3	2	1994	6	1	4	2	0	5	1	1	0	0	0	0	4	0	0	0	0	
5	3	1	1994	6	1	4	2	0	14	4	0	7	0	0	2	52	0	1	0	0	
5	7	2	1994	6	1	4	3	0	8	0	1	0	1	0	3	5	0	0	0	0	
5	7	1	1994	6	1	4	3	0	19	2	4	2	1	0	28	75	0	2	0	0	
5	3	2	1994	6	1	4	3	0	6	0	0	0	0	0	1	7	0	0	0	0	
5	3	1	1994	6	1	4	3	0	11	2	0	3	1	0	6	53	1	6	2	0	
5	7	2	1994	6	1	4	4	0	10	1	1	1	0	0	6	4	0	0	0	0	
5	7	1	1994	6	1	4	4	0	33	16	0	0	3	1	29	83	0	2	0	0	
5	3	2	1994	6	1	4	4	0	4	0	0	0	0	0	0	6	0	0	0	0	
5	3	1	1994	6	1	4	4	0	20	1	0	2	1	1	2	42	1	4	2	0	
5	7	2	1994	6	1	4	5	0	8	1	0	1	0	0	4	5	0	0	0	0	
5	7	1	1994	6	1	4	5	0	61	16	0	1	2	0	18	47	0	2	0	0	
5	3	2	1994	6	1	4	5	0	5	1	0	0	0	0	1	12	0	2	0	0	
5	3	1	1994	6	1	4	5	0	36	6	0	2	1	0	5	58	1	8	4	0	
5	7	2	1994	6	1	4	6	0	34	4	1	1	0	0	2	3	0	0	0	0	
5	7	1	1994	6	1	4	6	0	138	25	2	2	3	0	23	62	0	5	0	0	
5	3	2	1994	6	1	4	6	0	27	2	0	0	1	0	0	9	0	0	0	0	
5	3	1	1994	6	1	4	6	0	84	20	0	7	0	0	6	71	2	2	0	0	
5	7	2	1994	6	1	4	7	0	36	2	3	0	5	0	7	5	0	0	0	0	
5	7	1	1994	6	1	4	7	1	160	22	4	1	8	0	36	74	0	1	1	0	
5	3	2	1994	6	1	4	7	0	64	5	0	0	0	0	0	9	0	1	0	0	
5	3	1	1994	6	1	4	7	0	166	20	0	17	1	0	6	81	0	5	0	0	
5	7	2	1994	6	1	4	8	0	38	3	1	0	3	0	3	9	0	0	0	0	
5	7	1	1994	6	1	4	8	0	158	23	3	1	6	1	27	73	0	3	0	0	
5	3	2	1994	6	1	4	8	0	57	4	0	3	0	0	1	9	0	1	0	0	
5	3	1	1994	6	1	4	8	0	236	28	0	13	0	0	9	58	1	3	1	0	
5	7	2	1994	6	1	4	9	0	38	4	2	0	0	0	6	5	0	1	0	0	

Figure 9 *Ag1.out* file

Aggregation scheme #2 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_13	MARK
5	7	2	1994	6	1	4	0	14	7	
5	7	1	1994	6	1	4	0	46	80	
5	3	2	1994	6	1	4	0	8	19	
5	3	1	1994	6	1	4	0	42	72	
5	7	2	1994	6	1	4	1	5	13	
5	7	1	1994	6	1	4	1	60	347	*
5	3	2	1994	6	1	4	1	4	10	
5	3	1	1994	6	1	4	1	25	57	
5	7	2	1994	6	1	4	2	7	10	
5	7	1	1994	6	1	4	2	16	115	
5	3	2	1994	6	1	4	2	6	5	
5	3	1	1994	6	1	4	2	18	62	
5	7	2	1994	6	1	4	3	8	10	
5	7	1	1994	6	1	4	3	21	112	
5	3	2	1994	6	1	4	3	6	8	
5	3	1	1994	6	1	4	3	13	72	
5	7	2	1994	6	1	4	4	11	12	
5	7	1	1994	6	1	4	4	49	118	
5	3	2	1994	6	1	4	4	4	6	
5	3	1	1994	6	1	4	4	21	55	
5	7	2	1994	6	1	4	5	9	10	
5	7	1	1994	6	1	4	5	77	70	
5	3	2	1994	6	1	4	5	6	15	
5	3	1	1994	6	1	4	5	42	79	
5	7	2	1994	6	1	4	6	38	7	
5	7	1	1994	6	1	4	6	163	97	
5	3	2	1994	6	1	4	6	29	10	
5	3	1	1994	6	1	4	6	104	88	
5	7	2	1994	6	1	4	7	38	20	
5	7	1	1994	6	1	4	7	183	125	
5	3	2	1994	6	1	4	7	69	10	
5	3	1	1994	6	1	4	7	186	110	
5	7	2	1994	6	1	4	8	41	16	
5	7	1	1994	6	1	4	8	181	114	
5	3	2	1994	6	1	4	8	61	14	
5	3	1	1994	6	1	4	8	264	85	
5	7	2	1994	6	1	4	9	42	14	

Figure 10 *Ag2.out* File

Aggregation scheme #3 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_8	C9_13	MARK
5	7	2	1994	6	1	4	0	14	2	5	
5	7	1	1994	6	1	4	0	46	22	58	
5	3	2	1994	6	1	4	0	8	2	17	
5	3	1	1994	6	1	4	0	42	6	66	
5	7	2	1994	6	1	4	1	5	9	4	
5	7	1	1994	6	1	4	1	60	24	323	*
5	3	2	1994	6	1	4	1	4	1	9	
5	3	1	1994	6	1	4	1	25	5	52	
5	7	2	1994	6	1	4	2	7	3	7	
5	7	1	1994	6	1	4	2	16	29	86	
5	3	2	1994	6	1	4	2	6	1	4	
5	3	1	1994	6	1	4	2	18	9	53	
5	7	2	1994	6	1	4	3	8	5	5	
5	7	1	1994	6	1	4	3	21	35	77	
5	3	2	1994	6	1	4	3	6	1	7	
5	3	1	1994	6	1	4	3	13	10	62	
5	7	2	1994	6	1	4	4	11	8	4	
5	7	1	1994	6	1	4	4	49	33	85	
5	3	2	1994	6	1	4	4	4	0	6	
5	3	1	1994	6	1	4	4	21	6	49	
5	7	2	1994	6	1	4	5	9	5	5	
5	7	1	1994	6	1	4	5	77	21	49	
5	3	2	1994	6	1	4	5	6	1	14	
5	3	1	1994	6	1	4	5	42	8	71	
5	7	2	1994	6	1	4	6	38	4	3	
5	7	1	1994	6	1	4	6	163	30	67	
5	3	2	1994	6	1	4	6	29	1	9	
5	3	1	1994	6	1	4	6	104	13	75	
5	7	2	1994	6	1	4	7	38	15	5	
5	7	1	1994	6	1	4	7	183	49	76	
5	3	2	1994	6	1	4	7	69	0	10	
5	3	1	1994	6	1	4	7	186	24	86	
5	7	2	1994	6	1	4	8	41	7	9	
5	7	1	1994	6	1	4	8	181	38	76	
5	3	2	1994	6	1	4	8	61	4	10	
5	3	1	1994	6	1	4	8	264	22	63	
5	7	2	1994	6	1	4	9	42	8	6	
5	7	1	1994	6	1	4	9	175	29	105	

Figure 11 *Ag3.out* file

Aggregation scheme #4 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_5	C6_8	C9_13	MARK
5	7	2	1994	6	1	4	0	14	0	2	5	
5	7	1	1994	6	1	4	0	46	2	20	58	
5	3	2	1994	6	1	4	0	8	0	2	17	
5	3	1	1994	6	1	4	0	42	3	3	66	
5	7	2	1994	6	1	4	1	5	1	8	4	
5	7	1	1994	6	1	4	1	60	8	16	323	*
5	3	2	1994	6	1	4	1	4	1	0	9	
5	3	1	1994	6	1	4	1	25	1	4	52	
5	7	2	1994	6	1	4	2	7	0	3	7	
5	7	1	1994	6	1	4	2	16	2	27	86	
5	3	2	1994	6	1	4	2	6	1	0	4	
5	3	1	1994	6	1	4	2	18	7	2	53	
5	7	2	1994	6	1	4	3	8	1	4	5	
5	7	1	1994	6	1	4	3	21	6	29	77	
5	3	2	1994	6	1	4	3	6	0	1	7	
5	3	1	1994	6	1	4	3	13	3	7	62	
5	7	2	1994	6	1	4	4	11	2	6	4	
5	7	1	1994	6	1	4	4	49	0	33	85	
5	3	2	1994	6	1	4	4	4	0	0	6	
5	3	1	1994	6	1	4	4	21	2	4	49	
5	7	2	1994	6	1	4	5	9	1	4	5	
5	7	1	1994	6	1	4	5	77	1	20	49	
5	3	2	1994	6	1	4	5	6	0	1	14	
5	3	1	1994	6	1	4	5	42	2	6	71	
5	7	2	1994	6	1	4	6	38	2	2	3	
5	7	1	1994	6	1	4	6	163	4	26	67	
5	3	2	1994	6	1	4	6	29	0	1	9	
5	3	1	1994	6	1	4	6	104	7	6	75	
5	7	2	1994	6	1	4	7	38	3	12	5	
5	7	1	1994	6	1	4	7	183	5	44	76	
5	3	2	1994	6	1	4	7	69	0	0	10	
5	3	1	1994	6	1	4	7	186	17	7	86	
5	7	2	1994	6	1	4	8	41	1	6	9	
5	7	1	1994	6	1	4	8	181	4	34	76	
5	3	2	1994	6	1	4	8	61	3	1	10	
5	3	1	1994	6	1	4	8	264	13	9	63	
5	7	2	1994	6	1	4	9	42	2	6	6	
5	7	1	1994	6	1	4	9	175	7	22	105	
5	3	2	1994	6	1	4	9	72	0	3	16	
5	3	1	1994	6	1	4	9	207	15	9	91	

Fig. 12 *Ag4.out* file

APPENDIX A

Extraction routine

This routine extracts data from the ATR, CAVC and WIM data polls as that are converted into card3, card4 and card7 data files respectively. If the data are stored in files separated on the basis of sites, months, year and card type then the data is ready for analysis. If the data has not been sorted out based on these criteria, then the extraction routine is run, and data is extracted in separate files based on specific site, month, year, and card type. Figure 1 shows an example database, which has Card 3, Card4, and Card 7 data in one file. The EXTRACT routine separates the file based on specific site, month, year, and card type. If you run the EXTRACT routine, the routine requires the following information:

(1) Input data file name and directory (e.g., c:\output\combine.out)

(2) Output file name and directory (e.g., c:\data\c00001.c14)

(3) Card type (e.g., 4)

(4) Site Id (e.g., 1)

(5) Year (e.g., 94)

(6) Number of months (e.g., 1)

(7) Months users want to extract (e.g., 1)

When users run the EXTRACT routine with parameters in the parenthesis, the EXTRACT routine produces a file (i.e., C:\data\c00001.c14) shown in Figure 2.

```
C42      13194011000          1   15    2    1    0    2    1    0   38   16    1    1   83
C42      13294011000          0    4   -1    0    0    0    0    2   20    0    0    1    0
C42      17294011000          0    2   -1    1    0    0    0    0    5    0    0    0    0
C42      17194011000          0   30    5    1    3    0    0    0   58    1    5    0    0
C42      13194011001          0    8    2    1    1    3    0    3   51   19    2    0   44
C42      57293051000          0    8    2    0    0    0    0    0    3    0    0    0    0
C42      53193051000          0   53    9    1    0    2    0   21  115    0    3    0    0
C42      53293051000          0   22   -1    0    1    0    0    3    8    0    0    0    0
C42      57193051000          0   51    3    1    2    0    0    2   18    0    1    0    0
C42      57293051001          0    6   -1    0    0    0    0    0    1    0    0    0    0
C42      53193051001          0   33    9    0    0    2    0   16  130    0    5    0    0
C42      53293051001          0   19    1    0    0    0    0    5   13    0    0    0    0
C42      57193051001          0   24    2    0    1    1    0    2   23    2    4    1    0
W42000005719406010009    167 5 38 47 33 12 34 97 34 12 29
W42000005719406010009    257 5 46 50 58 12 64 93 39 12 49
W42000005719406010009    361 5 52 43 81 14 82 84 69 31 77
W42000005719406010009    323 5 39 40 72 13 75 97 73 14 65
W42000005729406010009    274 5 46 47 54 13 52 89 56 12 66
W42000005729406010009    356 5 45 52 73 14 82 96 77 12 78
W42000005729406010009     99 3 46 46 30 14 23
W42000005719406010009    168 5 42 48 36 13 44 91 20 12 27
W42000005719406010009    323 5 45 51 78 14 78103 59 12 64
W42000005719406010005     72 2 35 36 37
W42000005719406010009    158 5 38 43 32 12 42 52 20 11 27
W42000005719406010009    269 5 42 57 54 14 57 83 54 30 60
W42000005719406010009    230 5 46 54 48 13 48100 46 12 43
W42000005719406010011    285 5 42 38 85 64 53 28 63 68 43
W42000005719406010011    161 5 39 37 40 62 27 29 26 66 29
W42000005719406010009    137 5 40 54 29 13 28 81 17 13 24
W42000005729406010009    150 5 34 31 38 13 35104 23 12 20
3420100000130940110200161001340011800099000970011900142001680021700242002620024200271002790025100175001700015800135001340011000230002220020 40
3420100000170940110200111000880009500080001060010700129002010021700275002850032800395004380044600489004380047300383003530040400311002530025 20
3420100000130940111300181001540014200135001430016500231002620028100244002690032800208003590039500259003190028800235002530020300185001300011 00
3420100000170940111300205001980017500152001430018500192002980033900360003630041400411004930045600528005120051500414003920038600335003070024 40
3420100000130940112400122001620014800132001340013000200001570025000270001580030100359004020038600394004240038500216002750028700286003000021 50
3420100000170940112400212002030017900165001490021300181002540026900291003020032100359003400034700361003930034200346002720028000236001750017 00
3420100000130940113500164001360016200124001560018600213002300029300321003420044200392004140044900476004290040200338003780021600241002850026 10
3420100000170940113500188001460014300139001580017100202002910033200409004400051400448004900050800571005400049200439004030034400195001260000 70
3420100000130940114600184001400011000111001090010100156002000022100256002820028500305003420030200305002940025300252002170019500149001200013 20
3420100000170940114600024003380017500181002070023100252002910030000374003780038600400004430049200525005040050300449003700029100292002330018 90
3420100000130940115700081000770004500054000730005200070000890010500122001850021100177002070019800198001680015900134001410009700090000760007 10
3420100000170940115700208001320013500102000920010800103001520017300264003210030200328004050033200370003280028600228002080013500136001100007 40
3420100000130940116100056000550003900043000360004500048000890011600172001980032900312003470039800468004190030000403003590025300291001760015 60
3420100000170940116100085000530006700044000360003500061000600009200156002300029500356004000038400402004340036900314002780025600206001300012 20
3420100000130940411200286002230016200145001710020300248003210037600407004290041500457004300045600499004640044600420003670036700315002770024 80
3420100000170940411200120001050008200093001220015000194002780025700332003630035700408004540047600548005060048900436003520038800329003400027 90
```

Figure 1 Input data for the EXTRACT routine

C42	13194011000	1	15	2	1	0	2	1	0	38	16	1	1	83
C42	13294011000	0	4	-1	0	0	0	0	2	20	0	0	1	0
C42	17294011000	0	2	-1	1	0	0	0	0	5	0	0	0	0
C42	17194011000	0	30	5	1	3	0	0	0	58	1	5	0	0
C42	13194011001	0	8	2	1	1	3	0	3	51	19	2	0	44

Figure 2 Output file created by the EXTRACT routine

APPENDIX B

QCM User's Manual

Conventions Used

- Items in *italics* refer to the ***LTPP Quality Control Analysis, User's Manual*** (called QCM herein)

- Items in **bold** refer to examples and the user can use any name convenient to him/her so long as the conventions specified in the ***LTPP Quality Control Analysis, User's Manual*** are followed and/or for file names required for analysis are used according to that manual as well.

- Items with double underline (===) indicate icons in QC software

- In order to run the LTPP QC Interface the *System Requirements (pp. 1 in QCM)* should be met

- Please ignore the item *Data (pp. 1 in QCM)* for the purpose of analysis

Algorithm for Running the CAVC Routines and Getting the Desired Results

Step 1: Install SAS© V6.11 for Windows© (refer to the installation instructions, which comes with the SAS© program)

Step 2: Install LTPP QC Interface (refer to *Setup [pp. 3,4,5 in QCM]*)
Once the Interface has been setup, the following directories will be found under the route directory. If the hard drive is C, then the hierarchy of directories will be as follows:

- C:\analysis\document
- C:\analysis\graphs
- C:\analysis\purge
- C:\ analysis\rawdata
- C:\ analysis\sascode
- C:\ analysis\sasdata

Detailed information for each directory under the directory analysis can be found under the item *Directory Structure (pp. 4 in QCM)*

Step 3: Copy the files provided in the diskette to the directory, C:\analysis\sascode\. The diskette includes the modified SAS code developed for this project. Overwrite the existing files in this directory.

Step 4: The original card4 and card7 files are saved in **C:\ORG_DATA** and have names such as **PA94.CLA** and **PA94.WGT**. In this example, the data in the two files are for PA SHRP ID 0005 from June 1, 1994. The original files are shown in Figure 1. Convert file names to the format required by the Interface. *Appendix C (pp. C-2 to C-4 in QCM)* gives complete instructions for the file naming conventions. The files **PA94.CLA** and **PA94.WGT** have been named in the convention to be followed, and are as follows:**C420005.H14 (PA94.CLA)** and **W420005.H14 (PA94.WGT)** respectively. The following paragraphs give a quick summary of the file naming convention with respect to the two example files.

- The first character of the file name is a character referencing the type of data collected. For example, W refers to weight data, C to classification data, and V to traffic data
- The second through seventh character of the file name is the six-digit SHRP site ID number. The first two digits are the State Code, and next four digits are the SHRP test site ID number.
- The three characters of the extension is an index to the starting date (Month, Day, Year) of the count, beginning with the month code, the day code, and the year code.

In Figure 1 the data set PA94.cla has been modified to reflect a typical system error, i.e., same volumes exist for 4 or more consecutive hours. The figure shows the section of the data set for the sample run.

Once the above four procedures have been accomplished, the Interface is ready to run.

Step 5: In order to run the Interface, return to Windows, click on the "LTPP Analysis" folder and then click on "LTPP Analysis Interface" icon. Copy to the files **C420005.H14** and **W420005.H14 to c:\data.** Ensure that the data files are copied to the **c:**\analysis\rawdata subdirectory. Click on the MOVER icon and type the source directory as **c:\data.** Answer the queries and then click the icon do it. The MOVER program organizes the data files into the Level 4 directory hierarchies. Ensure that the data file has been copied to the **c:**\analysis\rawdata directory. Once the data processing is over, it is advised to delete the old data files before new files are copied to the rawdata directory. Once this has been accomplished, return to the main LTPP Analysis Interface window. For more information please refer to the item *Mover (pp. 15)*.

Step 6: Click on the STANDARD ANALYSIS icon. Under the Standard Analysis Package, the following options are found:
Run QC
Run GVW
Run 7 V.s. 4
Run Class Distribution
Run Cluster
Select only the Run QC option. Enter the other required fields. For the field 'Enter Source Directory' enter only **c:\data**. Click on the icon do it. This analysis has to be run to ensure that the data aggregation takes place.

Step 7: The next window in this sequence of operations is headed "Select Sites You Wish to Run". Select the required sites. Click on the icon create lists. The Interface goes through a check option and will ask whether the user is sure . Click on the icon Yes or No accordingly. Clicking Yes continues the process.

Step 8: Once step 7 has been taken care of, depending on the size of the files the Interface will run. During this run two windows will show up, one saying "reading LTPP data files " and the other saying "creating graphs. Please wait a moment". After the files have processed, it returns to the Standard Analysis Window. The process produces the "Graph files" and the following SAS output files. These files are saved in the directory c:\output.

