

DEVELOPMENT OF TRAFFIC INPUTS FOR THE MECHANISTIC-EMPIRICAL PAVEMENT
DESIGN GUIDE IN NEW YORK STATE

by

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DEDICATION

I dedicate my thesis to my mother Late Tahmuda Ahmmmed and my father Rabiul Awal.

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ABSTRACT

DEVELOPMENT OF TRAFFIC INPUTS FOR THE MECHANISTIC-EMPIRICAL PAVEMENT DESIGN GUIDE IN NEW YORK STATE

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Proper characterization of traffic data is a prerequisite for the determination of appropriate traffic inputs to *Mechanistic-Empirical Pavement Design Guide* (MEPDG). The development of proper traffic inputs helps reflect the traffic conditions over the life of pavement which would decrease the maintenance, repair and traffic disruptions and improve the traffic conditions of a road network.

The objective of the study was to characterize the traffic data and suggest the site-specific, regional or state wide average values for traffic inputs to MEPDG for New York State. Vehicle class distribution (VCD), monthly distribution factors (MDF), hourly distribution factors (HDF), average number of axle groups per vehicle (AGPV) and axle load spectra were obtained from vehicle classification and WIM sites in New York State for the years of 2007-2011. These traffic data was processed with TrafLoad software. Cluster analysis was performed on the processed VCD, MDF and HDF data collected during the time period. This statistical analysis could not be done for AGPV values and axle load spectra due to the unavailability of

sufficient number of WIM sites. However, MEPDG runs were carried out to investigate the effect of the variability of traffic inputs on the pavement performance of typical new flexible and rigid pavement structures.

The statistical analysis showed consistent results for VCD and HDF over the years. However, the results of statistical analysis on MDF were not consistent over the time period.

Site specific values for VCD, MDF, AGPV and axle load spectra showed little variation with statewide average values after the cluster analysis and MEPDG runs for the vehicle classification and WIM data of the year of 2010. This was observed for both flexible and rigid pavements. However, HDF did not show any effect on the design of pavement with MEPDG. These findings were also verified from the analysis of vehicle classification and WIM data of the other years.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

The AASHTO (American Association of State Highway and Transportation Officials) 1993 pavement design uses 18-kip Equivalent Single Axle Loads (ESALs) for determining pavement thickness. The ESALs are dependent on load equivalency factors (LEFs). LEFs are based on factors such as pavement type, slab thickness or structural number, axle type, load and terminal serviceability index. The development of the Mechanistic Empirical Pavement Design Guide (MEPDG) by NCHRP (National Cooperative Highway Research Program) Project 1-37 has eliminated the shortcomings of AASHTO practices by using new traffic characterization requirements. It uses axle load distributions in lieu of ESAL. Axle load spectra differentiate the traffic loading in terms of the number of load applications of different axle configurations within a certain weight classification range. The AASHTO design considers the Present Serviceability Index (PSI) as a measure of the pavement performance. On the other hand, MEPDG expresses the performance of pavements in terms of structural distresses, such as percent slabs cracked, fatigue cracking, rutting; and functional distresses, such as International Roughness Index (IRI). Besides, the fundamental limitation of AASHTO design was the fact that it was developed on the basis of American Association of State Highway Officials (AASHO) Road test; which was carried out in one geographic location, traffic loadings, soil type and construction methods in lieu of a range of conditions. Therefore, extrapolation was necessary for the design of pavement outside the original test range. However, the proper implementation of MEPDG depends on the appropriate characterization of traffic data. But detailed traffic data is not always available for the previous years. Therefore, MEPDG identifies

a hierarchical approach to develop required traffic inputs. The traffic data is classified into three levels. Level 1 uses site-specific data, which is the most realistic. Level 2 provides truck volume and weight data for the case when the designer has modest knowledge of past and future traffic. Level 3 uses regional, statewide or default values.

The traffic data depends on vehicle distributions, axle loads and truck volumes along the same route or between different routes. The traffic information for Level 1 and 2 can be obtained from vehicle classification and weigh-in-motion (WIM) sites. The designer must be able to assess the current and future traffic patterns to properly perform the design of pavement. He has to rely upon Level 2 input in case of unavailability of level 1 data, i.e. when only weight distribution data at regional or network level is available. Level 3 data is the only solution if there is poor knowledge of the present and future traffic and unavailability of Level 1 and 2 data. The state agencies develop Level 2 and 3 inputs from the available Level 1 inputs. However, the development of regional, network or statewide values require the collection, calibration and analysis of site specific traffic data of previous years.

Several studies have been conducted to implement MEPDG for the design of new flexible pavements in the New York State. There is a need for traffic data to be characterized to develop regional or statewide values. This requires extensive analysis of hourly distribution factors (HDFs), monthly distribution factors (MDFs), vehicle class distributions (VCDs) and development of axle load distributions.

1.2 Study Objectives

The primary objective of this study is to characterize traffic data for different input levels for the MEPDG for new and rehabilitated pavements in the State of New York. Statistical analyses were conducted to develop traffic inputs and the results were verified with the help of MEPDG runs. The changes in results of statistical analyses would be examined for different years. The study consists of:

- Literature review of the efforts for the characterization of traffic data by New York and other states;
- Extraction of vehicle classification and WIM data from the traffic data collected by the vehicle classification and WIM stations of NYSDOT (New York State Department of Transportation);
- Statistical or cluster analysis of vehicle classification data to develop traffic inputs for MEPDG;
- Cluster analysis of vehicle classification data to identify differences in traffic data for different years and
- MEPDG runs to verify the results of cluster analysis to determine the effect of clustering on the predicted for a given design solution.

1.3 Organization of Thesis

The research that has been carried out on the development of traffic inputs to MEPDG for New York and other states is presented in the literature review, Chapter 2. The literature review also provides concise discussions on the cluster analysis and different components of MEPDG. The type and characteristics of collected data are discussed on the Chapter 3. The methodology of the research along with the necessary assumptions is also stated in this Chapter. The results of cluster analysis and MEPDG runs on the vehicle classification and WIM data of the year of 2010 are presented in Chapter 4. The variation in the results of cluster analysis and MEPDG runs for both the vehicle classification and WIM data of different years are discussed in Chapter 5. The conclusions and recommendations for the development of traffic inputs to MEPDG for the State of New York are stated in Chapter 6.

CHAPTER 2

LITERATURE REVIEW

2.1 MEPDG

The National Cooperative Highway Research Program (NCHRP) carried out Project 1-37A to develop a new Mechanistic-Empirical Pavement Design Guide (MEPDG) to improve the design and analysis procedure for new and rehabilitated pavement structures. The mechanistic approaches alone are not sufficient for the design of pavements. These procedures need to be supported by empirical relationships to make them more practical and effective.

The new design guide considers the research findings, current practices and database for the purpose of pavement analysis and design. It contains common design parameters for subgrade, traffic and environment which would work as basis for the design of flexible, rigid and composite pavements. The NCHRP report also provides the software to facilitate the implementation of the new pavement design process, with the necessary documentation and training materials (Sridhar, 2008).

The 1993 AASHTO Design guide has been successful for the design of pavement for years. But it was unable to consider the increase of traffic volume and the effect of climate on pavement performances. The newly developed MEPDG is more successful in dealing with different conditions of pavements such as subgrade, surfacing materials, base course, truck characterization, environmental change, drainage, design life and performance.

2.1.1 MEPDG Design Approach

The approach to the MEPDG design method consists of three major steps; the first step consists of the development of inputs such as material data, traffic input data and Enhanced Integrated Climatic Model for modeling temperature and moisture content within each layer.

The second step of the design approach deals with the structural/performance analysis. It is an iterative process which starts with a selection of initial trial design which may be derived from current design procedure or from a design catalog. The initial values of layer thickness, geometric features, initial smoothness/IRI and material characteristics are needed for the trial design. This trial method is analyzed incrementally with the pavement response and distress models and the accumulated damage is expressed as the expected amount of distress and smoothness.

The third step evaluates structurally viable alternatives with the consideration of engineering and life cycle cost analysis.

2.1.2 Materials

In the AASHTO flexible pavement design procedures, only the structural layer coefficient ‘a’ was describing the material of a given layer which was correlated with the elastic modulus of the material. As some materials are time-temperature dependent and some are stress state dependent, it is necessary to consider these factors in the M-E (Mechanistic-Empirical) analysis. The consideration of elastic modulus and Poisson’s ratio of the material helps predict the stresses, strains and displacements within the pavement structure. Besides the material properties, the engineering index properties, thermal properties and gradation parameters are required to determine the temperature and moisture profiles throughout the pavement cross-section.

2.1.3 Inputs for the MEPDG for Pavement Design

The input parameters for the design of new flexible pavement for the MEPDG software are as follows:

- General Information
- Site/Project Identification
- Analysis Parameters
- Traffic
- Climate
- Drainage and surface properties
- Pavement Structure

2.1.3.1 General Information

This group describes the analysis period and type which includes the following:

- Design life (years) – expected design life of pavement.
- Base/Subgrade Construction Month (month, year) – the month in which the base and subgrade are expected to be constructed. In case of the unavailability of the data, the designer would use the month in which most pavement construction occurs in the specific area.
- Pavement (Hot Mix Asphalt) construction month (month, year) – in case of the unavailability data for the construction time of pavement, the designer may use the month in which most pavement construction occurs in the area.
- Traffic opening month (month, year) – the anticipated month in which the pavement would be open to traffic. It also works as a reference time for damage accumulation.
- Pavement Type – the type of pavement to be designed.

2.1.3.2 Site/Project Identification

This group consists of the following parameters:

- Project location

- Project identification – Project ID, Section ID, begin and end mile posts and traffic direction.
- Functional class of the pavement being designed. This includes the following categories:
 - Principal Arterial – Interstate and defense routes.
 - Principal Arterials – others.
 - Minor Arterials.
 - Major Collectors.
 - Minor Collectors.
 - Local Routes and Streets.

2.1.3.3 Analysis Parameters

- Initial IRI (inches/mile) – it expresses the smoothness of a newly constructed pavement. It depends on the project smoothness specifications and it has an impact on the long-term ride quality of the pavement. Typical values have a range from 50 to 100 in/mi.
- Performance Criteria
- Surface-down fatigue cracking (longitudinal cracking, ft/mile) – The performance criterion for this type of cracking expresses the maximum allowable length of longitudinal cracking per mile of pavement over the design period. Typical values of acceptable cracking are on the order of 1,000 ft per mile of pavement.
- Bottom-up cracking (alligator cracking, %) – The performance criterion for this cracking is taken as the maximum area of alligator cracking expressed as a percentage of the total lane area which is acceptable over the design period. Typical values of allowable cracking are on the order of 25 to 50 percent of the total lane area.

- Thermal cracking (ft/mile) – The corresponding performance criterion is taken as the maximum length of transverse cracking per mile of pavement allowable during design period. Typical values are on the order of 1000 ft per mile of pavement.
- Terminal IRI (in/mile) – The performance criterion for smoothness is determined by the acceptable IRI at the end of design life, which is terminal IRI. Typical values of terminal IRI lie in the range of 150 to 250 in/mile with the consideration of the functional class of the roadway and design reliability.
- Permanent Deformation (Rutting, inches) – The maximum rut depth in the wheel path is defined as the performance criterion for this type of distress. Typical maximum rut depths lie on the order of 0.3 to 0.5 inches.

2.1.3.4 Traffic

This is one of the major input groups for the analysis and design of pavement structures. It provides the estimation of the loads applied throughout the design life of pavement. The requirement of traffic data is similar for different types of pavement; i.e., rigid, flexible, new or rehabilitated. The collection of traffic data is done with the help of Weigh-in-motion (WIM), Automatic Vehicle Classifier (AVC) and Automatic Traffic Recorder (ATR).

The characterization of the truck volumes and loadings are expressed as axle numbers by type and load frequency distribution (axle load spectra). The accuracy of traffic data depends on the length of data collection period.

The primary traffic data elements for the design of pavement are;

- Truck growth factors: it estimates the future truck traffic volumes for the design period of a pavement.
- Vehicle (truck) class distribution: it expresses the proportion of each truck class (classes 4 through 13) within the total number of trucks for the base year (Figure 2.1). The

MEPDG software allows the use of one out of 17 sets of default values on the basis of functional classification of road, in addition to a user defined default set.

- Base year truck-traffic volume: The base year indicates the first year when the roadway segment under design is open to traffic. The following information is needed for the base year: two-way annual average daily truck traffic, number of lanes in the design direction, proportion of trucks in design direction, proportion of trucks in design lane and vehicle operational speed. All of these inputs except vehicle operational speed are used to compute the number of trucks in the design lane.
- Axle and wheel base configurations: They represent the tire, axle and vehicle wheelbase dimensions. They are needed for the estimation of pavement response.
- Hourly Distribution/Adjustment Factors (HDF/HAF): The HDF/HAF values give the proportion of trucks passing over the pavement structure in each of the 24 hours of a day.
- Monthly Distribution/Adjustment Factors (MDF/MAF): The MDF gives the proportion of trucks passing over the pavement in each month of the year.
- Average Number of Axle Groups per Vehicle (AGPV): This represents the average number of axles for each truck class (class 4-13) for each type of axle (single, tandem, tridem and quad).
- Axle Load Spectra: Axle load spectra categorize the traffic loading in terms of the number of load applications of different axle types (single, tandem, tridem and quad) within a certain weight classification range. Axle load distribution factors need to be computed for a given axle type and vehicle class (classes 4 to 13). The load intervals for each axle type are classified as follows: for single axles (3,000 lb to 40,000 lb at 1,000-lb intervals), for tandem axles (6,000lb to 80,000lb at 2,000-lb intervals), and for tridem and quad axles (12,000 lb to 102,000 lb at 3,000-lb intervals).

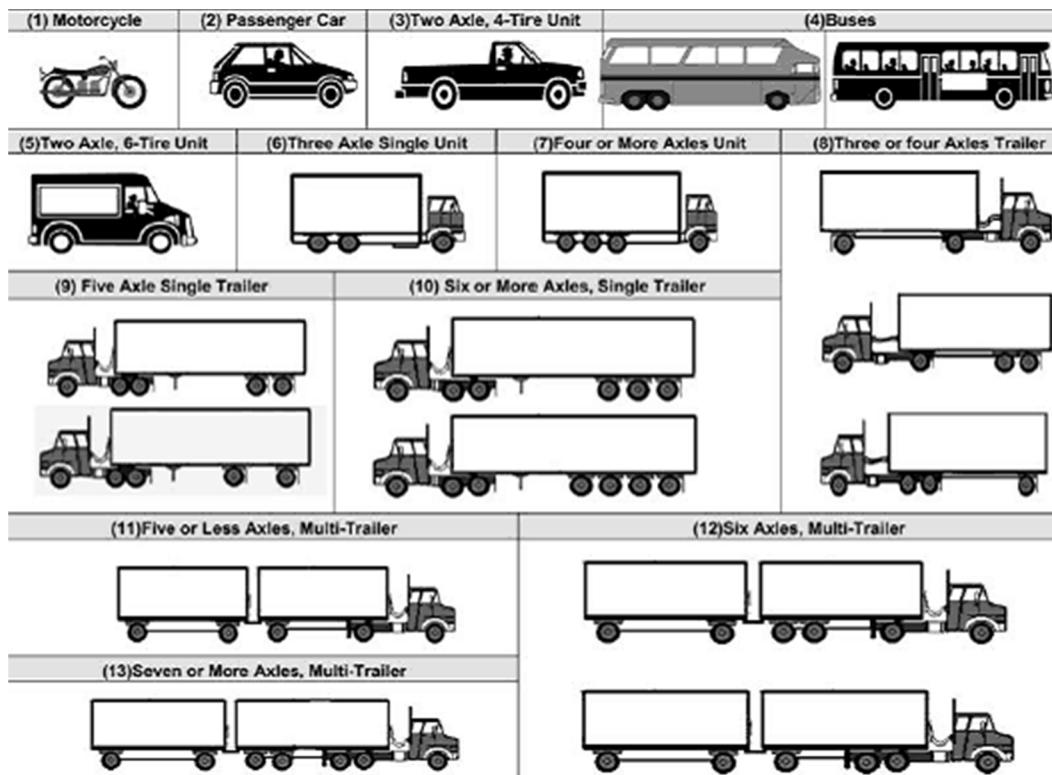


Figure 2.1 FHWA vehicle classes used for traffic data collection (<http://support.diamondtraffic.com>, Nov. 8, 2012)

The MEPDG develops a hierarchical strategy to implement traffic inputs, termed as Level 1, 2 and 3, as follows:

- Level 1: It represents site specific traffic data with sound knowledge of past and future traffic characteristics. The traffic data are collected along or near the roadway project that must be designed.
- Level 2: The regional or statewide truck volume and weight data work as level 2 inputs.
- Level 3: It is used when knowledge on past and future traffic characteristics is limited. In many situations, only the annual average daily traffic and percentage of trucks may be available. A regional, statewide or some other default input values may be used.

2.1.3.5 Climate

Climate and environmental conditions have an important effect on the performance of pavements. Precipitation, temperature, freeze-thaw cycles and ground water table also play a significant role on the pavement performance. These factors influence pavement and subgrade layer temperature and moisture content which also affect the load carrying capacity of the pavement.

The MEPDG uses the Enhanced Integrated Climatic Model (EICM) in order to study the effects of changing temperatures and moisture profiles. It simulates the behavior and characteristics of the pavement under heat and moisture flow due to the change in climatic conditions.

The climatic inputs are obtained from the closest weather station located nearby the project site with the help of the software. The software accesses data from National Climatic Data Center (NCDC) database comprising of more than 800 locations in the United States. The software needs a minimum of 24 months of weather data to do the computations. In case of absence of a weather station near the project site, a virtual weather station (VWS) may be created from a combination of as many as six closest weather stations. The inputs are as follows:

- Latitude (Degrees, Minutes)
- Longitude (Degrees, Minutes)
- Elevation (ft)
- Depth of water table (ft)

2.1.3.6 Pavement Structure

The pavement structure inputs which are used in EICM are;

- Drainage and surface characteristics: These are general pavement structure properties which include;

- Pavement surface layer shortwave absorptivity: It is the ratio of the amount of solar energy absorbed by the pavement surface to the total energy the surface was exposed to.

The input values lie in the range of 0 to 1.

- Infiltration: This input signifies the amount of water infiltrating the pavement structure.

- Layer properties: The pavement design allows a wide variety of asphalt, base and sub-base material properties and layer thicknesses. The original pavement structure usually has 4 to 6 layers.

2.2 Cluster Analysis

The cluster analysis uses a hierarchical mathematical algorithm which classifies the sites on the basis of similarity of traffic characteristics. It has been successful to classify the WIM sites on the basis of different characteristics. On the other hand, a regression model has not been good in explaining the similarities or dissimilarities among the WIM sites (Lu et al., 2009).

2.2.1 Cluster Classification

Three different techniques are used for clustering. They are: k-means, two-stage and hierarchical.

The K-means method is a nonhierarchical process. This method requires the number of clusters to be predetermined. These clusters are assigned by a mean or centroid value at which the sites would be clustered. The algorithm selects the site to the closest mean or centroid value on the basis of a given distance measure. This minimizes the variation within clusters and maximizes the variation in groups. The cluster means are changed with a subsequent addition of another site to a specific cluster. So, the formation of clusters changes along with the progression of the algorithm. This method is effective for large volume of data.

In the two-stage clustering method, pre-clusters are formed to facilitate the reduction of the data size. It is followed by a hierarchical analysis which produces the final clusters.

The hierarchical clustering procedure determines the clustering distance with the help of four types of linkage techniques:

- Single linkage: In single linkage, the clustering distance between two clusters is calculated by defining two sites in each cluster that possess the lowest Euclidean distance.
- Complete linkage: In complete linkage, the clustering distance is measured between two clusters by defining two sites of each cluster that are the furthest apart by Euclidean distance.
- Un-weighted pair group average: In this technique, the clustering distance is determined by the two clusters which possess lowest average Euclidean distance among all sites within the two clusters.
- Ward's method: Ward's method may also be termed as minimum variance procedure (Wang et al, 2011). The distance between two clusters is found by the ANOVA sum of squares added up over all the variables. The sum of squares within clusters is reduced over all partitions with each generation.

2.2.2 Principles of Clustering

Clustering can be done in two steps.

- Step 1: A proximity measure is defined to find the closeness of the objects. An original data matrix X ($n \times p$) with n measurements of p variables is assumed. The measures of similarity or dissimilarity can be defined as a matrix ($n \times n$),

$$D = \begin{matrix} d_{11} & d_{12} & .. & d_{1n} \\ .. & d_{22} & .. & .. \\ .. & .. & .. & .. \\ d_{n1} & d_{n2} & .. & d_{nn} \end{matrix}$$

[1]

The values of d_{ij} represent the measure of similarity. The higher distance indicates the less similarity in the objects. The distance is generally found by Euclidean distance.

- Step 2: A group-building algorithm is selected, so that the variations between groups are significant. The observations within groups must also be as close as possible.

2.2.3 Importance of Statistical Analysis

Several studies have been carried out to identify the effect of statistical analysis in terms of pavement performance. The effect of different periods of time on the traffic data was also studied.

Axle load spectra collected by 13 WIM sites in Alabama was analyzed by Tisdale (Tisdale, 2003), who concluded that the data provided by the WIM sites was statistically different. However, another study (Timm et al, 2006) that investigated the influence of the axle load spectra on pavement response and the corresponding pavement thickness recommended the use of statewide load spectra. The analysis revealed that 86% of design thicknesses were within the limit of 0.5 in of the thickness found by using statewide load spectra. So, statistically different data does not necessarily mean they would have significantly different effects on MEPDG analysis.

Several studies have also been conducted whether there is any change in traffic data over the years. A study for the Texas Department of Transportation (TxDOT) used WIM data from two sites for 1993, 1994, and 1995 to analyze yearly axle load distributions (Qu et al, 1997). Axle load distributions among the three years were not statistically similar over the years.

Another study using LTPP data from 21 sites in the North Central Region for interstate highways used axle type distribution, ESAL distribution, and axle load distribution to identify trends in the traffic data (Kim et al, 1998). The North Central Region consisted of the following states; Iowa, Illinois, Indiana, Kansas, Kentucky, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. Within the three regions the Kruskal-Wallis test found that

the distribution by axle type, ESAL, and axle load for both single and tandem axle did not have significant change over time for the three years studied.

A research was done on the data from TxDOT from 1993-1995 and it was observed that Class 9 and Class 4 trucks had an annual rate of change of 6% and 5%, while the percentage of other truck classes did not rise over the given time period (Qu et al, 1997). TxDOT also compared the axle load spectra of the same axle type in the same or different truck class. It was found that the same axle types would have different load distributions when they were in different truck classes or at a different position, such as the front or the rear, on the same truck class.

2.3 Traffic Study for New York State

The development of traffic inputs by the MEPDG software is one of the tasks for FHWA pooled fund project TPF-5(079) for the design of pavement in the New York State. The Traffic Monitoring Unit of the New York State Department of Transportation (NYSDOT) collects the vehicle classification and WIM data for all the stations for various years. Several studies have been done on the traffic volume and corresponding performance of the pavements of New York State.

2.3.1 Results of Analysis of Traffic

TrafLoad software was used to process the W-card (WIM data) and C-card (Vehicle classification data) files in order to obtain the traffic patterns of New York. Data was successfully processed only for level 1A sites (Level 1 data collected from actual sites). The software does not give satisfactory results for other type of sites. The processed TrafLoad results are saved in different files for each vehicle classification and WIM site for each year.

The traffic data was analyzed to identify the variation of truck pattern across the state. The acceptability of state average values or the default values as design input for pavement was also studied. The analysis was done only on 2007 data (Romanoschi et al, 2011).

2.3.1.1 Vehicle Classification Factors (VCF)

The values of the VCF for twelve stations of “Rural-Principal Arterial-Interstate” roads and the MEPDG default values are shown in Figure 2.2. The calculated VCF values are almost identical to each other and to the default set suggested by MEPDG.

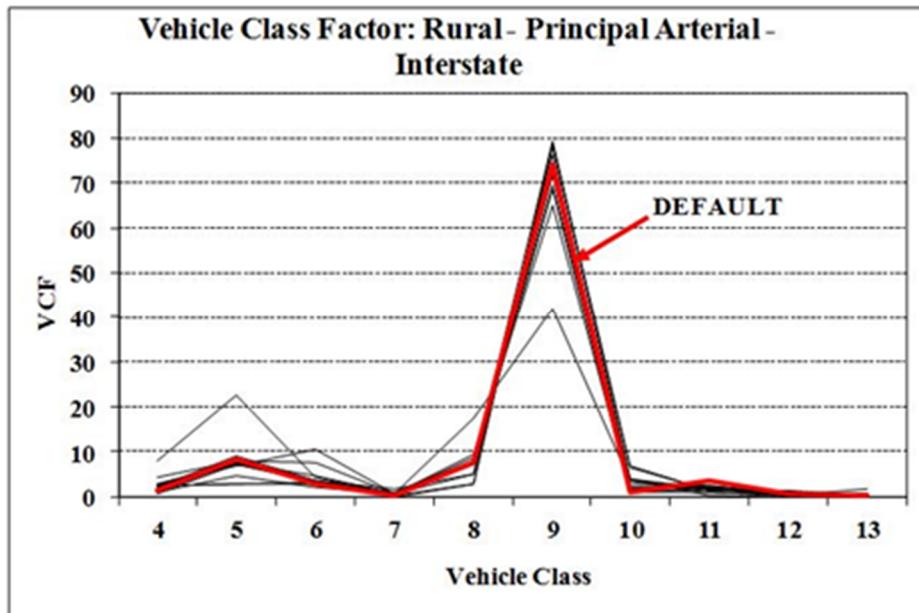


Figure 2.2 Vehicle Class Factors: Rural Principal Arterial, Interstate (Romanoschi et al, 2011)

The VCF values varied substantially for the other functional classes maintaining substantial difference with the default values suggested by MEPDG. The VCF values along with the default values suggested by MEPDG for Urban-Principal Arterial-Street are shown in Figure 2.3. The proportion of Class 9 vehicles is higher than the recommended values of MEPDG. This conforms to the facts that VCF values are a characteristic of each site and state average or default VCF values can not to be used.

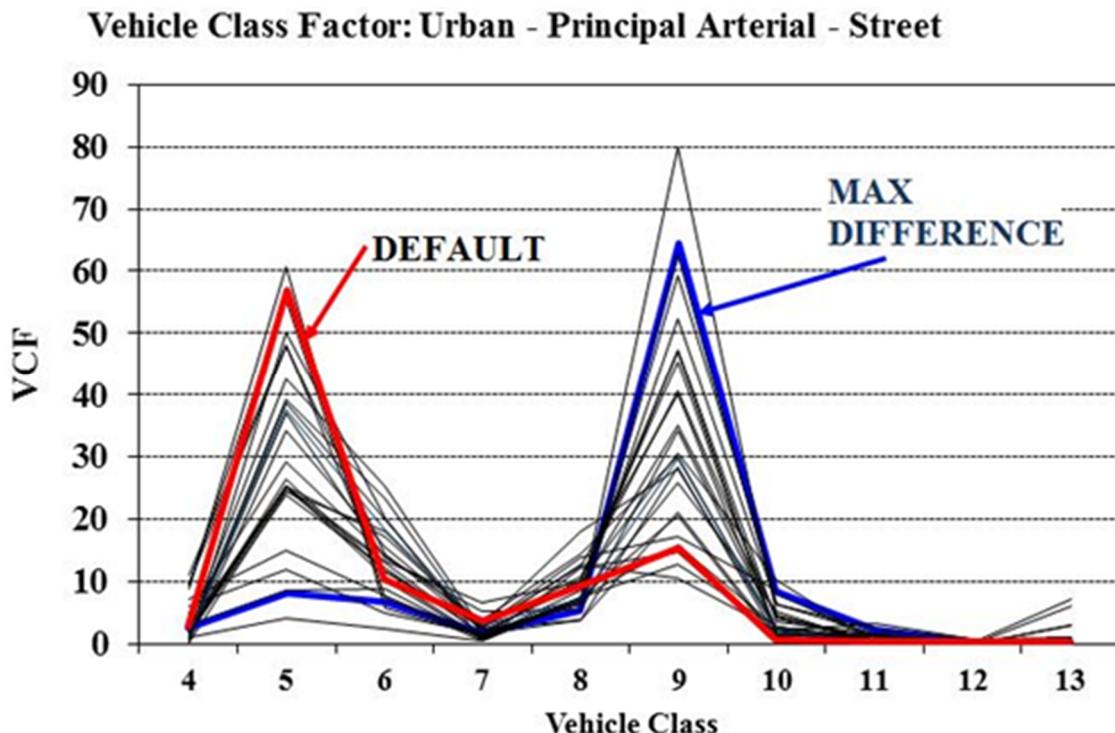


Figure 2.3 Vehicle Class Factors: Urban-Principal-Arterial (Romanoschi et al, 2011).

The difference between the computed VCF values and the values in the MEPDG default set was calculated using the following formula;

$$DIF(VCF) = \sum (VCF_i - VCF_{idefault})^2 \quad [2]$$

where

VCF_i = computed values of the VCF for vehicle class 4 to 13

$VCF_{idefault}$ = default values of the VCF recommended by MEPDG for vehicle class 4 to 13

The largest difference of VCF value was found for the site 004181 in Direction 1. The set of VCF values for the site is shown as blue line in the figure 2.3. The VCF values of this site are 8 and 64.5 for vehicle classes 5 and 9 respectively, whereas the VCF values suggested by MEPDG for the vehicle 5 and 9 classes are 56.9 and 15.3 respectively.