- Flags.out (Flagging Missing or Erroneous data shown in Figure 2)
- Scheme1.out (System 1 of Aggregation shown in Figure 3)
- Scheme2.out (System 2 of Aggregation shown in Figure 4)
- Scheme3.out (System 3 of Aggregation in Figure 5)
- Scheme4.out (System 4 of Aggregation in Figure 6)
- TMG3.out (This file will be used to generate card3 datafile)

C420000057294060100	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060100	0	42	4	2	0	1	0	19	55	1	2	0	0
C420000053294060100	0	14	-1	0	0	0	0	2	5	0	0	0	0
C420000057194060100	0	37	5	0	3	1	0	2	61	0	5	0	0
C420000057294060101	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060101	0	42	4	2	0	1	0	19	55	1	2	0	0
C420000053294060101	0	14	-1	0	0	0	0	2	5	0	0	0	0
C420000057194060101	0	37	5	0	3	1	0	2	61	0	5	0	0
C420000057294060102	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060102	0	42	4	2	0	1	0	19	55	1	2	0	0
C420000053294060102	0	14	-1	0	0	0	0	2	5	0	0	0	0
C420000057194060102	0	37	5	0	3	1	0	2	61	0	5	0	0
C420000057294060103	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060103	0	42	4	2	0	1	0	19	55	1	2	0	0
C420000053294060103	0	14	-1	0	0	0	0	2	5	0	0	0	0
C420000057194060103	0	37	5	0	3	1	0	2	61	0	5	0	0
C420000057294060104	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060104	0	42	4	2	0	1	0	19	55	1	2	0	0
C420000053294060104	0	14	-1	0	0	0	0	2	5	0	0	0	0
C420000057194060104	0	37	5	0	3	1	0	2	61	0	5	0	0
C420000057294060105	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060105	0	42	4	2	0	1	0	19	55	1	2	0	0
C420000053294060105	0	14	-1	0	0	0	0	2	5	0	0	0	0
C420000057194060105	0	37	5	0	3	1	0	2	61	0	5	0	0
C420000057294060106	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060106	0	138	25	2	2	3	0	23	62	0	5	0	0
C420000053294060106	0	34	4	1	1	0	0	2	3	0	0	0	0
C420000057194060106	0	84	20	0	7	0	0	6	71	2	2	0	0
C420000057294060107	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053194060107	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000053294060107	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000057194060107	0	6	2	0	0	1	0	1	17	0	0	0	0
C420000057294060108	0	84	20	0	7	0	0	6	71	2	2	0	0
C420000053194060108	0	84	20	0	7	0	0	6	71	2	2	0	0
C420000053294060108	0	84	20	0	7	0	0	6	71	2	2	0	0
C420000057194060108	0	84	20	0	7	0	0	6	71	2	2	0	0
C420000057294060109	0	84	20	0	7	0	0	6	71	2	2	0	0

Figure 1 A sample CARD4 dataset Used in the Sample Run

Figure 2 shows the output from the runs and includes the flagged data set, i.e. the 4 or more consecutive hours with same volumes have been flagged. Figures 3 through 6 show the outputs from the four different systems of aggregation for the vehicle classes. The SAS output files are saved in the directory c:\output. More detailed description of the Standard Analysis process are given under the items *Typical Analysis Process (pp. 8), QC Edit Analysis (pp. 21)*

Step 9: Exit the Standard Analysis window. Click on the icon Graph Management to view the graphs which have been created due to system and / or equipment errors. To view the original data files, click on the icon Data Management. For more details on Graph Management and Data Management refer to the items *Graph Management Facility (pp. 40)* and *Data Management Facility (pp. 38).* The SAS output files can be seen in either one of the following:

DOS Editor
SAS Program Editor
Any Word Processor

ERROR DATA CAUGHT BY QC SOFTWARE

OBS	SHRPID	DIRECT	LANE	YEAR	MONTH	DAY	DOW	EDIT	STTIME	ENDTIME	NUMB
1	5	7	1	1994	6	2	5	4+ Consec Nonzeros	5	11	6
2	5	7	2	1994	6	2	5	4+ Consec Nonzeros	5	11	6
3	5	3	1	1994	6	2	5	4+ Consec Nonzeros	5	11	6
4	5	3	2	1994	6	2	5	4+ Consec Nonzeros	5	11	6
5	5	7	1	1994	6	3	6	8+ Consec Zeros	2	12	10
6	5	3	2	1994	6	3	6	8+ Consec Zeros	2	12	10
7	5	3	1	1994	6	3	6	8+ Consec Zeros	2	12	10
8	5	3	2	1994	6	3	6	8+ Consec Zeros	2	12	10
9	5	7	1	1994	6	1	4	Time Check	2	14	2

Figure 2 Flags.out file from the sample run

Aggregation scheme #1 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	CLASS1	CLASS2	CLASS3	CLASS4	CLASS5	CLASS6	CLASS7	CLASS8	CLASS9	CLASS10	CLASS11	CLASS12	CLASS13
1	3	2	1994	1	10	2	0	0	4	0	0	0	0	0	2	20	0	0	1	0
1	3	1	1994	1	10	2	0	1	15	2	1	0	2	1	0	38	16	1	1	83
1	7	2	1994	1	10	2	0	0	2	0	1	0	0	0	0	5	0	0	0	0
1	7	1	1994	1	10	2	0	0	30	5	1	3	0	0	0	58	1	5	0	0
1	3	2	1994	1	10	2	1	0	2	3	0	0	1	0	1	12	1	0	1	0
1	3	1	1994	1	10	2	1	0	8	2	1	1	3	0	3	51	19	2	0	44
1	7	2	1994	1	10	2	1	0	4	0	0	0	0	0	0	3	0	0	0	0
1	7	1	1994	1	10	2	1	0	20	3	0	2	3	0	2	42	3	6	0	0
1	3	2	1994	1	10	2	2	0	4	0	1	1	1	0	0	12	0	1	0	0
1	3	1	1994	1	10	2	2	0	12	6	0	1	2	0	1	51	7	1	0	37
1	7	2	1994	1	10	2	2	0	4	0	0	0	1	0	1	0	0	0	0	0
1	7	1	1994	1	10	2	2	0	16	3	0	1	0	0	0	56	1	12	0	0
1	3	2	1994	1	10	2	3	0	0	0	0	0	0	0	1	14	0	1	1	0
1	3	1	1994	1	10	2	3	0	9	3	0	1	2	0	0	25	13	3	0	43
1	7	2	1994	1	10	2	3	0	0	2	0	0	0	0	0	5	0	0	0	0
1	7	1	1994	1	10	2	3	0	19	0	0	5	2	1	1	35	0	10	0	0
1	3	2	1994	1	10	2	4	0	3	1	0	0	1	0	0	9	0	1	0	0
1	3	1	1994	1	10	2	4	0	18	13	0	0	2	0	1	27	6	0	0	30
1	7	2	1994	1	10	2	4	0	2	0	0	0	1	0	0	6	0	1	0	0
1	7	1	1994	1	10	2	4	0	21	5	0	4	4	2	4	49	2	5	0	0
1	3	2	1994	1	10	2	5	0	2	1	1	1	0	0	0	12	0	0	0	0
1	3	1	1994	1	10	2	5	0	22	7	0	2	3	0	4	36	5	3	0	37
1	7	2	1994	1	10	2	5	0	8	2	1	0	2	0	0	2	0	0	0	0
1	7	1	1994	1	10	2	5	0	21	8	0	7	5	0	4	39	2	6	0	0
1	3	2	1994	1	10	2	6	0	8	0	0	0	0	0	1	11	0	2	0	0
1	3	1	1994	1	10	2	6	0	42	11	2	2	4	0	0	31	14	7	0	29
1	7	2	1994	1	10	2	6	0	5	6	0	0	0	0	0	2	0	0	0	0
1	7	1	1994	1	10	2	6	0	39	15	0	3	3	5	4	41	1	5	0	0
1	3	2	1994	1	10	2	7	0	14	3	0	0	0	0	0	15	0	3	0	0
1	3	1	1994	1	10	2	7	4	56	21	2	4	3	4	2	31	5	2	1	33
1	7	2	1994	1	10	2	7	0	13	10	0	1	1	0	0	6	1	0	0	0
1	7	1	1994	1	10	2	7	0	76	14	0	6	2	9	5	52	0	4	1	0

Figure 3 Scheme1.out file from the sample run

Aggregation scheme #2 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_13
1	3	2	1994	1	10	2	0	4	23
1	3	1	1994	1	10	2	0	18	143
1	7	2	1994	1	10	2	0	2	6
1	7	1	1994	1	10	2	0	35	68
1	3	2	1994	1	10	2	1	5	16
1	3	1	1994	1	10	2	1	10	124
1	7	2	1994	1	10	2	1	4	3
1	7	1	1994	1	10	2	1	23	58
1	3	2	1994	1	10	2	2	4	16
1	3	1	1994	1	10	2	2	18	100
1	7	2	1994	1	10	2	2	4	2
1	7	1	1994	1	10	2	2	19	70
1	3	2	1994	1	10	2	3	0	17
1	3	1	1994	1	10	2	3	12	87
1	7	2	1994	1	10	2	3	2	5
1	7	1	1994	1	10	2	3	19	54
1	3	2	1994	1	10	2	4	4	11
1	3	1	1994	1	10	2	4	31	66
1	7	2	1994	1	10	2	4	2	8
1	7	1	1994	1	10	2	4	26	70
1	3	2	1994	1	10	2	5	3	14
1	3	1	1994	1	10	2	5	29	90
1	7	2	1994	1	10	2	5	10	5
1	7	1	1994	1	10	2	5	29	63
1	3	2	1994	1	10	2	6	8	14
1	3	1	1994	1	10	2	6	53	89
1	7	2	1994	1	10	2	6	11	2
1	7	1	1994	1	10	2	6	54	62
1	3	2	1994	1	10	2	7	17	18
1	3	1	1994	1	10	2	7	81	87
1	7	2	1994	1	10	2	7	23	9
1	7	1	1994	1	10	2	7	90	79
1	3	2	1994	1	10	2	8	20	19
1	3	1	1994	1	10	2	8	99	118
1	7	2	1994	1	10	2	8	21	11
1	7	1	1994	1	10	2	8	84	101
1	3	2	1994	1	10	2	9	25	29

Figure 4 Scheme2.out file from the sample run

Aggregation scheme #3 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_8	C9_13
1	3	2	1994	1	10	2	0	4	2	21
1	3	1	1994	1	10	2	0	18	4	139
1	7	2	1994	1	10	2	0	2	1	5
1	7	1	1994	1	10	2	0	35	4	64
1	3	2	1994	1	10	2	1	5	2	14
1	3	1	1994	1	10	2	1	10	8	116
1	7	2	1994	1	10	2	1	4	0	3
1	7	1	1994	1	10	2	1	23	7	51
1	3	2	1994	1	10	2	2	4	3	13
1	3	1	1994	1	10	2	2	18	4	96
1	7	2	1994	1	10	2	2	4	2	0
1	7	1	1994	1	10	2	2	19	1	69
1	3	2	1994	1	10	2	3	0	1	16
1	3	1	1994	1	10	2	3	12	3	84
1	7	2	1994	1	10	2	3	2	0	5
1	7	1	1994	1	10	2	3	19	9	45
1	3	2	1994	1	10	2	4	4	1	10
1	3	1	1994	1	10	2	4	31	3	63
1	7	2	1994	1	10	2	4	2	1	7
1	7	1	1994	1	10	2	4	26	14	56
1	3	2	1994	1	10	2	5	3	2	12
1	3	1	1994	1	10	2	5	29	9	81
1	7	2	1994	1	10	2	5	10	3	2
1	7	1	1994	1	10	2	5	29	16	47
1	3	2	1994	1	10	2	6	8	1	13
1	3	1	1994	1	10	2	6	53	8	81
1	7	2	1994	1	10	2	6	11	0	2
1	7	1	1994	1	10	2	6	54	15	47
1	3	2	1994	1	10	2	7	17	0	18
1	3	1	1994	1	10	2	7	81	15	72
1	7	2	1994	1	10	2	7	23	2	7
1	7	1	1994	1	10	2	7	90	22	57
1	3	2	1994	1	10	2	8	20	2	17
1	3	1	1994	1	10	2	8	99	28	90
1	7	2	1994	1	10	2	8	21	5	6
1	7	1	1994	1	10	2	8	84	33	68
1	3	2	1994	1	10	2	9	25	9	20
1	3	1	1994	1	10	2	9	104	22	116
1	7	2	1994	1	10	2	9	32	3	13

Figure 5 Scheme3.out file from the sample run

Aggregation scheme #4 for CAVC

SHRPID	DIRECT	LANE	YR	MN	DAY	DOW	TIME	C1_3	C4_5	C6_8	C9_13
1	3	2	1994	1	10	2	0	4	0	2	21
1	3	1	1994	1	10	2	0	18	1	3	139
1	7	2	1994	1	10	2	0	2	1	0	5
1	7	1	1994	1	10	2	0	35	4	0	64
1	3	2	1994	1	10	2	1	5	0	2	14
1	3	1	1994	1	10	2	1	10	2	6	116
1	7	2	1994	1	10	2	1	4	0	0	3
1	7	1	1994	1	10	2	1	23	2	5	51
1	3	2	1994	1	10	2	2	4	2	1	13
1	3	1	1994	1	10	2	2	18	1	3	96
1	7	2	1994	1	10	2	2	4	0	2	0
1	7	1	1994	1	10	2	2	19	1	0	69
1	3	2	1994	1	10	2	3	0	0	1	16
1	3	1	1994	1	10	2	3	12	1	2	84
1	7	2	1994	1	10	2	3	2	0	0	5
1	7	1	1994	1	10	2	3	19	5	4	45
1	3	2	1994	1	10	2	4	4	0	1	10
1	3	1	1994	1	10	2	4	31	0	3	63
1	7	2	1994	1	10	2	4	2	0	1	7
1	7	1	1994	1	10	2	4	26	4	10	56
1	3	2	1994	1	10	2	5	3	2	0	12
1	3	1	1994	1	10	2	5	29	2	7	81
1	7	2	1994	1	10	2	5	10	1	2	2
1	7	1	1994	1	10	2	5	29	7	9	47
1	3	2	1994	1	10	2	6	8	0	1	13
1	3	1	1994	1	10	2	6	53	4	4	81
1	7	2	1994	1	10	2	6	11	0	0	2
1	7	1	1994	1	10	2	6	54	3	12	47
1	3	2	1994	1	10	2	7	17	0	0	18
1	3	1	1994	1	10	2	7	81	6	9	72
1	7	2	1994	1	10	2	7	23	1	1	7
1	7	1	1994	1	10	2	7	90	6	16	57
1	3	2	1994	1	10	2	8	20	0	2	17
1	3	1	1994	1	10	2	8	99	9	19	90
1	7	2	1994	1	10	2	8	21	2	3	6
1	7	1	1994	1	10	2	8	84	10	23	68
1	3	2	1994	1	10	2	9	25	4	5	20
1	3	1	1994	1	10	2	9	104	10	12	116
1	7	2	1994	1	10	2	9	32	0	3	13

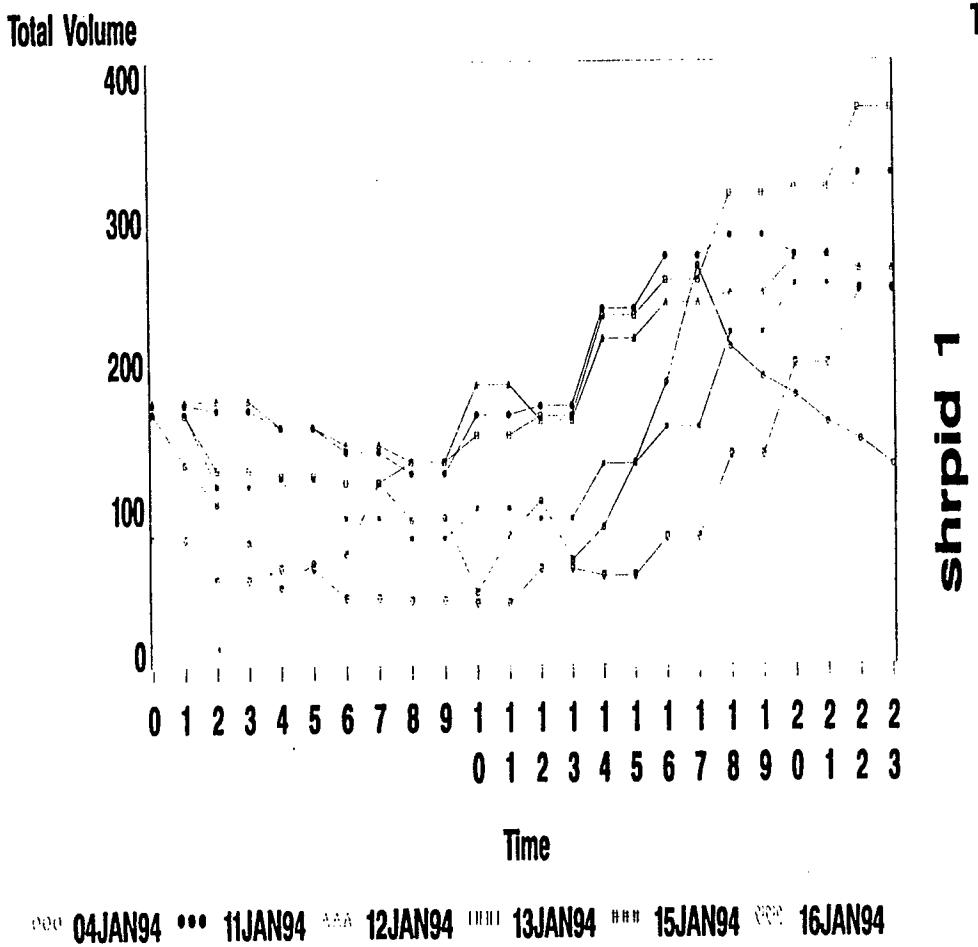
Figure 6 Scheme4.out file from the sample run

APPENDIX C

Sample Graphs

QA EDIT CHECKS
FOR 4 CARD DATA

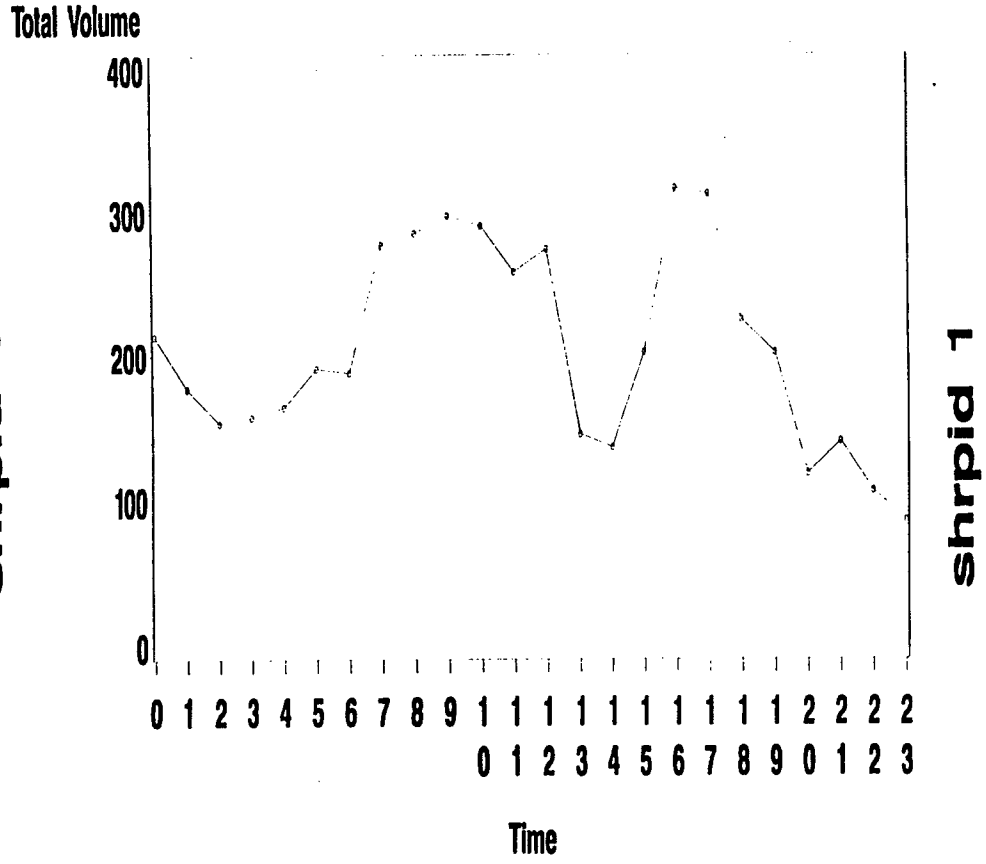
EDIT=Time Check STATE=Pennsylvania DIRECT=West LANE=1 MONTH=Janu



000 04JAN94 ••• 11JAN94 ^^^ 12JAN94 IIIII 13JAN94 ### 15JAN94 ~~~ 16JAN94

QA EDIT CHECKS
FOR 4 CARD DATA

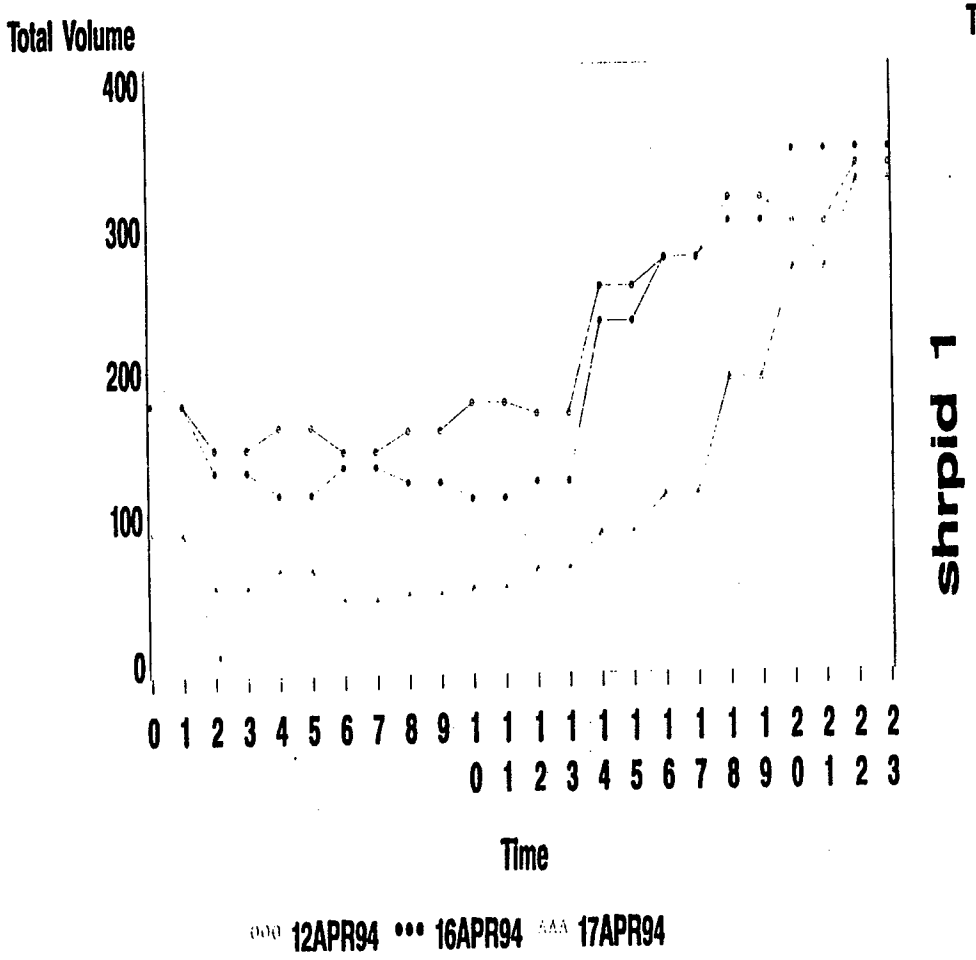
EDIT=Time Check STATE=Pennsylvania DIRECT=West LANE=1 MONTH=Marc