2.3.1.2 Hourly Adjustment Factors (HAF)

The HAF values show the number of trucks passing over the pavement structure in each of 24 hours of the day. The HAF values of 109 sites along with the average value are shown in the Figure 2.4. The HAF values show significant variation keeping a reasonable difference with the average value. So, it can be said that HAF values are site specific and the State average value may not be recommended. However, HAF is not considered in the design of flexible pavement.

The difference between the HAF values of the site and the average HAF set were found out. The largest difference was observed for site 004380 along the Direction 1. The set of HAF values for the site are featured in blue and the average HAF values are shown in red in the figure 2.4.

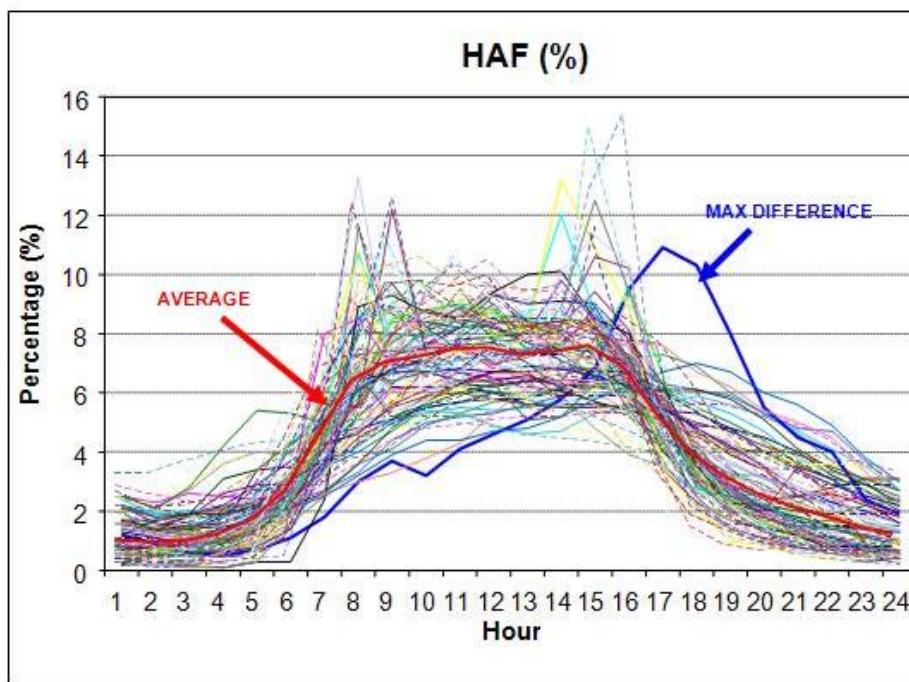


Figure 2.4 Hourly Adjustment Factors (Romanoschi et al, 2011)

2.3.1.3 Monthly Adjustment Factors (MAF)

The set of MAF values shows significant variation. Approximately three quarters of the sets are close to the average MAF values. So, state average may be used in the pavement design process.

The highest value of DIF (MAF) was found out for site 008580 in Direction 1. The MAF values of this site is indicated in blue and the average values are expressed in red (Figure 2.5), while the set of average MAF values is highlighted in red.

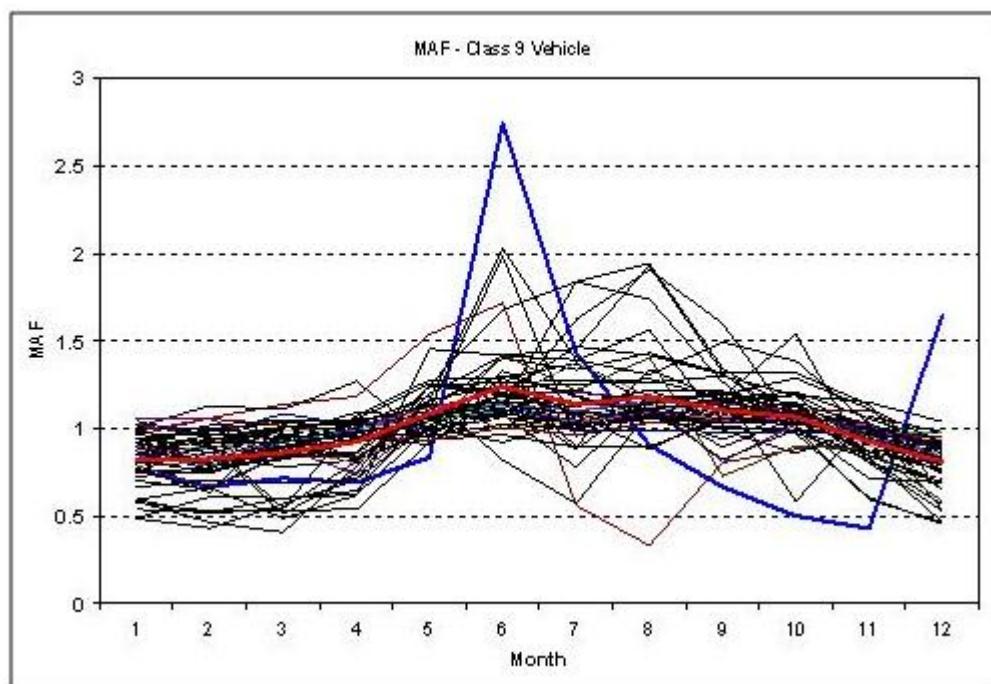


Figure 2.5 Monthly Adjustment Factor (Class 9 vehicles) (Romanoschi et al, 2011)

2.4 Other Studies on the Traffic Inputs to MEPDG

Several states have undertaken studies to facilitate the development of traffic inputs for the MEPDG guide. They used cluster analysis to predict the Level 2 values from the results of processed Class 1A data. The summary of these studies are stated below.

2.4.1 Michigan Study

A study was carried out in order to obtain the characterization of the traffic of Michigan (Haider et al, 2011). The researchers considered monthly distribution factors, hourly distribution factors, truck traffic classifications, axle groups per vehicle and axle load distributions for various axle configurations. Level 1 traffic inputs were developed from the data collected from forty-four WIM and fifty-one classification stations for the time period of November 2005 to October 2007. Ward's method of cluster analysis was used to differentiate the sites on the basis of similar characteristics to develop Level 2 inputs. The average of data for all the sites was used to obtain Level 3 inputs. The analyses were done to predict the performance of rigid pavements for the developed traffic inputs with the MEPDG models. It may be mentioned that site-specific data is the most suitable. However, Level 2 and 3 data need to be used in case of the unavailability of Level 1 data. And the statewide data are more appropriate in comparison to Level 3 data.

Vehicle classes 5 and 9 are most prominent in the truck traffic distribution at the national level. Three distinguishing patterns of vehicle classification are found by the Long Term Pavement Performance at equal frequencies.

The monthly distribution factor (MDF) was differentiated on the basis of three categories; single-unit trailers (VC 4 to 7), tractor-trailer combinations (VC 8 to 10) and multi-trailer combinations (VC 11 to VC 13).

A little difference in single AGPVs was observed. So, it can be said that the AGPV is the characteristic for each VC. Same types of results were found for the tandem AGPV except for VC4. The tridem AGPV clusters had more significant pattern in comparison to the single and tandem ones. The VC 7, VC 10 and VC 13 trucks have tridem axles. The quad AGPV clusters also show distinguishing patterns.

The cluster of single axle showed two peaks in its pattern. The range of 4 to 7 kips and 9 to 14 kips exhibited the two peaks. The dominant proportion of single axles is found in the range of 4-7 kip, the remaining portions of single ALS has peak at the 9-14 kip range except VC 7. Single ALS of all sites exhibit similar distribution within the same VC. The statewide ALS can be used for all VCs of single axle because single axle is dependent on the distribution of VC rather than on the shape of the ALS.

The tridem-axle clusters showed dominant proportion of light axles (12 kips) which is followed by peak values of 40 to 45 kips. The quad ALS clusters have the peak values at 15 to 20, 50 to 60 and 104 kip ranges. It may be mentioned that the observation of 104 kip load in the clusters is significant.

2.4.2 North Carolina Study

The implementation of Level 2 mechanistic-empirical pavement design for North Carolina was a challenging task (Sayyady et al, 2011). It is difficult to work with ALDF (Axe Load Distribution Factor) inputs; because:

- For single and tandem axles, 12 months*10 vehicle classes**39 load bins = 4,680 combinations;
- For tridem and quad axles, 12 months*10 vehicle classes*31 load bins = 3,720 combinations.

These parameters are more complicated than MAF (12 months*10 vehicle classes = 120 combinations), HDF (24 h) and VCD (10 vehicle classes). Moreover, MEPDG damage-based sensitivity analysis demonstrates that pavement performance is sensitive to site-specific ALDF and VCD rather than site-specific HDF and MAF values in North Carolina (Sayyady et al, 2010).

2.4.2.1 Multidimensional Clustering

Multi-dimensional clustering tests the similarity among WIM data on the basis of several attributes, where one dimensional clustering does it on the basis of one attribute at a time. One dimensional analysis provides clusters which are distinct by one axle type, but they are difficult to interpret or relate to a definite traffic pattern. So, the cluster representing single axles may not contain the characteristics of roadways where tandem axles are predominant. Moreover, Vehicle Class 5 (two single axles) and Class 9 (one single axle and two tandem axles) are the predominant classes in North Carolina (Sayyady et al, 2011). Class 5 and 9 represent single and tandem axles better, respectively. As a result, the implementation of multidimensional clustering may improve the results, because it considers the relationship of multiple attributes simultaneously and processes well-explained clusters.

Therefore, multidimensional clustering was adopted to characterize the traffic inputs for North Carolina. For this process, the frequency and the effect of various axle types on the performance of pavement was considered for the selection of the axle types and load combinations. The effect of tridem and quad axles was not as significant as the effect of single and tandem axles in North Carolina. So, the use of only single and tandem axles as two dimensions for the cluster analysis was recommended by the MEPDG damage analysis. The results from this type of analysis showed that clustering of ALDF can be successful in explaining similar traffic pattern for same type of highway system. The 48-h classification counts and the percentage of Class 5 and Class 9 vehicles were considered as attributes.

The traffic data were collected from 44 WIM stations from 1997 to mid-2007 by North Carolina Department of Transportation. The location map of WIM stations was divided into three regions; nine WIM sites in eastern coastal plain, twenty two in the central Piedmont and 13 in the western mountains. Nineteen Long-term Pavement Performance stations were included.

The results of one dimensional clustering show that the WIM site that belongs to one tandem cluster may not be member of same single cluster. The WIM sites of Cluster 2 tandem axles are correlated to the Clusters 1 and 3 single axles (Figure 2.6). The average tandem ALDF for Cluster 2 tandem axles and the average single ALDF for Clusters 1 and 3 single axles are shown in Figure 2.6.

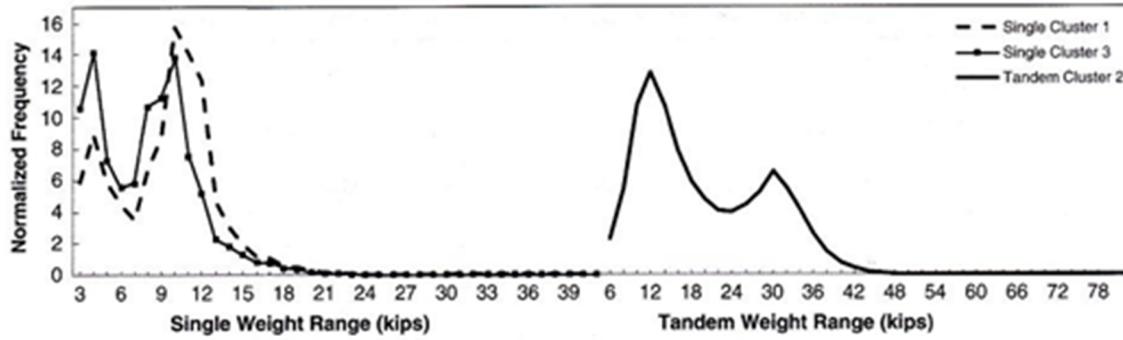


Figure 2.6 Multidimensional clustering analysis on single and tandem ALDF data (Sayyady et al, 2011).

Similarly, comparisons may be drawn for tridem and quad clusters. So, multidimensional clustering analysis is more effective than the one dimensional clustering. The single, tandem, tridem and quad axle types were considered in multidimensional cluster analysis. The four dimensional clustering produces four types of WIM clusters. Figure 2.7 shows the average axle load spectra for each cluster. The clustering outputs demonstrate that the high variability of the rare quad axles influences the variability of other axle types in North Carolina. The proportion of single, tandem, tridem and quad axles are 57.7%, 41.9%, 0.3% and 0.1% respectively, in accordance with the WIM data of North Carolina. And the majority of pavement damage is done by single and tandem axles, which are 35% and 64% respectively (Jadoun et al, 2011). So, the tridem and quad axles contribute to this damage insignificantly. And therefore, the tridem and quad axles are removed from the clustering analysis (Jadoun et al, 2011). This is

also applicable to some single and tandem axle bins. The analysis is done on 3 to 21 kip load bins for single axles and 6 to 50 kip load bins for tandem axles.

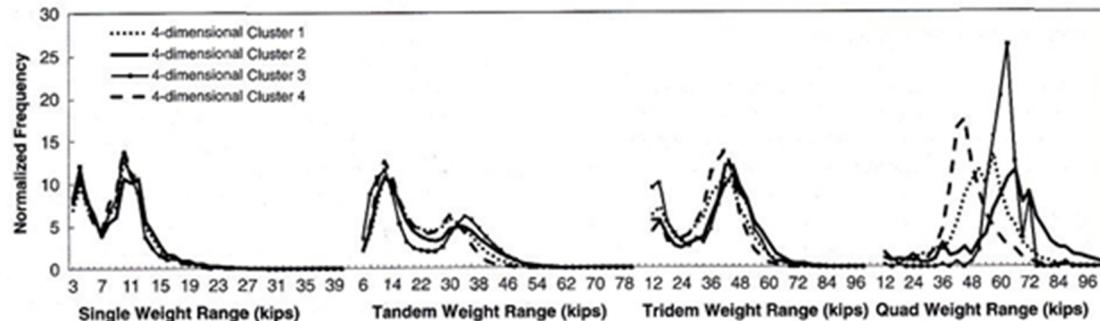


Figure 2.7 Single, tandem, tridem and quad ALDF data for each four dimensional Cluster (Sayyady et al, 2011)

The two dimensional clustering of single and tandem ALDFs produced four major clusters. The single and tandem axle load spectra of individual WIM sites were grouped in each cluster.

The functional classification of highway alone cannot explain the variations of ALDF clusters. The AADTT and the proportions of Class 5 and Class 9 vehicles explain the variations better than the type of location does.

2.4.3 Arkansas Study

The state of Arkansas adopted cluster analysis to establish similarities depending on truck traffic volume variations, vehicle class distribution and load spectra.

The WIM data was checked thoroughly for truck loading with the Traffic Monitoring Guide (TMG). The guide adopts four-step and two-step data check process for vehicle classification and vehicle weight respectively. The corresponding algorithms for the procedure are defined and adopted in the PrepME database software, which is developed at the University of Arkansas. The checking of data found 22 WIM stations good in the State of Arkansas.

Class 9 vehicles were selected to represent the load spectra for cluster analysis due to its predominance. Gross vehicle weight (GVW), monthly adjustment factor (MAF), hourly distribution factor (HDF) and vehicle class distribution factors (CDF) were adopted as attributes for cluster analysis.

The distribution of loading was characterized by the proportion of empty or lightly loaded trucks against fully loaded heavy trucks. The clusters of vehicle class distribution factors (CDFs), hourly distribution factors (HDFs) and monthly adjustment factors (MAFs) were obtained with the help of K-means clustering procedure. Three clusters of VCD were identified to reflect the higher proportions of Class 5 (single unit, two-axle trucks) and Class 9 vehicles (five-axle semitrailer trucks). The clusters from HDF data were formed on the basis of proportion of traffic during daytime. The clusters from MAF data were formed on the basis of proportion of traffic during different seasons of the year.

2.4.4. Washington State Study

The clustering process was adopted on the data from WIM sites of the seven states; Connecticut, Indiana, Michigan, Minnesota, Mississippi, Vermont and Washington (Papagiannakis et al, 2006). It was a part of the study of pavement design reliability as a variable for the quality of traffic input data. The data sets consisted of 178 WIM sites in seven states (including Washington) for the time period of more than 299 days a year.

2.4.4.1 Clustering Technique

In the study of Washington State, Euclidean distance, e_{ij} , was used to identify the similarity between the pair of objects (Papagiannakis et al, 2006). If the value of the e_{ij} tends to zero, it means similarity between a pair of objects (Figure 2.8). A clustering tree was formed with the pair of objects grouped together. The attributes were averaged in the order of increasing e_{ij} .

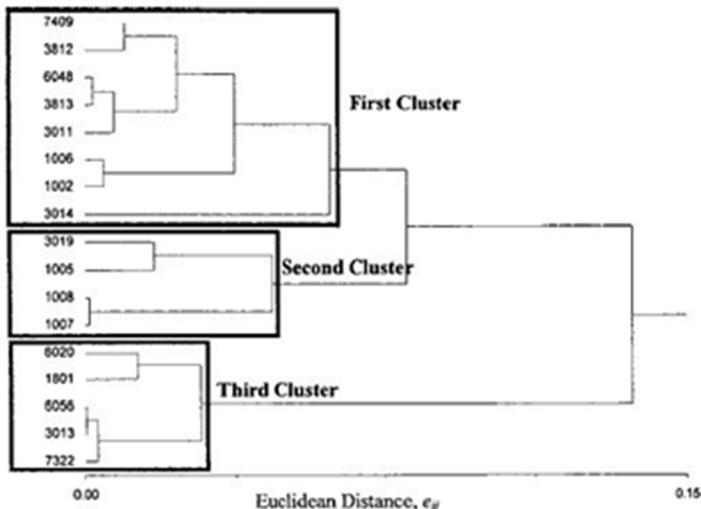


Figure 2.8 Clustering Tree: Annual distribution of tandem axle loads, Washington state LTPP sites (Papagiannakis et al, 2006)

The following steps were adopted in the analysis.

- The pair possessing the lowest Euclidean distance is chosen as the first clustering candidate. The distance obtained under clustering process is one half this Euclidean distance.
- The next clustering member is the pair with the second lowest Euclidean distance. The half of the Euclidean distance is added to the clustering strategy distance as mentioned above, to form the new clustering distance.
- Similarly, the third pair is the third lowest Euclidean distance. The half of the Euclidean distance is again summed with the above calculated value.

So, this process compares distance between previous pairs. It also adds pairs of similar sections successively. The groups of same types of yearly distributions of tandem axle loads are shown in Figure 2.8. The desired number of final clusters was predetermined in this process.

2.4.4.2 Results of Analysis

The load distribution on tandem axles was selected as common variable between WIM sites for cluster analysis. For vehicle classification, three clusters were obtained in the process on the basis of different proportions of Class 5 and 9 vehicles. It was observed that the groups with similarities in truck classification distributions may not be same as those selected on the basis of axle load distributions.

The monthly data did not show any significant variation. So, the groups of sites processed by the clustering of yearly traffic data might exhibit monthly traffic patterns.

2.4.5 California Study

The default truck traffic inputs were developed for mechanistic-empirical pavement design procedures for the California highway system from California WIM data (Lu et al, 2009). The traffic input evaluation was done for both Mechanistic-Empirical Pavement Design Guide (MEPDG) and Caltrans Mechanistic-Empirical (CalME) Pavement Design software. The development of default axle load spectra was done by both cluster and regression analysis. The results from regression analysis were not satisfactory.

California Department of Transportation (Caltrans) started installing WIM stations and collection of traffic data since 1987. It has been maintaining an elaborate database of 80 highway sites. The cluster analysis for the axle loads was done on 108 WIM stations for the time period of 1991-2003.

CalME requires the load spectra of steering, single, tandem and tridem axles. And MEPDG needs the load spectra of single, tandem, tridem and quadruple axles. Quadruple axles are not considered in the analysis as they are not dominant on the roads.

2.4.5.1 Analysis

Cluster analysis was first carried out on the tandem axle load because of its predominance. The grouping was then corrected in compliance with the cluster analysis of other load groups. The cluster analysis on tandem axle produced three groups.

AADT, AADTT, truck proportion and (4-8)/(9-15) ratio were tested for their significance. The truck proportion means the percentage of AADTT in AADT. And the (4-8)/(9-15) ratio expresses the ratio of Class 4 through Class 8 truck volume to Class 9 through Class 15 truck volume. This ratio was found as the number of trucks with two, three and four axles divided by the number of trucks with five or more axles.

The cluster analysis of the steering axle load spectra classified the WIM sites into two major groups. The relationship between truck proportion and the (4-8)/(9-15) ratio is the yardstick for the classification. The two groups were formed on the basis of truck percentage and a (4-8)/(9-15) ratio.

The cluster analysis of the single axle load spectra also resulted into two subgroups. In addition, the analysis of tridem axle load spectra also classified the WIM sites into two groups. The truck volume was almost similar in the two opposite directions of travel with similar amount of AADTT. The directional distribution factor, the ratio of truck volume in the heavier traffic direction to that in the both directions, had a value in between 0.50 and 0.56. A default value of directional distribution factor was suggested as the statewide average because it is almost identical for each subgroup.

The truck classes 5, 6, 8, 9 and 11 constituted almost 90% of truck traffic. It also may be mentioned that the pattern of truck traffic was different for urban and rural regions (Lu et al, 2006).

2.5 Discrepancies in WIM Data

The effect of unclassified vehicles is a significant factor for the design of pavement. In Indiana, a significant research was done on the effect of unclassified vehicles on the traffic volume (Jiang et al, 2008). The WIM sites experience some traffic which cannot be identified by themselves. The IDOT (Illinois Department of Transportation) made a study on the effect of unclassified vehicles on the AADT (Jiang et al, 2008). The unclassified vehicles may be passenger cars, buses and trucks. There is an ambiguity on whether to consider them as truck traffic or not, as their inclusion and exclusion would over and underestimate the total traffic respectively.

Different numbers of unclassified vehicles are added to total truck volumes to a five year WIM data to observe the variations. Figure 2.9 shows the total truck volumes disregarding the unclassified vehicles. The regression equation is also shown in the figure. The unclassified vehicles (C0) are added as 100%, 50% and 25% to the truck traffic and the corresponding results are shown in Figure 2.10, 2.11 and 2.12 respectively.

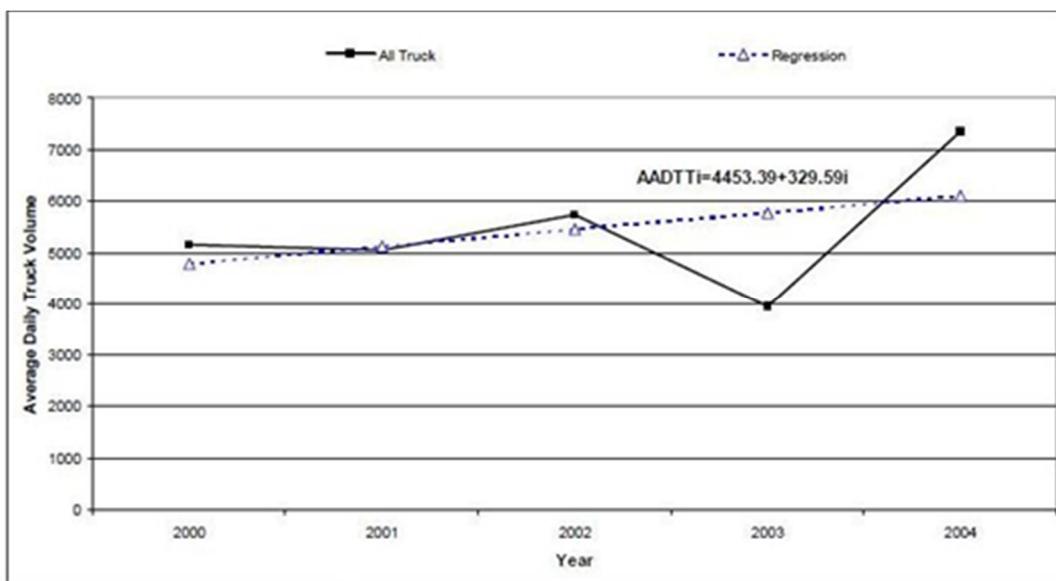


Figure 2.9 Average Daily Truck Traffic (without unclassified vehicles) (Jiang et al, 2008)

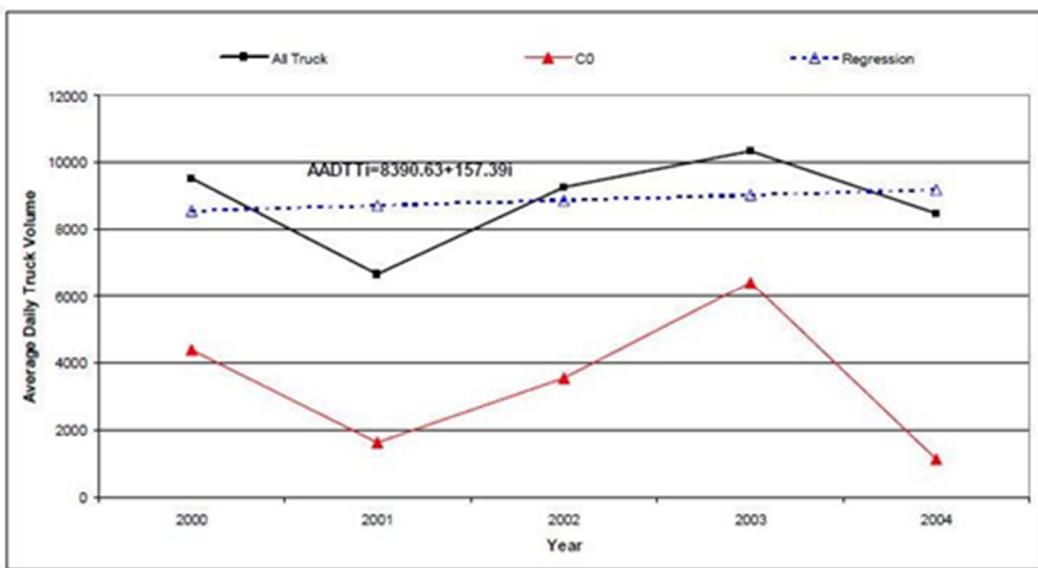


Figure 2.10 Average Daily Truck Traffic (including unclassified vehicles) (Jiang et al, 2008)

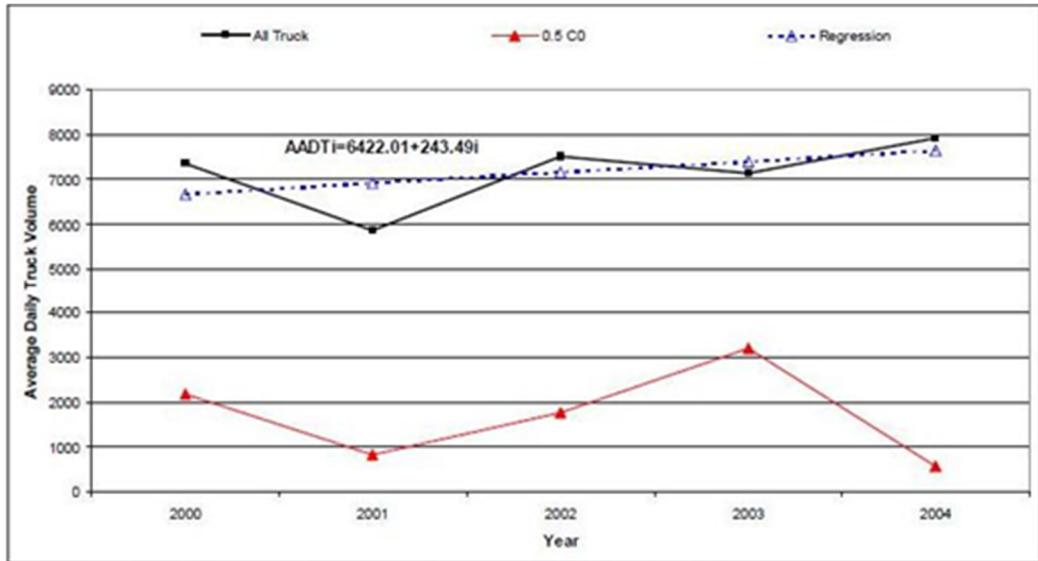


Figure 2.11 Average Daily Truck Traffic (including 50% of unclassified vehicles) (Jiang et al, 2008)

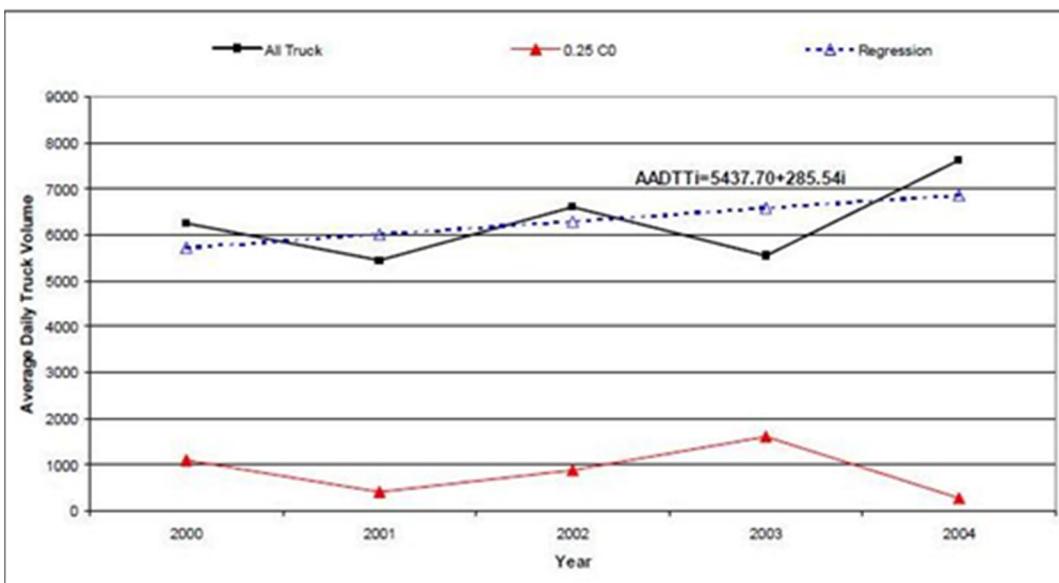


Figure 2.12 Average Daily Truck Traffic (including 25% of unclassified vehicle) (Jiang et al, 2008)

Tisdale also did some studies on the discrepancies of WIM data. In the study, the weight data was stored by equipment manufactured by two different companies; PAT and HESTIA WIM stations. It was found that one possible reason of faults in data was the HESTIA sites were weighing less Class 5 vehicles than PAT sites (Table 2.1). The HESTIA sites were counting the Class 5 vehicles but they were not weighing all of them. This resulted in the PAT sites having a different model than the HESTIA sites.