000 09MAR94

QA EDIT CHECKS
FOR 4 CARD DATA

EDIT=Time Check STATE=Pennsylvania DIRECT=West LANE=1 MONTH=Apri



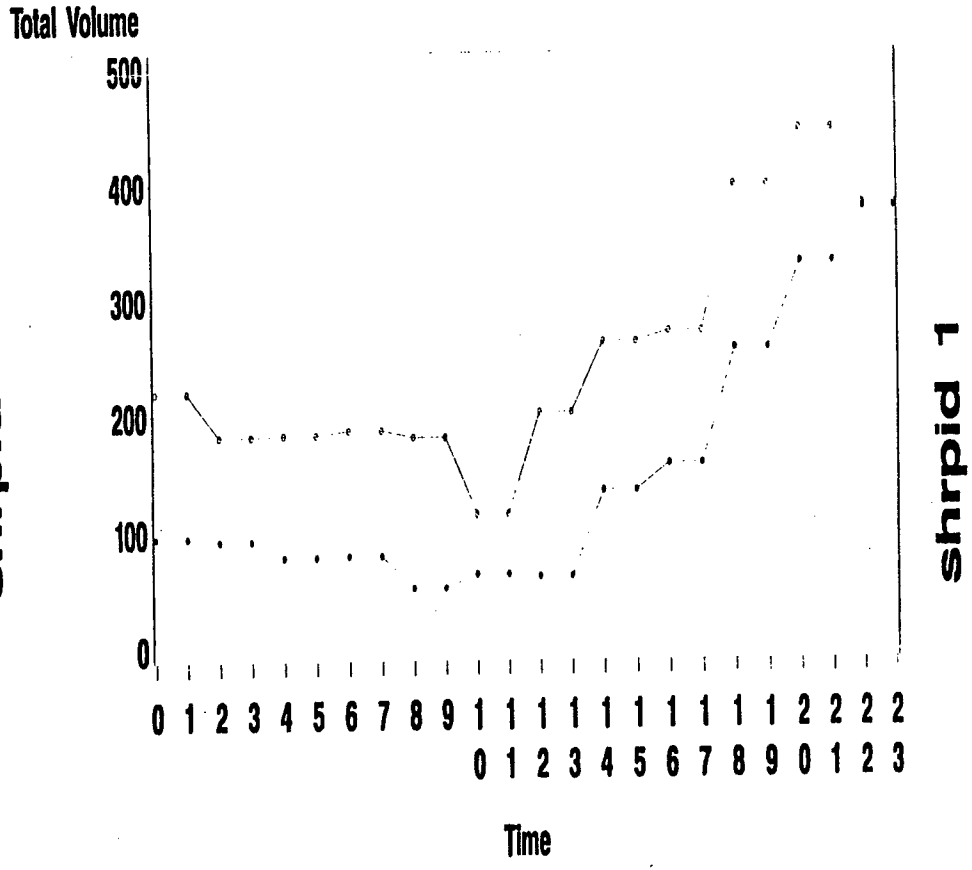
000 12APR94 ••• 16APR94 AAA 17APR94

1993

LTPP.PA000144

QA EDIT CHECKS
FOR 4 CARD DATA

EDIT=Time Check STATE=Pennsylvania DIRECT=West LANE=1 MONTH=Octo



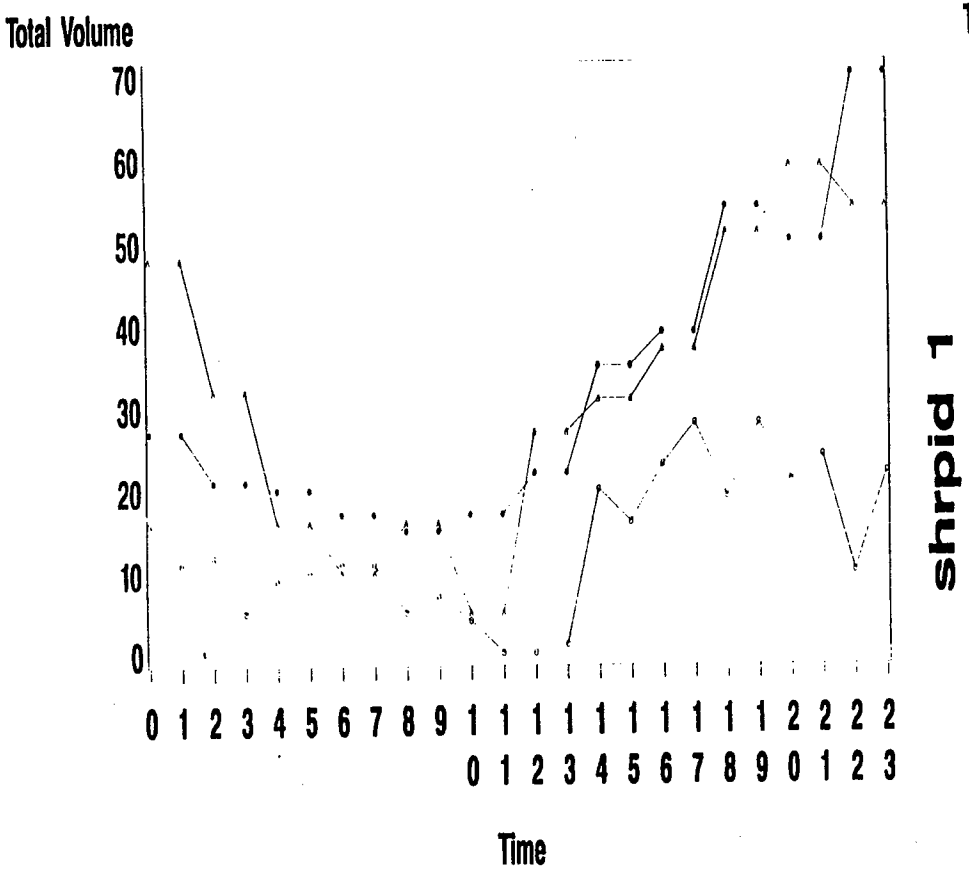
000 19OCT94 ••• 23OCT94

1993

LTPP.PA000144

QA EDIT CHECKS
FOR 4 CARD DATA

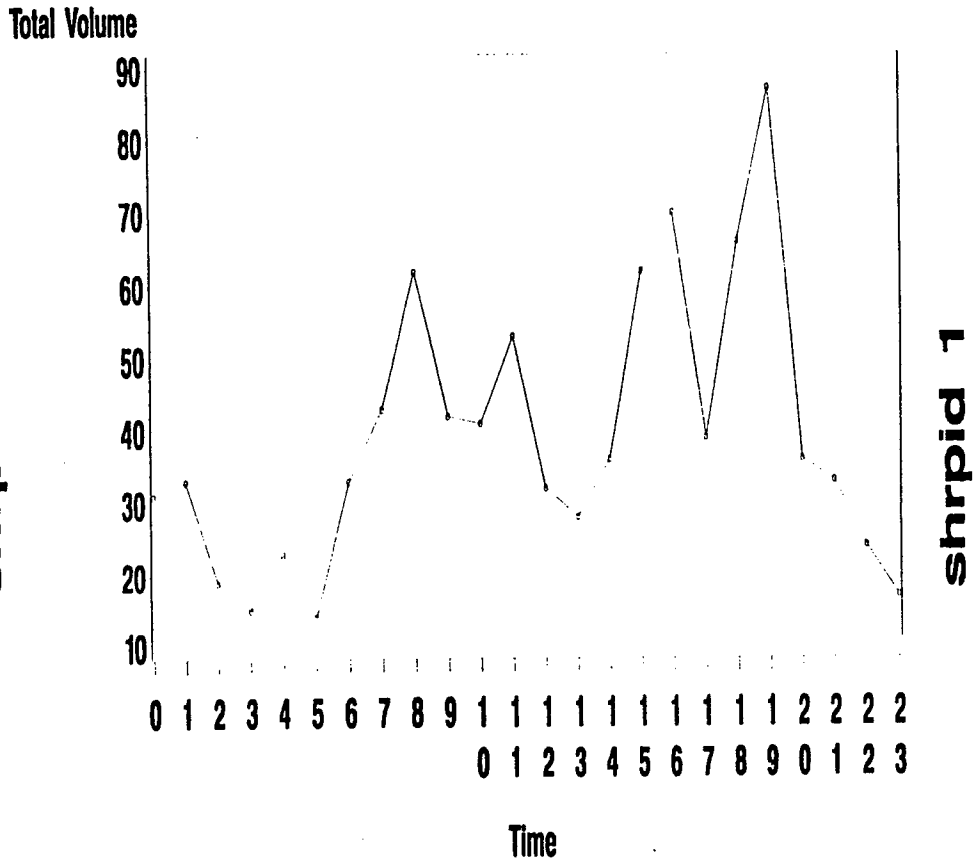
EDIT=Time Check STATE=Pennsylvania DIRECT=East LANE=2 MONTH=Janu



000 04JAN94 ••• 10JAN94 ^^^ 14JAN94

QA EDIT CHECKS
FOR 4 CARD DATA

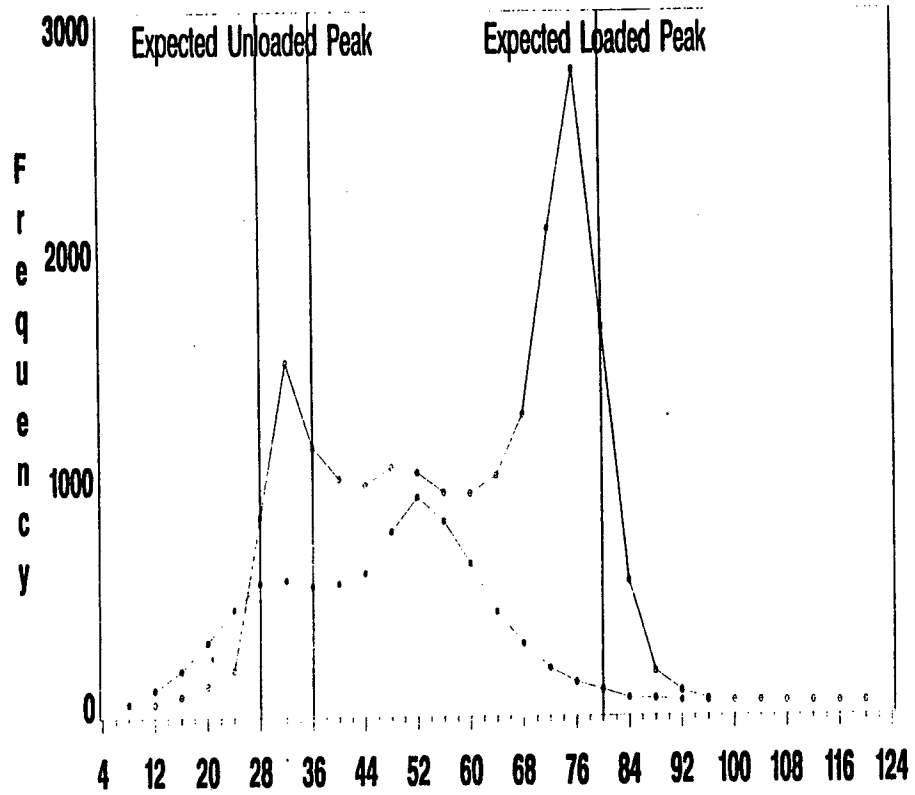
EDIT=Time Check STATE=Pennsylvania DIRECT=East LANE=2 MONTH=Marc



000 09MAR94

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=West LANE=1 YR=1994



ooo JAN-MAR *** APR-JUN

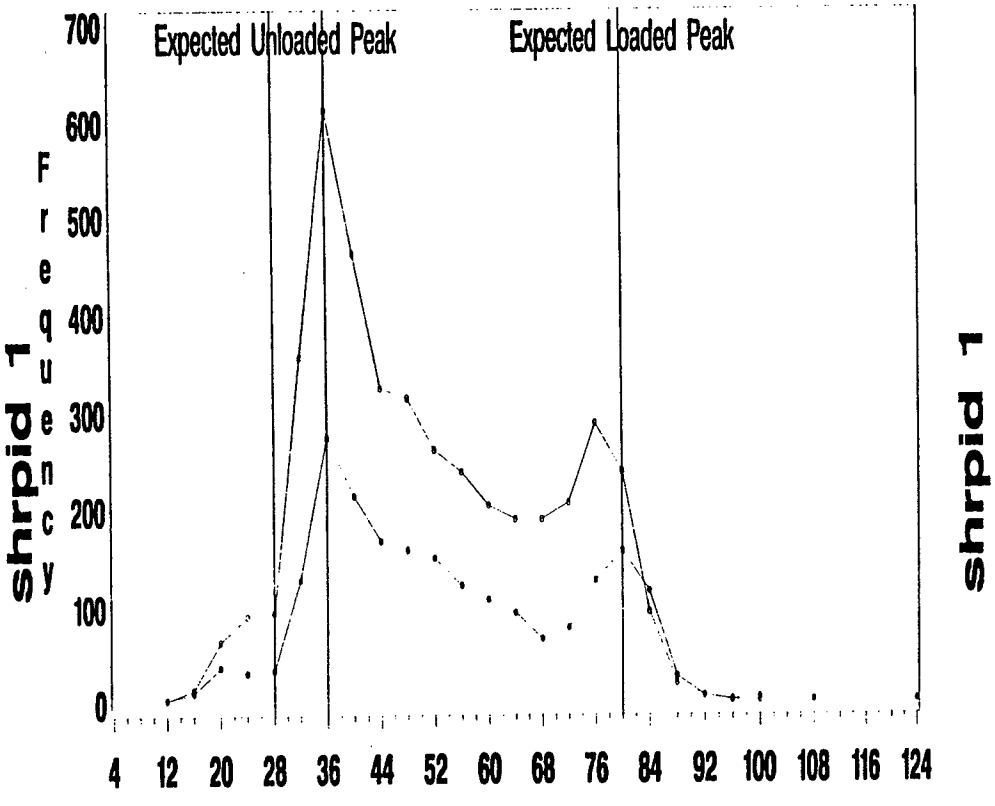
	JAN-MAR	APR-JUN
Less than 28 KIPS -	1%	12%
Between 28 & 80 KIPS -	95%	88%
Greater than 80 KIPS -	4%	1%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=West LANE=2 YR=1994



ooo JAN-MAR *** APR-JUN

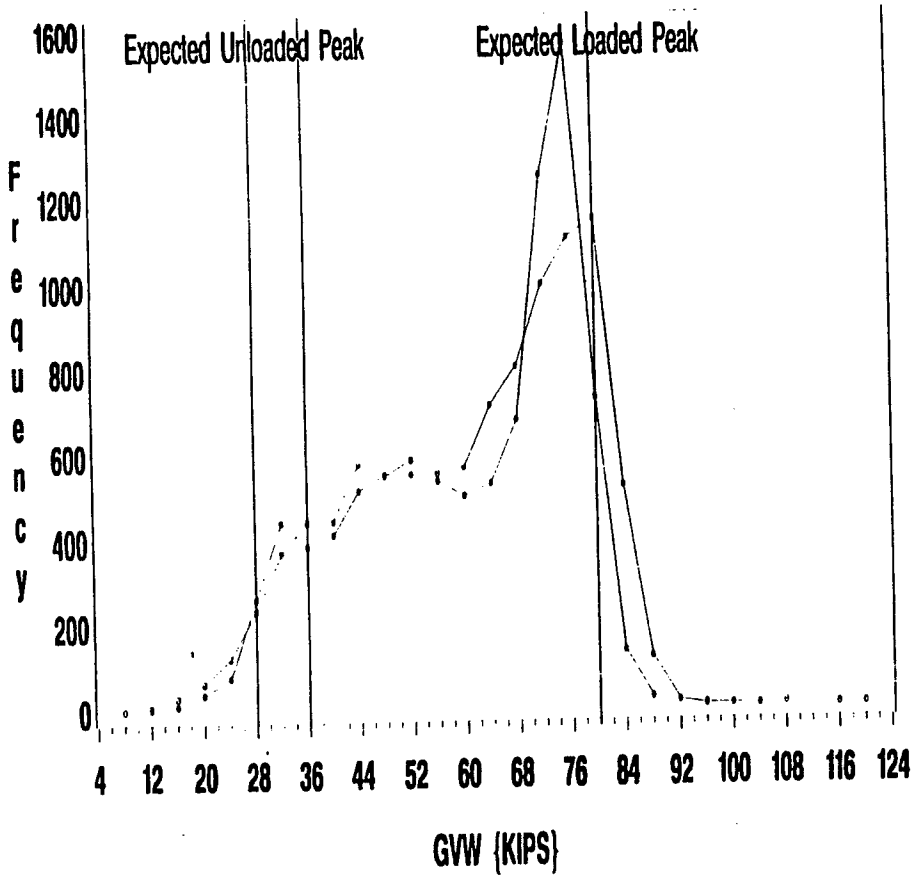
	JAN-MAR	APR-JUN
Less than 28 KIPS -	4%	4%
Between 28 & 80 KIPS -	93%	89%
Greater than 80 KIPS -	3%	7%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=East LANE=1 YR=1994



000 JAN-MAR *** APR-JUN

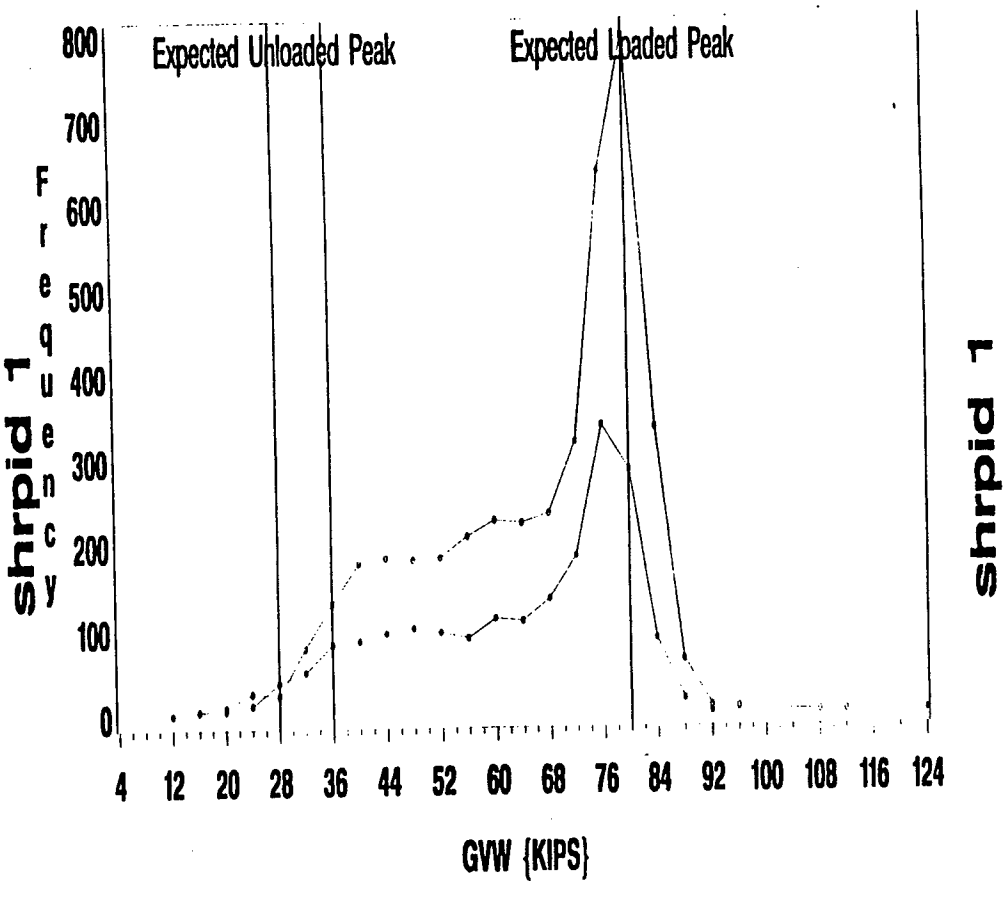
	JAN-MAR	APR-JUN
Less than 28 KIPS -	2%	1%
Between 28 & 80 KIPS -	91%	97%
Greater than 80 KIPS -	7%	2%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=East LANE=2 YR=1994



000 JAN-MAR *** APR-JUN

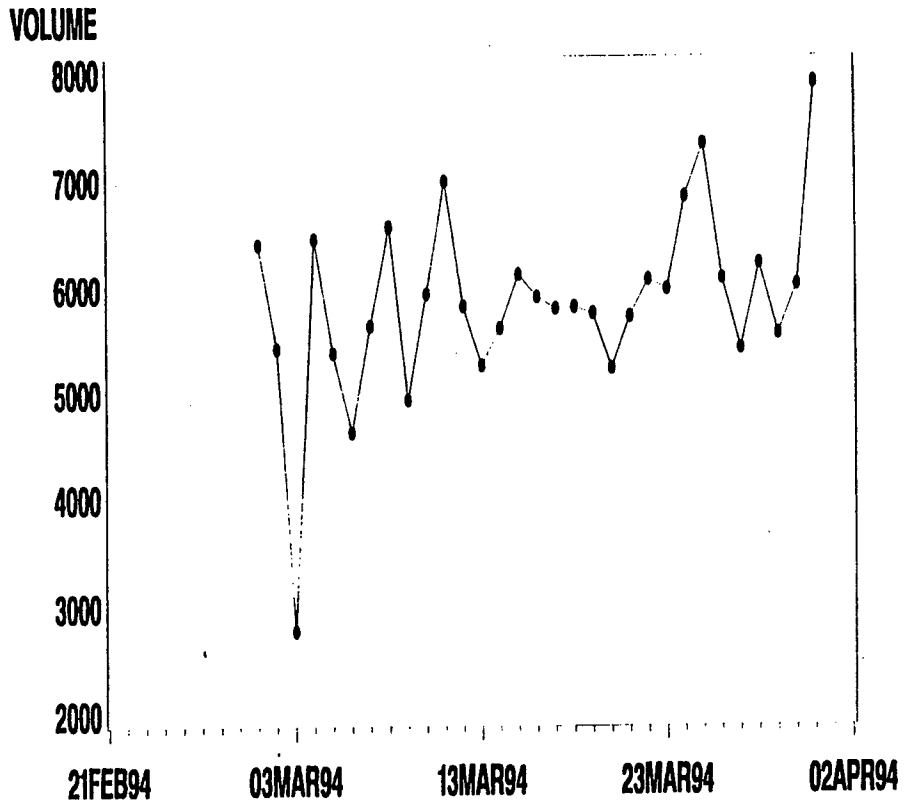
	JAN-MAR	APR-JUN
Less than 28 KIPS -	1%	1%
Between 28 & 80 KIPS -	89%	93%
Greater than 80 KIPS -	10%	5%

1994

LTPP.PA000147

4 & 7 CARD DAILY VOLUMES FOR VEHICLES

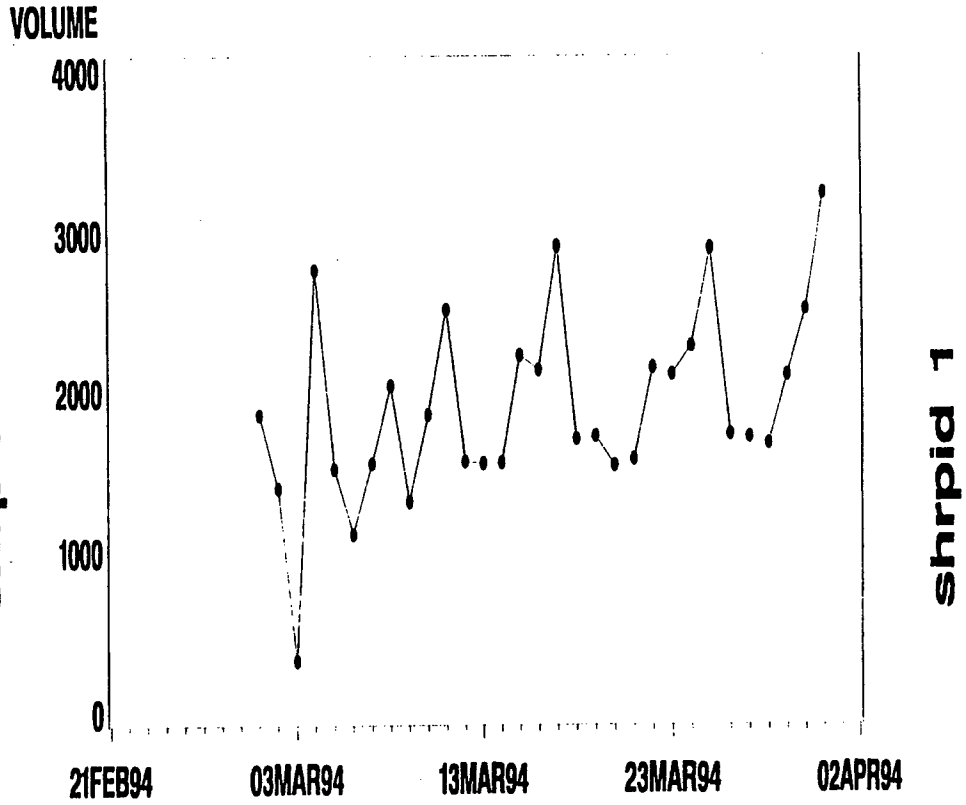
STATE=Pennsylvania YR=1994 MONTH=March DIRECT=West LANE=1



LTPP.PA000144

4 & 7 CARD DAILY VOLUMES FOR VEHICLES

STATE=Pennsylvania YR=1994 MONTH=March DIRECT=West LANE=2

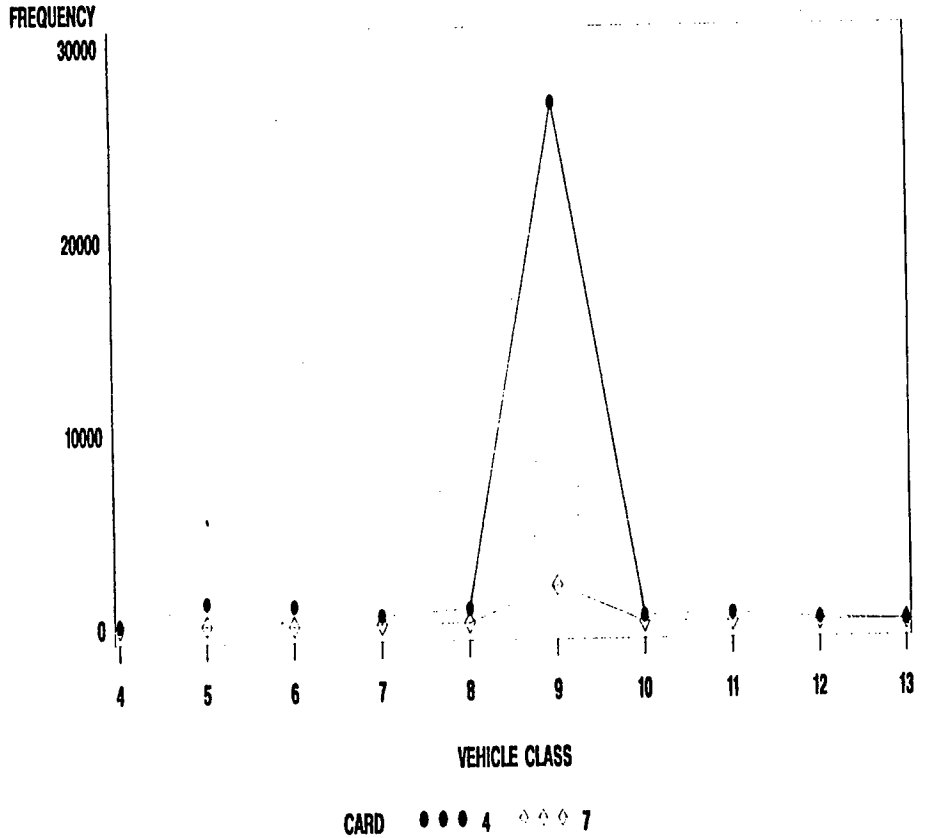


LTPP.PA000144

Card	VC4	VC5	VC6	VC7	VC8	VC9	VC10	VC11	VC12	VC13
4	0%	4%	3%	2%	3%	86%	1%	1%	0%	0%
7	0%	4%	0%	2%	3%	87%	2%	1%	1%	0%

4 & 7 CARD VEHICLE CLASS DISTR by MONTH

STATE=Pennsylvania DIRECT=East LANE=2 YR=1994 MONTH=April

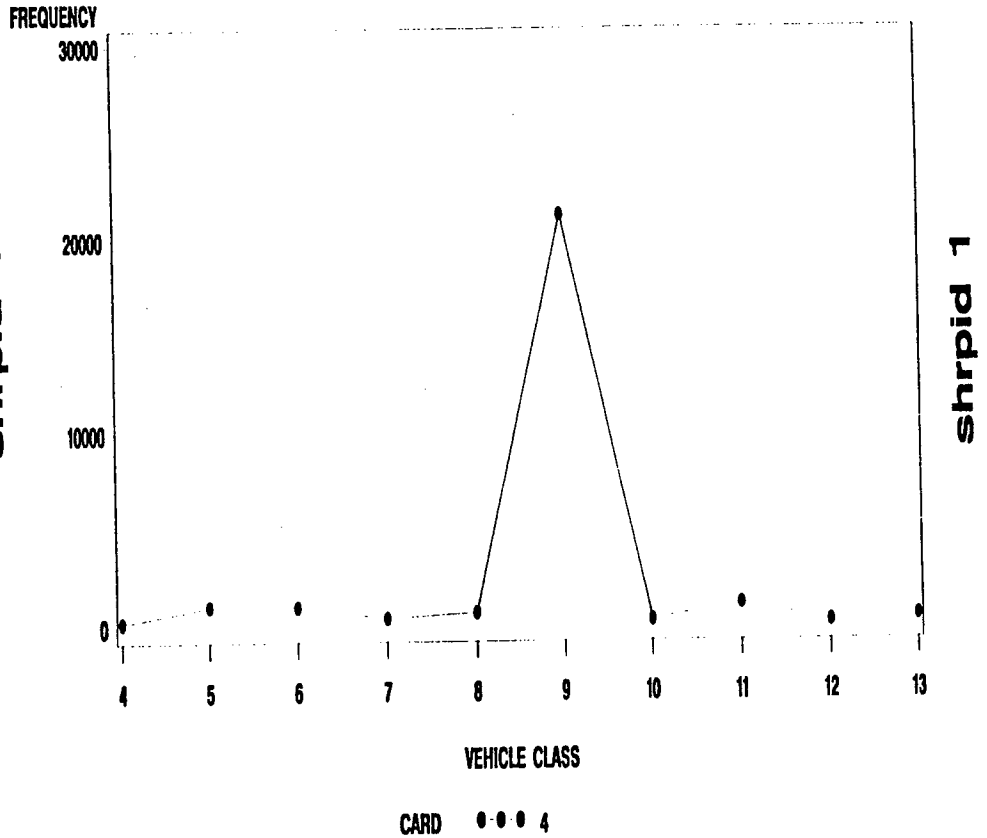


LTPP.PA000144
LTPP.PA000147

Card	VC4	VC5	VC6	VC7	VC8	VC9	VC10	VC11	VC12	VC13
4	1%	4%	4%	1%	2%	81%	1%	4%	1%	2%

4 & 7 CARD VEHICLE CLASS DISTR by MONTH

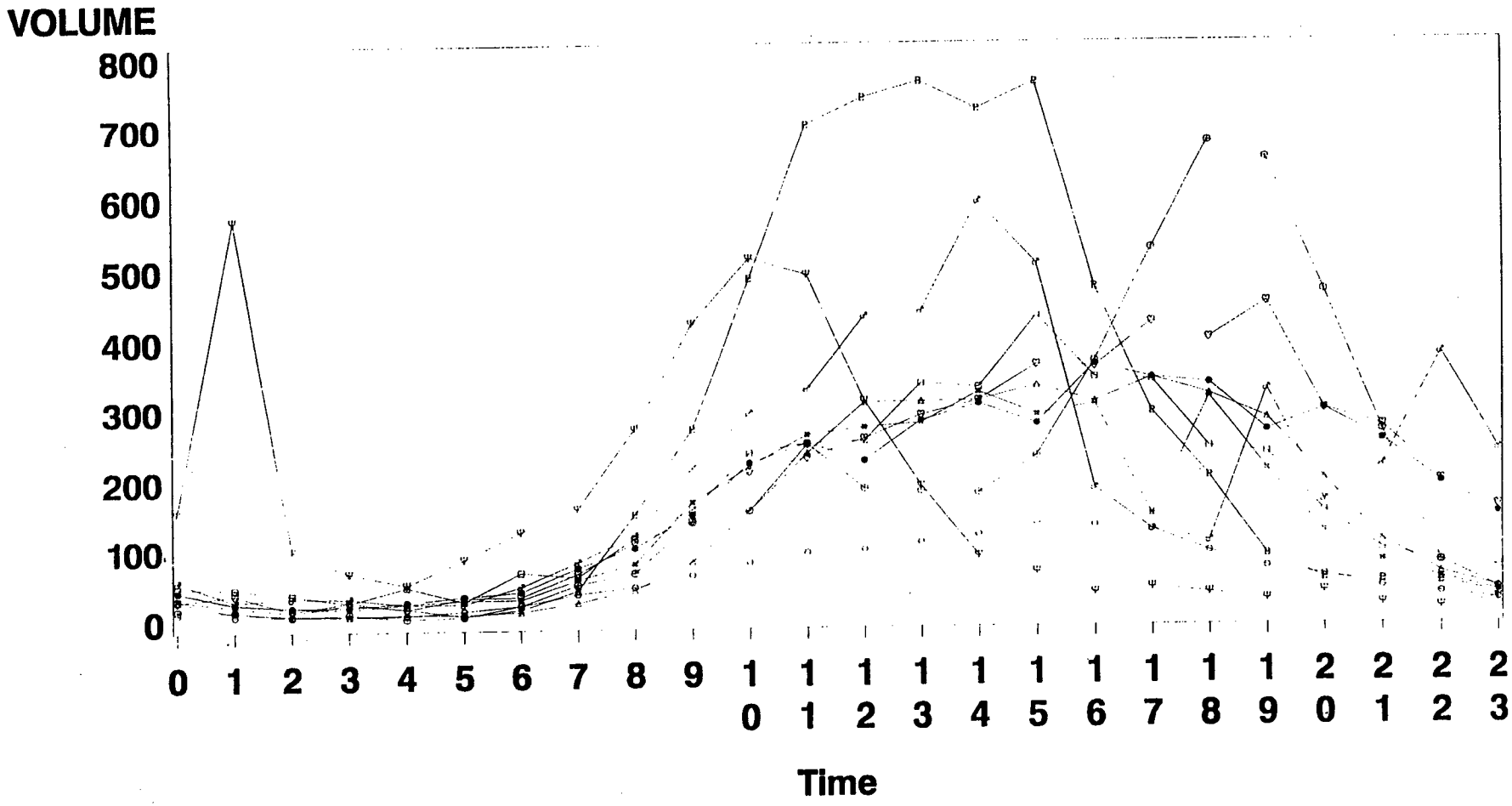
STATE=Pennsylvania DIRECT=East LANE=2 YR=1994 MONTH=May



LTPP.PA000144
LTPP.PA000147

MEDIAN HOURLY VOLUMES OF CLUSTERS FOR CARS

STATE = Pennsylvania SHRPID = 1 DIRECT = West LANE = 2



LTPP.PA000144

SINGLE Cluster Method

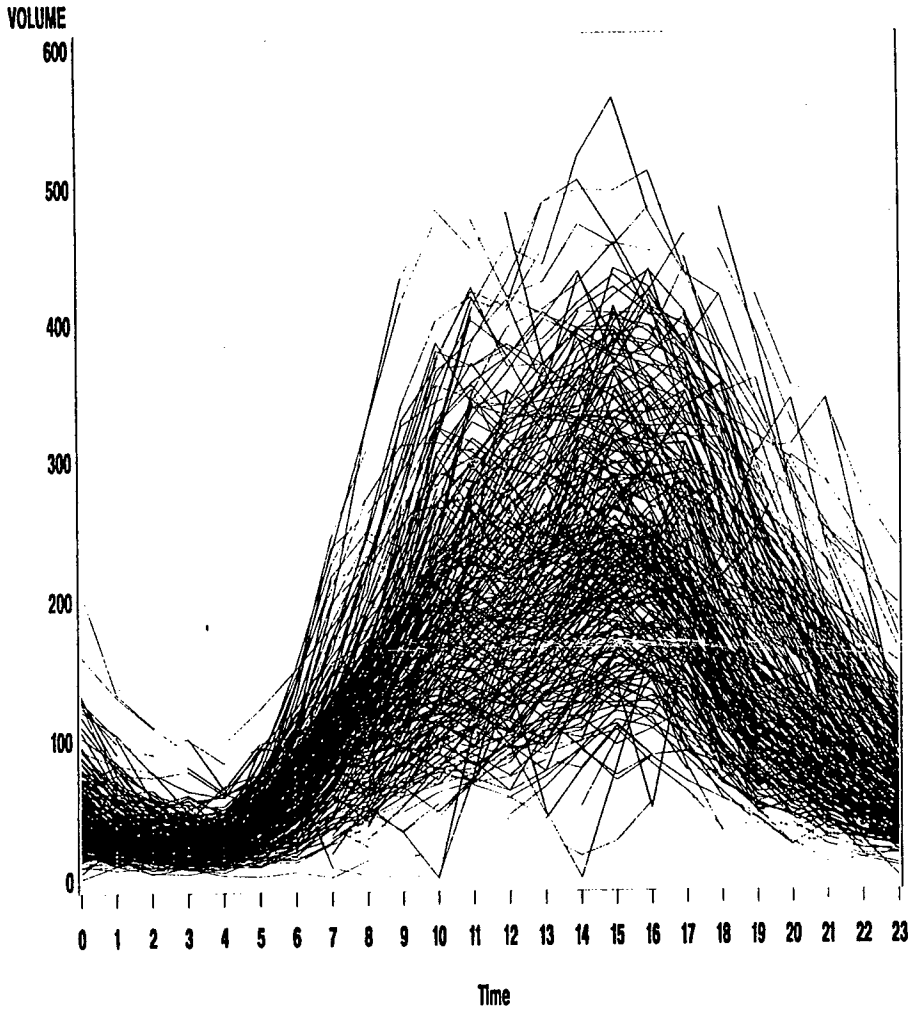
Sun	Mon	Tue	Wed	Thu	Fri	Sat
39	38	40	37	37	37	39

CLUSTERED HOURLY VOLUMES FOR CARS

Jan	Feb	Mar	Apr	May	Jul	Aug
28	27	30	28	28	13	28
Sep	Oct	Nov				
29	31	25				

Tue
1

STATE=Pennsylvania SHRPID=1 DIRECT=West LANE=1 CLUSTER=1

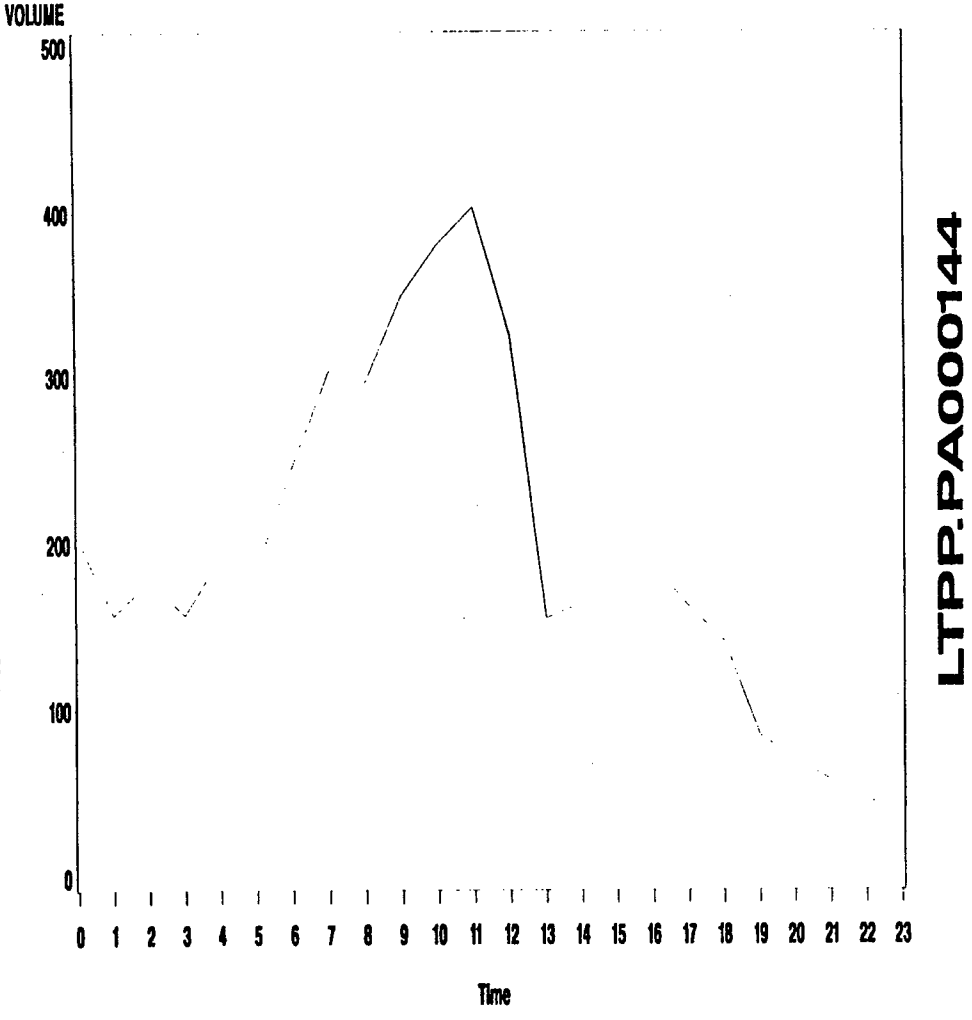


SINGLE Cluster Method

CLUSTERED HOURLY VOLUMES FOR CARS

May
1

STATE=Pennsylvania SHRPID=1 DIRECT=West LANE=1 CLUSTER=2



SINGLE Cluster Method

APPENDIX D

VTRIS Outputs

PENNSYLVANIA TRANSPORTATION

Date: April 13, 1997

W-2 Table
COMPARISON OF WEIGHED VS. COUNTED

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000530 (00000531, 00000532), 00000570 (00000571, 00000572)