Table 2.1 Comparison of Weighed and Counted Class 5 Vehicles (Tisdale, 2003)

Site (Directions Combined)		Class 5		% of Class 5 Vehicles in the Truck Traffic
		Average Daily Count	Average Daily Weighed	
HESTIA	48	343	273	11.03
	9205	120	95	6.08
	906	84	78	27.56
	914	143	129	14.81
	917	74	65	17.02
PAT	931	225	386	15.53
	961	323	538	23.58
	911	237	389	45.18
	915	165	327	48.81
	933	247	428	27.09
	934	352	508	22.15
	939	146	284	28.57
	964	168	244	21.35

CHAPTER 3

DATA COLLECTION AND ASSEMBLY

3.1 Data Collection

Proper collection of data was a prerequisite for successful analysis of this study. The traffic data was collected by vehicle classification sites and WIM sites distributed over all eleven regional offices of New York State Department of Transportation (NYSDOT). The TrafLoad software was used to process the raw data for the period between 2007 and 2011, as shown in Table A-3. The data collected in 2010 by 52 vehicle classification and 19 WIM sites was selected for the initial statistical analysis. However, the traffic data for other years was also analyzed to find if there was any statistical difference over time. It was assumed that proper validation procedures were adopted by the NYSDOT but an additional quality control of the data was done with the TrafLoad software. The software adopts a formatting validation algorithm to check each line of raw traffic data to find the acceptability of traffic data files.

3.2 Cluster Analysis

Ward's method of cluster analysis was carried out to differentiate the sites for Level 2 inputs. Semi-partial R-squared (SPR) value was used to determine the number of clusters to be selected for the analysis. The SPR value measures the loss of homogeneity because of merging of two clusters into a new cluster at a given step. High SPR values show that the two clusters are quite different. However, low values of SPR indicate more homogeneity among the clusters. Too low SPR values lead to too many clusters. On the other hand, too high SPR values would not represent the characteristics of each site properly, because it would result in too few clusters consisting of too many sites. Care must be taken to decide the number of

clusters to be considered. In this analysis, an SPR below 0.05 indicate that the cluster can be merged.

3.3 MEPDG Runs

The cluster analysis helps grouping the traffic sites into clusters, based on similarity of data for a given parameter. However, it cannot indicate if the use of input data from different clusters changes the outcome of the pavement design process. Therefore, MEPDG runs were performed with the suggested average parameters obtained for each cluster. The runs were conducted for each type of traffic input separately; all other inputs were kept unchanged. The predicted distress values obtained from the MEPDG runs were used to study the effect of the variation in each traffic input parameter. The distresses predicted when cluster average values were used were compared to those predicted when statewide average values or MEPDG default values were used.

Data from less than 20 WIM sites were obtained for each of the year of analysis. Therefore, the cluster analysis would not be able to properly cluster the sites. Therefore, only MEPDG runs were carried out to decide if site specific or statewide average values should be used for AGPV and axle load spectra. The change in percentage of predicted distresses due to the use of site specific or statewide average values was used to differentiate the WIM sites. Similarly, MEPDG runs were carried out for the WIM data of other years in order to find if there is any variation over the years.

The MEPDG runs were performed for a typical primary road pavement structure used by NYSDOT. The modeled asphalt pavement consisted of:

- A 4.0 inch asphalt concrete surface layer with a SM 9.5mm mix;
- A 8.0 inch asphalt concrete base layer with a SM 19.0mm mix;
- A 12.0 inch granular base layer and
- An AASHTO A-7-6 soil for the infinite subgrade layer.

The material data used for the two asphalt concrete mixes were obtained from the construction records of an actual pavement project designed by NYSDOT. The following predicted distresses were used to determine the influence of variation in traffic parameters:

- Total rut depth (inches) and
- The difference between the initial IRI and terminal IRI, named delta IRI, (inches/mile).

The predicted alligator and longitudinal cracking were not considered in the analysis. The cracking models for these distresses used by MEPDG are not considered reliable. Moreover, NYSDOT uses only total rut depth and IRI as trigger values for deciding when a distressed flexible pavement must be overlaid,

The MEPDG runs were also performed for a typical rigid pavement structure used by NYSDOT. The modeled jointed plain concrete pavement (JPCP) consisted of:

- A 12.0 inch JPCP slab;
- A 10.0 inch granular base layer;
- An AASHTO A-7-6 soil for the infinite subgrade layer.

The traffic and climatic inputs were kept same as MEPDG runs for asphalt pavement. This was done to compare the effects of traffic inputs on both types of pavements. The following predicted distresses were used to determine the influence of variation in traffic parameters:

- Mean joint faulting (inches) and
- The difference between the terminal IRI and initial IRI, named delta IRI, (inches/mile).

However, transverse cracking was not considered due to the lack of reliability of its distress model.

CHAPTER 4

IDENTIFICATION OF TRAFFIC INPUTS FOR MEPDG

The development of appropriate traffic inputs is necessary for the design and analysis of pavements. The availability of Level 1 data for all the sites is not possible. Moreover, site specific traffic data may not be needed if statewide average values represent the characteristics of sites well. Cluster analysis is used to differentiate the sites on the basis of different traffic parameters. However, the results of this analysis need to be verified with MEPDG runs for typical pavements.

4.1 Analysis of Traffic Inputs for Flexible and Rigid Pavement

Cluster analysis was done on different traffic parameters for vehicle classification data for 2010. This analysis could not be done on AGPV and axle load spectra due to unavailability of enough WIM data. MEPDG runs were carried out to find the significance of the results of cluster analysis for both asphalt and rigid pavements. In addition, the MEPDG runs also worked as a tool to differentiate WIM traffic inputs.

Typical asphalt and JCP pavements were modeled for carrying out MEPDG runs to verify the effect of traffic inputs. The traffic and climate inputs were kept same on the runs done for both the pavements. This would help to compare the effects on the rigid and the asphalt pavements.

The distress values were found from the MEPDG runs for cluster and site specific traffic inputs. These values were compared with the distress values found from the MEPDG runs for the statewide average values of traffic inputs. The fifteen percentage change in distress values may be considered as the measure of comparison. If the site or cluster specific distress values show a difference within a range of 15% with the distress values for statewide average values,

statewide average values were chosen as the appropriate traffic inputs.

4.1.1 Annual Average Daily Truck Traffic (AADTT)

Cluster analysis was not conducted for the Annual Average Daily Truck Traffic (AADTT) because this information is always available for a site. However, AADTT values can be categorized in three groups: low (0 to 299), medium (300 to 999) and high (>1000). The majority of the sites showed low AADTT values.

4.1.2 Vehicle Class Distribution (VCD)

The cluster analysis of vehicle class distribution (VCD) produced four distinct clusters; the average values of the proportion of each truck class are shown for each cluster in Figure 4.1. The two directions of traffic were considered separately for the cluster analysis of VCD. However, the direction of traffic showed effect only on four sites; the opposing directions of traffic for sites 5281, 8180, 9380 and 9381 belong to different clusters. These four sites were located on principal arterials.

The differences between clusters are mainly due to the variation of the proportion of Class 5 and Class 9 vehicles. Clusters 1 and 3 show higher proportion of Class 9 vehicles than Class 5 vehicles, with Class 9 vehicles being more dominant in Cluster 1. Cluster 2 shows almost equal proportion of classes 5 and 9 vehicles, which is closer to the statewide average distribution. In cluster 4, Class 5 vehicles are dominant compared with Class 9 vehicles. However, it may be mentioned that the proportion of Class 5 or Class 9 vehicles does not determine the cluster group for a site alone; it also depends on the other class of vehicles and the total number of sites being considered.

It was observed that the sites in Cluster 1 have high one-way AADTT values, with an average of 1,241. These sites were located on interstate routes: I-81, I-86 and I-87. The sites in Cluster 2 exhibited one-way AADTT of 320 on an average. These sites were located on I-295, NY 30, NY 13, NY 11, NY 414, and NY 394. The sites of Cluster 3 had an average AADTT of

210 in one direction of traffic. Most of the sites were located on rural principal arterials. They were located on NY 5, NY 11, NY 104, NY 37 and NY 219. Finally, the sites of Cluster 4 have the lowest average one-way AADTT of 105. The majority of them were located on NY 10, NY 96B, NY 364, NY 54A, NY 201 and NY 145.

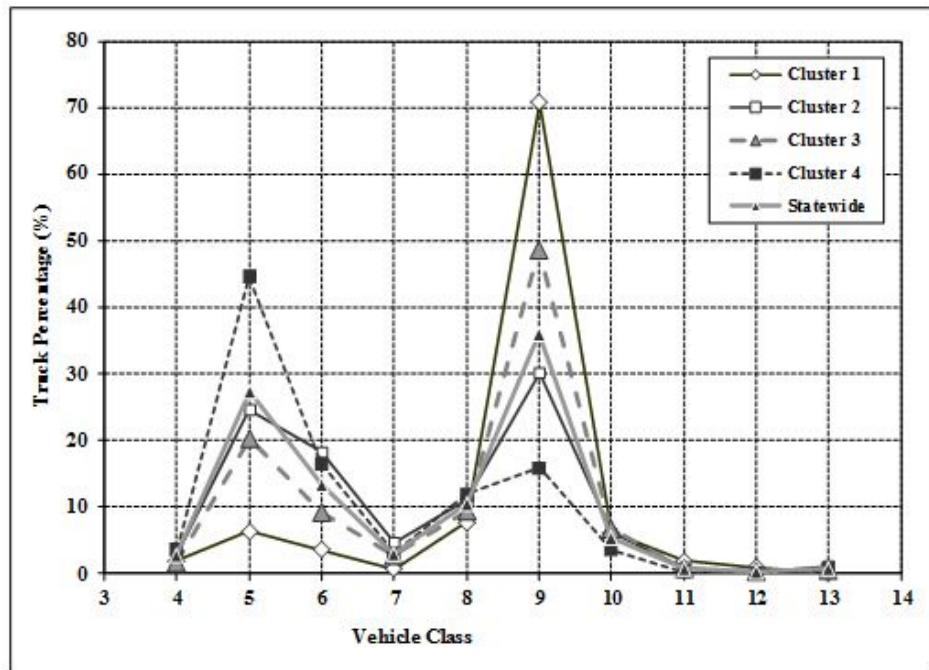


Figure 4.1 VCD Clusters (2010).

MEPDG runs were conducted for average values of VCD clusters for asphalt pavement. The percentage change in predicted distresses relative to those for statewide average VCD values are shown in Figure 4.2. The predicted distress values for total rutting and delta IRI are very close to the distress values for statewide average VCD values. However, Clusters 1 and 3 show higher predicted distresses in comparison to Cluster 2 and 4 and the state-wide average, due to the large proportion of Class 9 vehicles. The predicted distresses for Cluster 4 are the lowest due to the presence of higher proportion of Class 5 vehicles than Class 9 vehicles. Since

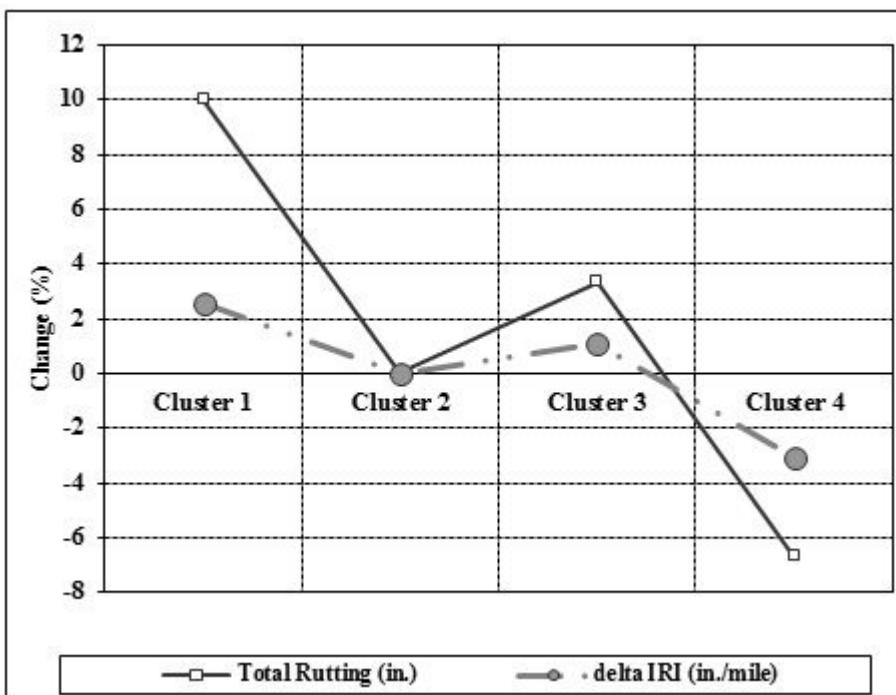


Figure 4.2 Change in distress values for different VCD Clusters (flexible pavement, 2010).

NYSDOT uses only total rut depth and IRI as trigger values for deciding when a distressed flexible pavement must be overlaid, the insignificant effects on the predicted distresses for total rutting and delta IRI suggest that state-wide average VCD could be used effectively without affecting the outcome of the design.

MEPDG runs for rigid pavement show that there is almost no difference in distress values delta IRI in comparison to those for statewide average values (Figure 4.3). The change in distress values for mean joint faulting may seem significant but the actual distress values are very small. For example, the statewide average distress value for mean joint faulting is 0.003 inch only, while the average values for cluster 1 is 0.004 inch only. Therefore, the results of the MEPDG runs for rigid pavements also suggest the use of statewide average vehicle classification distribution values (Table 4.1).

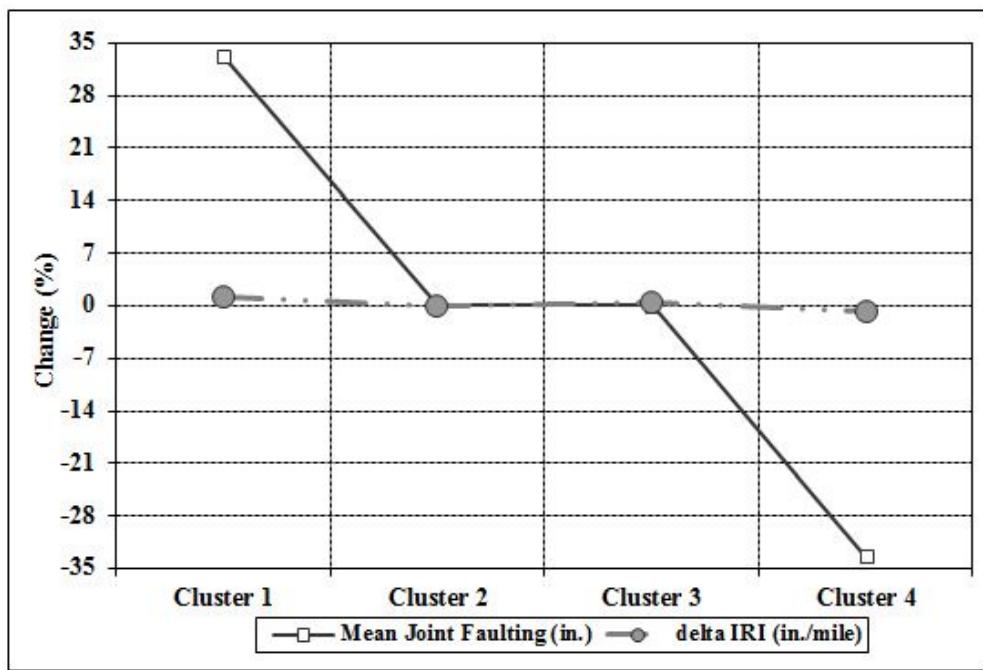


Figure 4.3 Change in distress values for different VCD Clusters (rigid pavement, 2010).

Table 4.1 Statwide average vehicle class distribution (2010)

Vehicle Class	4	5	6	7	8	9	10	11	12	13
Statewide (%)	2.64	27.30	13.40	3.04	10.43	36.00	5.45	0.79	0.25	0.70

4.1.3 Monthly Distribution Factors (MDF)

For monthly distribution factors, a two dimensional analysis was done by considering the MDF for both Class 5 and Class 9 vehicles simultaneously, as they are the most predominant vehicle classes. The two dimensional analysis was done to eliminate the shortcomings of one dimensional analysis. However, careful attention was given so that the higher variability of one vehicle class does not affect the variability of other classes of vehicles. This was done to reduce the possibility of bias in results.

Four distinctive patterns were observed from the cluster analysis of MDF for asphalt pavement (Figures 4.4 and 4.5). Site 6480 is an outlier because of its significantly high SPR.

The site is located on urban principal arterial – interstate with low AADTT of 110. The sites of Cluster 1 show similar pattern for both Class 5 and Class 9 vehicles. The member sites show low values of MDF in Fall and Spring and high values in Summer. The majority of the vehicle classification sites belonged to this cluster. These sites are distributed all over the state and have high variation in AADTT values. The sites in Cluster 2 show lower MDF values in Summer and higher values in Fall for Class 5 vehicles in comparison to the corresponding values for Cluster 9 vehicles. These sites have a medium average for AADTT (392) and are located mainly on I-86, I-88, NY 41, NY 104 and US 219. The sites of Cluster 3 show higher MDF values in Summer for Class 9 vehicles than for Class 5 vehicles. These sites have a low average AADTT (101). The majority of the sites were located on NY 3, NY 30, NY 64 and NY 96B. The sites of Cluster 4 show higher MDF values in Summer for Class 9 vehicles than for Class 5 vehicles. Sites 1281, 4482 and 9381 belong to this cluster and have a low average AADTT (70).

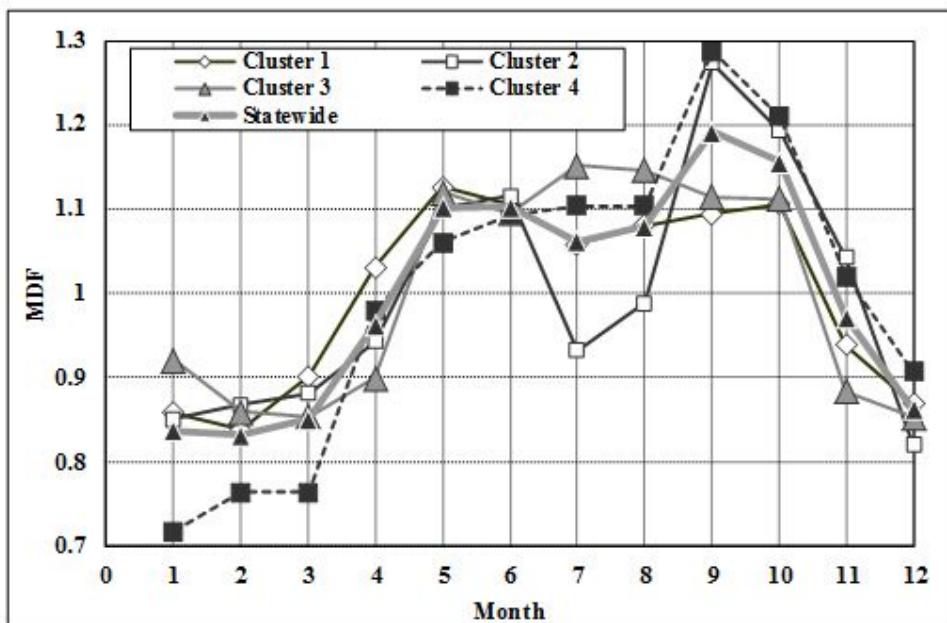


Figure 4.4 MDF Clusters (Class 5, 2010).

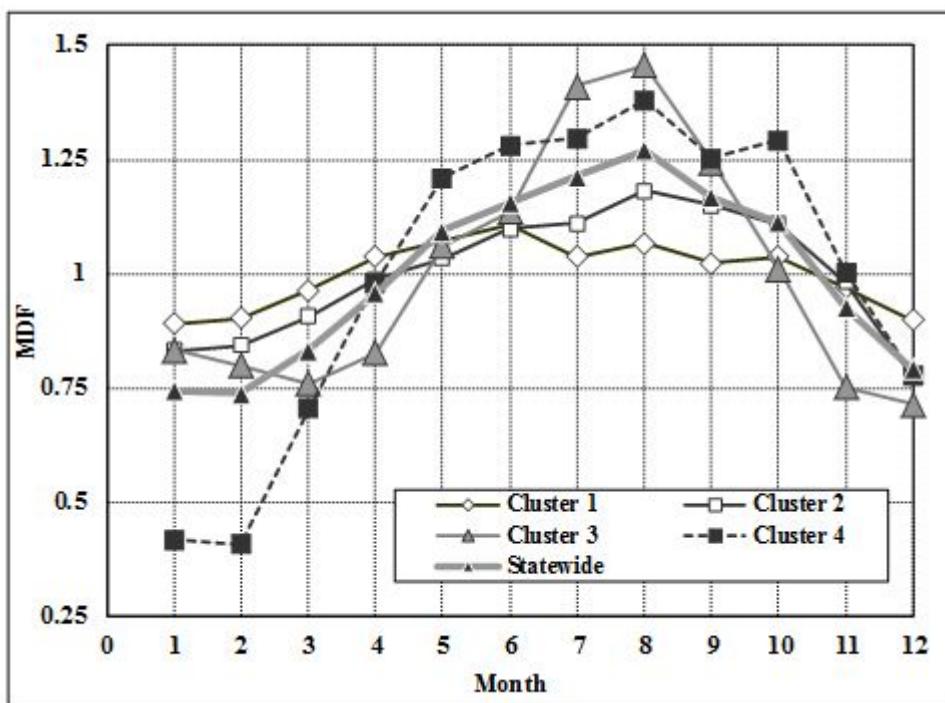


Figure 4.5 MDF Clusters (Class 9, 2010).

MEPDG runs were conducted to verify the results of cluster analysis of MDF for asphalt pavement. Figure 4.6 shows the percentage change in the predicted distresses when average values of MDF for each cluster are used instead of the statewide average MDF values. The figure suggests that the predicted distresses are not sensitive to the MDF values. Therefore it is recommended that statewide average values for MDF be used as inputs to MEPDG.

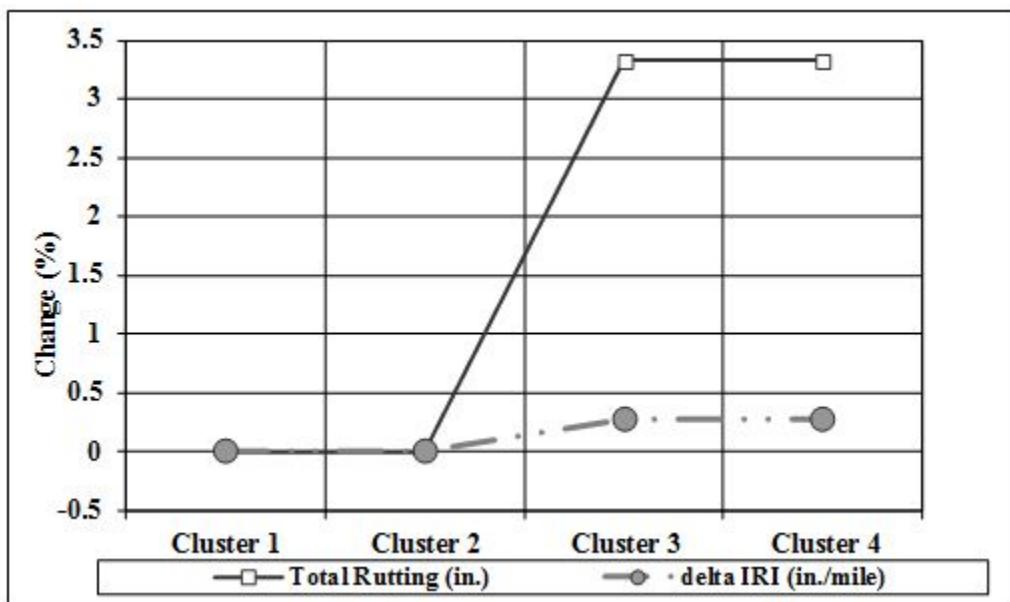


Figure 4.6 Change in distress values for different MDF Clusters (flexible pavement, 2010).

MEPDG runs were also carried out to find the effect of monthly distribution factors on the rigid pavement (Figure 4.7). It shows no percentage change in distress values in comparison to those for statewide values. So, the statewide average values, given in Table 4.2, are suggested for both asphalt and rigid pavements (Table 4.2).

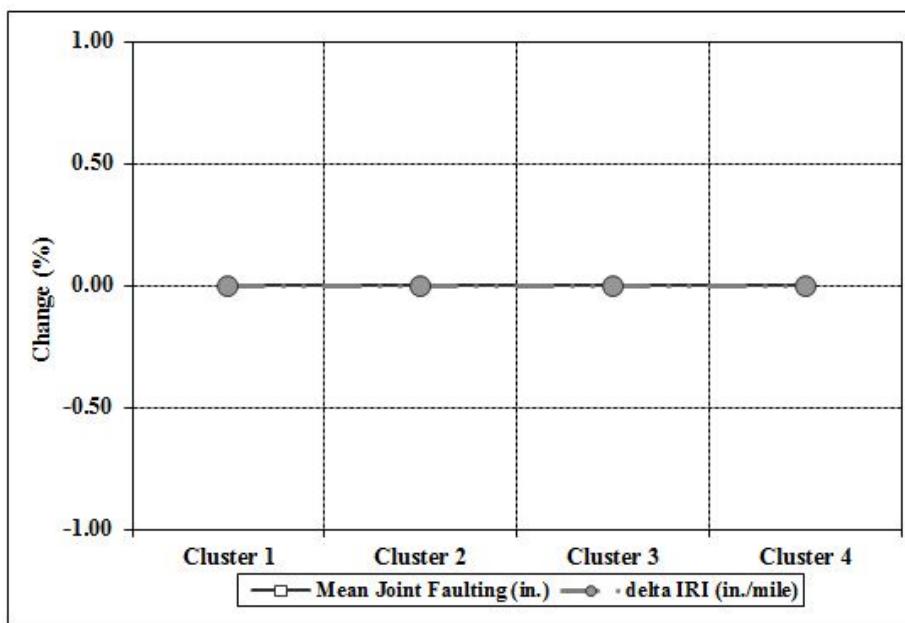


Figure 4.7 Change in distress values for different MDF Clusters (rigid pavement, 2010).

Table 4.2 Statewide average monthly distribution factors for Class 5 and 9 vehicles (2010).

Month	Class 5	Class 9
January	0.84	0.94
February	0.83	0.97
March	0.85	1.05
April	0.96	1.07
May	1.10	1.01
June	1.10	1.04
July	1.06	0.97
August	1.08	1.02
September	1.19	1.02
October	1.16	1.04
November	0.97	0.99
December	0.86	0.88

4.1.4 Hourly Distribution Factors (HDF)

The cluster analysis suggested four clusters for the HDF values, as shown in Figure 4.8. Cluster 1 shows similar pattern in comparison to the statewide average; more than half of the classification sites belong to Cluster 1. Almost all of the sites of regions 8 and 9 of NYSDOT belong to Cluster 1. The sites of Cluster 4 show similar HDF values to the MEPDG default values. These site have high two-way AADTT (average of 2300) and they are mainly located on interstate routes (I-81, I-84, I-86 and I-87). Five clasification sites (6100, 7100, 7111, 7381 and 8280) also have high AADTT (average is 2375) and are located on the same interstate routes but they constitute Cluster 4. Cluster 2 is characterized by high HDF values during morning and evening hours, about 25% higher than the statewide average values. The sites of Cluster 3 showed high AADTT (1518).

MEPDG runs were conducted to study the effect of HDF rigid pavements. It did not have any effect in the design of pavements (Figure 4.9).