	FHWA VEHICLE CLASS	AVERAGE DAILY COUNT	PERCENTAGE DISTRIBUTION TOTAL VEHICLES	PERCENTAGE DISTRIBUTION TRUCKS & COMB.	AVERAGE NUMBER WEIGHED	PERCENTAGE DISTRIBUTION OF NUMBER W.
1	Motorcycles	4	0.05			
2	Passenger Cars	4,700	58.80			
	Single Unit Trucks:					
3	2-axle, 4-tire	492	6.16			
4	Buses	37	0.46			
	Single Unit Trucks:					
5	2-axle, 6-tire	128	1.60	4.64	151	5.36
6	3-axle	62	0.78	2.25	0	0.00
7	4-axle, or more	5	0.06	0.18	5	0.18
	Single Trailer Trucks:					
8	4-axle, or less	387	4.84	14.02	168	5.97
9	5-axle	2,008	25.12	72.75	2,313	82.14
10	6-axle, or more	18	0.23	0.65	22	0.78
	Multi-Trailer Trucks:					
11	5-axle, or less	140	1.75	5.07	142	5.04
12	6-axle	8	0.10	0.29	12	0.43
13	7-axle, or more	4	0.05	0.14	3	0.11
	AVERAGE DAILY TRUCKS	2,760		AVERAGE WEIGHED	2,816	
	AVERAGE DAILY TRAFFIC	7,993				

Date: April 13, 1997

W-3 Table
AVERAGE EMPTY, LOADED, AND CARGO WEIGHTS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

FHWA VEHICLE CLASS	TOTAL VEHICLES NUMBER WEIGHED	TOTAL VEHICLES AVERAGE GROSS WT kg	TOTAL VEHICLES BREAKPOINT EMPTY / LOADED kg	TOTAL VEHICLES PERCENT LOADED	LOADED VEHICLES ESTIMATED NUMBER LOADED	LOADED VEHICLES AVERAGE LOADED WT kg	LOADED VEHICLES CARRIED LOAD WT. AVG kg	EMPTY VEHICLES PERCENT EMPTY	EMPTY VEHICLES ESTIMATED NUMBER EMPTY	EMPTY VEHICLES AVERAGE EMPTY WT kg
Single Unit Trucks:										
2-axle, 6-tire	151	7,989	4,500	92.72	140	8,299	3,808	7.28	11	3,949
3-axle	0	0	7,500	0.00	0	0	0	0.00	0	0
4-axle, or more	5	32,347	9,000	100.00	5	32,347	23,347	0.00	0	0
All Single Unit	156	8,818		92.95	145	9,178	4,522	7.05	11	3,949
Single Trailer Trucks:										
4-axle, or less	168	14,711	12,500	69.64	117	16,672	4,195	30.36	51	10,187
5-axle	2,313	26,126	14,000	96.97	2,243	26,577	12,577	3.03	70	11,661
6-axle, or more	21	31,169	15,500	95.24	20	32,367	16,877	4.76	1	12,926
All Single Trailer	2,502	25,403		95.12	2,380	26,138	12,200	4.88	122	11,062
Multi-Trailer Trucks:										
5-axle, or less	142	28,958	17,000	87.32	124	30,840	13,840	11.97	17	15,522
6-axle	12	25,404	19,000	83.33	10	28,029	9,029	16.67	2	12,995
7-axle, or more	2	33,937	21,000	50.00	1	65,214	44,214	50.00	1	13,607
All Multi-Trailer	156	28,751		86.54	135	30,859	13,681	13.46	21	15,134
All TRUCKS:	2,815	24,669		94.53	2,661	25,452	11,856	5.47	154	11,119
ALL COMB. TRUCKS:	2,659	25,600		94.62	2,516	26,392	12,280	5.38	143	11,659

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	Equivalent Single Axle Load FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
			SINGLE AXLES										
UP TO 1.4	0.0008	0.0008	1	5	9	0	2	16	14	7	2	6	2
1.4 TO 1.9	0.0017	0.0017	-	-	19	0	0	11	46	1	11	1	-
1.9 TO 2.4	0.0044	0.0044	-	-	29	0	0	15	71	1	29	2	-
2.4 TO 2.9	0.0096	0.0099	-	-	34	0	0	26	70	1	29	2	-
2.9 TO 3.4	0.0189	0.0198	-	1	41	0	0	51	163	2	27	3	-
3.4 TO 3.9	0.0342	0.0363	-	2	46	0	-	65	467	5	51	5	-
3.9 TO 4.4	0.0577	0.0618	-	3	39	0	-	55	747	6	77	6	-
4.4 TO 4.9	0.0925	0.0993	-	4	26	0	-	39	615	4	73	5	-
4.9 TO 5.4	0.1418	0.1522	-	4	17	0	1	28	259	2	57	3	-
5.4 TO 5.9	0.2096	0.2240	-	2	11	0	-	18	67	1	55	2	-
5.9 TO 6.4	0.3004	0.3185	0	1	9	0	-	12	35	1	57	1	-
6.4 TO 6.9	0.4191	0.4394	0	-	7	0	1	10	47	2	56	1	-
6.9 TO 7.4	0.5712	0.5905	0	-	6	0	-	9	64	2	50	1	-
7.4 TO 7.9	0.7623	0.7755	0	-	5	0	-	8	72	2	43	-	-
7.9 TO 8.4	0.9988	0.9980	0	-	4	0	-	6	59	1	40	-	-
8.4 TO 8.9	1.2868	1.2616	0	-	3	0	-	4	37	-	33	-	-
8.9 TO 9.4	1.6327	1.5697	0	-	2	0	-	2	21	-	23	-	0
9.4 TO 9.9	2.0429	1.9261	0	-	1	0	1	2	11	-	11	-	0
9.9 TO 10.4	2.5236	2.3345	0	-	1	0	-	1	6	-	4	-	0
10.4 TO 10.9	3.0811	2.7992	0	-	1	0	-	1	5	-	1	-	0
10.9 TO 11.4	3.7213	3.3247	0	-	1	0	-	1	5	0	1	-	0
11.4 TO 11.9	4.4507	3.9162	0	-	1	0	-	-	5	0	-	0	0
11.9 TO 12.4	5.2757	4.5792	0	-	-	0	-	-	5	-	-	0	0
12.4 TO 12.9	6.2035	5.3202	0	0	-	0	-	-	4	-	-	0	0
12.9 TO 13.4	7.2422	6.1461	0	-	-	0	-	-	2	-	-	0	-
13.4 TO 13.9	8.4008	7.0646	0	-	-	0	-	-	2	0	-	0	-
13.9 TO 14.4	9.6896	8.0842	0	-	-	0	-	-	1	0	-	0	-
14.4 TO 14.9	11.1204	9.2140	0	-	-	0	-	-	1	0	0	0	0
14.9 TO 15.4	12.7060	10.4639	0	-	-	0	-	0	1	0	0	0	0

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
			SINGLE AXLES										
15.4 TO 15.9	14.4610	11.8445	0	0	0	0	-	0	1	0	0	0	0
15.9 TO 16.4	16.4010	13.3671	0	-	0	0	-	0	-	0	0	0	0
16.4 TO 16.9	18.5428	15.0440	0	-	0	0	-	0	-	0	0	0	0
16.9 TO 17.4	20.9045	16.8879	0	-	0	0	-	0	0	0	0	0	0
17.4 TO 17.9	23.5049	18.9124	0	0	0	0	0	0	0	0	0	0	0
17.9 TO 18.4	26.3641	21.1319	0	0	0	0	0	0	0	0	0	0	0
18.4 TO 18.9	29.5029	23.5614	0	0	0	0	0	0	-	0	0	0	0
18.9 TO 19.4	32.9429	26.2169	0	0	0	0	0	0	-	0	0	0	0
19.4 TO 19.9	36.7068	29.1151	0	0	0	0	0	0	-	0	0	0	0
ABOVE 19.9	38.6726	30.6269	0	0	0	0	0	0	-	0	0	0	0
AVERAGE SINGLE AXLES WEIGHED			2	24	311	0	10	379	2,904	38	730	38	4
AVERAGE VEHICLES WEIGHED			1	20	151	0	5	168	2,313	21	142	12	2
AVERAGE VEHICLES COUNTED			473	23	215	47	6	211	2,390	25	163	12	3

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
			TANDEM AXLES										
UP TO 2.7	0.0019	0.0010	0	0	-	0	0	6	12	-	0	1	-
2.7 TO 3.6	0.0036	0.0019	0	0	-	0	0	8	47	1	0	-	-
3.6 TO 4.5	0.0087	0.0047	0	-	-	0	0	22	183	1	-	-	-
4.5 TO 5.4	0.0185	0.0103	0	-	1	0	0	28	264	1	-	-	-
5.4 TO 6.3	0.0354	0.0200	0	-	1	0	0	24	281	1	-	-	-
6.3 TO 7.2	0.0626	0.0359	0	-	3	0	0	20	349	2	1	-	-
7.2 TO 8.1	0.1039	0.0602	0	-	4	0	0	13	355	2	2	1	-
8.1 TO 9.0	0.1641	0.0957	0	1	4	0	0	11	327	2	1	2	-
9.0 TO 9.9	0.2484	0.1455	0	3	3	0	0	8	304	4	2	2	-
9.9 TO 10.8	0.3632	0.2130	-	5	3	0	0	7	283	4	3	1	-
10.8 TO 11.7	0.5152	0.3017	-	3	3	0	-	5	252	3	2	1	-
11.7 TO 12.6	0.7119	0.4155	0	2	2	0	-	5	257	3	1	-	-
12.6 TO 13.5	0.9611	0.5581	0	1	2	0	-	3	298	3	2	-	-
13.5 TO 14.4	1.2710	0.7334	0	1	2	0	1	3	387	3	2	-	-
14.4 TO 15.3	1.6496	0.9450	0	-	3	0	1	4	466	3	2	-	-
15.3 TO 16.2	2.1052	1.1965	0	-	3	0	1	3	431	2	2	-	-
16.2 TO 17.1	2.6456	1.4916	0	-	3	0	1	2	268	1	1	-	-
17.1 TO 18.0	3.2788	1.8339	0	-	2	0	0	1	115	1	-	-	-
18.0 TO 18.9	4.0128	2.2268	0	-	1	0	-	1	43	-	1	-	0
18.9 TO 19.8	4.8559	2.6740	0	-	1	0	-	1	33	-	1	-	-
19.8 TO 20.7	5.8176	3.1795	0	-	1	0	-	-	22	-	1	-	-
20.7 TO 21.6	6.9083	3.7474	0	-	-	0	-	1	15	-	1	0	-
21.6 TO 22.5	8.1401	4.3823	0	-	-	0	-	-	8	-	-	0	-
22.5 TO 23.4	9.5273	5.0891	0	-	0	0	0	-	3	-	-	0	0
23.4 TO 24.3	11.0856	5.8733	0	0	0	0	0	0	1	-	-	0	0
24.3 TO 25.2	12.8331	6.7411	0	0	-	0	0	0	-	-	0	0	0
25.2 TO 26.1	14.7896	7.6991	0	0	-	0	0	0	-	0	0	0	0
26.1 TO 27.0	16.9766	8.7546	0	0	0	0	0	0	0	0	0	0	0
27.0 TO 27.9	19.4175	9.9155	0	0	0	0	-	0	0	0	0	0	0

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES): 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	Equivalent Single Axle Load FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
		TANDEM AXLES											
27.9 TO 28.8	22.1366	11.1905	0	0	0	0	-	0	-	0	0	0	0
28.8 TO 29.7	25.1602	12.5888	0	-	0	0	0	0	-	0	0	0	-
29.7 TO 30.6	28.5153	14.1203	0	-	0	0	0	0	-	0	0	0	-
30.6 TO 31.5	32.2306	15.7955	0	0	0	0	0	0	0	0	0	0	0
31.5 TO 32.4	36.3358	17.6258	0	0	0	0	0	0	0	0	0	0	0
32.4 TO 33.3	40.8617	19.6231	0	0	0	0	-	0	0	0	0	0	0
33.3 TO 34.2	45.8408	21.7998	0	0	0	0	-	0	0	0	0	0	0
34.2 TO 35.1	51.3063	24.1694	0	0	0	0	0	0	-	0	0	0	0
35.1 TO 36.0	57.2930	26.7456	0	0	0	0	0	0	-	0	0	0	0
36.0 TO 36.9	63.8371	29.5432	0	0	0	0	0	0	0	0	0	0	0
36.9 TO 37.8	70.9760	32.5774	0	0	0	0	0	0	0	0	0	0	0
37.8 TO 38.7	78.7485	35.8642	0	0	0	0	0	0	0	0	0	0	0
38.7 TO 39.6	87.1948	39.4204	0	0	0	0	0	0	0	0	0	0	0
ABOVE 39.6	91.5916	41.2680	0	0	0	0	0	0	0	0	0	0	0
AVERAGETANDE AXLES WEIGHED			0	18	40	0	6	176	5,005	37	24	9	4
AVERAGE VEHICLES WEIGHED			1	20	151	0	5	168	2,313	21	142	12	2
AVERAGE VEHICLES COUNTED			473	23	215	47	6	211	2,390	25	163	12	3

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
			TRIDEM AXLES										
UP TO 5.4	0.0091	0.0034	0	0	0	0	0	0	0	0	0	0	0
5.4 TO 6.8	0.0153	0.0058	0	0	0	0	0	0	0	0	0	0	0
6.8 TO 8.2	0.0333	0.0129	0	0	0	0	0	0	0	0	0	0	0
8.2 TO 9.6	0.0646	0.0256	0	0	0	0	0	0	0	0	0	0	0
9.6 TO 11.0	0.1156	0.0465	0	0	0	0	0	0	0	0	0	0	0
11.0 TO 12.4	0.1936	0.0788	0	0	0	0	0	0	0	0	0	0	0
12.4 TO 13.8	0.3076	0.1262	0	0	0	0	0	0	0	0	0	0	0
13.8 TO 15.2	0.4679	0.1930	0	0	0	0	0	0	0	0	0	0	0
15.2 TO 16.6	0.6858	0.2838	0	0	0	0	0	0	0	0	0	0	0
16.6 TO 18.0	0.9734	0.4036	0	0	0	0	0	0	0	0	0	0	0
18.0 TO 19.4	1.3433	0.5573	0	0	0	0	0	0	0	0	0	0	0
19.4 TO 20.8	1.8083	0.7502	0	0	0	0	0	0	0	0	0	0	0
20.8 TO 22.2	2.3807	0.9872	0	0	0	0	0	0	0	0	0	0	0
22.2 TO 23.6	3.0728	1.2733	0	0	0	0	0	0	0	0	0	0	0
23.6 TO 25.0	3.8972	1.6134	0	0	0	0	0	0	0	0	0	0	0
25.0 TO 26.4	4.8669	2.0122	0	0	0	0	0	0	0	0	0	0	0
26.4 TO 27.8	5.9970	2.4745	0	0	0	0	0	0	0	0	0	0	0
27.8 TO 29.2	7.3049	3.0053	0	0	0	0	0	0	0	0	0	0	0
29.2 TO 30.6	8.8113	3.6095	0	0	0	0	0	0	0	0	0	0	0
30.6 TO 32.0	10.5404	4.2927	0	0	0	0	0	0	0	0	0	0	0
32.0 TO 33.4	12.5199	5.0607	0	0	0	0	0	0	0	0	0	0	0
33.4 TO 34.8	14.7812	5.9201	0	0	0	0	0	0	0	0	0	0	0
34.8 TO 36.2	17.3586	6.8781	0	0	0	0	0	0	0	0	0	0	0
36.2 TO 37.6	20.2892	7.9427	0	0	0	0	0	0	0	0	0	0	0
37.6 TO 39.0	23.6129	9.1227	0	0	0	0	0	0	0	0	0	0	0
39.0 TO 40.4	27.3717	10.4279	0	0	0	0	0	0	0	0	0	0	0
40.4 TO 41.8	31.6100	11.8687	0	0	0	0	0	0	0	0	0	0	0
41.8 TO 43.2	36.3746	13.4567	0	0	0	0	0	0	0	0	0	0	0
43.2 TO 44.6	41.7143	15.2042	0	0	0	0	0	0	0	0	0	0	0

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
			TRIDEM AXLES										
44.6 TO 46.0	47.6803	17.1246	0	0	0	0	0	0	0	0	0	0	0
46.0 TO 47.4	54.3264	19.2322	0	0	0	0	0	0	0	0	0	0	0
47.4 TO 48.8	61.7083	21.5421	0	0	0	0	0	0	0	0	0	0	0
48.8 TO 50.2	69.8848	24.0704	0	0	0	0	0	0	0	0	0	0	0
50.2 TO 51.6	78.9168	26.8342	0	0	0	0	0	0	0	0	0	0	0
51.6 TO 53.0	88.8681	29.8514	0	0	0	0	0	0	0	0	0	0	0
53.0 TO 54.4	99.8050	33.1410	0	0	0	0	0	0	0	0	0	0	0
54.4 TO 55.8	111.7968	36.7229	0	0	0	0	0	0	0	0	0	0	0
55.8 TO 57.2	124.9155	40.6179	0	0	0	0	0	0	0	0	0	0	0
57.2 TO 58.6	139.2360	44.8478	0	0	0	0	0	0	0	0	0	0	0
58.6 TO 60.0	154.8361	49.4355	0	0	0	0	0	0	0	0	0	0	0
ABOVE 60.0	162.9659	51.8217	0	0	0	0	0	0	0	0	0	0	0
AVERAGE TRIDEM AXLES WEIGHED			0	0	0	0	0	0	0	0	0	0	0
AVERAGE VEHICLES WEIGHED			1	20	151	0	5	168	2,313	21	142	12	2
AVERAGE VEHICLES COUNTED			473	23	215	47	6	211	2,390	25	163	12	3

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES): 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
			QUAD AXLES										
UP TO 5.4	0.0121	0.0045	0	0	0	0	0	0	0	0	0	0	0
5.4 TO 6.8	0.0205	0.0078	0	0	0	0	0	0	0	0	0	0	0
6.8 TO 8.2	0.0443	0.0173	0	0	0	0	0	0	0	0	0	0	0
8.2 TO 9.6	0.0862	0.0342	0	0	0	0	0	0	0	0	0	0	0
9.6 TO 11.0	0.1541	0.0620	0	0	0	0	0	0	0	0	0	0	0
11.0 TO 12.4	0.2581	0.1050	0	0	0	0	0	0	0	0	0	0	0
12.4 TO 13.8	0.4102	0.1683	0	0	0	0	0	0	0	0	0	0	0
13.8 TO 15.2	0.6239	0.2574	0	0	0	0	0	0	0	0	0	0	0
15.2 TO 16.6	0.9144	0.3785	0	0	0	0	0	0	0	0	0	0	0
16.6 TO 18.0	1.2979	0.5381	0	0	0	0	0	0	0	0	0	0	0
18.0 TO 19.4	1.7911	0.7431	0	0	0	0	0	0	0	0	0	0	0
19.4 TO 20.8	2.4110	1.0002	0	0	0	0	0	0	0	0	0	0	0
20.8 TO 22.2	3.1742	1.3162	0	0	0	0	0	0	0	0	0	0	0
22.2 TO 23.6	4.0971	1.6977	0	0	0	0	0	0	0	0	0	0	0
23.6 TO 25.0	5.1962	2.1511	0	0	0	0	0	0	0	0	0	0	0
25.0 TO 26.4	6.4892	2.6829	0	0	0	0	0	0	0	0	0	0	0
26.4 TO 27.8	7.9960	3.2994	0	0	0	0	0	0	0	0	0	0	0
27.8 TO 29.2	9.7399	4.0070	0	0	0	0	0	0	0	0	0	0	0
29.2 TO 30.6	11.7484	4.8127	0	0	0	0	0	0	0	0	0	0	0
30.6 TO 32.0	14.0538	5.7235	0	0	0	0	0	0	0	0	0	0	0
32.0 TO 33.4	16.6933	6.7476	0	0	0	0	0	0	0	0	0	0	0
33.4 TO 34.8	19.7083	7.8934	0	0	0	0	0	0	0	0	0	0	0
34.8 TO 36.2	23.1448	9.1708	0	0	0	0	0	0	0	0	0	0	0
36.2 TO 37.6	27.0523	10.5903	0	0	0	0	0	0	0	0	0	0	0
37.6 TO 39.0	31.4838	12.1637	0	0	0	0	0	0	0	0	0	0	0
39.0 TO 40.4	36.4955	13.9039	0	0	0	0	0	0	0	0	0	0	0
40.4 TO 41.8	42.1467	15.8249	0	0	0	0	0	0	0	0	0	0	0
41.8 TO 43.2	48.4994	17.9422	0	0	0	0	0	0	0	0	0	0	0
43.2 TO 44.6	55.6190	20.2723	0	0	0	0	0	0	0	0	0	0	0

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES): 01

STATION CODE(S): 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AXLE LOAD IN METRIC TONS (t)	Equivalent Single Axle Load RIGID P= 2.50 D= 228 mm	FLEXIBLE P= 2.50 SN= 127 mm	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
		QUAD AXLES											
44.6 TO 46.0	63.5738	22.8329	0	0	0	0	0	0	0	0	0	0	0
46.0 TO 47.4	72.4351	25.6429	0	0	0	0	0	0	0	0	0	0	0
47.4 TO 48.8	82.2778	28.7228	0	0	0	0	0	0	0	0	0	0	0
48.8 TO 50.2	93.1797	32.0939	0	0	0	0	0	0	0	0	0	0	0
50.2 TO 51.6	105.2224	35.7789	0	0	0	0	0	0	0	0	0	0	0
51.6 TO 53.0	118.4908	39.8019	0	0	0	0	0	0	0	0	0	0	0
53.0 TO 54.4	133.0733	44.1880	0	0	0	0	0	0	0	0	0	0	0
54.4 TO 55.8	149.0624	48.9639	0	0	0	0	0	0	0	0	0	0	0
55.8 TO 57.2	166.5540	54.1572	0	0	0	0	0	0	0	0	0	0	0
57.2 TO 58.6	185.6479	59.7971	0	0	0	0	0	0	0	0	0	0	0
58.6 TO 60.0	206.4481	65.9140	0	0	0	0	0	0	0	0	0	0	0
60.0 TO 61.4	229.0622	72.5397	0	0	0	0	0	0	0	0	0	0	0
61.4 TO 62.8	253.6021	79.7072	0	0	0	0	0	0	0	0	0	0	0
62.8 TO 64.2	280.1839	87.4510	0	0	0	0	0	0	0	0	0	0	0
64.2 TO 65.6	308.9276	95.8070	0	0	0	0	0	0	0	0	0	0	0
65.6 TO 67.0	339.9576	104.8125	0	0	0	0	0	0	0	0	0	0	0
67.0 TO 68.4	373.4029	114.5063	0	0	0	0	0	0	0	0	0	0	0
68.4 TO 69.8	409.3963	124.9285	0	0	0	0	0	0	0	0	0	0	0
69.8 TO 71.2	448.0755	136.1207	0	0	0	0	0	0	0	0	0	0	0
71.2 TO 72.6	489.5826	148.1263	0	0	0	0	0	0	0	0	0	0	0
72.6 TO 74.0	534.0640	160.9899	0	0	0	0	0	0	0	0	0	0	0
74.0 TO 75.4	581.6709	174.7578	0	0	0	0	0	0	0	0	0	0	0
75.4 TO 76.8	632.5593	189.4778	0	0	0	0	0	0	0	0	0	0	0
76.8 TO 78.2	686.8896	205.1994	0	0	0	0	0	0	0	0	0	0	0
78.2 TO 79.6	744.8272	221.9736	0	0	0	0	0	0	0	0	0	0	0
ABOVE 79.6	774.7188	230.6304	0	0	0	0	0	0	0	0	0	0	0

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

AVERAGEQUAD AXLES WEIGHED	0	0	0	0	0	0	0	0	0	0	0
AVERAGE VEHICLES WEIGHED	1	20	151	0	5	168	2,313	21	142	12	2
AVERAGE VEHICLES COUNTED	473	23	215	47	6	211	2,390	25	163	12	3

Date: April 13, 1997

W-4 TABLE
EQUIVALENCY FACTORS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES): 01

STATION CODE(S) : 00000570 (00000571, 00000572)

DAILY AVERAGES BY VEHICLE CLASS

SUMMARY ESAL DESIGN FACTORS	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
RIGID PAVEMENT P= 2.50 *D=* 228 mm											
ESALSs PER VEHICLE	0.2252	1.8126	0.6951	0.0000	8.7460	0.7739	2.3907	2.1694	2.4078	0.7723	7.5365
PERCENT DISTRIBUTION OF AVERAGE AXLE WEIGHED (USING VEHICLES COUNTED)	1.58	0.62	2.22	0.00	0.79	2.43	85.20	0.81	5.83	0.13	0.33
FLEXIBLE PAVEMENT P= 2.50 *SN=* 127 mm											
ESALSs PER VEHICLE	0.2010	1.1933	0.5401	0.0000	6.2042	0.6150	1.4763	1.3776	2.2871	0.6185	4.3602
PERCENT DISTRIBUTION OF AVERAGE AXLE WEIGHED (USING VEHICLES COUNTED)	2.17	0.62	2.66	0.00	0.87	2.97	80.89	0.79	8.52	0.16	0.29
TRAFFIC VOLUME											
AVERAGE VEHICLES WEIGHED	1	20	151	0	5	168	2,313	21	142	12	2
AVERAGE VEHICLES COUNTED	473	23	215	47	6	211	2,390	25	163	12	3
PERCENT DISTRIBUTION OF AVERAGE DAILY COUN AGAINST TRUCK VEHICLE TYPES			7.00	1.51	0.20	6.86	77.82	0.82	5.30	0.39	0.10

20 YEAR ESAL ESTIMATES
ADT = 1000
Values in millions

FLEXIBLE PAVEMENTS GROWTH RATES

PERCENT TRUCKS	0	2	4	6	8	10
2	0.20	0.24	0.30	0.34	0.42	0.52
4	0.40	0.49	0.60	0.68	0.84	1.03
6	0.60	0.73	0.90	1.02	1.25	1.55
8	0.81	0.98	1.20	1.36	1.67	2.06
10	1.01	1.22	1.50	1.70	2.09	2.58
15	1.51	1.84	2.25	2.55	3.13	3.87
20	2.02	2.45	3.00	3.41	4.18	5.16
25	2.52	3.06	3.75	4.26	5.22	6.44
30	3.02	3.67	4.50	5.11	6.27	7.73

RIGID PAVEMENTS GROWTH RATES

0	2	4	6	8	10
0.31	0.38	0.46	0.53	0.65	0.80
0.62	0.76	0.93	1.05	1.29	1.60
0.94	1.14	1.39	1.58	1.94	2.39
1.25	1.52	1.86	2.11	2.58	3.19
1.56	1.89	2.32	2.63	3.23	3.99
2.34	2.84	3.48	3.95	4.85	5.98
3.12	3.79	4.64	5.27	6.46	7.98
3.90	4.74	5.80	6.58	8.08	9.97
4.68	5.68	6.96	7.90	9.69	11.96

Date: April 13, 1997

W-5 Table
GROSS VEHICLE WEIGHTS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

FHWA VEHICLE CLASSES

GROSS OPERATING WEIGHT IN METRIC TONS	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
UNDER 5	0	-	16	0	0	-	0	0	0	0	0
5 TO 7	-	-	39	0	0	3	1	0	0	0	0
7 TO 9	-	1	52	0	0	12	7	0	-	0	0
9 TO 11	-	2	26	0	0	10	16	-	-	0	0
11 TO 13	0	2	12	0	0	35	18	1	-	2	1
13 TO 15	0	4	5	0	0	41	107	-	2	-	1
15 TO 17	0	7	1	0	0	25	288	1	14	-	-
17 TO 19	0	3	-	0	-	13	219	1	4	-	-
19 TO 21	-	-	0	0	0	10	149	1	3	-	0
21 TO 23	0	0	0	0	0	9	140	1	4	1	0
23 TO 25	0	0	0	0	0	4	144	1	5	1	0
25 TO 27	0	0	0	0	-	3	125	1	7	2	0
27 TO 29	0	0	0	0	-	1	112	1	12	1	0
29 TO 31	0	0	0	0	1	-	116	1	18	2	0
31 TO 33	0	0	0	0	1	-	172	1	22	1	0
33 TO 35	0	-	0	0	1	-	259	3	24	1	0
35 TO 37	0	0	0	0	1	0	272	5	19	-	0
37 TO 39	0	0	0	0	-	0	128	2	5	-	0
39 TO 41	0	0	0	0	-	0	31	1	1	-	0
41 TO 43	0	0	0	0	0	0	5	1	0	0	0
43 TO 45	0	0	0	0	0	0	1	1	0	0	0
45 TO 47	0	0	0	0	0	0	1	0	0	0	-
47 TO 49	0	0	0	0	0	0	-	-	0	0	0
49 TO 51	0	0	0	0	0	0	0	-	0	0	0
51 TO 53	0	0	0	0	0	0	0	-	0	0	-
53 TO 55	0	0	0	0	0	0	0	0	0	0	0
55 TO 57	0	0	0	0	0	0	0	0	0	0	0
57 TO 59	0	0	0	0	0	0	0	0	0	0	0
59 TO 61	0	0	0	0	0	0	0	0	0	0	0
61 TO 63	0	0	0	0	0	0	0	0	0	0	0
63 TO 65	0	0	0	0	0	0	0	0	0	0	-
65 TO 67	0	0	0	0	0	0	0	0	0	0	-
67 TO 69	0	0	0	0	0	0	0	0	0	0	-

W-5 Table
GROSS VEHICLE WEIGHTS

Averaging Method: Hour of Day

Axle Grouping Method: Vehicle Size & Weight

DATA FROM: Pennsylvania

PERIOD: 1994

FUNCTIONAL CLASS(ES) : 01

STATION CODE(S) : 00000570 (00000571, 00000572)

FHWA VEHICLE CLASSES

GROSS OPERATING WEIGHT IN METRIC TONS	3 SU 2-AX 4-TR	4 BUS	5 SU 2-AX 6-TR	6 SU 3-AX	7 SU 4-AX OR MORE	8 STT 4-AX OR LESS	9 STT 5-AX	10 STT 6-AX OR MORE	11 MTT 5-AX OR LESS	12 MTT 6-AX	13 MTT 7-AX OR MORE
69 TO 71	0	0	0	0	0	0	0	0	0	0	0
71 TO 73	0	0	0	0	0	0	0	0	0	0	0
73 TO 75	0	0	0	0	0	0	-	0	0	0	-
75 TO 77	0	0	0	0	0	0	0	0	0	0	0
77 TO 79	0	0	0	0	0	0	0	0	0	0	-
ABOVE 79	0	0	0	0	0	0	0	0	0	0	0
TOTAL AVERAGE VEHICLES WEIGHED	1	20	151	0	5	168	2,313	21	142	12	2
TOTAL AVERAGE VEHICLES COUNTED	473	23	215	47	6	211	2,390	25	163	12	3

W-6 Table
OVERWEIGHT VEHICLE REPORT
By Direction

STATE CODE : PA YEAR: 1994

FUNCTIONAL CLASS(ES) : ALL

STATION CODE(S) : 00000570 (00000571,00000572)

FHWA VEHICLE CLASS		Axle Load Limit 9,070 kg		Tandem Load Limit 15,420 kg		Gross Load Limit 36,290 kg		Bridge Formula	
		Number Exceed	Percent Exceed	Number Exceed	Percent Exceed	Number Exceed	Percent Exceed	Number Exceed	Percent Exceed
	Single Unit Trucks:								
3	2-axle, 4tire	0	0.00	0	0.00	0	0.00	0	0.00
4	Buses	1	5.10	2	12.93	0	0.00	1	5.09
	Single Unit Trucks:								
5	2-axle, 6-tire	7	2.38	10	24.44	0	0.00	5	3.15
6	3-axle	0	0.00	0	0.00	0	0.00	0	0.00
7	4-axle, or more	4	37.75	3	52.15	1	15.63	3	64.38
	Single Trailer Trucks:								
8	4-axle, or less	8	2.15	8	4.77	0	0.00	4	2.24
9	5-axle	73	2.51	878	17.54	256	11.08	431	18.63
10	6-axle, or more	1	1.37	6	15.39	6	28.40	6	27.06
	Multi-Trailer Trucks:								
11	5-axle, or less	45	6.10	7	27.69	11	7.76	11	7.60
12	6-axle	-	1.28	1	6.18	-	3.56	1	4.08
13	7-axle, or more	-	5.06	2	40.32	1	39.39	1	22.22
	All Vehicles:	139	3.14	917	17.22	276	9.72	461	16.27

W-7 Table
Distribution of Overweight Vehicles

STATE CODE : PA YEAR: 1994

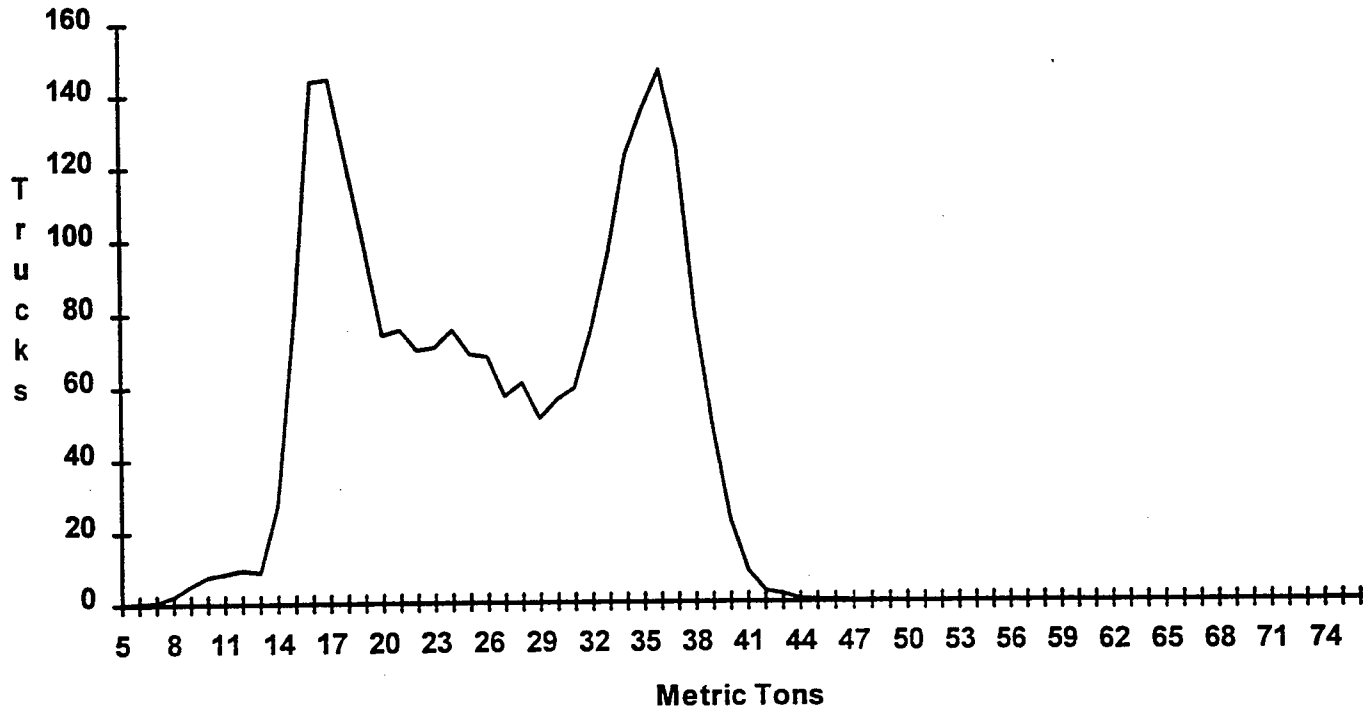
FUNCTIONAL CLASS(ES) : ALL

STATION CODE(S) : 00000570 (00000571,00000572)

	FHWA VEHICLE CLASS	Number Weighed & Percent of Avg. Daily Count	In Excess	Not in Excess	Excess by percent or More				
					5	10	20	30	50
	Single Unit Trucks:								
5	2-axle, 6-tire	151	0	151	0	0	0	0	0
	> 18,140kg	100%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6	3-axle	0	0	0	0	0	0	0	0
	> 24,490kg	100%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
7	4-axle, or more	5	2	3	1	0	0	0	0
	> 33,570kg	100%	40.00%	60.00%	20.00%	0.00%	0.00%	0.00%	0.00%
	Single Trailer Trucks:								
8	4-axle, or less	168	0	168	0	0	0	0	0
	> 33,570kg	100%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
9	5-axle	2,313	256	2,057	83	18	2	0	0
	> 36,290kg	100%	11.07%	88.93%	3.59%	0.78%	0.09%	0.00%	0.00%
10	6-axle, or more	21	6	15	3	2	1	1	0
	> 36,290kg	100%	28.57%	71.43%	14.29%	9.52%	4.76%	4.76%	0.00%
	Multi-Trailer Trucks:								
11	5-axle, or less	142	11	131	2	0	0	0	0
	> 36,290kg	100%	7.75%	92.25%	1.41%	0.00%	0.00%	0.00%	0.00%
12	6-axle	12	0	12	0	0	0	0	0
	> 36,290kg	100%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
13	7-axle, or more	2	1	1	1	1	0	1	1
	> 36,290kg	100%	50.00%	50.00%	50.00%	0.00%	50.00%	50.00%	50.00%
	All Trucks:	2,814	276	2,538	90	21	4	2	1
		100%	9.81%	90.19%	3.20%	0.75%	0.14%	0.07%	0.04%