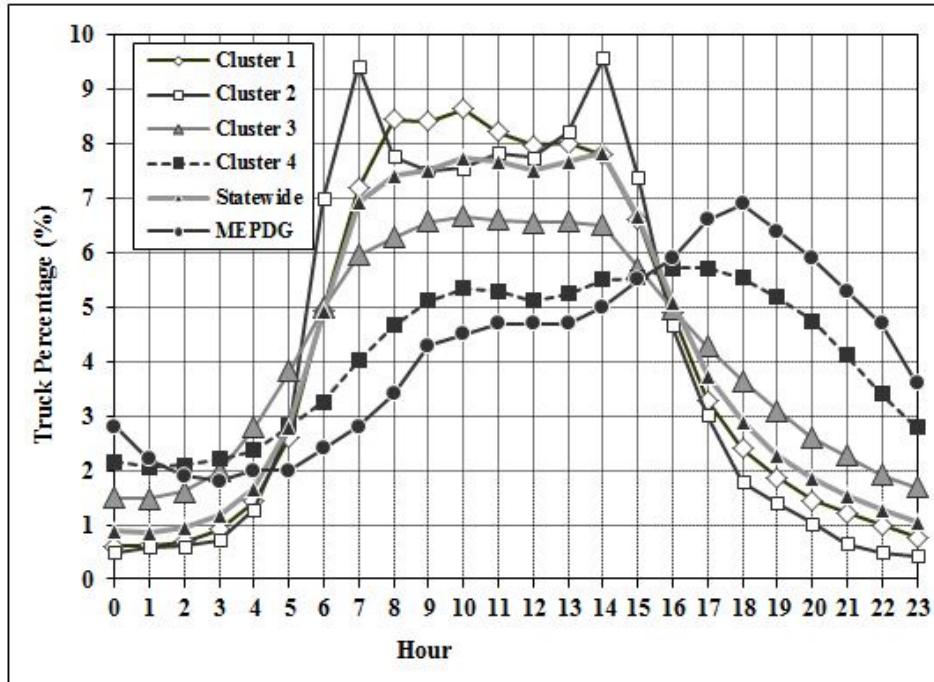


Figure 4.8 HDF Clusters (2010).

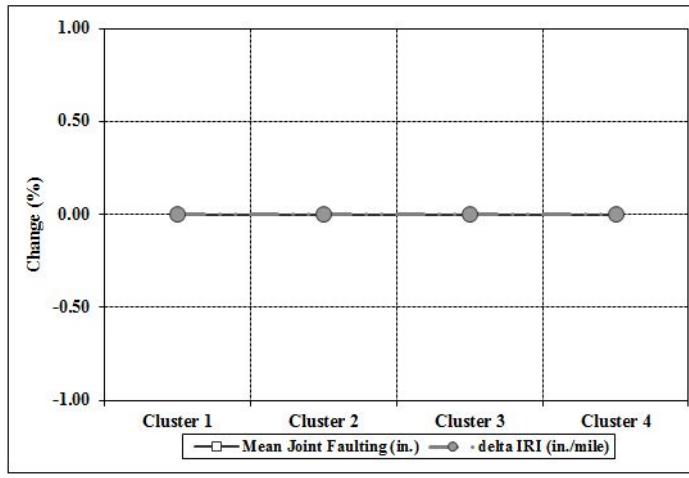


Figure 4.9 Change in distress values for different HDF Clusters (rigid pavement, 2010).

4.1.5 Axle Groups Per Vehicle (AGPV)

MEPDG runs were carried out for site specific AGPV values for all nineteen WIM sites and for the statewide average values for a typical asphalt pavement. The percentage change in the predicted distress values in comparison to the distresses predicted when statewide average values were used are plotted in Figure 4.10. The figure indicates that the change in predicted distresses is for total rutting; the range is between -3.23% and 0%, while for delta IRI is -0.84% to +0.28%. Since no clear pattern could be distinguished on the effect of the variation of AGPV in terms of traffic volume, location or route functional classification, the use of statewide average values for AGPV is recommended.

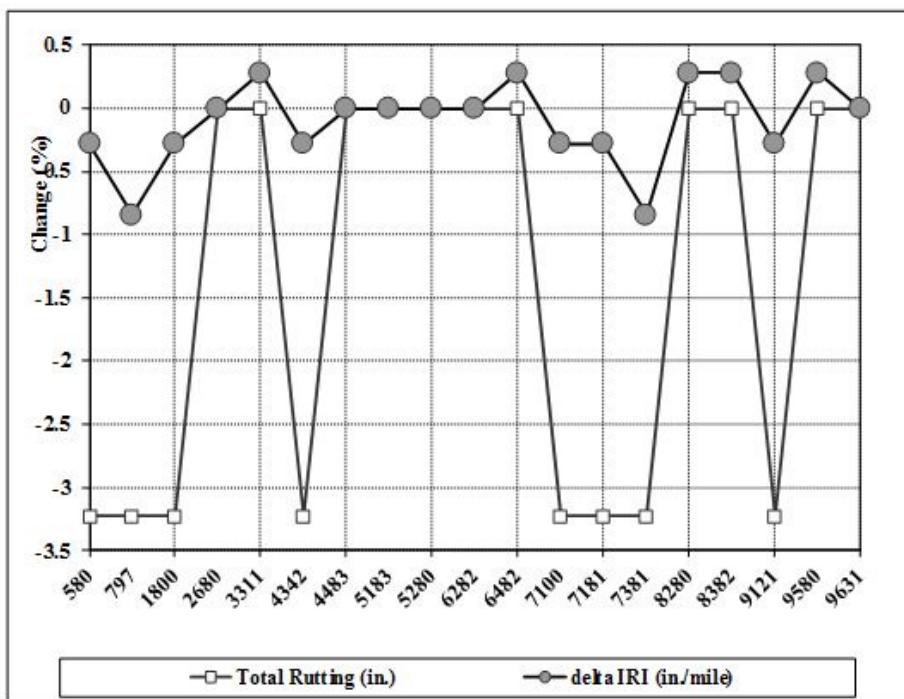


Figure 4.10 Change in distress values due to variation of AGPV (flexible pavement, 2010).

The percentage change in distress values for AGPV also does not show any significant change comparing with those for statewide average values for rigid pavement (Figure 4.11). Therefore, statewide average values are recommended for both asphalt and rigid pavements. The statewide average AGPV values are given in Table 4.3.

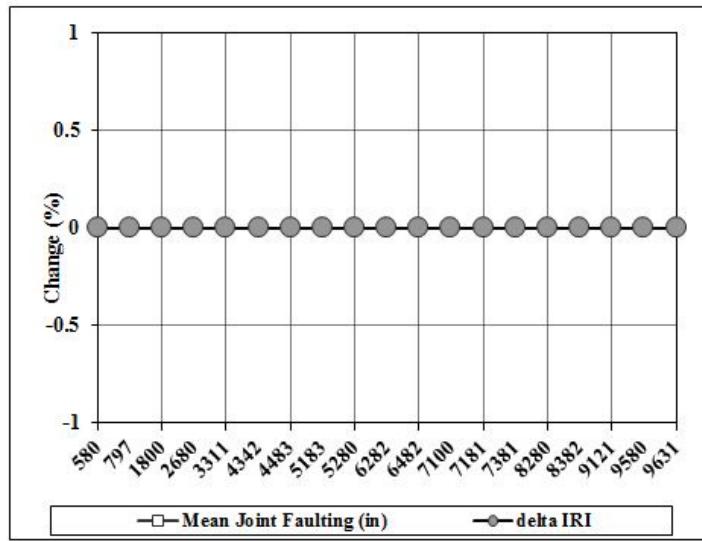


Figure 4.11 Change in distress values due to variation of AGPV (rigid pavement, 2010).

Table 4.3 Statewide Average AGPV values (2010)

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
4	1.32	0.68	0.00	0.00
5	2.00	0.00	0.00	0.00
6	1.00	1.00	0.00	0.00
7	1.32	0.28	0.64	0.05
8	2.45	0.59	0.02	0.00
9	1.23	1.89	0.00	0.00
10	1.07	0.99	0.95	0.05
11	3.70	0.27	0.25	0.01
12	3.71	1.09	0.03	0.00
13	2.11	0.76	0.28	0.32

4.1.6 Axle Load Spectra

Following the same process as for AGPV, MEPDG runs were performed to study the effect of axle load spectra on the predicted distress of asphalt pavement. The change in distresses is shown in Figure 4.12.

The percentage change in total rutting shows variation within a range of -22.9% to +42.9% (Figure 4.12). Most of the sites exhibit negative change in distress values which means that the use of statewide average load spectra would slightly overpredict total rutting for most projects. The percentage change in delta IRI is between -9.1% to +15.5%. However, site 797 exhibits high distress values. The VCD of the sites shows that it experiences 0.6% class 13 vehicles. This site can be considered as an outlier. Therefore, the use of statewide axle load spectra instead of site specific load spectra will not much affect the predicted IRI. As a result, the use of statewide average axle load spectra is recommended.

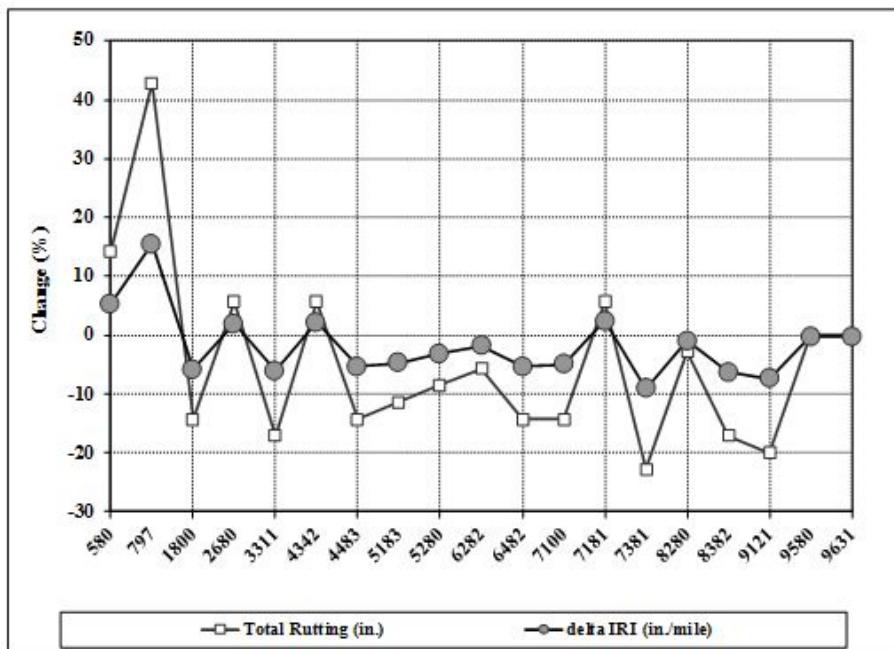


Figure 4.12 Change in distress values due to variation of axle load spectra (flexible pavement, 2010).

Similarly, the effect of axle load distribution factors was studied on rigid pavement (Figure 4.13). It shows significant change for the distress values of mean joint faulting, but actual distress values are minor. However, it shows percentage change in delta IRI within a range of -0.35% to 2.5% in comparison to statewide average values, which is also negligible.

Therefore, statewide axle load spectra is suggested for the design of asphalt and rigid pavements, which is given in Appendix C.

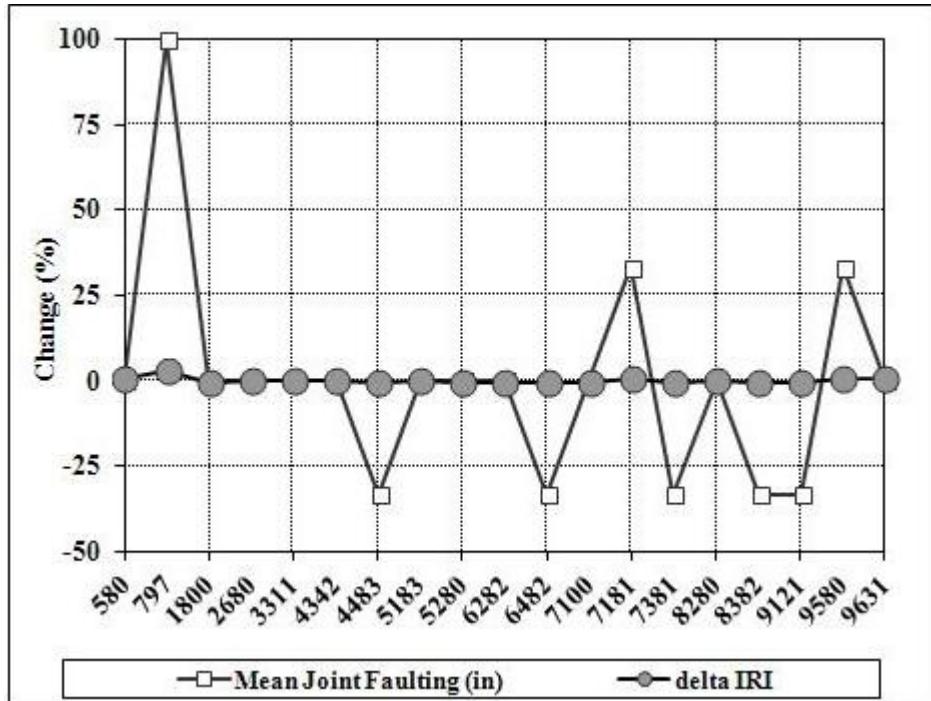


Figure 4.13 Change in distress values due to variation of axle load spectra (rigid pavement, 2010).

CHAPTER 5

CHANGE IN TRAFFIC INPUTS FOR MEPDG WITH TIME

The traffic data from vehicle classification and WIM sites show variation with time. Moreover, the number of vehicle classification and WIM sites are not consistent over the years. Proper traffic inputs for the design of pavements, were developed from the vehicle classification and WIM data of 2010 only. Therefore, the study of traffic inputs for different years would verify the observation for 2010 data. Cluster analysis was performed for the traffic inputs of vehicle classification data for the years of 2007, 2008, 2009, 2010 and 2011. MEPDG runs were carried out to verify the results of cluster analysis of VCD and MDF in terms of both flexible and rigid pavement performance for different years. However, the results of cluster analysis of HDF were verified by only the MEPDG runs for rigid pavement. MEPDG runs were also carried out for AGPV and axle load spectra data over the study period.

5.1 Cluster analysis of traffic input data for different years

5.1.1 Vehicle Classification Distribution (VCD)

Both directions were considered for the cluster analysis of vehicle classification distribution data of five years (Table 5.1). The summary of cluster analysis for the years is shown in Appendix B. The results produce same number of clusters for all the years. No outlier is observed from the analysis of any year. However, Twenty one vehicle classification sites belong to different types of clusters for different years. This variation is mostly observed for clusters 2 and 4. This may be due to the change in proportion of Class 5 and Class 9 vehicles over the years. However, the direction of traffic has little impact on clusters for the years studied.

Table 5.1 Number of sites analyzed for vehicle class distribution

Year	2007	2008	2009	2010	2011
Number of vehicle classification sites	55	75	57	52	45

The results of cluster analysis of vehicle class distribution for the years of 2007, 2008, 2009 and 2011 are shown in Figures 5.1, 5.4, 5.7 and 5.10. The results of the analysis are almost consistent for all the years. Therefore, it can be said that the proportion of Class 5 and 9 vehicles does not change significantly over time.

The results of MEPDG runs do not show any significant change in total rutting and delta IRI in comparison to statewide values for flexible pavement (Figures 5.2, 5.5, 5.8 and 5.11). The distress values for rigid pavement show similar patterns for all the years (Figures 5.3, 5.6, 5.9 and 5.12). Though the distress values for mean joint faulting are significant comparing with statewide average values, actually the distress values are minor. For example, The change in distress value of mean joint faulting is 33.33% for cluster 1 comparing to statewide values in 2007. But actually the cluster specific and statewide distress values of mean joint faulting are only 0.004 inch and 0.003 inch respectively. These results conform to the results of analysis for the year of 2010, i.e., statewide average values are suggested for vehicle class distribution.

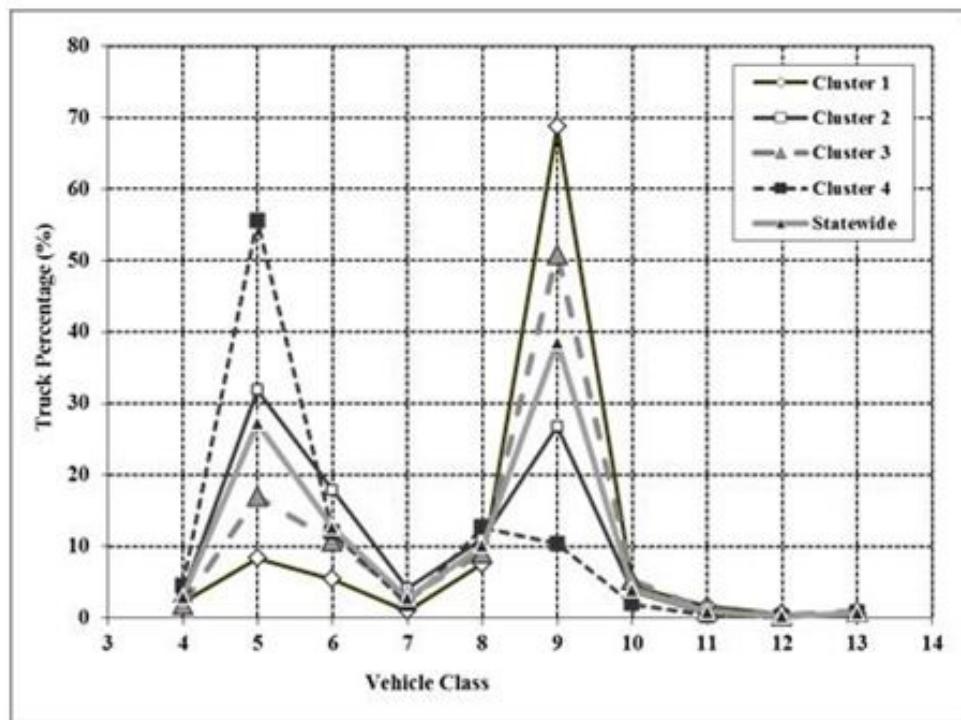


Figure 5.1 VCD Clusters (2007).

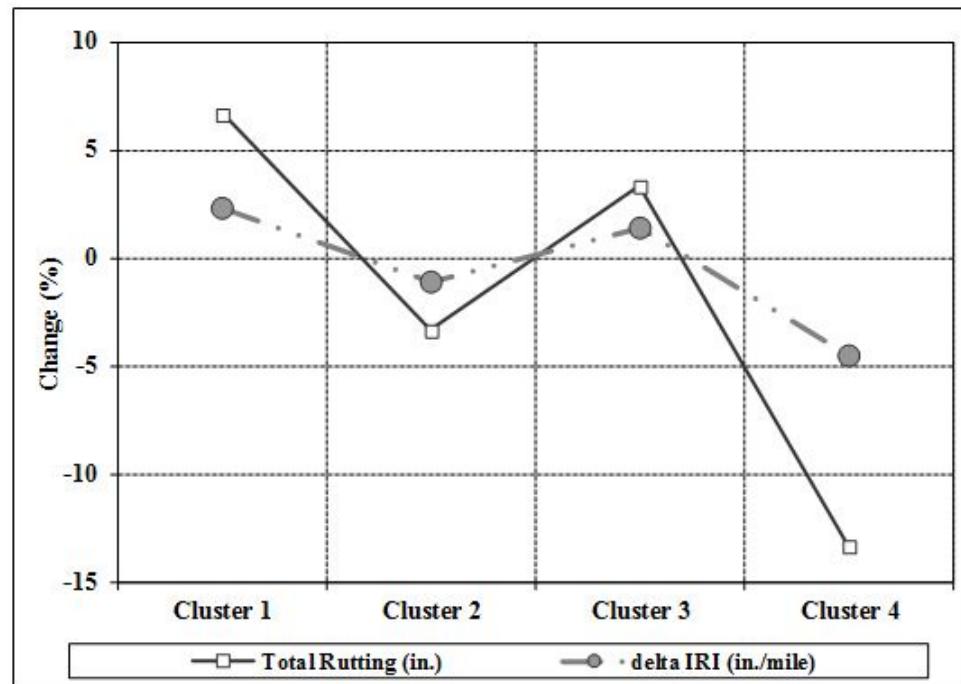


Figure 5.2 Change in distress values for different VCD Clusters (flexible pavement, 2007).

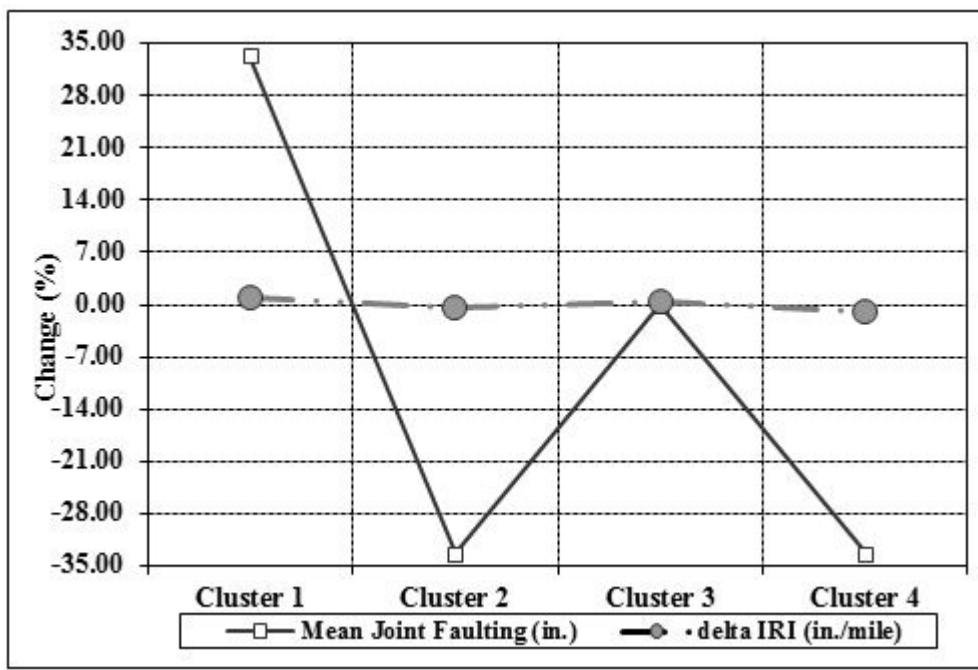


Figure 5.3 Change in distress values for different VCD Clusters (rigid pavement, 2007).

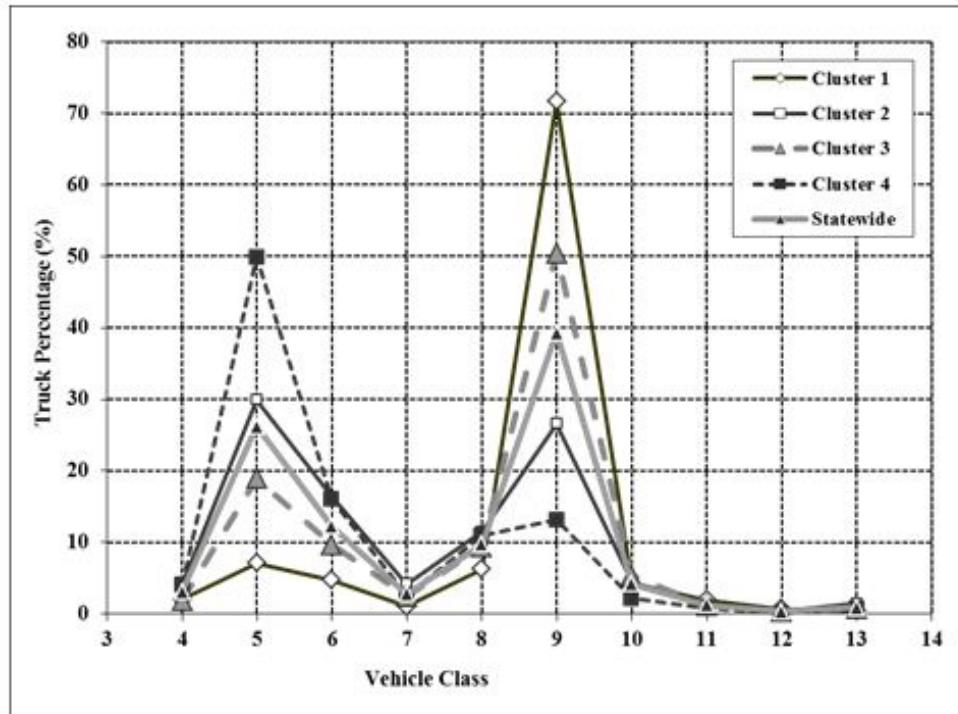


Figure 5.4 VCD Clusters (2008).

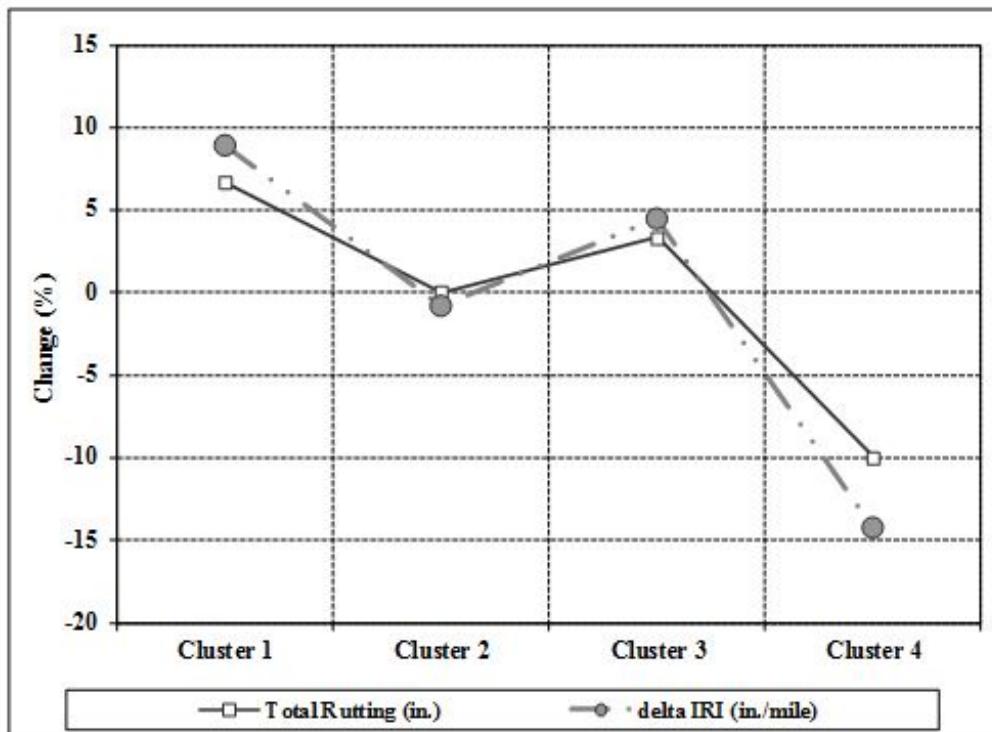


Figure 5.5 Change in distress values for different VCD Clusters (flexible pavement, 2008).

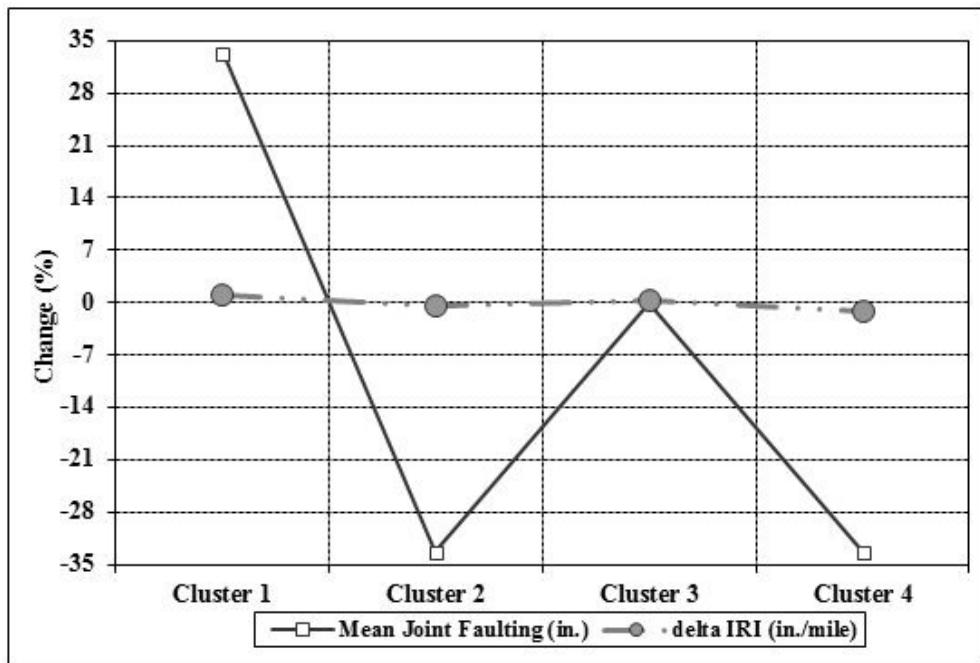


Figure 5.6 Change in distress values for different VCD Clusters (rigid pavement, 2008).