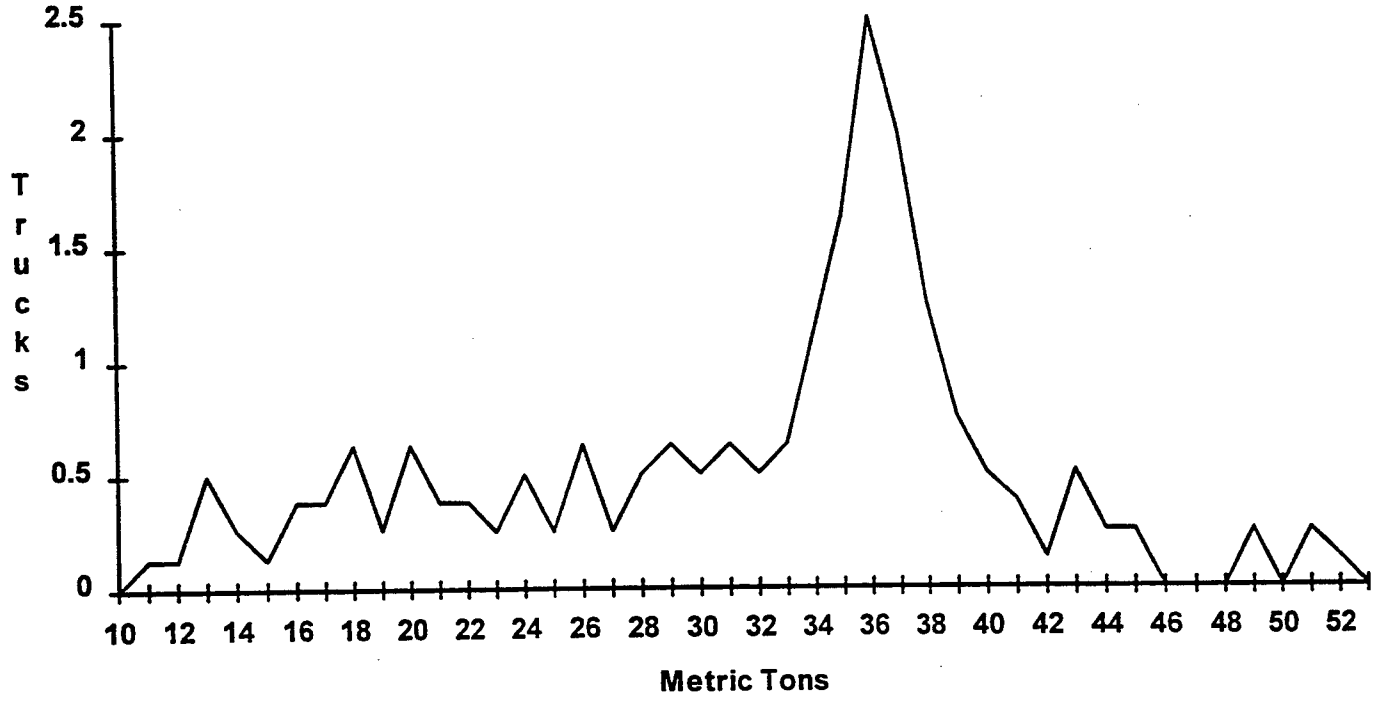
Station: 00000570

GVW Distribution for VC 9 from Summary



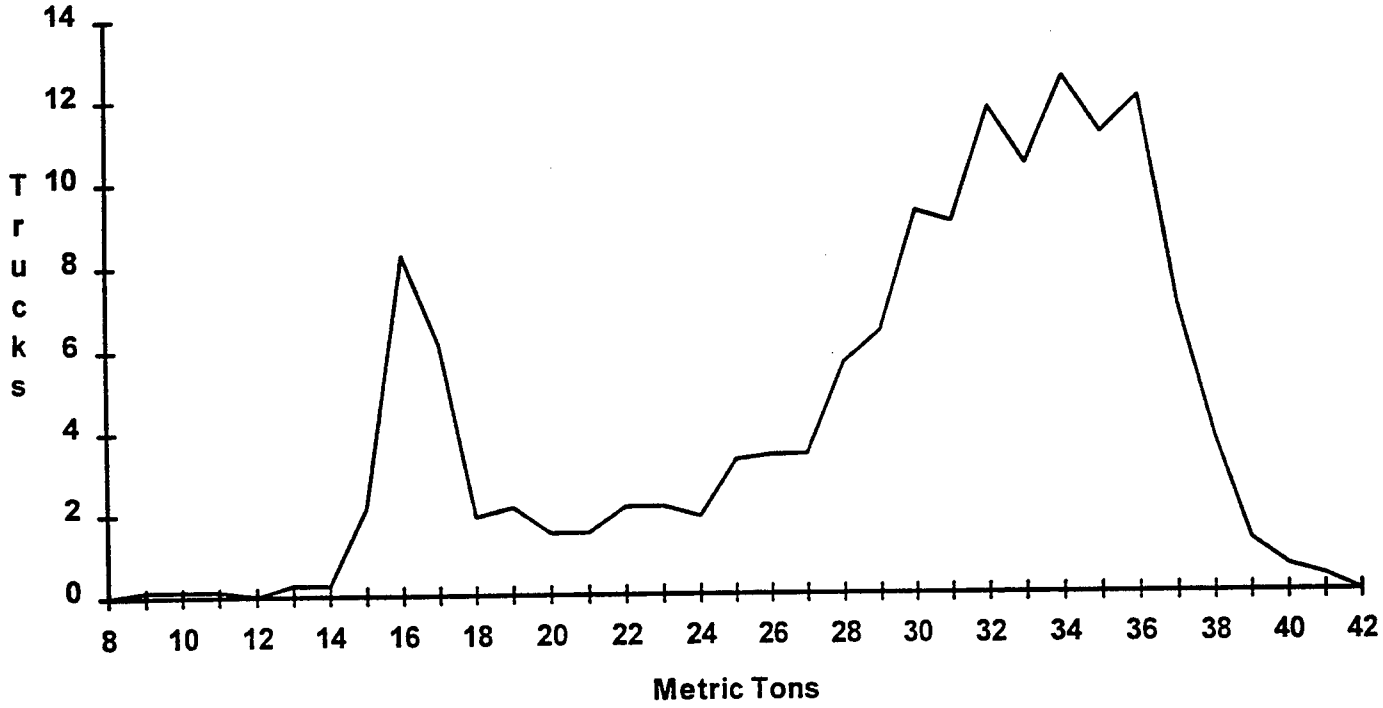
Station: 00000570

GVW Distribution for VC 10 from Summary



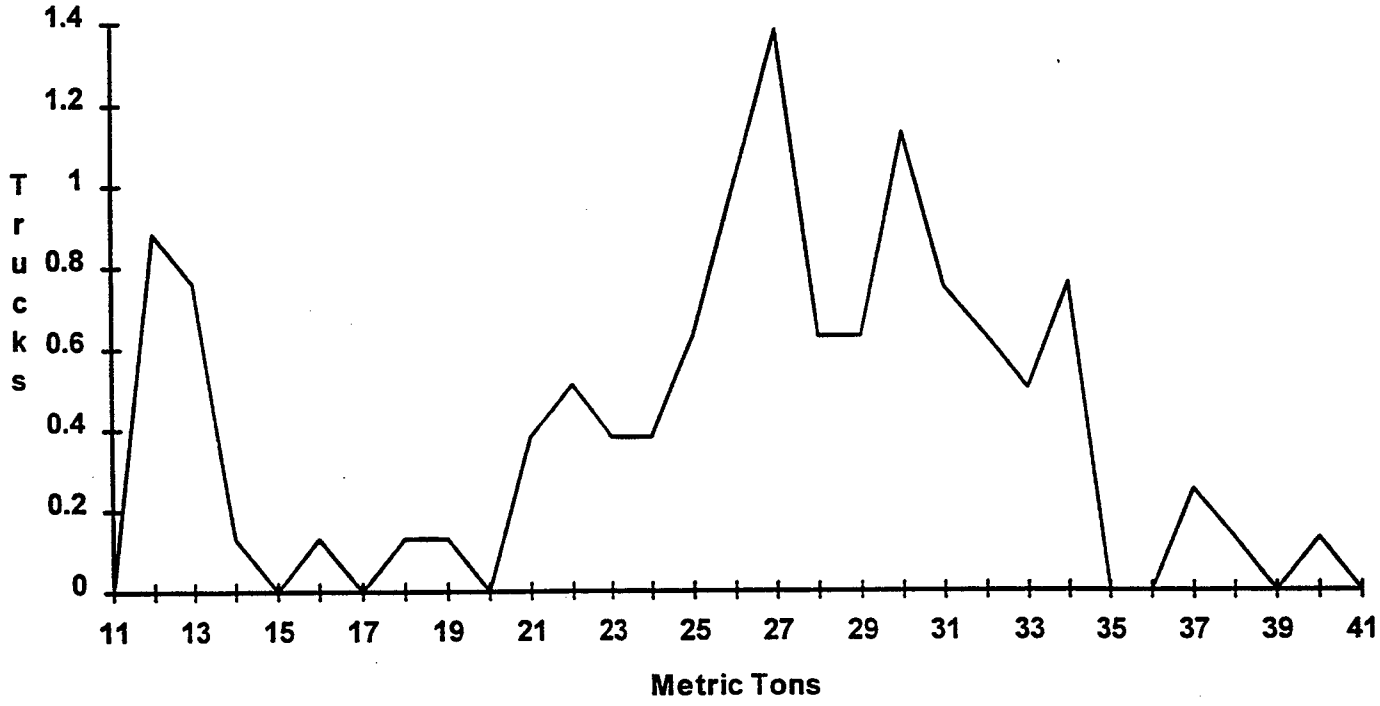
Station: 00000570

GVW Distribution for VC 11 from Summary



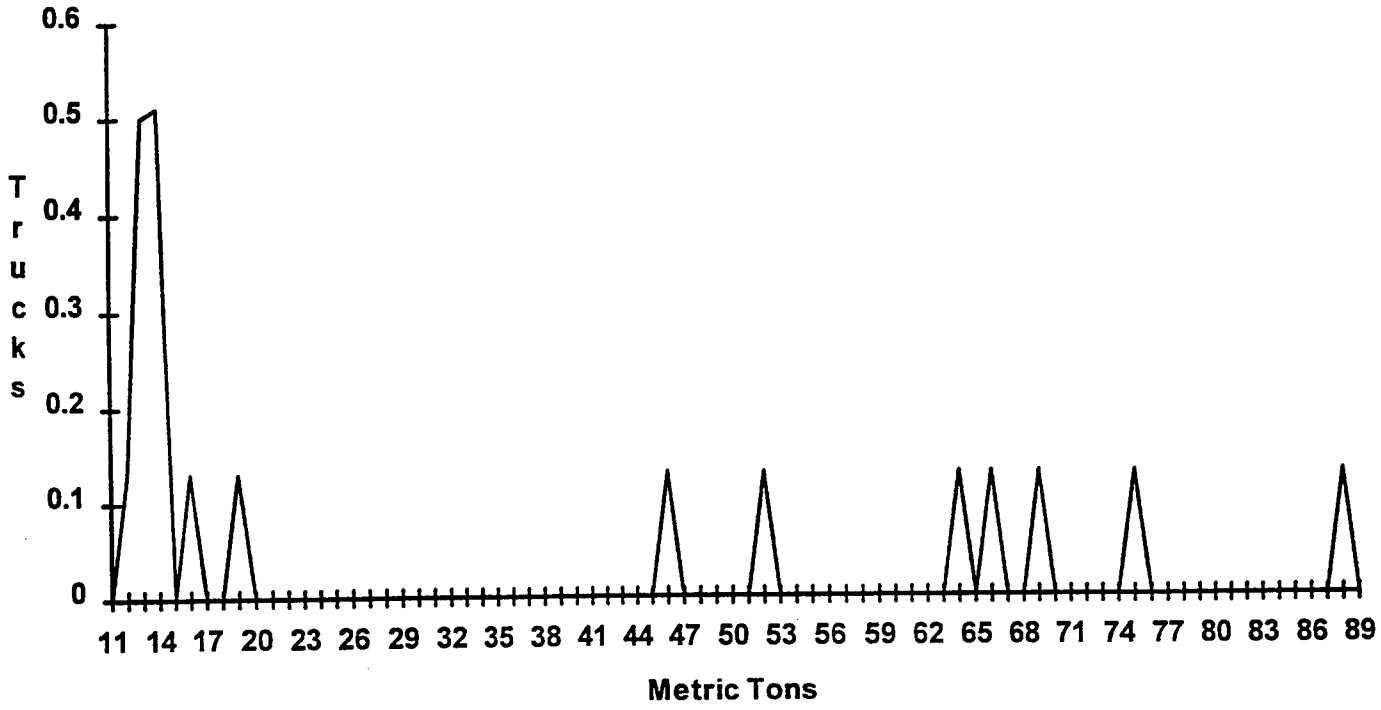
Station: 00000570

GVW Distribution for VC 12 from Summary



Station: 00000570

GVW Distribution for VC 13 from Summary



APPENDIX E

GVW Analysis

Note regarding the GVW graphs

The original QC Interface developed by Chaparral Systems uses ***English*** units for their measurements. In order to keep changes to the original Interface to a minimum, researchers at PTI felt that it was best to modify the source code in such a manner that:

a. *The new TMG format could be read*

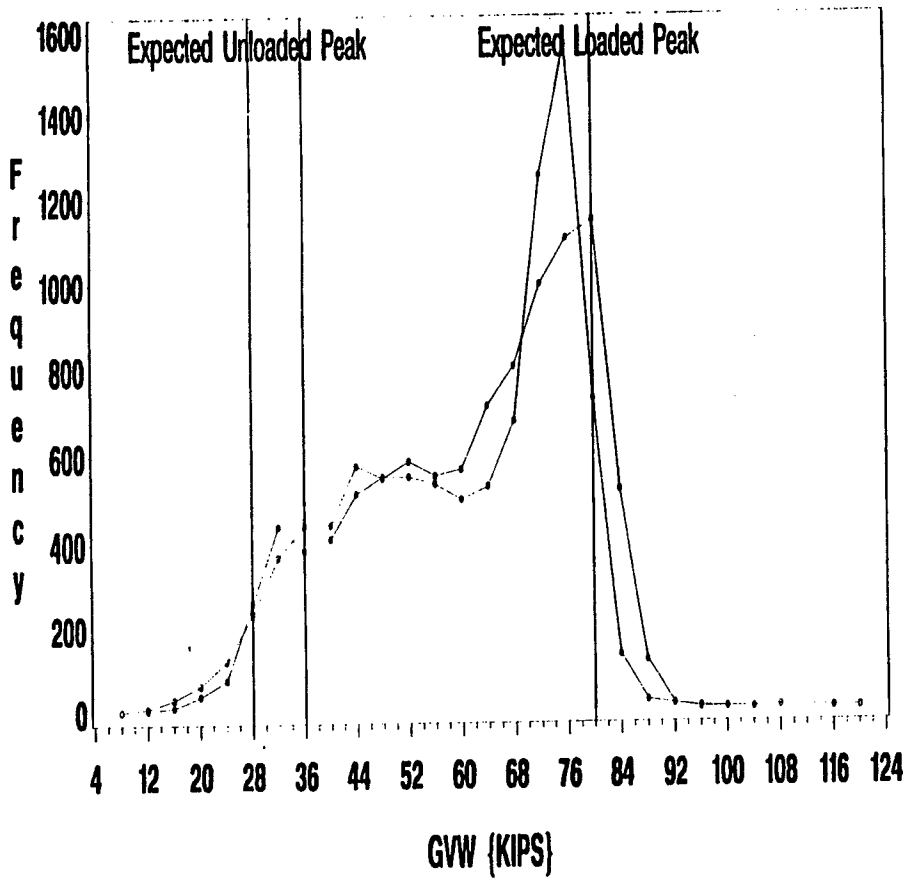
and

b. *Graphs produced would have their gross vehicle weights in* ***English*** *units*

Hence the graphs produced by the QCM are the same as the graphs produced by the original QC Interface even when the data input is in metric units.

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=East LANE=1 YR=1994



ooo JAN-MAR *** APR-JUN

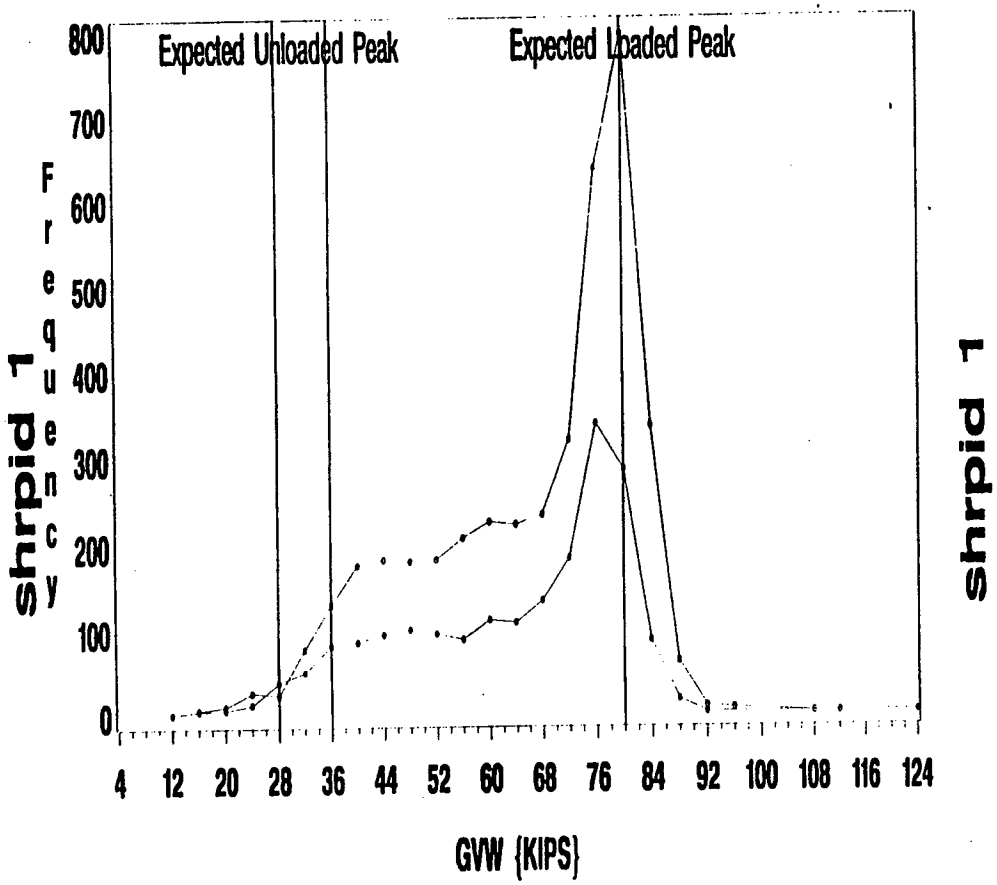
	JAN-MAR	APR-JUN
Less than 28 KIPS -	2%	1%
Between 28 & 80 KIPS -	91%	97%
Greater than 80 KIPS -	7%	2%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=East LANE=2 YR=1994



ooo JAN-MAR *** APR-JUN

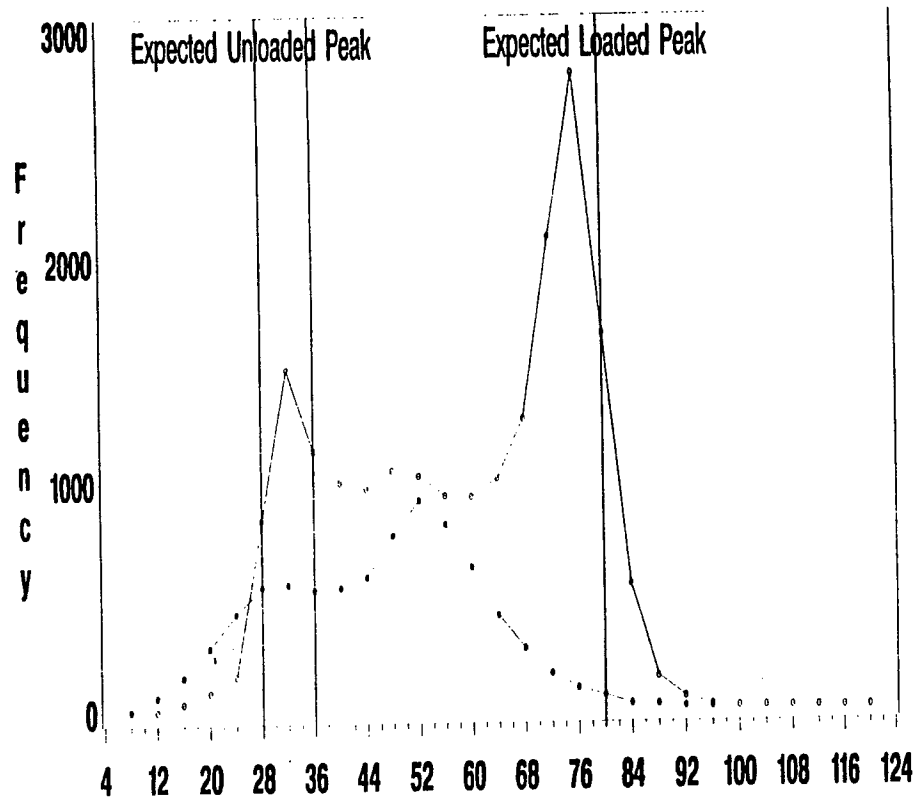
	JAN-MAR	APR-JUN
Less than 28 KIPS -	1%	1%
Between 28 & 80 KIPS -	89%	93%
Greater than 80 KIPS -	10%	5%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=West LANE=1 YR=1994



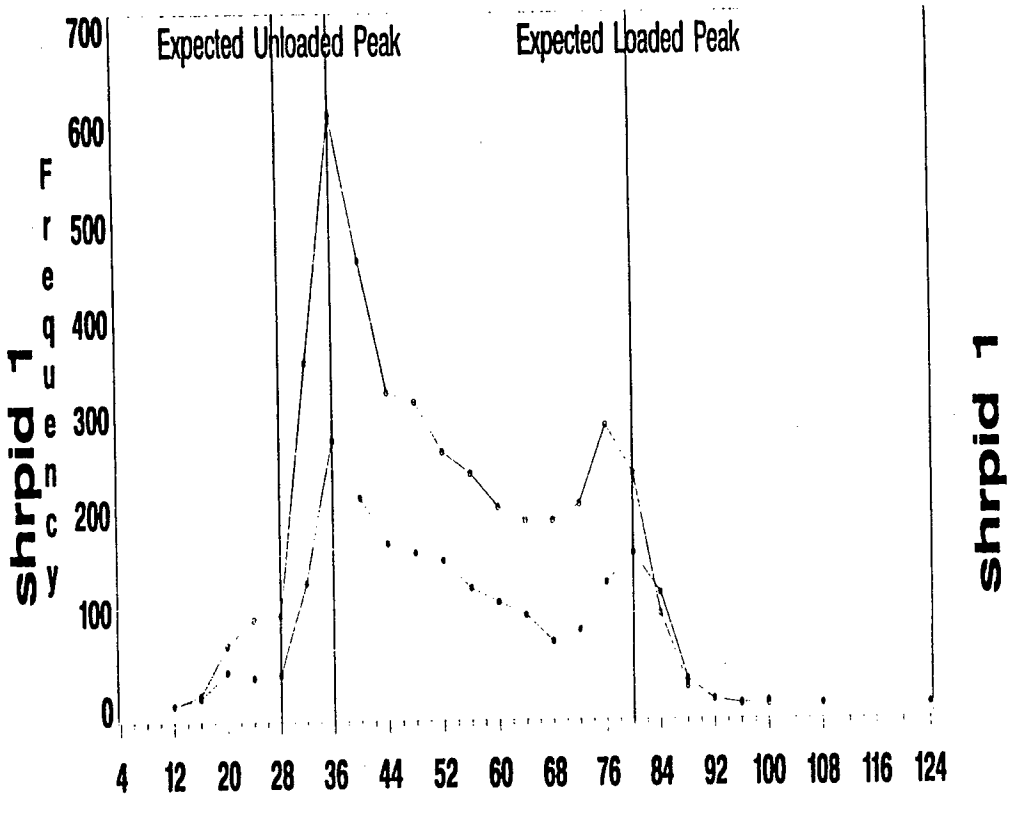
	JAN-MAR	APR-JUN
Less than 28 KIPS -	1%	12%
Between 28 & 80 KIPS -	95%	88%
Greater than 80 KIPS -	4%	1%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=West LANE=2 YR=1994



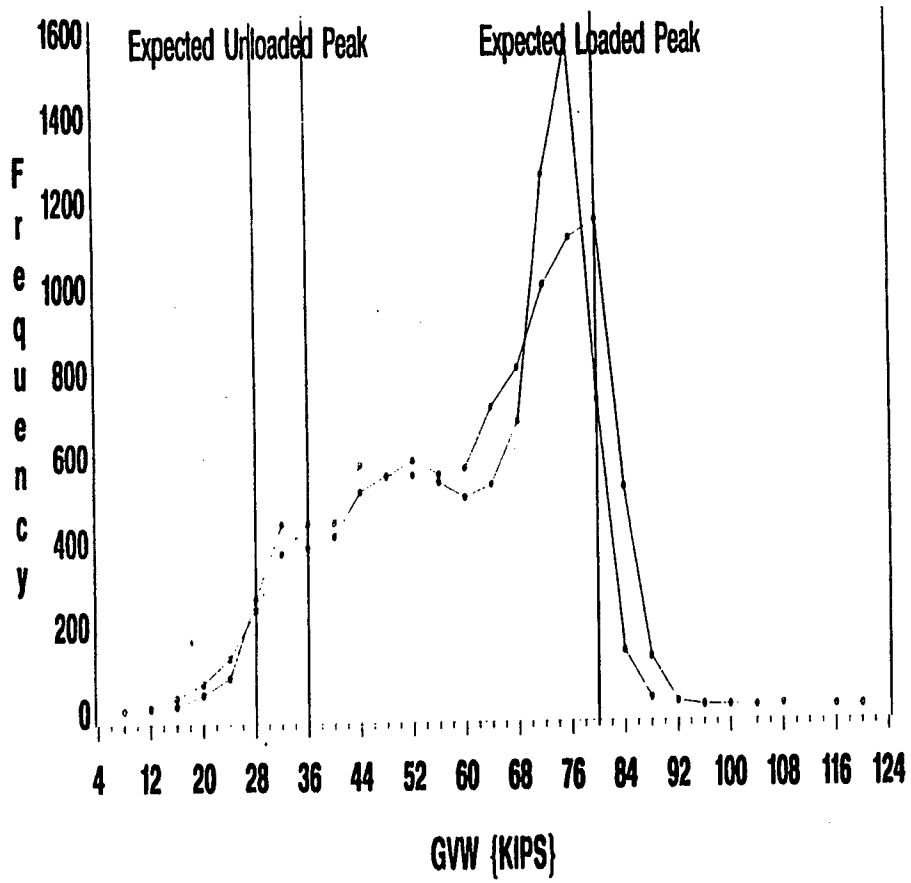
	JAN-MAR	APR-JUN
Less than 28 KIPS -	4%	4%
Between 28 & 80 KIPS -	93%	89%
Greater than 80 KIPS -	3%	7%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=East LANE=1 YR=1994