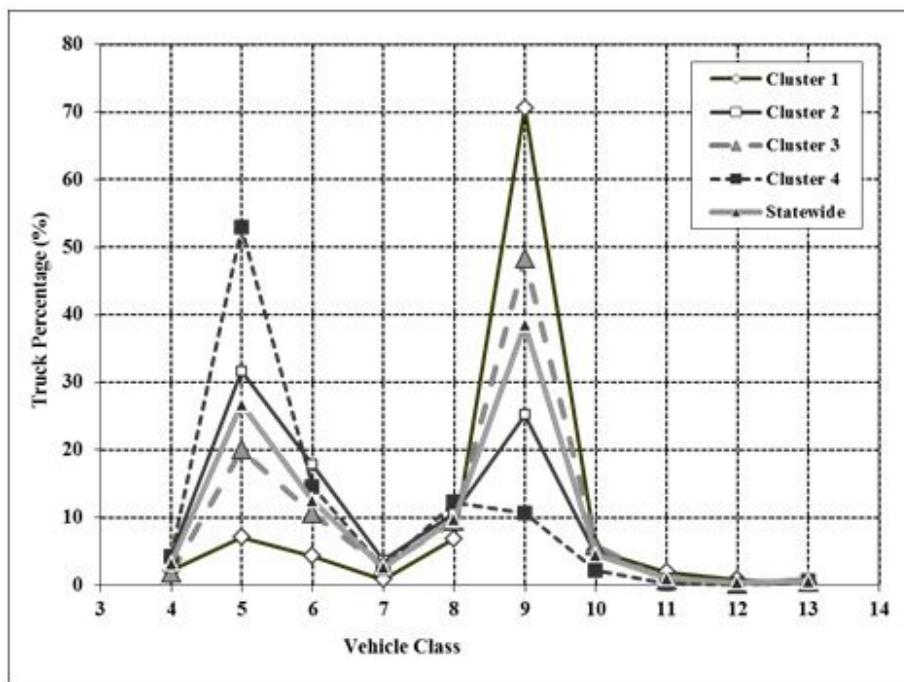


Figure 5.7 VCD Clusters (2009).

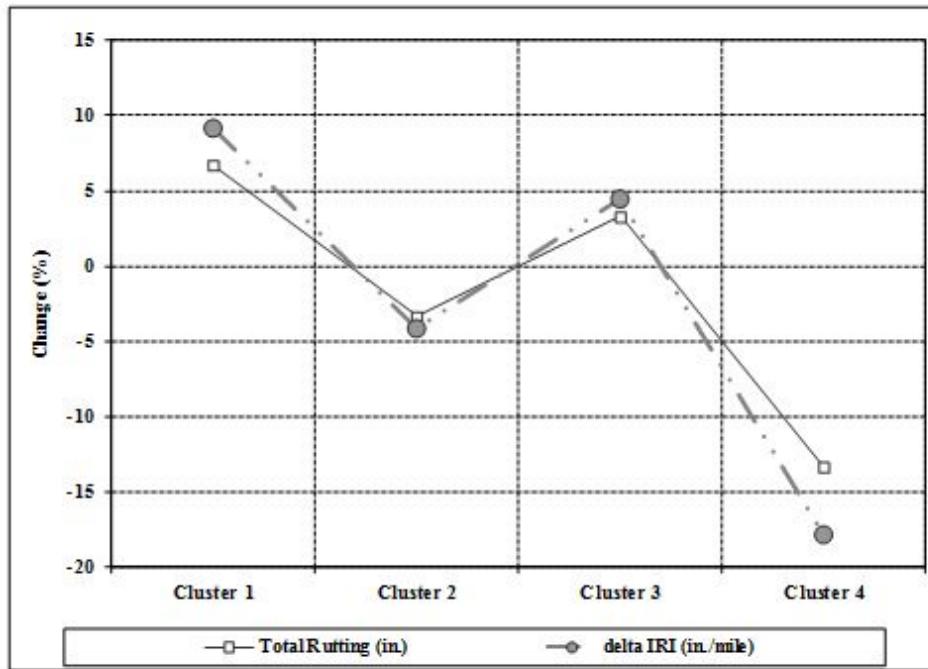


Figure 5.8 Change in distress values for different VCD Clusters (flexible pavement, 2009).

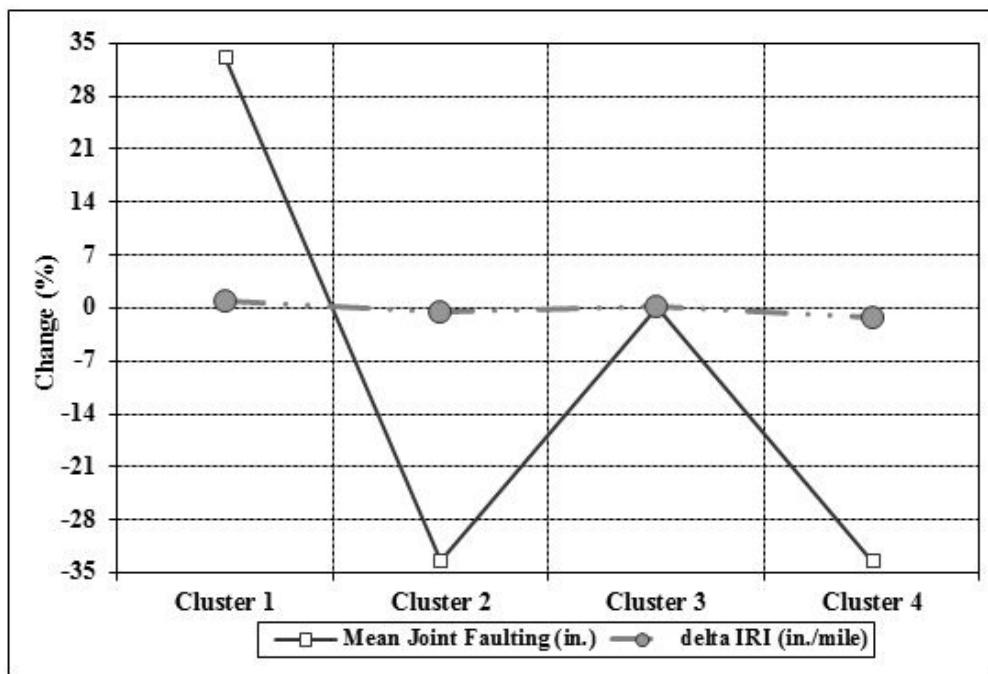


Figure 5.9 Change in distress values for different VCD Clusters (rigid pavement, 2009).

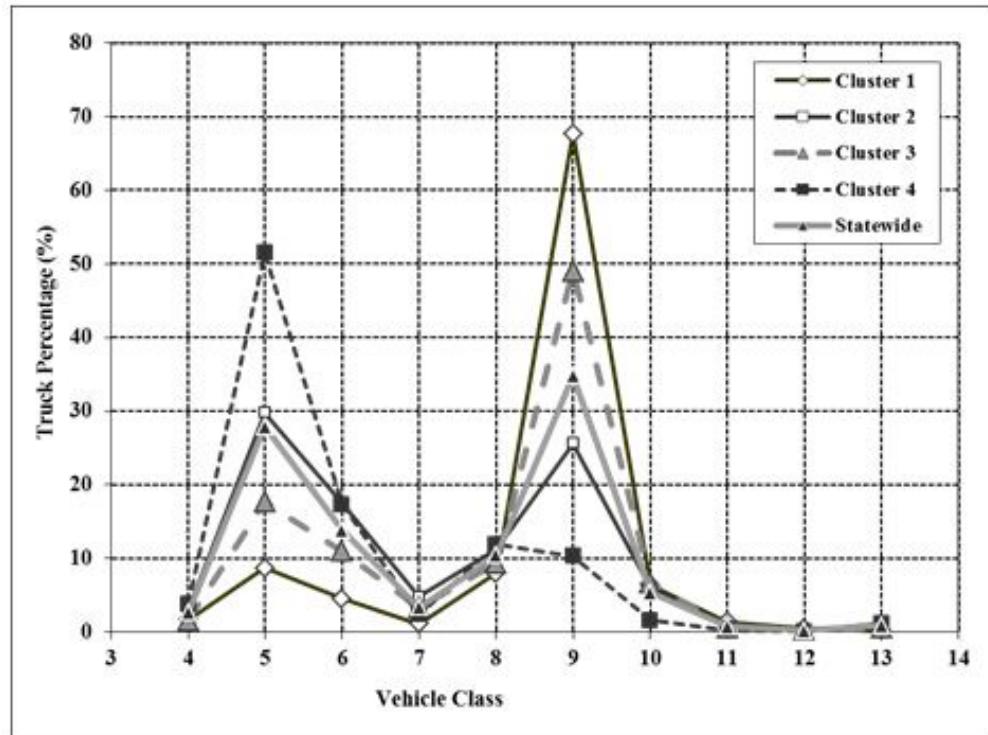


Figure 5.10 VCD Clusters (2011).

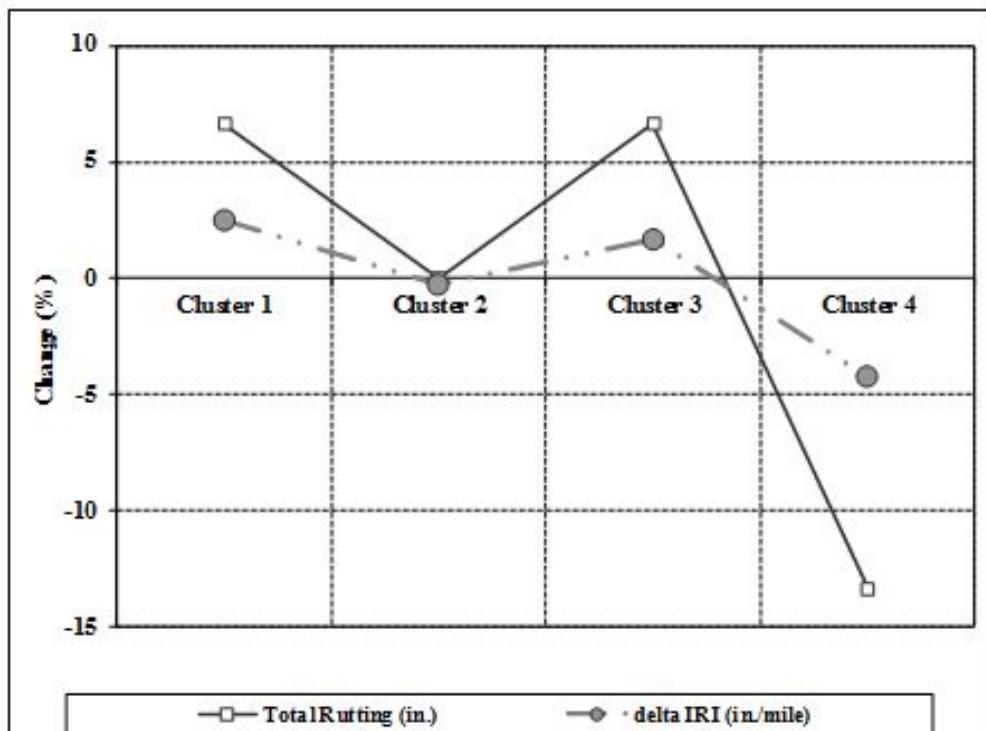


Figure 5.11 Change in distress values for different VCD Clusters (flexible pavement, 2011).

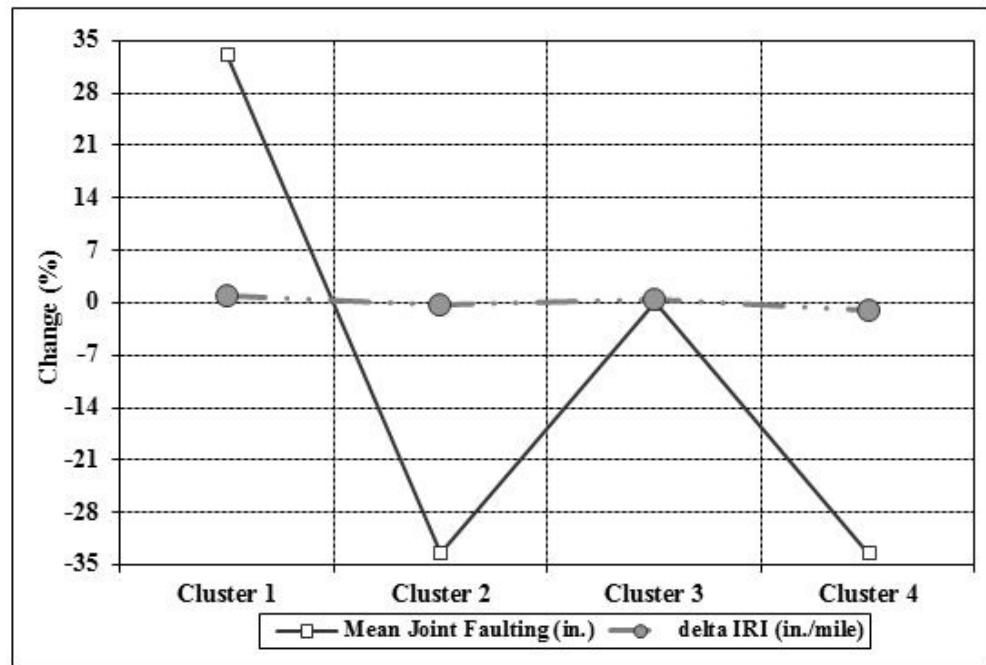


Figure 5.12 Change in distress values for different VCD Clusters (rigid pavement, 2011).

Statewide average vehicle class distributions of different years are given in Table 5.2.

The statewide average VCDs were compared in terms of pavement performance (Table 5.3).

The predicted distress values of total rutting and delta IRI for the statewide average VCDs exhibit coefficients of variation of 6.1% and 2.1% respectively for flexible pavement, while the distress values of mean joint faulting and delta IRI show coefficients of variation of 0.0% and 0.1% for rigid pavement over the study period. Therefore, the statewide average VCDs show little variation in terms of performance over the years.

Table 5.2 Statewide average vehicle class distributions for different years.

Years	Vehicle Class									
	4	5	6	7	8	9	10	11	12	13
2007	2.97	27.23	12.67	2.77	10.11	38.57	3.91	0.87	0.23	0.65
2008	3.11	26.23	12.19	2.78	9.75	39.30	4.16	1.23	0.34	0.90
2009	3.26	26.74	12.52	2.66	9.76	38.56	4.53	1.03	0.38	0.57
2011	2.62	27.89	13.84	3.35	10.42	34.73	5.31	0.72	0.22	0.87

Table 5.3 Predicted distress values for statewide average VCDs for different years.

Pavement Type	Predicted Distresses	Years					Mean	Standard Deviation	Coefficient of Variation
		2007	2008	2009	2010	2011			
Flexible	Total Rutting (in)	0.30	0.30	0.26	0.30	0.30	0.29	0.018	6.1%
	Delta IRI	35.5	35.6	33.9	35.6	35.5	35.2	0.740	2.1%
Rigid	Mean Joint Faulting (in)	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.0%
	Delta IRI	57.2	57.3	57.3	57.2	57.2	57.2	0.055	0.1%

5.1.2 Monthly Distribution Factors (MDF)

Cluster analysis was done for monthly distribution factors of Class 5 and 9 vehicles (Table 5.4). The number of clusters is not consistent for the years. The number of clusters for the years of 2007 and 2008 is four which is same as the year of 2010 (Appendix B). However, the number of clusters for the years of 2009 and 2011 are three and five respectively. The number of outlier sites is one for each of the years of 2007, 2008 and 2010. On the other hand, three outliers are observed for the year of 2009. No outlier is observed for the year of 2011.

Table 5.4 Number of sites analyzed for monthly distribution factors

Year	2007	2008	2009	2010	2011
Number of vehicle classification sites	38	38	34	52	45

The results of cluster analysis for monthly distribution factors are shown in Figures 5.13, 5.14, 5.17, 5.18, 5.21, 5.22, 5.25 and 5.26. The range of variation of the MDF values are almost same for all the years. However, the peak and low values for different seasons of the years are not consistent. This may be due to the variation in number of vehicle classification sites and number of clusters considered over the years.

The MEPDG runs for the years of 2007 and 2008 show almost same results as the year of 2010 as they have same number of clusters (Figures 5.15, 5.19, 5.23 and 5.27). However, the distress values for total rutting and delta IRI do not have any significant variation in comparison to statewide values for flexible pavement over time. In addition, the distress values for mean joint faulting and delta IRI do not have much impact on pavement design in comparison to statewide average values (Figures 5.16, 5.20, 5.24 and 5.28). The distress values for mean joint faulting may show high variation but the actual distress values are minor. Therefore, the statewide average values of monthly distribution factors are suggested as traffic inputs.

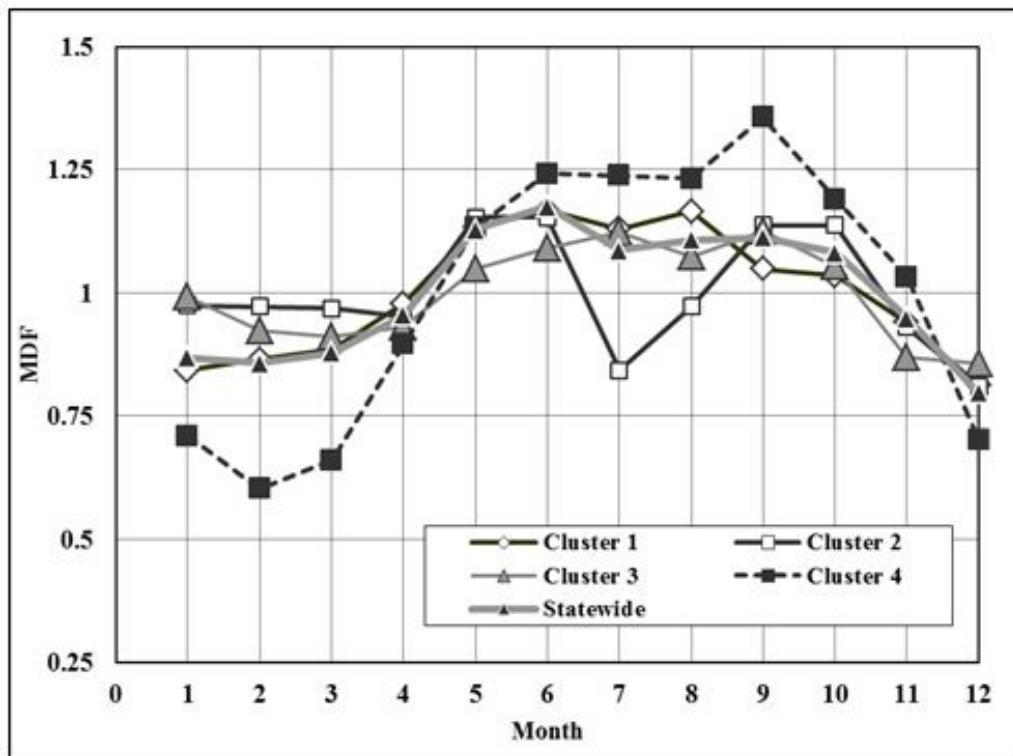


Figure 5.13 MDF Clusters (Class 5, 2007).

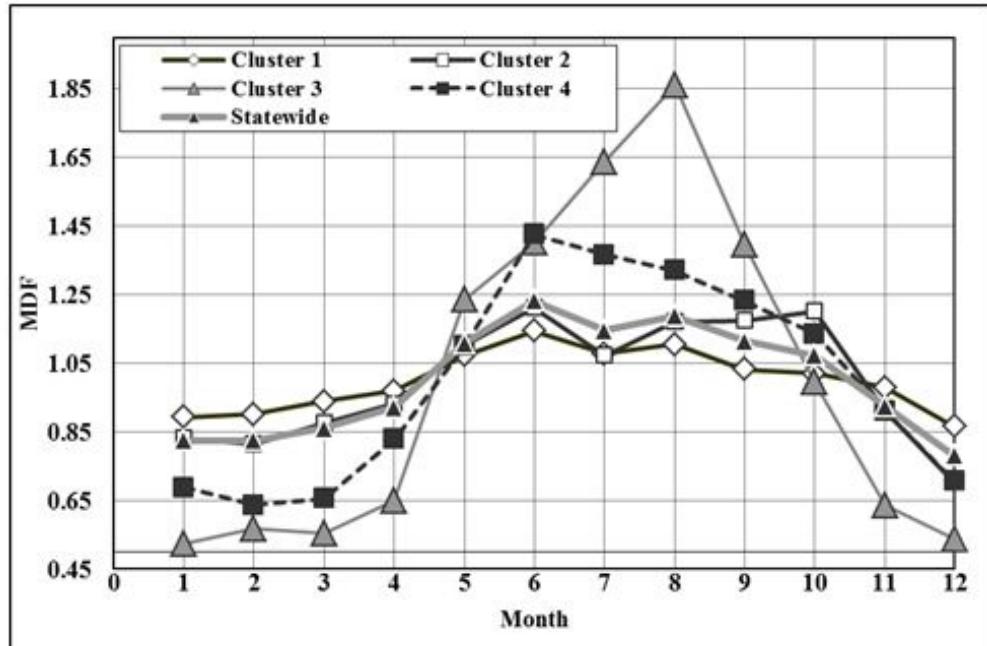


Figure 5.14 MDF Clusters (Class 9, 2007).

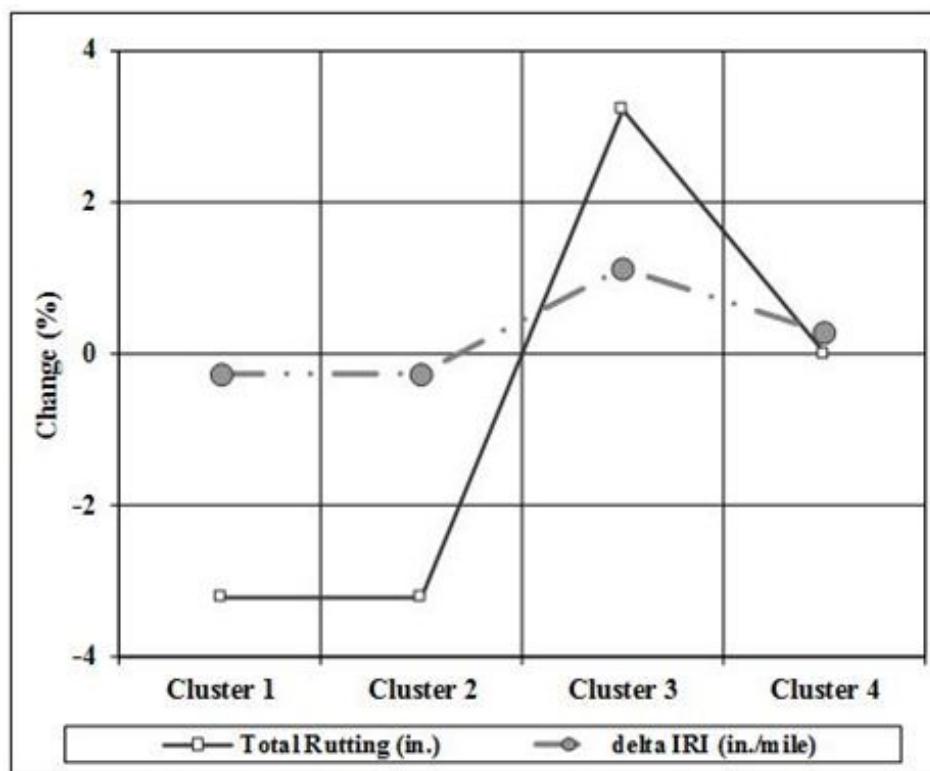


Figure 5.15 Change in distress values for different MDF Clusters (flexible pavement, 2007).

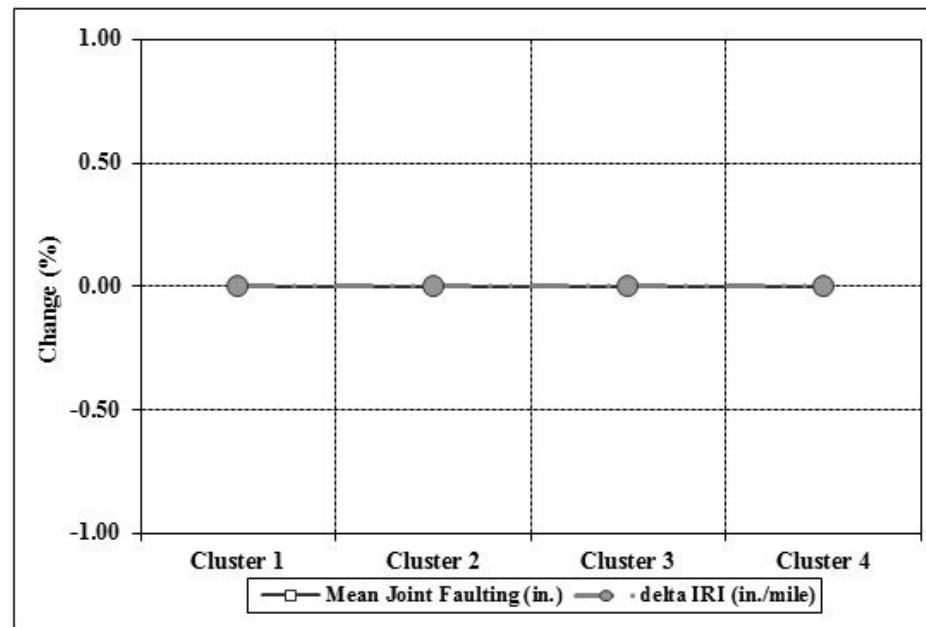


Figure 5.16 Change in distress values for different MDF Clusters (rigid pavement, 2007).

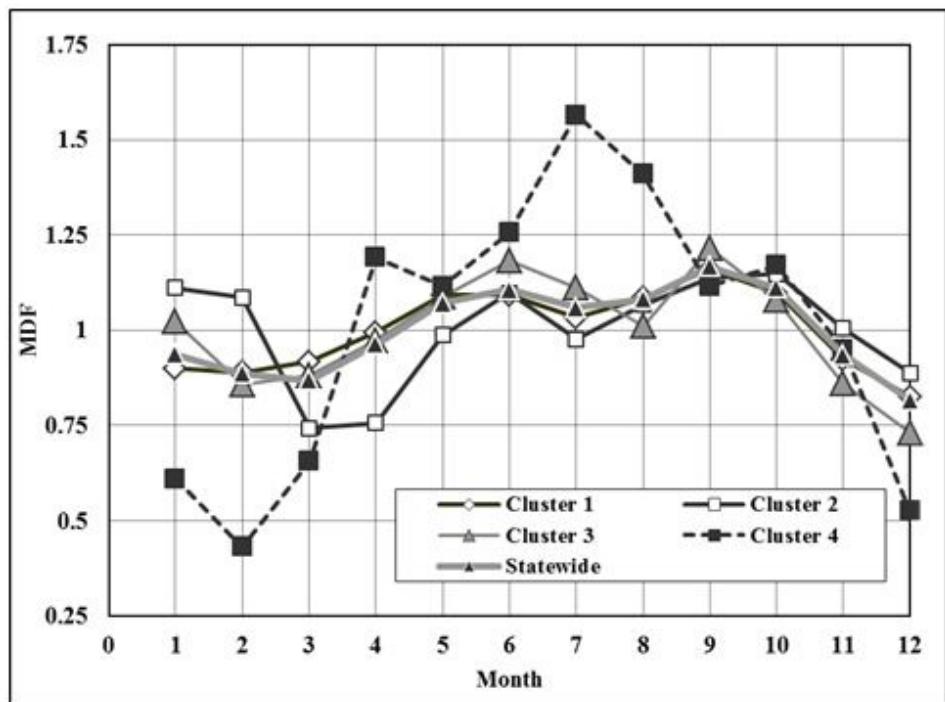


Figure 5.17 MDF Clusters (Class 5, 2008).

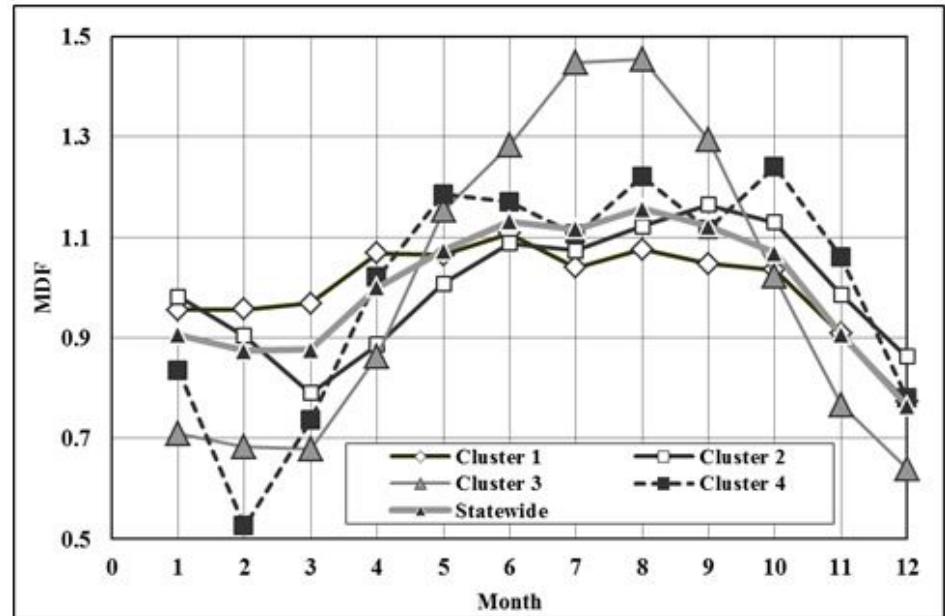


Figure 5.18 MDF Clusters (Class 9, 2008).

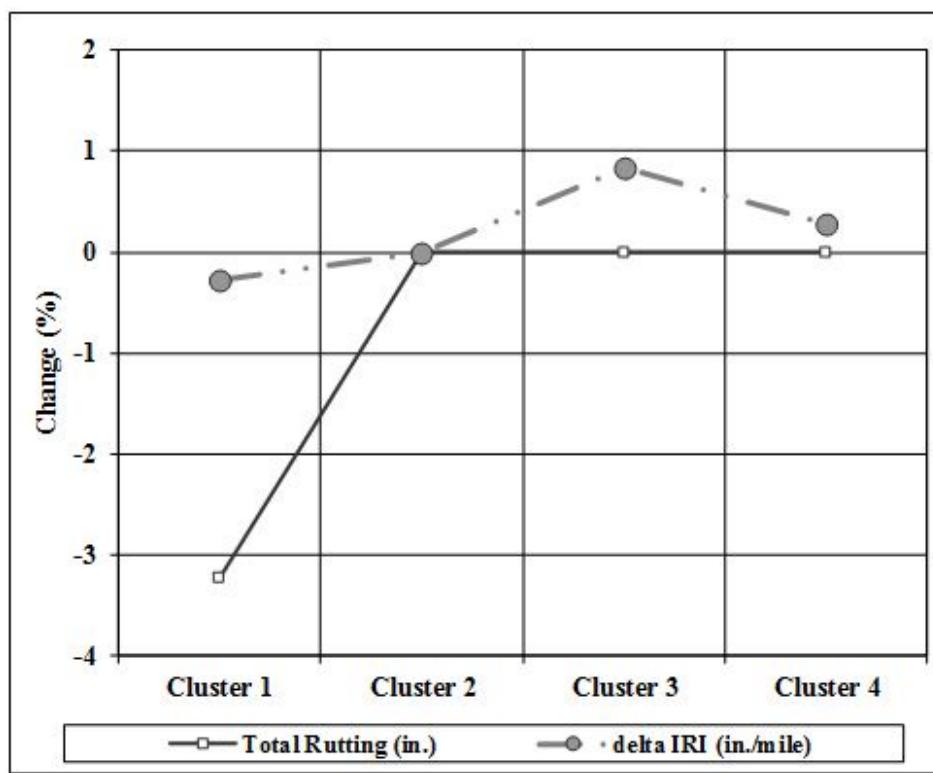


Figure 5.19 Change in distress values for different MDF Clusters (flexible pavement, 2008).

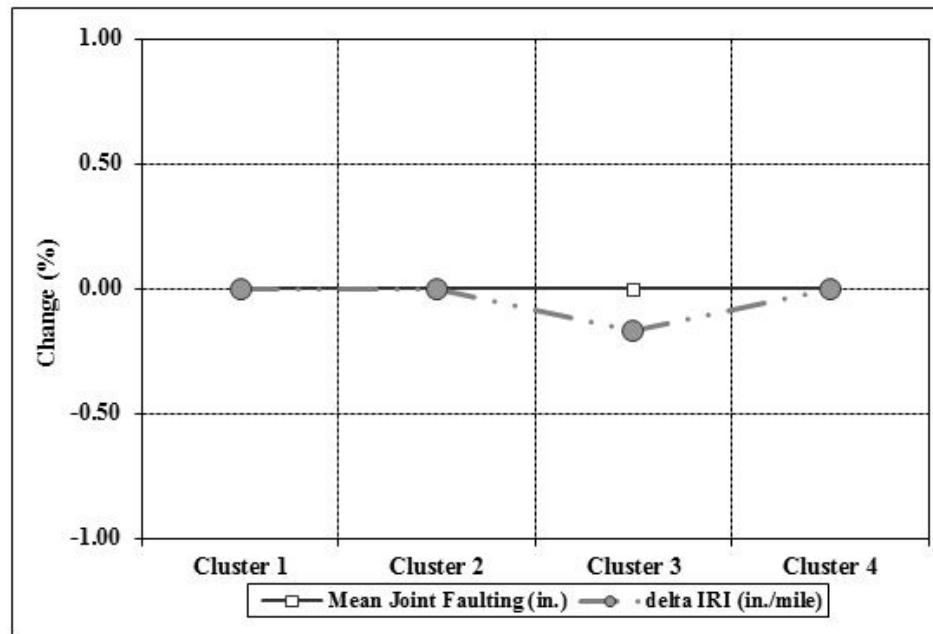


Figure 5.20 Change in distress values for different MDF Clusters (rigid pavement, 2008).

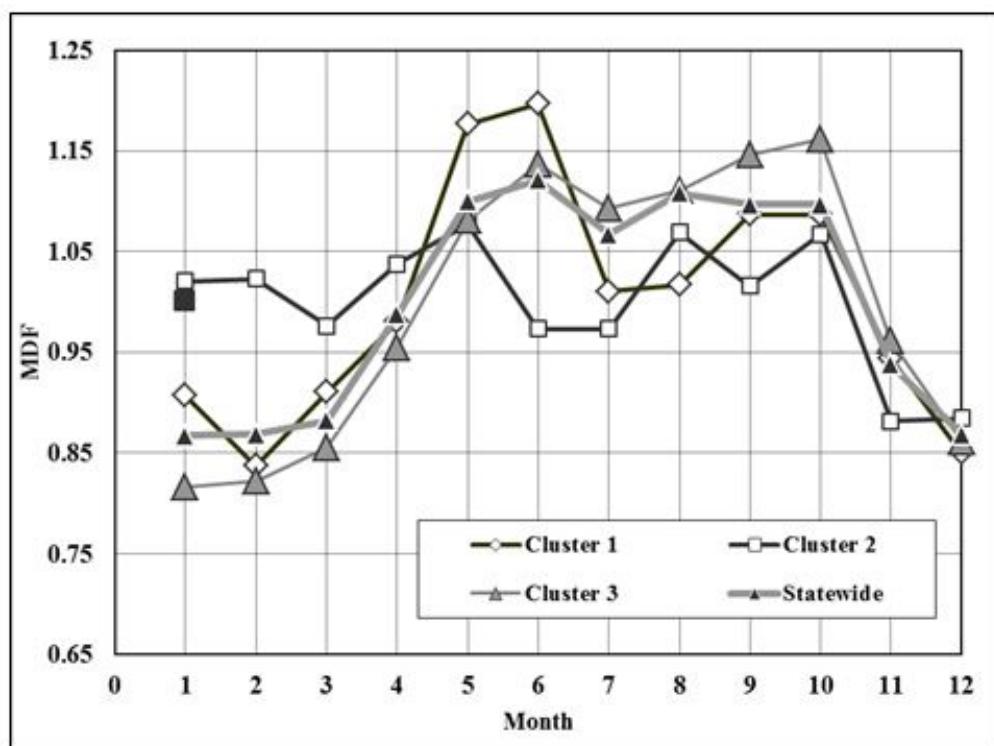


Figure 5.21 MDF Clusters (Class 5, 2009).

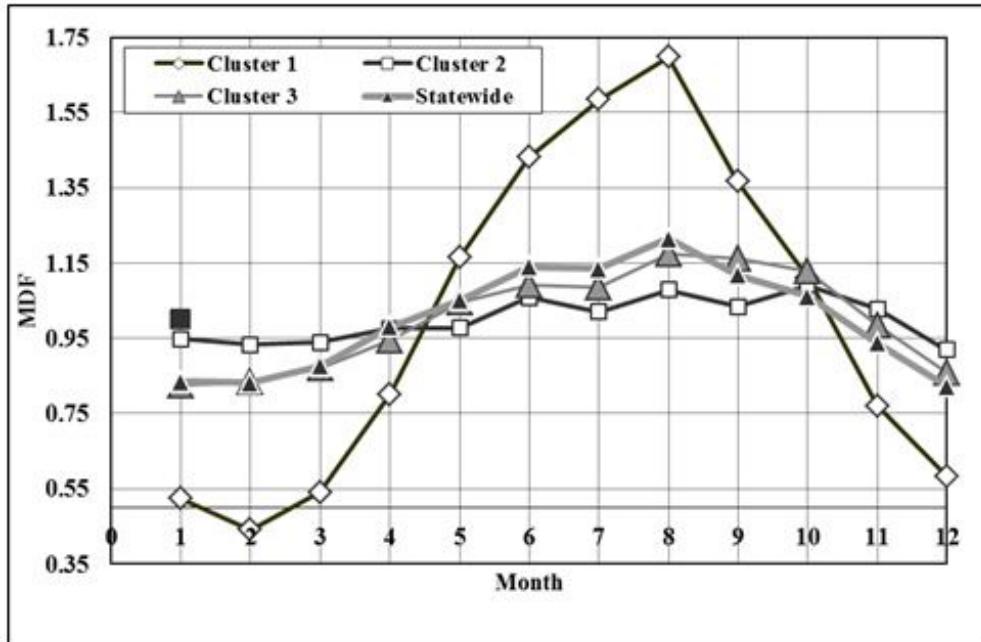


Figure 5.22 MDF Clusters (Class 9, 2009).

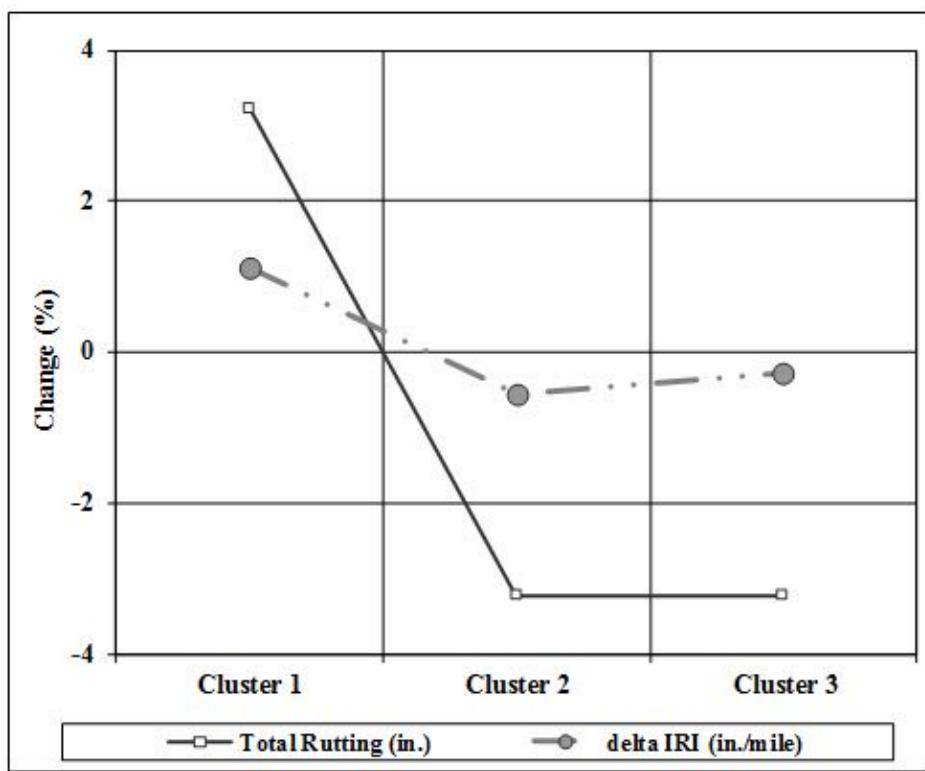


Figure 5.23 Change in distress values for different MDF Clusters (flexible pavement, 2009).

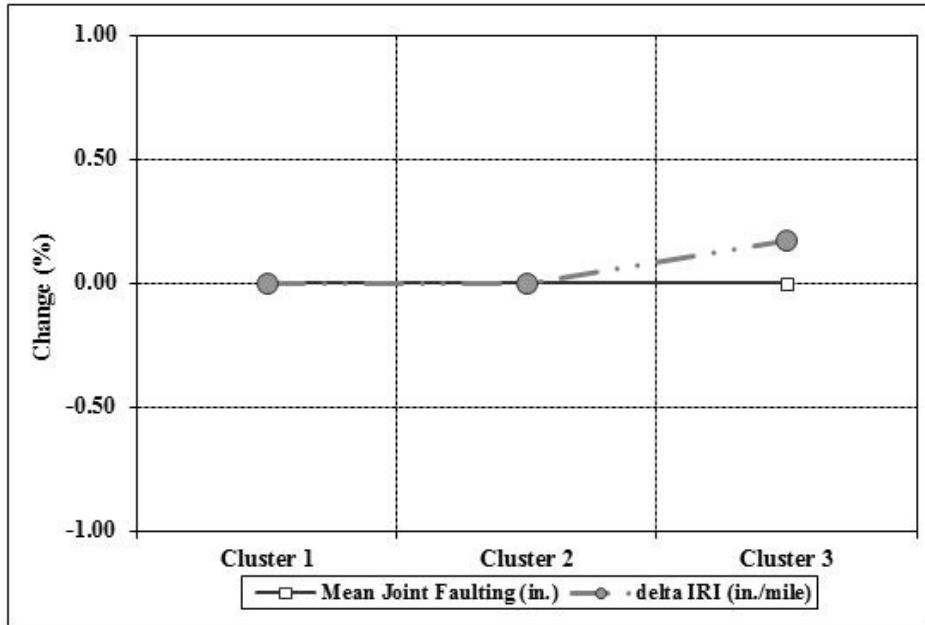


Figure 5.24 Change in distress values for different MDF Clusters (rigid pavement, 2009).

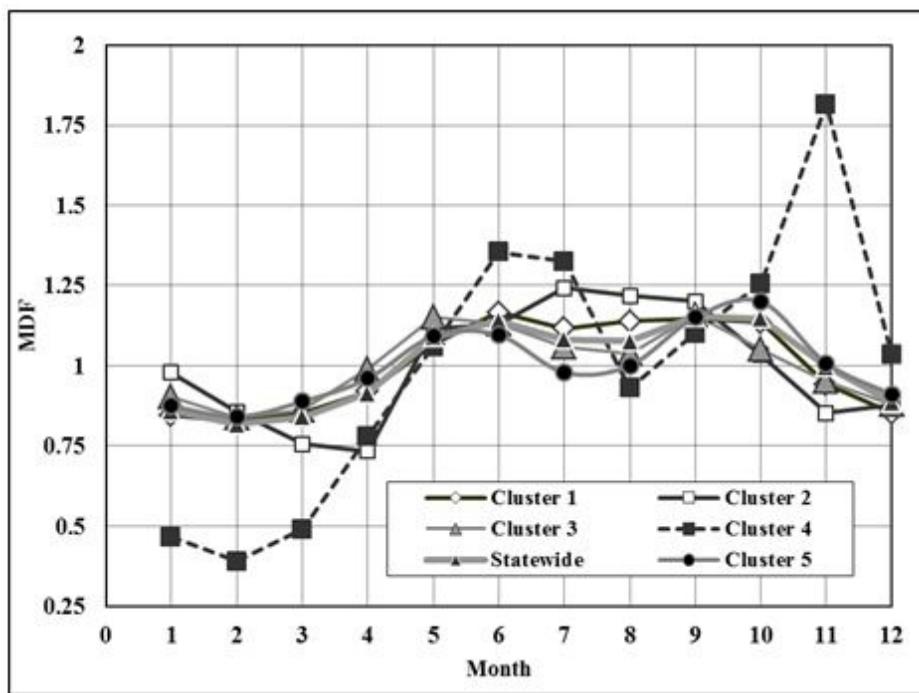


Figure 5.25 MDF Clusters (Class 5, 2011).

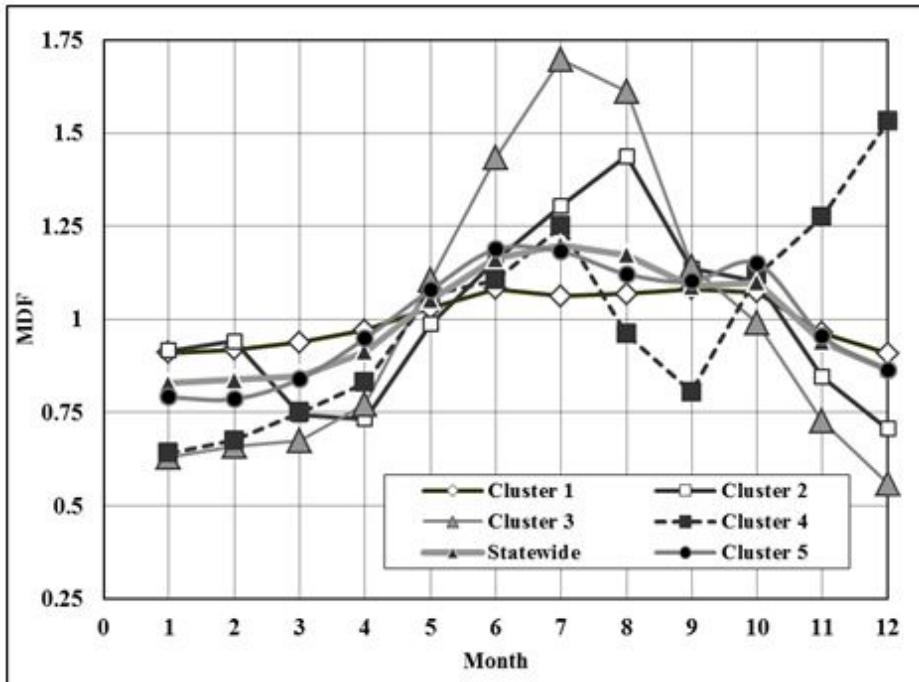


Figure 5.26 MDF Clusters (Class 9, 2011).

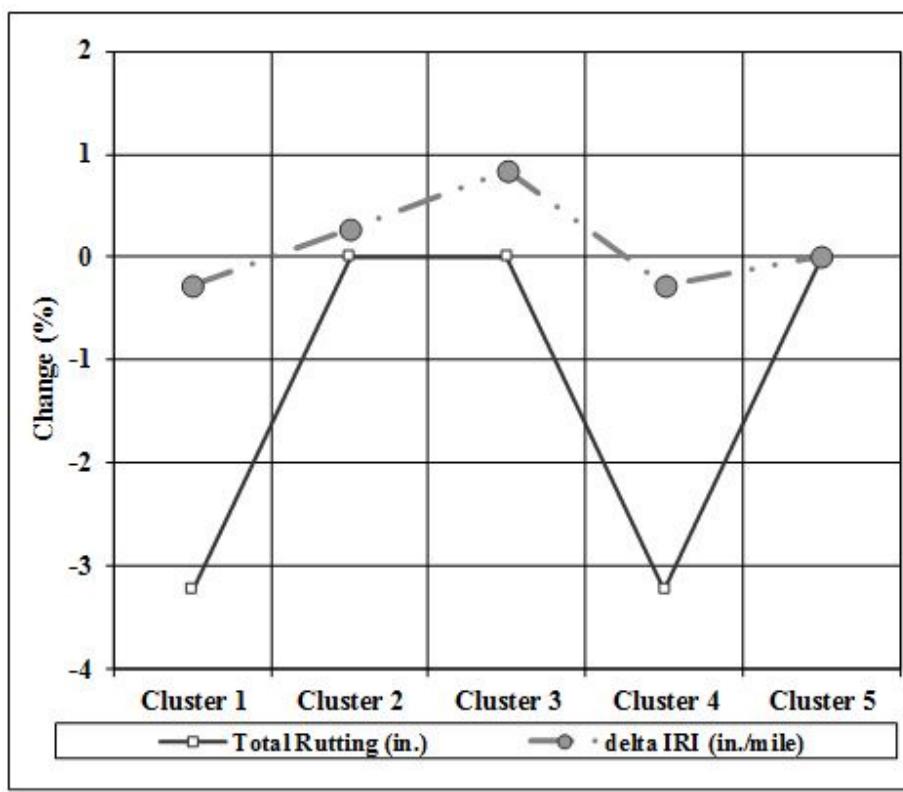


Figure 5.27 Change in distress values for different MDF Clusters (flexible pavement, 2011).

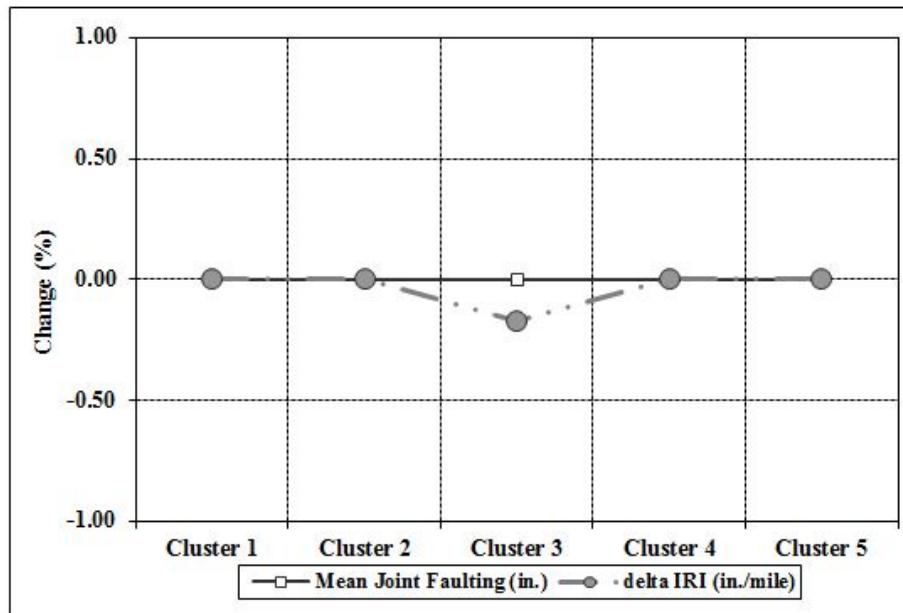


Figure 5.28 Change in distress values for different MDF Clusters (rigid pavement, 2011).

Statewide average monthly distribution factors of Class 5 and 9 vehicles for different years are given in Table 5.5. The statewide average MDFs were compared in terms of pavement performance (Table 5.6). The predicted distress values of total rutting and delta IRI for the statewide average VCDs exhibit coefficients of variation of 1.5% and 0.1% respectively over the study period. The coefficients of variation for the distress values of mean joint faulting and delta IRI are not significant over the study period. Therefore, the statewide average MDFs show little variation in terms of performance over the years.

Table 5.5 Statewide average monthly distribution factors for different years.

Month	2007		2008		2009		2011	
	Class 5	Class 9						
January	0.87	0.82	0.94	0.91	0.87	0.83	0.86	0.83
February	0.86	0.82	0.89	0.87	0.87	0.83	0.82	0.84
March	0.88	0.86	0.87	0.88	0.88	0.88	0.84	0.85
April	0.95	0.92	0.96	1.00	0.99	0.98	0.91	0.91
May	1.13	1.11	1.07	1.07	1.10	1.05	1.09	1.05
June	1.18	1.23	1.11	1.13	1.12	1.14	1.14	1.16
July	1.09	1.15	1.06	1.12	1.07	1.13	1.08	1.20
August	1.11	1.19	1.08	1.16	1.11	1.21	1.08	1.17
September	1.11	1.12	1.17	1.12	1.10	1.11	1.15	1.09
October	1.08	1.07	1.11	1.07	1.10	1.06	1.15	1.10
November	0.95	0.93	0.94	0.91	0.94	0.94	1.00	0.94
December	0.80	0.78	0.82	0.76	0.87	0.82	0.89	0.86

Table 5.6 Predicted distress values for statewide average MDFs for different years.

Pavement Type	Predicted Distresses	Years					Mean	Standard Deviation	Coefficient of Variation
		2007	2008	2009	2010	2011			
Flexible	Total Rutting (in)	0.31	0.31	0.31	0.30	0.31	0.31	0.004	1.5%
	Delta IRI	35.70	35.70	35.70	35.60	35.70	35.68	0.045	0.1%
Rigid	Mean Joint Faulting (in)	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.0%
	Delta IRI	57.2	57.3	57.2	57.2	57.2	57.2	0.045	0.1%

5.1.3 Hourly Distribution Factors (HDF)

The number of sites analysed for hourly distribution factors are same as those for vehicle classification distribution. The results of cluster analysis for hourly distribution factors is consistent for all the years (Appendix B). Four clusters are found and no outlier is observed for each of the years. However, most of the sites belong to different clusters for different years.

Results of cluster analysis of hourly distribution factors are shown in Figures 5.29, 5.31, 5.33 and 5.35. Variation on truck percentages for different hours of the day are observed over the years. However, the patterns of the graphs do not show much variation over the years. MEPDG runs were carried out considering cluster specific, statewide and MEPDG default hourly distribution factors for rigid pavement for different years (Figures 5.30, 5.32, 5.34 and 5.36). As HDF is not considered for the design of flexible pavement, no MEPDG simulations were conducted for this type of pavement. However, no significant change in distress values was also found for the variation in HDFs for rigid pavement over the years.

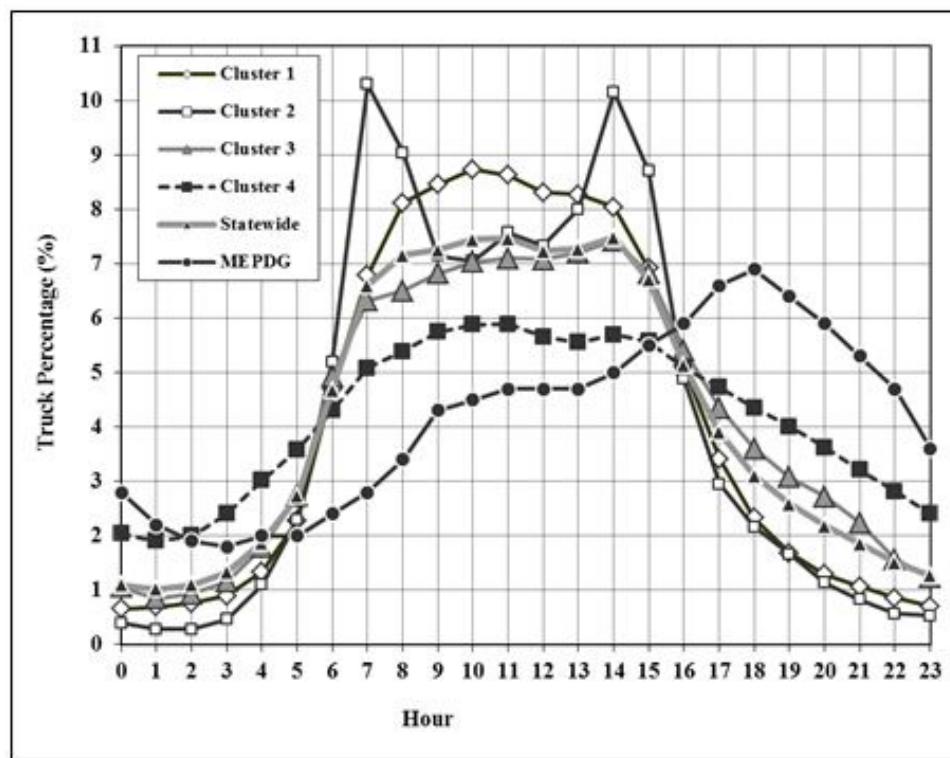


Figure 5.29 HDF Clusters (2007)

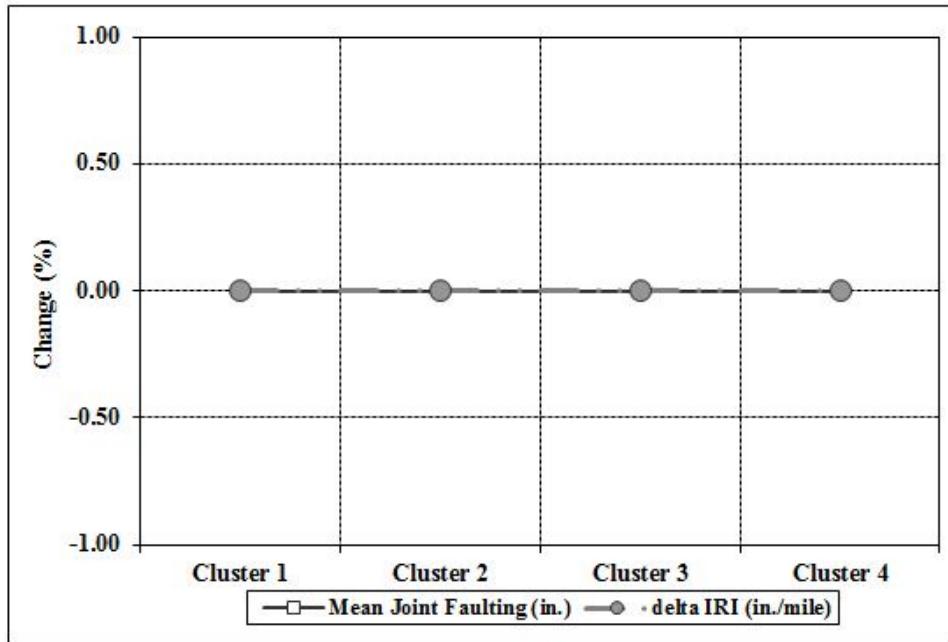


Figure 5.30 Change in distress values for different HDF Clusters (rigid pavement, 2007).