000 JAN-MAR ••• APR-JUN

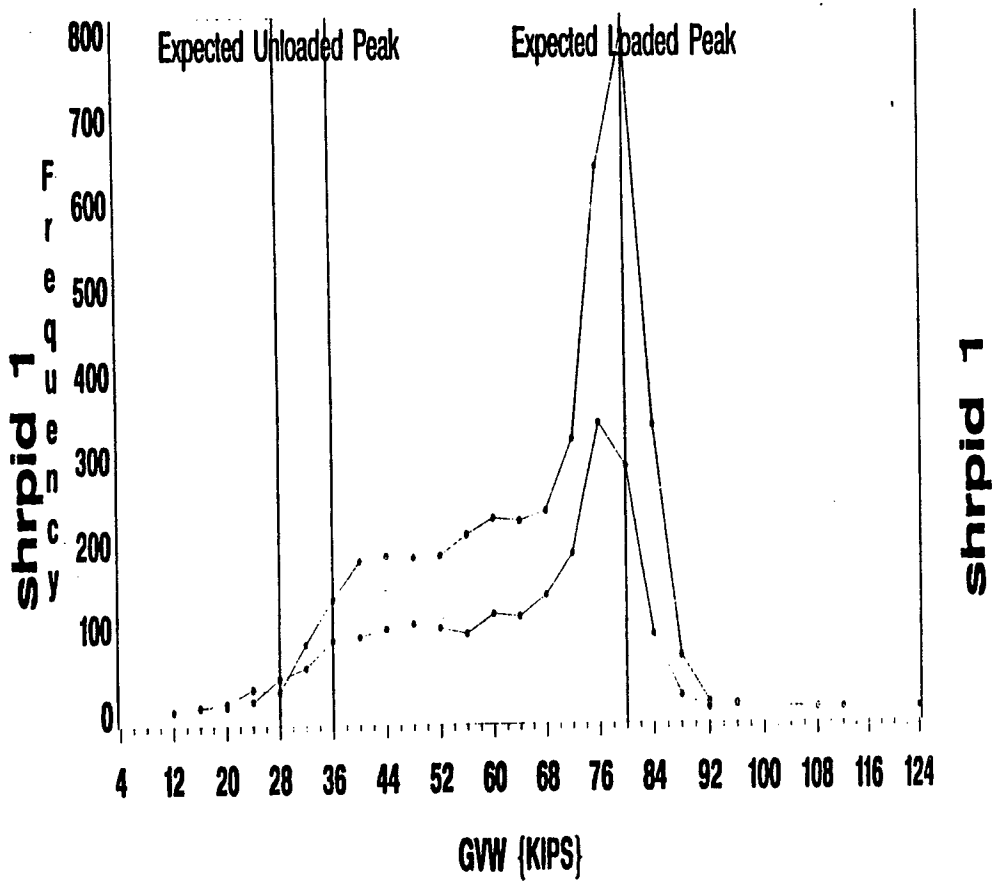
	JAN-MAR	APR-JUN
Less than 28 KIPS -	2%	1%
Between 28 & 80 KIPS -	91%	97%
Greater than 80 KIPS -	7%	2%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=East LANE=2 YR=1994



000 JAN-MAR ••• APR-JUN

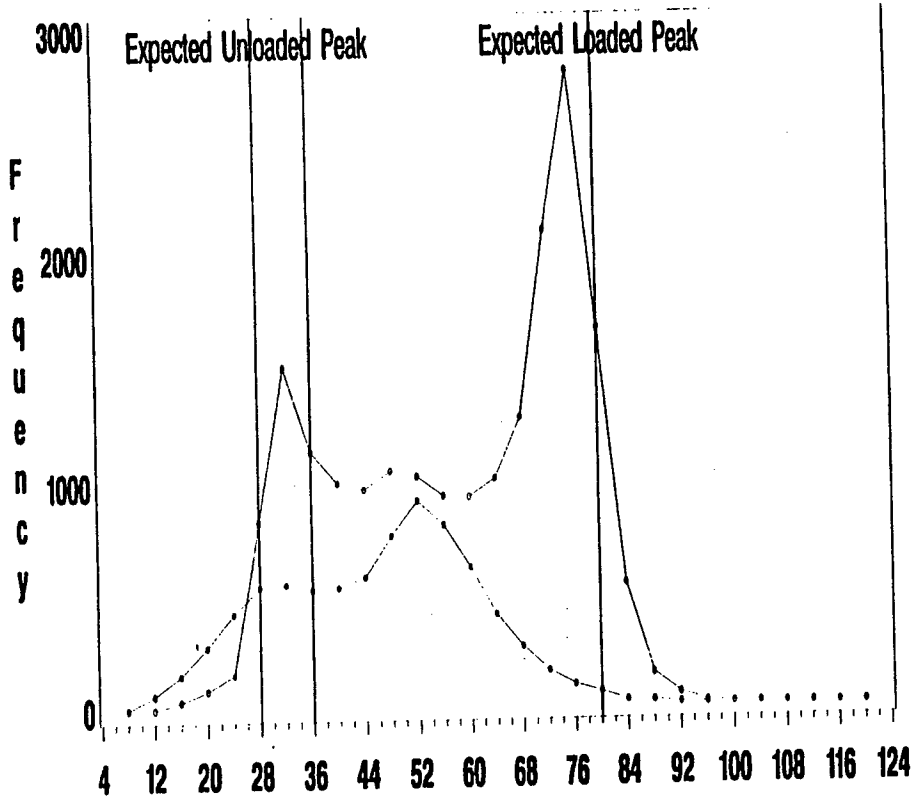
	JAN-MAR	APR-JUN
Less than 28 KIPS -	1%	1%
Between 28 & 80 KIPS -	89%	93%
Greater than 80 KIPS -	10%	5%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=West LANE=1 YR=1994



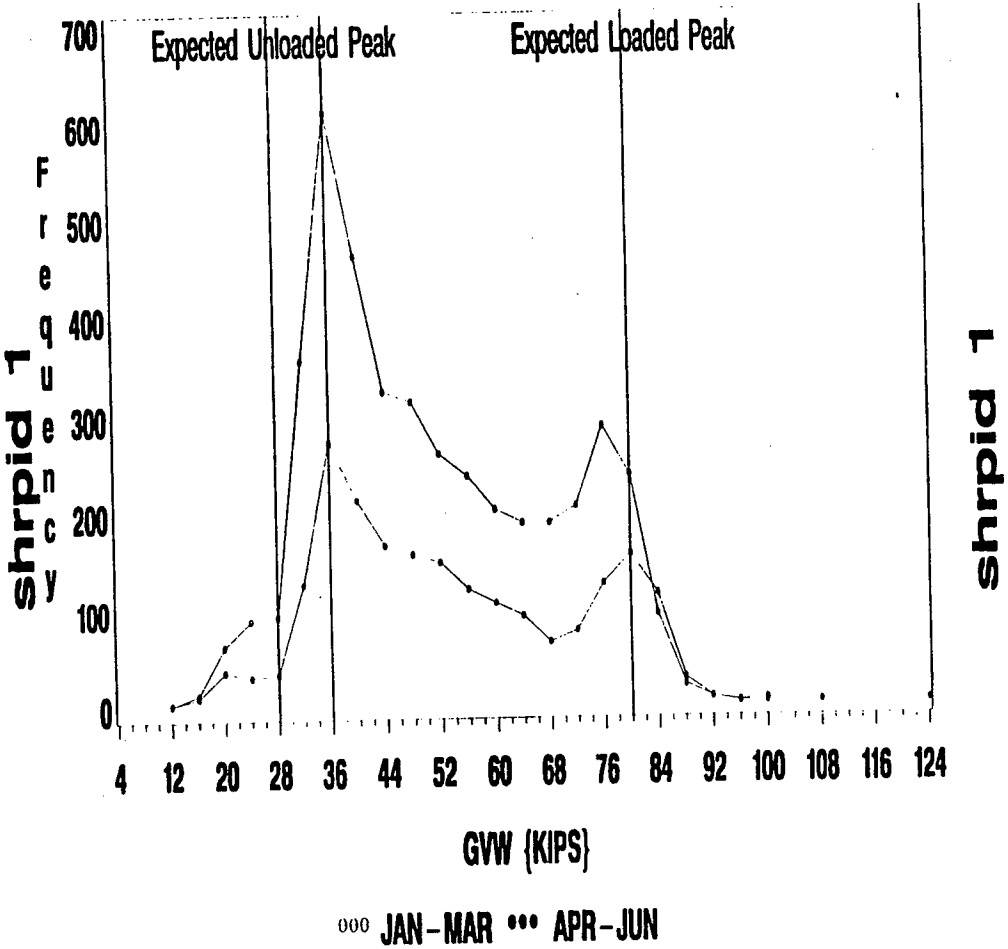
	JAN-MAR	APR-JUN
Less than 28 KIPS -	1%	12%
Between 28 & 80 KIPS -	95%	88%
Greater than 80 KIPS -	4%	1%

1994

LTPP.PA000147

GVW DISTR for VEHICLE CLASS 9
BY QTR

STATE=Pennsylvania DIRECT=West LANE=2 YR=1994



	JAN-MAR	APR-JUN
Less than 28 KIPS -	4%	4%
Between 28 & 80 KIPS -	93%	89%
Greater than 80 KIPS -	3%	7%

1994

LTPP.PA000147

APPENDIX F

Creation of the Lookup Table

Creation of the Lookup Table

The purpose of the lookup table is to determine the volume distribution by class, time of day and day of the week. The lookup table was also used in the edited card 3 datafile to impute the missing values. The file containing data for the year 1994 and from site 1 was used to create a look up table. The procedure for creation of the lookup table is detailed below:

Step 1: From the yearly datafile, a column containing the days of the week was created. The date on which the observation was recorded was used as a parameter to extract the day of the week.

Step 2: The proportion of vehicles for each hour of the day and class vehicle was calculated as a fraction of the whole twenty four hours of the day. For example,
on the first day of the week, at 12 noon if there are 12 vehicles of class 3 and the total number of vehicles for all 24 hours of the first day of the week is 480 then the value in the cell for that particular class, i.e. class 3 at 12 noon for the first day of the week is 12/480=0.025.

Step 3: Once the proportions have been created for the first day of the week, repeat the same process for the remaining days of the week. This process can be done using any spreadsheet package, such as Lotus 1-2-3©, Microsoft Excel© etc.

Step 4: Once the proportions for the seven days of the week are calculated, then copy all the various sheets containing proportions from different days of the week onto a single sheet. The final sheet should contain, 14 columns and 168 rows. The first 24 rows are for 24 hours of the first day of the week, Sunday, the next 24 rows are for the 24 hours of the second day of the week, Monday, and so on till the seventh day of the week. The 13 columns are for the 13 classes of vehicles, and the 14th column is for the sum of the first 13 columns. The 14th column data is used for converting edited card 3 into CAVC data.

Step 5: Save the final sheet in the ASCII format so that it is readable under different conditions.

Step 6: The look up table is now ready for use. Operators may create additional lookup tables for different sites and years. When the routines developed by PTI are run by the operators. the routines will ask the users to provide names of lookup table that the operator would like to use.

Figure 1 shows a section of the lookup table.

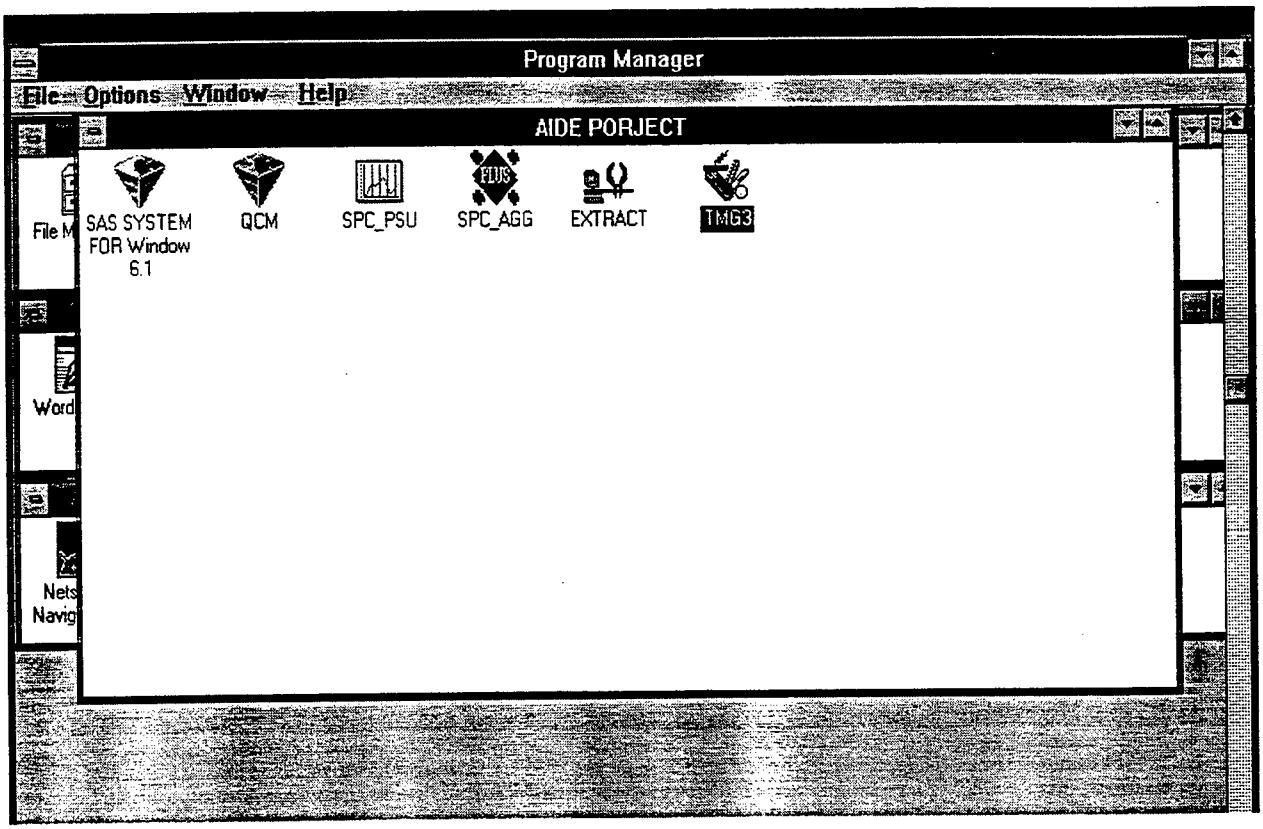
0.00000332	0.0054139	0.00098352	0.00008302	0.00025332	0.00015372	0.00000392	0.0001839	0.00422342	0.00005312	0.00074372	0.00004352	0.00033312	0.01247556
0.00000322	0.0038137	0.00070322	0.00009352	0.00018332	0.00013332	0.00001312	0.0001635	0.00338352	0.00005392	0.00069302	0.00003382	0.00033302	0.00960426
0.00000322	0.003153	0.00058312	0.00006352	0.00015312	0.00012342	0.00000382	0.0001431	0.00311392	0.00007302	0.00065392	0.00004312	0.00027352	0.00838386
0.00000332	0.0028831	0.00062362	0.00007372	0.00013352	0.00012332	0.00001312	0.0001036	0.00265342	0.00005362	0.00068352	0.00002392	0.00029322	0.00766506
0.00000322	0.002683	0.00052332	0.00007332	0.00014372	0.00010372	0.00000382	0.0001037	0.00261332	0.00007342	0.00069362	0.00004352	0.00026362	0.00732536
0.00000322	0.0029534	0.00064332	0.00006352	0.00015362	0.00012392	0.00000382	0.0001233	0.00266352	0.00005372	0.00072312	0.00005302	0.00021362	0.00777516
0.00000362	0.0046333	0.00109382	0.00007372	0.00018392	0.00012312	0.00001322	0.0001934	0.00293332	0.00005342	0.00088382	0.00004352	0.00025392	0.01048616
0.00001342	0.0079032	0.00159372	0.00006322	0.00026392	0.00015362	0.00001322	0.0002435	0.00427362	0.00005362	0.00099352	0.00004372	0.00030372	0.01591606
0.00001352	0.0135034	0.00256372	0.00007302	0.00040382	0.00018312	0.00001352	0.0003034	0.00596382	0.00006382	0.00102382	0.00005312	0.00036332	0.02452546
0.00001382	0.021523	0.00402302	0.00007302	0.00062302	0.00025372	0.00002332	0.0004935	0.00763392	0.00010362	0.00094352	0.00004352	0.00059372	0 03634476
0.00001312	0.0306832	0.00572332	0.00010312	0.00072342	0.00026382	0.00003352	0.0006533	0.01014372	0.00013352	0.00096332	0.00004352	0.00049352	0.04997446
0.00002392	0.0388831	0.00716302	0.00008362	0.00083332	0.00033362	0.00001382	0.000673	0.01198372	0.00009322	0.00106322	0.00003392	0.00047302	0.06165456
0.00003322	0.0427332	0.00755312	0.00012312	0.00082342	0.00028312	0.00002342	0.0006638	0.01282372	0.00015302	0.00085312	0.00004322	0.00063312	0.06674266
0.00004322	0.0477635	0.00863362	0.00016322	0.00095342	0.00035312	0.00003332	0.0007138	0.01423362	0.00017312	0.00098332	0.00006302	0.00055322	0.07466356
0.00003352	0.0513436	0.00899362	0.00014312	0.00100362	0.00037352	0.00003302	0.000733	0.01555372	0.00017342	0.00100332	0.00004382	0.00053352	0 07996486
0.00003392	0.0528837	0.00942372	0.00016322	0.00105392	0.00042302	0.00005302	0.0007434	0.01725342	0.00020342	0.00093352	0.00004352	0.00049322	0 08370506
0.00003382	0.050903	0.00901312	0.00017322	0.00101362	0.00042352	0.00002372	0.0007237	0.01805382	0.00022372	0.00084382	0.00003392	0.00061392	0.08207696
0.00002372	0.0454732	0.00797332	0.00015332	0.00103382	0.00042382	0.00002362	0.0007434	0.01847342	0.00026332	0.00090372	0.00004342	0.00074372	0.07627586
0.00004372	0.0380131	0.00673352	0.00017322	0.00086342	0.00041332	0.00003352	0.0006838	0.01902322	0.00034332	0.00080352	0.00007372	0.00098322	0.06818466
0.00003382	0.0306335	0.00526332	0.00016362	0.00074342	0.00040382	0.00001352	0.0007338	0.02005382	0.00041342	0.00085382	0.00006352	0.00119362	0.06056706
0.00001372	0.0236036	0.00436362	0.00011332	0.00067362	0.00035372	0.00001342	0.0006033	0.01893382	0.00044392	0.00083392	0.00003392	0.00099312	0.05097706
0.00001342	0.0167038	0.00286382	0.00011352	0.00062382	0.00029352	0.00000392	0.0005439	0.01807362	0.00039362	0.00079392	0.00005372	0.00088352	0.04135816
0.00001312	0.0118839	0.00223352	0.00008332	0.00051332	0.00023362	0.00001312	0.0005133	0.01660352	0.00043332	0.00077392	0.00008332	0.00070392	0.03408526
0.00001312	0.0085238	0.00162312	0.00008352	0.00045382	0.00026382	0.00001342	0.0005338	0.01527352	0.00037372	0.00077302	0.00007302	0.00090362	0.02890536
0.00000438	0.0057144	0.00126438	0.00010438	0.00047438	0.00025438	0.00002438	0.0004244	0.01336438	0.00030438	0.00081438	0.00009438	0.00083438	0.02367694
0.00000438	0.0042044	0.00095438	0.00008438	0.00038438	0.00021438	0.00002438	0.0004044	0.01073438	0.00030438	0.00071438	0.00005438	0.00066438	0.01874694
0.00000438	0.0033644	0.00088438	0.00007438	0.00031438	0.00022438	0.00003438	0.0003644	0.00942438	0.00022438	0.00069438	0.00006438	0.00058438	0.01625694
0.00000438	0.0031644	0.00096438	0.00007438	0.00039438	0.00028438	0.00011438	0.0003644	0.00894438	0.00024438	0.00071438	0.00004438	0.00045438	0.01576694

Figure 1. Section of the Lookup Table

APPENDIX G

List of Routines and Programs

List of software



① **SAS Version 6.11 For Windows** : SAS statistical software version 6.11for Windows made by SAS Institute.

② **QCM** : The modified QC Interface software made by PTI. The software produces six files, one file called Flags.out, one file called TMG3.out, and four files called scheme1.out, scheme2.out, scheme3.out and scheme4.out. The QCM also produces graphs for erroneous data.

③ **SPC_PSU**: The SPC_PSU routine developed by PTI allows the merging of the aggregated file with the flag file and the lookup table with volume distribution by class, time of day and day of week to give a clean data set needed for analysis.