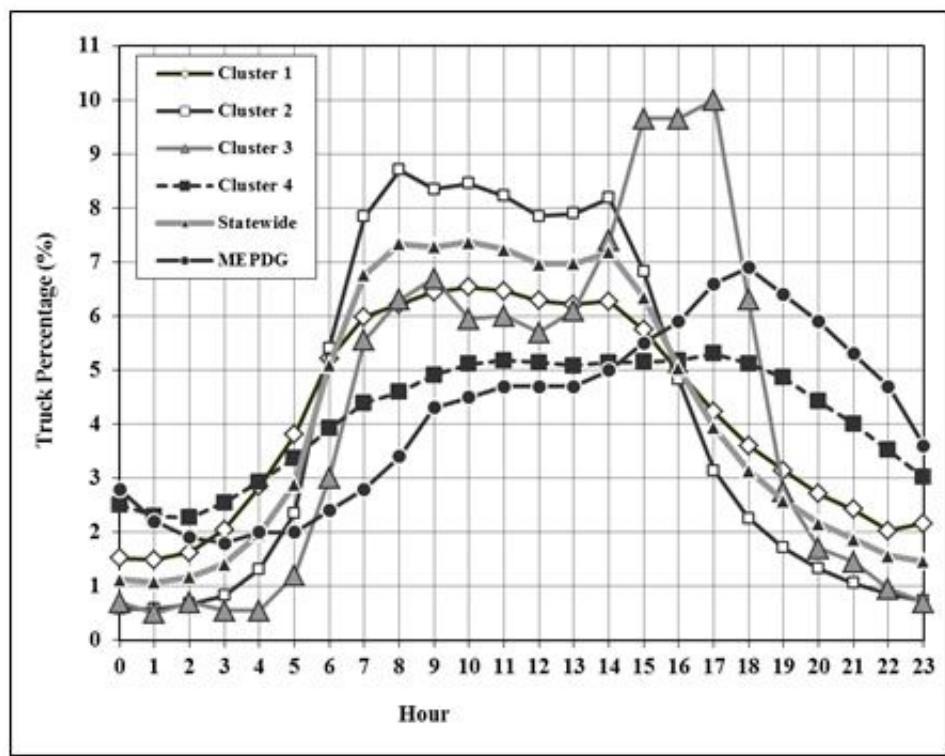


Figure 5.31 HDF Clusters (2008).

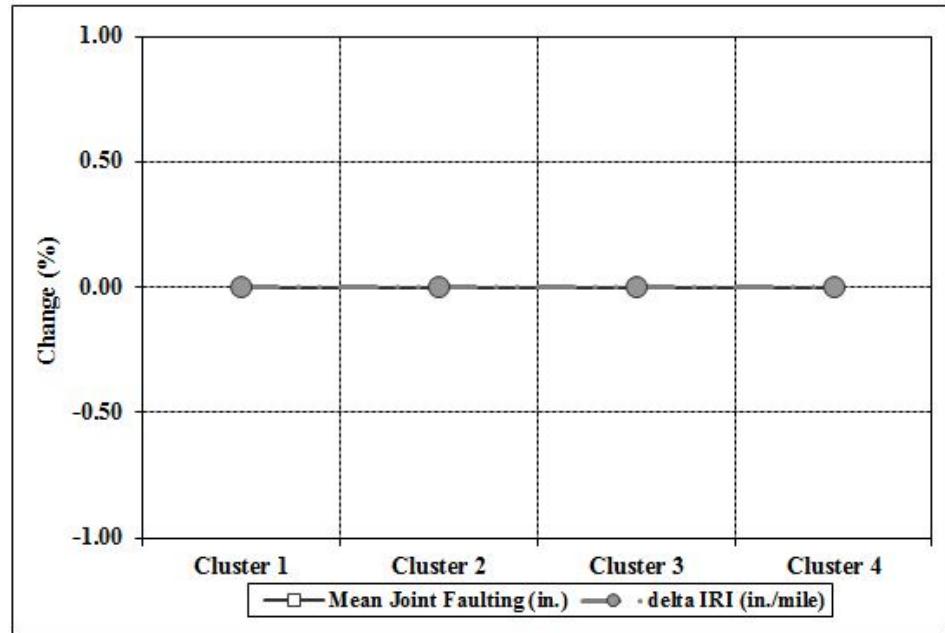


Figure 5.32 Change in distress values for different HDF Clusters (rigid pavement, 2008).

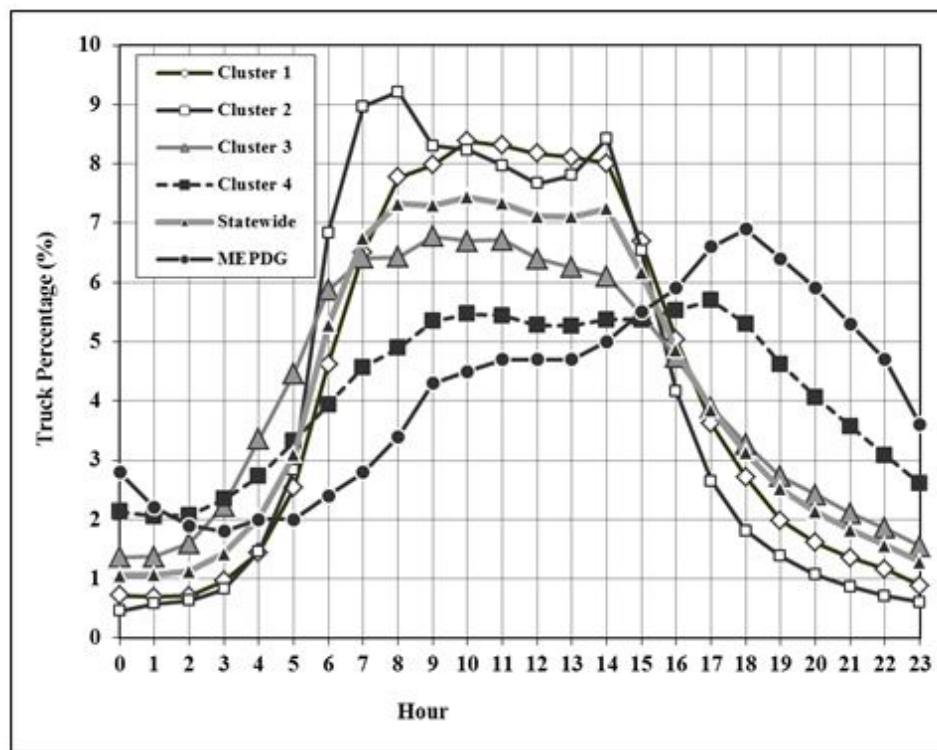


Figure 5.33 HDF Clusters (2009).

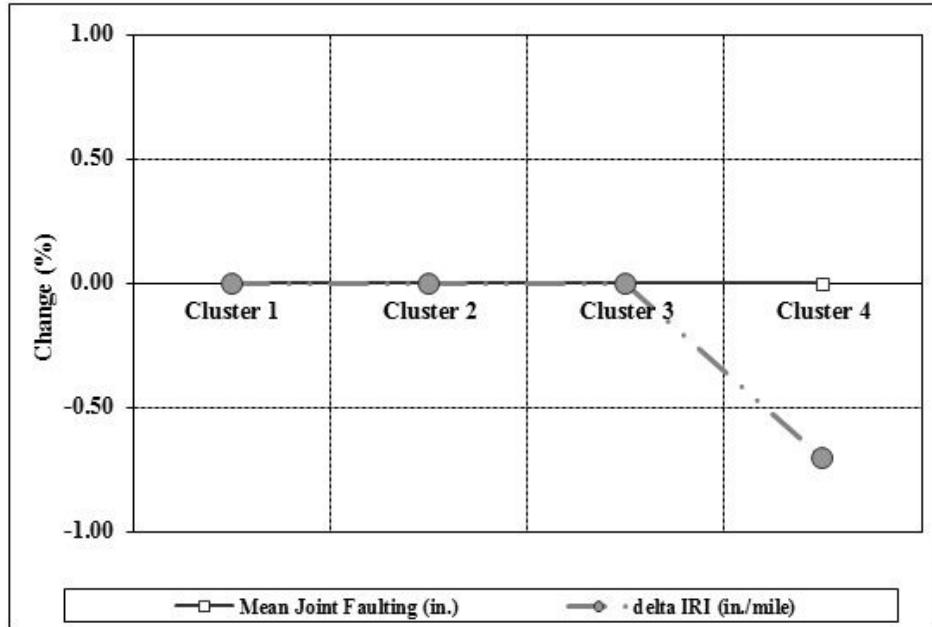


Figure 5.34 Change in distress values for different HDF Clusters (rigid pavement, 2009).

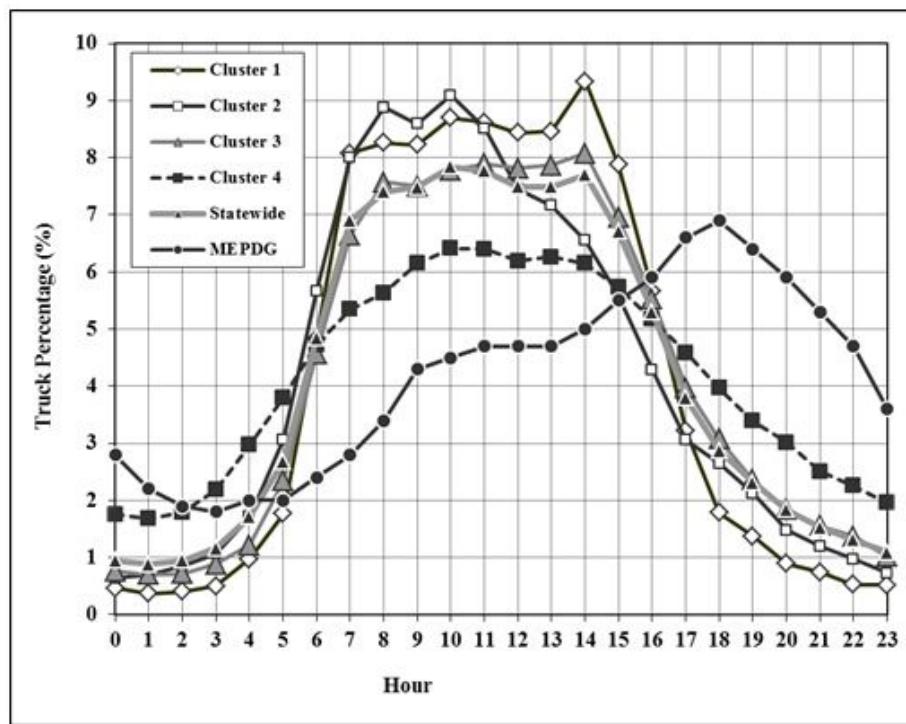


Figure 5.35 HDF Clusters (2011).

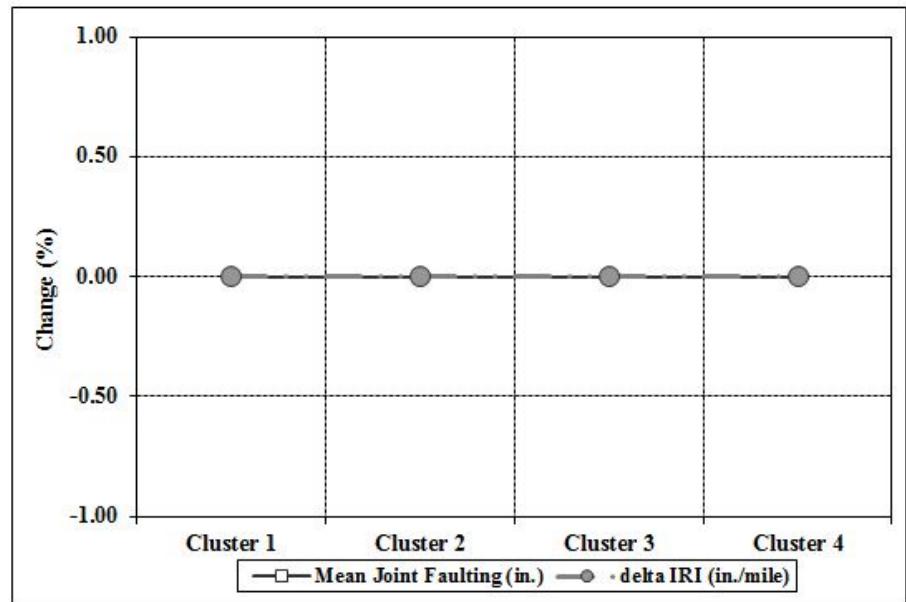


Figure 5.36 Change in distress values for different HDF Clusters (rigid pavement, 2011).

Statewide average values of predicted distresses for different years show no variation over the study period (Table 5.7).

Table 5.7 Predicted distress values for statewide average HDFs for different years.

Pavement Type	Predicted Distresses	Years					Mean	Standard Deviation	Coefficient of Variation
		2007	2008	2009	2010	2011			
Rigid	Mean Joint Faulting (in)	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.0%
	Delta IRI	57.2	57.2	57.2	57.2	57.2	57.2	0.000	0.0%

5.1.4 Axle Groups Per Vehicle (AGPV)

MEPDG runs were carried out to study the effects of AGPV values for different WIM sites for different years. Twelve sites were considered for this analysis for 2007 and 2008 and fourteen sites were considered for 2009 and 2011. The predicted distress values show little variation for site specific AGPV values than for the statewide average AGPV values for flexible pavements (Figures 5.37, 5.39, 5.41 and 5.43). No significant change for MEPDG runs for rigid pavements except for site 199 in 2007 (Figures 5.38, 5.40, 5.42 and 5.44). But actually the distress value for mean joint faulting for this site is only 0.007 inch and this site is no longer used by NYSDOT. Therefore, statewide average AGPV values are recommended for the design of pavement.

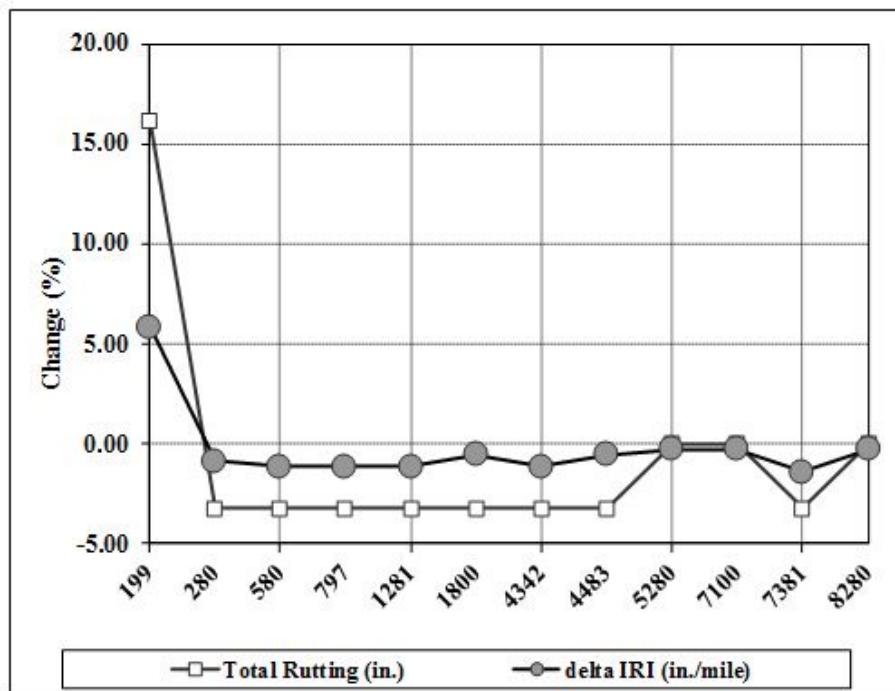


Figure 5.37 Change in distress values due to variation of AGPV (flexible pavement, 2007).

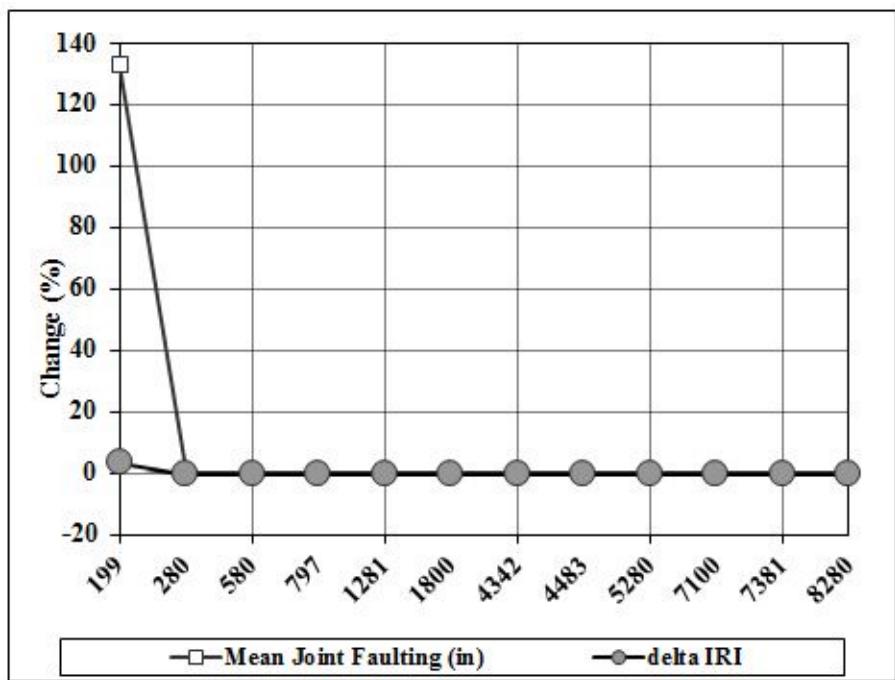


Figure 5.38 Change in distress values due to variation of AGPV (rigid pavement, 2007).

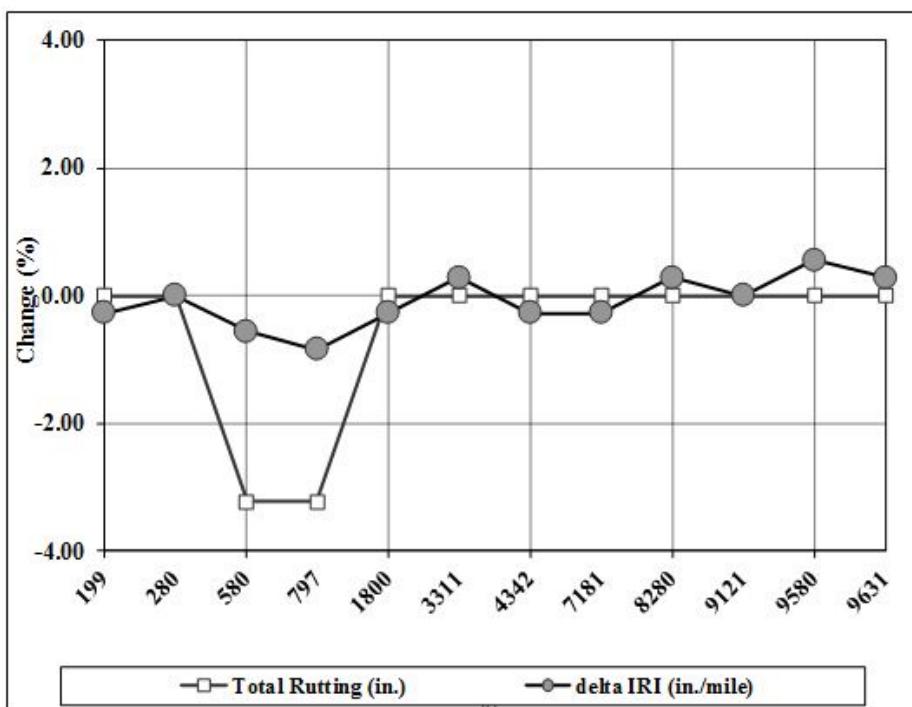


Figure 5.39 Change in distress values due to variation of AGPV (flexible pavement, 2008).

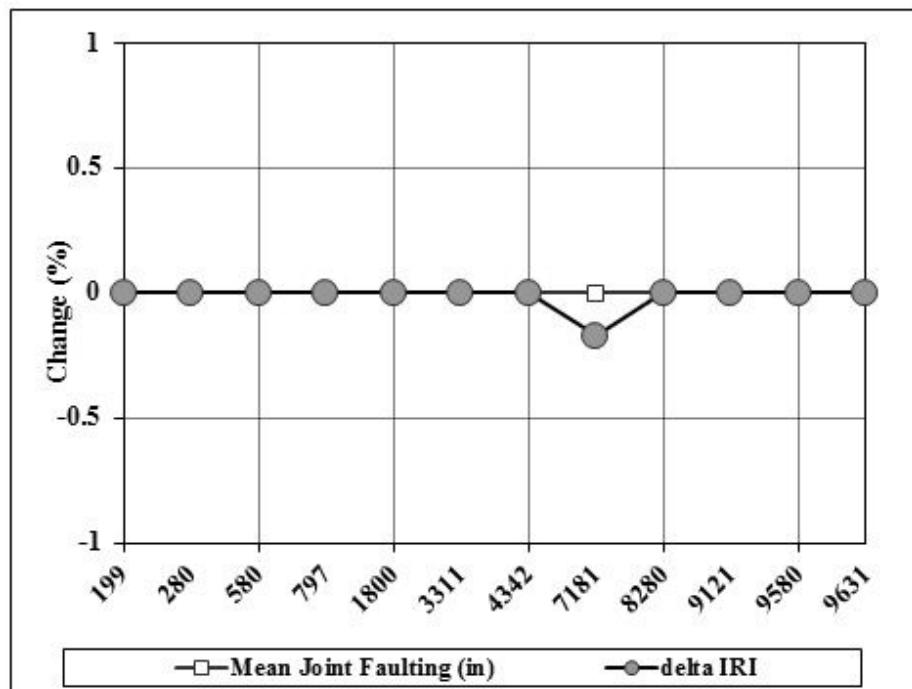


Figure 5.40 Change in distress values due to variation of AGPV (rigid pavement, 2008).

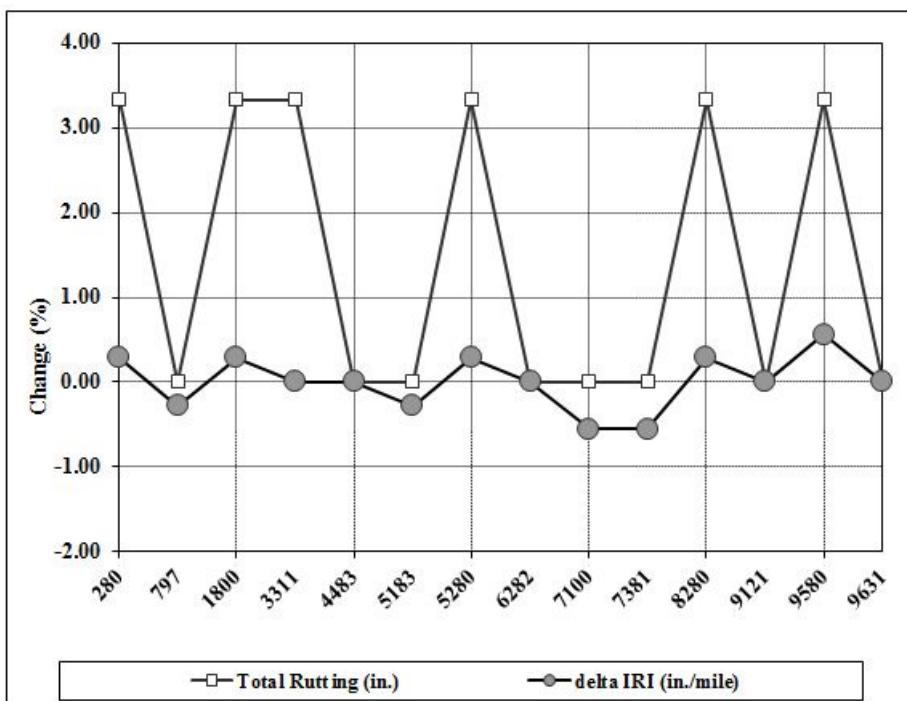


FIGURE 5.41 Change in distress values due to variation of AGPV (flexible pavement, 2009).

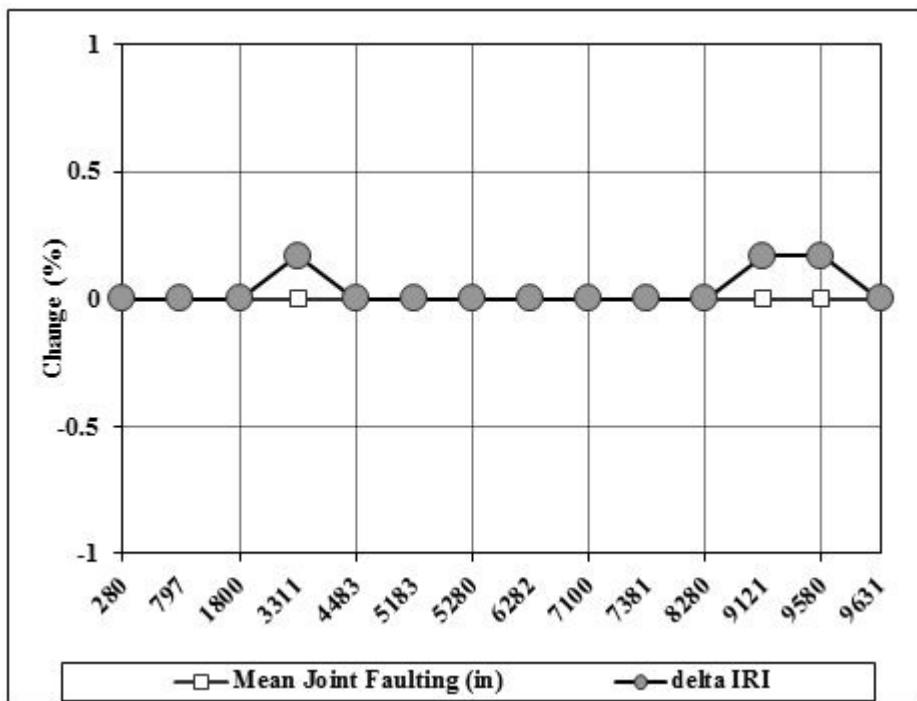


Figure 5.42 Change in distress values due to variation of AGPV (rigid pavement, 2009).

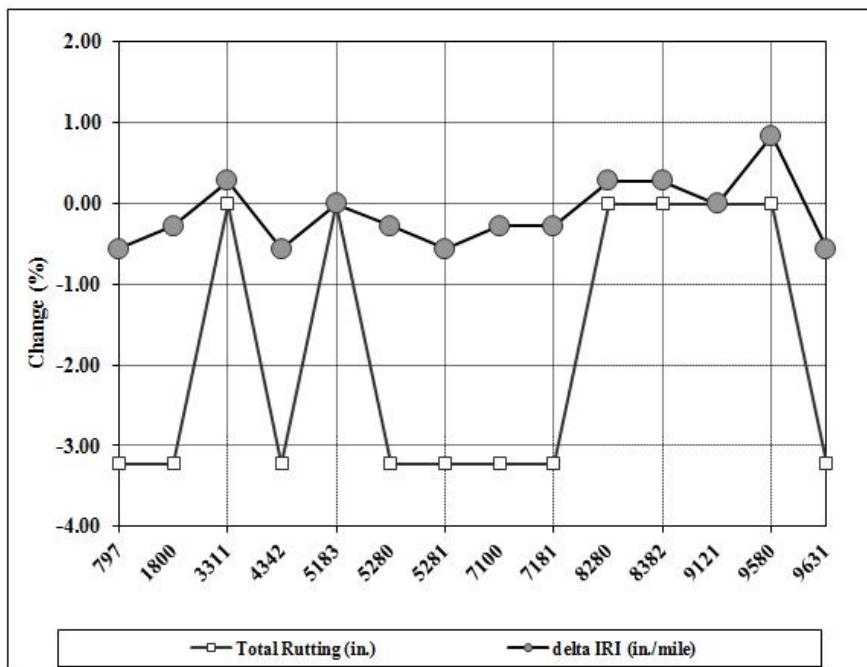


Figure 5.43 Change in distress values due to variation of AGPV (flexible pavement, 2011).

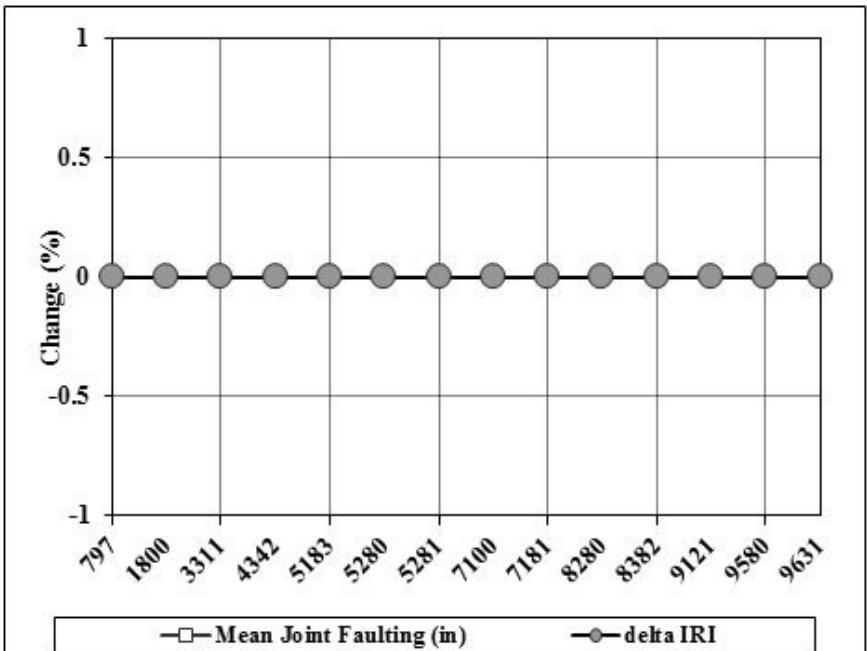


Figure 5.44 Change in distress values due to variation of AGPV (rigid pavement, 2011).

Statewide average AGPV values for different years are given in Table 5.8-5.11. The statewide average AGPVs were compared in terms of pavement performance (Table 5.12). The predicted distress values of total rutting and delta IRI for the statewide average AGPV values exhibit coefficients of variation of 1.5% and 0.2% respectively. No variation was found for the distress values of mean joint faulting for statewide AGPV values over the years. However, the coefficient of variation for delta IRI is same for both flexible and rigid pavements is same over the study period. Therefore, the statewide average AGPV values show little variation in terms of performance over the years.

Table 5.8 Statewide average AGPV values (2007)

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
4	1.46	0.71	0.00	0.00
5	2.16	0.02	0.00	0.00
6	1.07	1.07	0.01	0.00
7	1.30	0.26	0.73	0.09
8	2.52	0.70	0.02	0.01
9	1.34	2.04	0.00	0.00
10	1.11	1.05	1.06	0.06
11	3.38	0.29	0.35	0.09
12	3.66	1.29	0.09	0.00
13	1.88	0.87	0.47	0.30

Table 5.9 Statewide average AGPV values (2008).

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
4	1.34	0.67	0.00	0.00
5	2.00	0.01	0.00	0.00
6	1.00	1.00	0.00	0.00
7	1.17	0.19	0.75	0.06
8	2.33	0.67	0.01	0.01
9	1.20	1.90	0.00	0.00
10	1.06	1.01	0.95	0.04
11	3.68	0.25	0.24	0.02
12	3.76	1.09	0.01	0.00
13	1.81	1.41	0.26	0.51

Table 5.10 Statewide average AGPV values (2009).

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
4	1.27	0.73	0.00	0.00
5	2.00	0.01	0.00	0.00
6	1.00	1.00	0.00	0.00
7	1.30	0.28	0.67	0.04
8	2.44	0.61	0.01	0.00
9	1.24	1.88	0.00	0.00
10	1.08	0.99	0.95	0.04
11	3.77	0.22	0.25	0.01
12	4.00	0.98	0.00	0.01
13	1.99	0.83	0.29	0.31

Table 5.11 Statewide average AGPV values (2011).

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
4	1.30	0.71	0.00	0.00
5	2.00	0.01	0.00	0.00
6	0.99	0.99	0.01	0.00
7	1.35	0.30	0.62	0.05
8	2.40	0.64	0.01	0.00
9	1.22	1.89	0.00	0.00
10	1.09	0.99	0.95	0.05
11	3.74	0.31	0.21	0.01
12	3.74	1.06	0.03	0.01
13	2.13	0.86	0.37	0.31

Table 5.12 Predicted distress values for statewide average AGPV values for different years.

Pavement Type	Predicted Distresses	Years					Mean	Standard Deviation	Coefficient of Variation
		2007	2008	2009	2010	2011			
Flexible	Total Rutting (in)	0.31	0.31	0.30	0.31	0.31	0.31	0.004	1.5%
	Delta IRI	35.8	35.8	35.6	35.7	35.70	35.7	0.084	0.2%
Rigid	Mean Joint Faulting (in)	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.0%
	Delta IRI	57.4	57.3	57.2	57.2	57.2	57.3	0.089	0.2%

5.1.5 Axle Load Spectra

MEPDG runs were carried out to study the effects of axle load spectra for different WIM sites for different years. The number of WIM sites considered for this analysis is same as those considered for AGPV analysis over the years. The predicted distress values for total rutting show more variation than for delta IRI. However, the predicted distress values show little

variation for site specific axle load spectra than for the statewide average axle load spectra with a few exceptions (Figures 5.45, 5.47, 5.49 and 5.51). Site 280 shows high distress values for 2008 but this site is no longer acceptable by NYSDOT. Site 797 also shows high distress values comparing to statewide average values for 2008 and 2009. This site experiences 0.6% of class 13 vehicles and this may be the cause for such high distresses. Site 5280 experiences almost 70% of class 9 vehicles which may be the reason of high distress values for 2011.

Site specific distress values for the MEPDG runs for rigid pavements show significant variation for mean joint faulting comparing to the distress values for statewide average values in some cases (Figures 5.46, 5.48, 5.50 and 5.52). However, the actual distress values for mean joint faulting are very minor over the years. For example, site 199 shows a variation of 33.33% comparing to statewide average values but the actual distress value for the site is only 0.002 inch. Therefore, statewide average axle load spectra are recommended for the design of pavement.

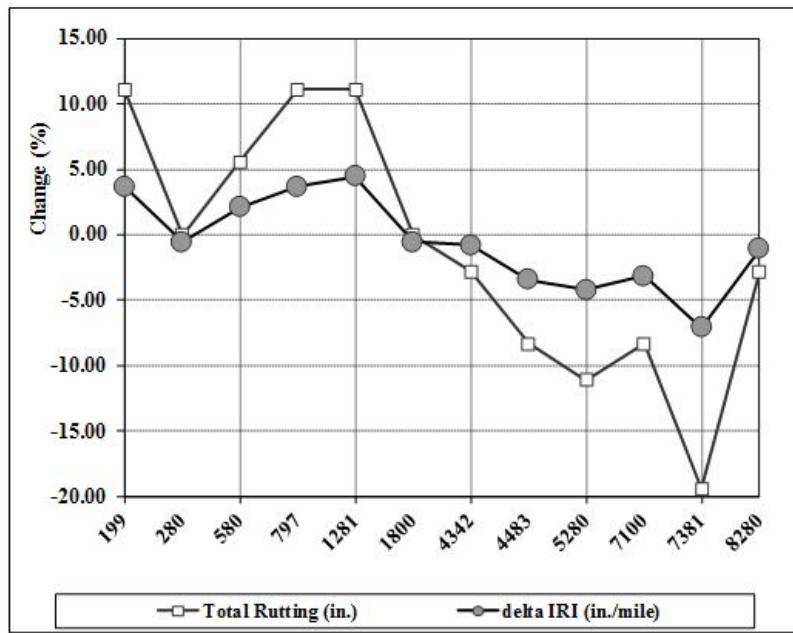


Figure 5.45 Change in distress values due to variation of axle load spectra (flexible pavement, 2007).

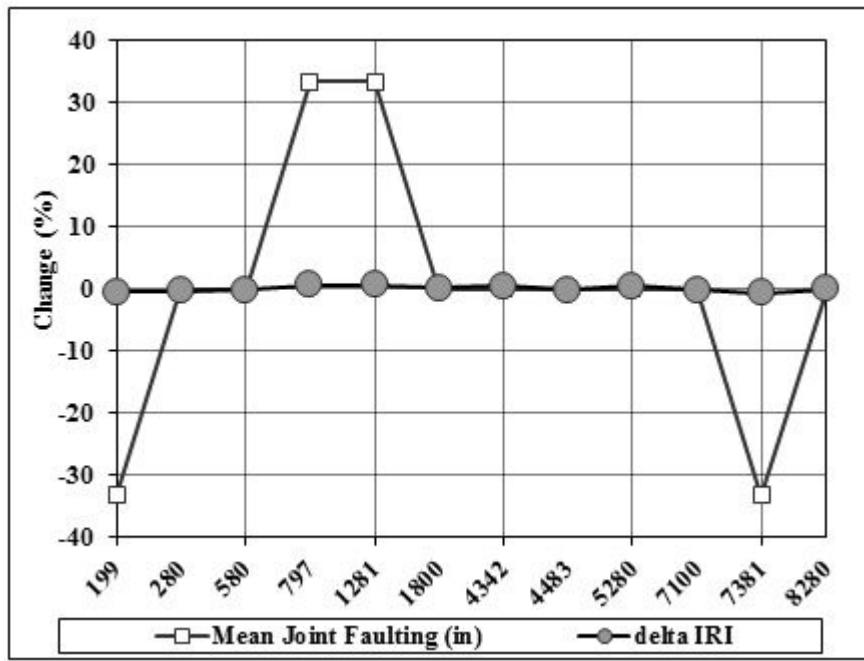


Figure 5.46 Change in distress values due to variation of axle load spectra (rigid pavement, 2007).

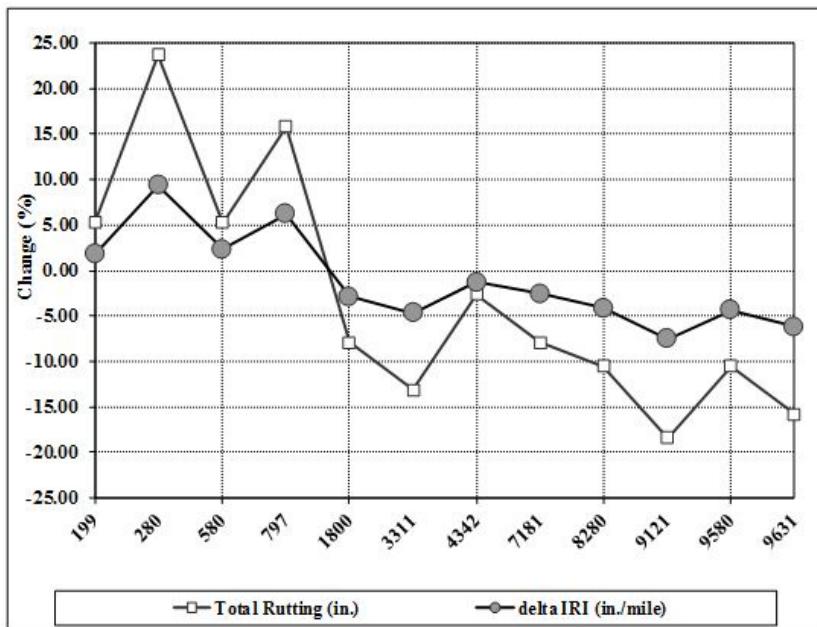


Figure 5.47 Change in distress values due to variation of axle load spectra (flexible pavement, 2008).

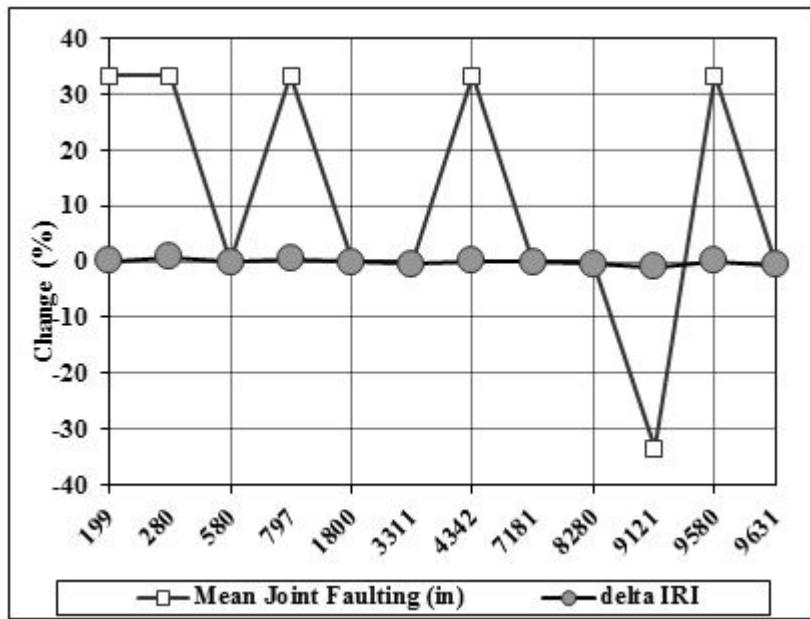


Figure 5.48 Change in distress values due to variation of axle load spectra (rigid pavement, 2008).

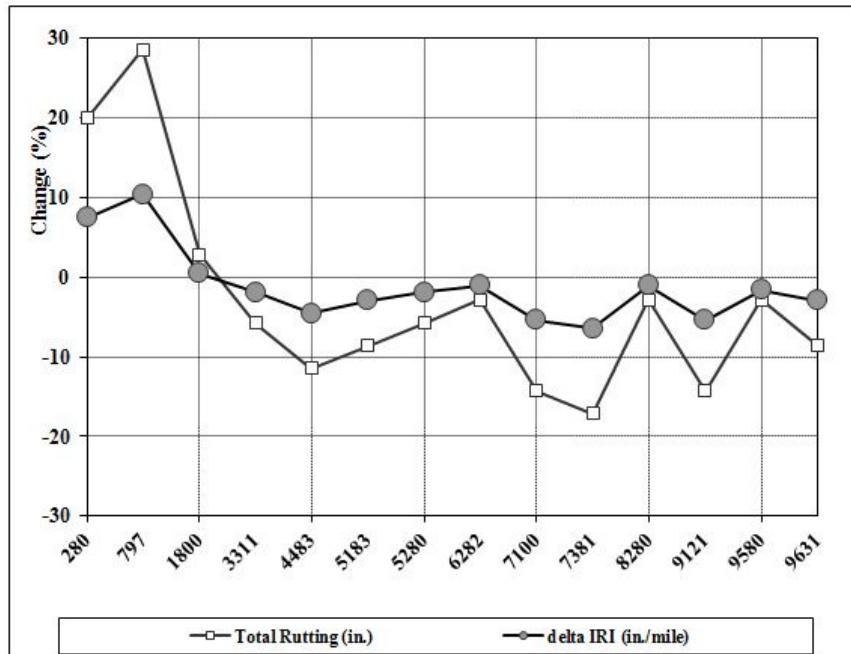


Figure 5.49 Change in distress values due to variation of axle load spectra (flexible pavement, 2009).

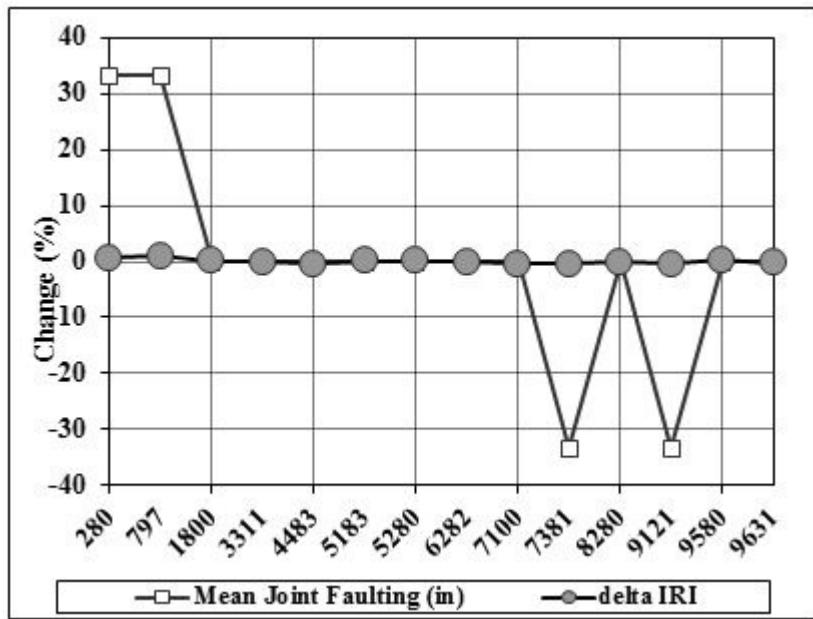


Figure 5.50 Change in distress values due to variation of axle load spectra (rigid pavement, 2009).

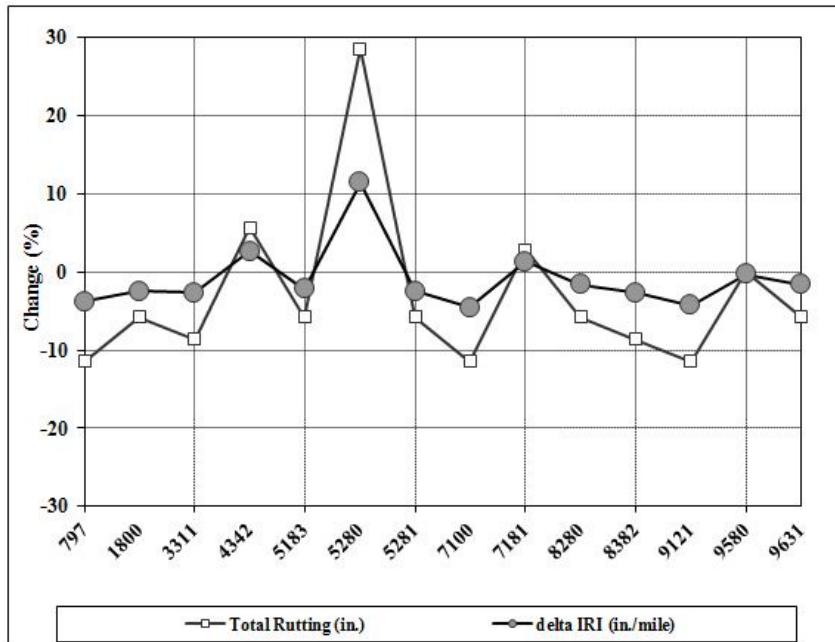


Figure 5.51 Change in distress values due to variation of axle load spectra (flexible pavement, 2011).

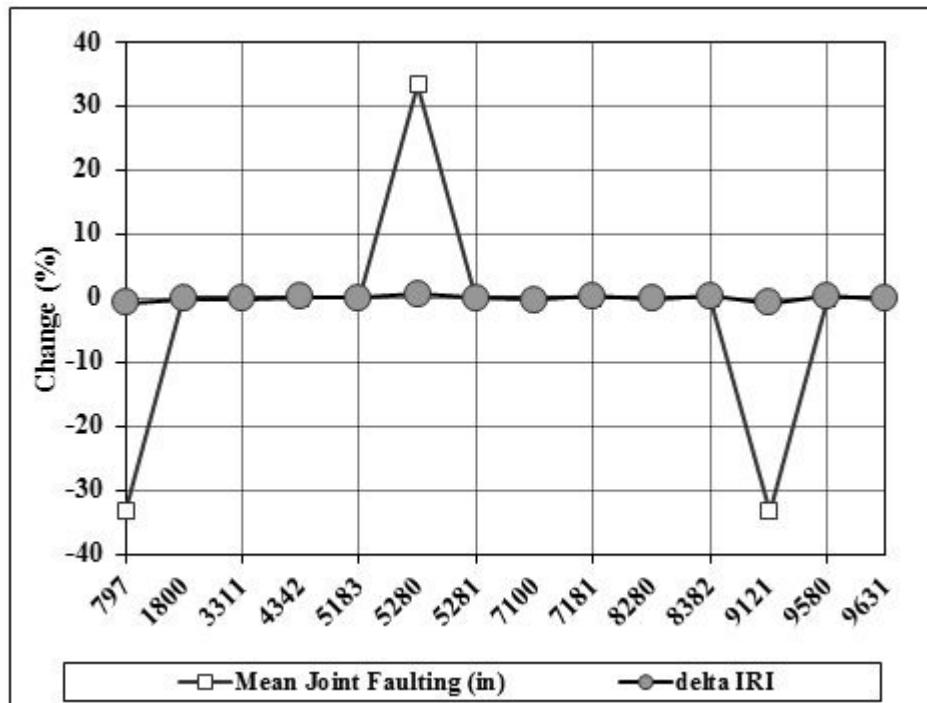


Figure 5.52 Change in distress values due to variation of axle load spectra (rigid pavement, 2011).

The statewide average axle load spectra were compared in terms of pavement performance (Table 5.13). The predicted distress values of total rutting and delta IRI for the statewide average VCDs exhibit coefficients of variation of 3.6% and 1.3% respectively. The variation in distress values for rigid pavement is less over the years comparing to the change in distress values over the years for flexible pavement. Therefore, it can be said that the statewide average axle load spectra show little variation in terms of performance over the years.

Since statewide average values do not show significant variation in terms of pavement performance over the years, the statewide average values of 2010 are suggested for VCD, MDF, AGPV and axle load spectra as traffic inputs to MEPDG. Because data of most number of WIM sites are available for this year.

Table 5.13 Predicted distress values for statewide average axle load spectra for different years.

Pavement Type	Predicted Distresses	Years					Mean	Standard Deviation	Coefficient of Variation
		2007	2008	2009	2010	2011			
Flexible	Total Rutting (in)	0.36	0.38	0.35	0.35	0.35	0.36	0.013	3.6%
	Delta IRI	37.9	38.6	37.5	37.5	37.4	37.8	0.497	1.3%
Rigid	Mean Joint Faulting (in)	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.0%
	Delta IRI	57.4	57.6	57.4	57.4	57.4	57.4	0.089	0.2%

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The proper implementation of MEPDG depends on the appropriate characterization of traffic data. But detailed traffic data is not always available for the previous years. Therefore, MEPDG identifies a hierarchical approach to develop required traffic inputs. The traffic data is classified into three levels. Level 1 uses site-specific data, which is the most accurate. Level 2 provides truck volume and weight data when the designer has modest knowledge of past and future traffic. Level 3 uses regional, statewide or default values.

The objective of the study was to characterize the traffic data and suggest the site-specific, regional or state wide average values for traffic inputs to MEPDG for New York State. Vehicle class distribution (VCD), monthly distribution factors (MDF), hourly distribution factors (HDF), average number of axle groups per vehicle (AGPV) and axle load spectra data were obtained from vehicle classification sites and WIM sites in New York State for the time period of 2007-2011. These traffic data were processed with TrafLoad software. Cluster analysis was adopted for the processed data of VCD, MDF and HDF for the data collected during the five year period. This statistical analysis could not be done for AGPV values and axle load spectra due to the unavailability of data for sufficient number of WIM sites for the time period. MEPDG runs were performed to study the effect of using site specific, cluster average, statewide average and MEPDG default values on predicted distresses for typical new flexible and rigid pavement structures in New York State.

The main conclusions of the study are:

- Vehicle classification sites can be divided into three groups on the basis of one-way AADTT: low (0 to 299), medium (300 to 999) and high (>1000). Majority of the sites show low AADTT values.
- Four clusters are found for the vehicle classification distribution (VCD). They are differentiated on the basis of proportions of Class 5 and Class 9 vehicles. The direction of travel has little impact on the VCD. The results of cluster analysis are consistent during entire period of analysis.
- Multidimensional clustering is adopted for monthly distribution factors considering Class 5 and 9 vehicles simultaneously. Four clusters are found for 2007, 2008 and 2010. However, three and five clusters are found for 2009 and 2010 respectively.
- Four clusters are found for hourly distribution factors for each of the years. The results of cluster analysis are almost consistent over the years. HDF does not show any impact on the performances of pavement.
- Cluster analysis cannot be done on AGPV and axle load spectra due to unavailability of enough WIM data. MEPDG runs show similar results for the variation in AGPV and axle load spectra on the performances pavements for the analysis period.

Statewide average values are recommended for VCD, MDF, AGPV and axle load spectra as traffic inputs to the MEPDG for both flexible and rigid pavements. However, the statewide average values do not show significant variation in terms of pavement performance over the years. The statewide average values of 2010 are recommended as the traffic inputs to MEPDG because the highest number of WIM sites are found for this year. HDF does not have any impact in the design of pavement with MEPDG.

Further analysis can be carried out by conducting MEPDG runs for thinner pavements and overlays. The distress models for cracking would be replaced in the future version of MEPDG. MEPDG runs with improved cracking models of MEPDG may show different results. So, further analysis can be carried out when the new MEPDG version is available.

APPENDIX A
VEHICLE CLASSIFICATION DATA

Table A-1: Functional Classification of Roads

FC Code	Description
1	Rural Principal Arterial-Interstate
2	Rural Principal Arterial-Other
6	Rural Minor Arterial
7	Rural Major Collector
8	Minor Collector
9	Rural Local
11	Urban Principal Arterial-Interstate
12	Urban Principal Arterial-Other Freeways and Expressways
14	Urban Principal Arterial-Other
16	Urban Minor Arterial
17	Urban Major Collector
19	Urban Local Road

Table A-2: Direction of Traffic

Direction	Description
0	E/W or SE/NW Combined
1	North
2	Northeast
3	East
4	Southeast
5	South
6	Southwest
7	West
8	Northwest
9	N/S or NE/SW Combined

Table A-3: Vehicle Classification Sites

Site_ID	Direction	N_Lanes	Region	FC Code	AADTT (2007)	AADTT (2008)	AADTT (2009)	AADTT (2010)	AADTT (2011)
00180	1	3	11	11	3965	3756	3373		
00180	5	3	11	11	3905	3713	3596		
00199	1	3	11	11		9042			
00199	5	3	11	11		9495			
00280	1	2	11	14	952	876	818		
00280	5	2	11	14	1067	1003	917		
00299	1	3	11	11		5955	5830		
00299	5	3	11	11		4569	3731		
00580	3	3	11	11		4495	4123		
00580	7	3	11	11		4169	3753		
00581	1	3	11	11				5137	
00698	1	4	11	12					2827
00698	5	3	11	12					2152
00710	1	1	10	16			159	165	151
00710	5	1	10	16			154	182	170
00797	3	1	10	14		189	172		176
00797	7	1	10	14		181	170		169
01280	3	1	1	16	108	100	101	94	
01280	7	1	1	16	97	93	87	86	
01281	1	1	1	6	81	75	58	41	
01281	5	1	1	6	85	77	61	44	
01511	1	3	1	11	2480	2472			
01511	5	3	1	11	2665	2566			
01512	1	3	1	11	2133	2068	1932	1970	1971
01512	5	3	1	11	2327	2273	2074	2123	2126
01800	1	1	1	2	566	526	500	524	510
01800	5	1	1	2	550	451	491	513	507
02180	1	1	2	7		27	27	28	30
02180	5	1	2	7		27	27	28	31
02181	1	1	2	14	74	63	52	52	55
02181	5	1	2	14	53	48	41	44	43
02280	1	1	2	6		46	35	41	40
02280	5	1	2	6		60	46	55	55
02680	1	2	2	12		161	168		155
02680	5	2	2	12		318	318		315
03311	1	2	3	1		2105	1978		2033
03311	5	2	3	1		2066	1946		1995
03381	1	1	3	7		53	41	41	44
03381	5	1	3	7		53	45	48	52
03382	1	2	3	12	589	595			
03382	5	2	3	12	585	534			

Table A-3: - *Continued*

Site_ID	Direction	N_Lanes	Region	FC Code	AADTT (2007)	AADTT (2008)	AADTT (2009)	AADTT (2010)	AADTT (2011)
03482	3	1	3	2	129	97	109	111	
03482	7	1	3	2	143	127	127	134	
03411	1	2	3	1	1338	1273	1155	1214	1195
03411	5	2	3	1	1409	1337	1114	1274	1239
03480	1	1	3	7		100	96		131
03480	5	1	3	7		102	95		147
03481	3	1	3	7	48	39			43
03481	7	1	3	7	40	36			43
03482	3	1	3	2					123
03482	7	1	3	2					144
03580	1	1	3	16	286	266	231	229	
03580	5	1	3	16	247	217	182	181	
03681	1	2	3	12		584	558	574	553
03681	5	2	3	12		455	429	453	435
03680	1	1	3	7		42	46	49	52
03680	5	1	3	7		45	54	55	54
04181	1	2	4	14	476	483	470		
04181	5	2	4	14	453	462	433		
04280	1	1	4	16	57	58			
04280	5	1	4	16	66	59			
04342	1	3	4	12	802	795			753
04342	5	3	4	12	902	880			786
04380	3	2	4	12	45	20	44		
04380	7	2	4	12	62	54	58		
04481	1	1	4	6	43	46	43	46	44
04481	5	1	4	6	42	41	44	45	41
04482	1	1	4	7	37	39	33	32	33
04482	5	1	4	7	38	39	34	34	36
04483	3	2	4	14	259		186		
04483	7	2	4	14	301		195		
04780	1	1	4	7		34	30	27	27
04780	5	1	4	7		32	29	26	28
05183	3	2	5	1			665		
05183	7	2	5	1			662		
05280	3	2	5	1	698	649	598		
05280	7	2	5	1	724	720	702		
05282	3	2	5	2	221	265	267	268	
05282	7	2	5	2	244	273	277	278	
05281	1	1	5	2	205	196	176	162	183
05281	5	1	5	2	193	189	170	159	173
05380	3	2	5	12			571		

Table A-3: - *Continued*

05380	7	2	5	12			624		
05381	1	2	5	16		139	138		
05381	5	2	5	16		137	136		
05384	1	2	5	2	479	350	341	362	
05384	5	2	5	2	435	351	341	356	
05383	3	3	5	14		278	255	266	276
05383	7	3	5	14		361	327	316	316
05480	1	1	5	16	129	110	60	111	105
05480	5	1	5	16	143	125	61	124	118
05484	3	1	5	2	83	77		80	85
05484	7	1	5	2	87	79		82	82
06100	3	2	6	1		756		791	795
06100	7	2	6	1		732		776	770
06280	1	1	6	6	100	108	115		117
06280	5	1	6	6	97	112	109		121
06282	3	2	6	12	121	107	100	119	124
06282	7	2	6	12	115	97	102	120	116
06281	3	1	6	16		46	37	33	
06281	7	1	6	16		52	44	39	
06340	1	1	6	2					160
06340	5	1	6	2					206
06480	1	1	6	7	62	58	56	48	42
06480	5	1	6	7	73	67	70	62	61
06500	3	2	9	2	1496	1493	1082		
06500	7	2	9	2	1569	1515	1096		
06680	3	1	6	16	42	44	40	42	44
06680	7	1	6	16	41	42	37	42	43
07183	1	1	7	2	190	176	159	169	175
07183	5	1	7	2	214	199	182	187	192
07182	1	1	7	14	41	44	41	41	38
07182	5	1	7	14	36	41	38	35	35
07181	3	1	7	2		212	232		231
07181	7	1	7	2	269	251	243		243
07111	1	2	7	1			831	834	
07111	5	2	7	1			848	861	
07100	1	2	7	1	904	864	746	753	
07100	5	2	7	1	1002	936	794	804	
07231	3	1	7	6	112		71	72	66
07231	7	1	7	6	164		75	75	69
07280	1	2	7	14			182	294	
07280	5	2	7	14	645		189	311	
07381	1	2	7	1		564	505	523	
07381	5	2	7	1		567	517	534	

Table A-3: - *Continued*

07380	1	2	7	14		381	367	363	
07380	5	2	7	14		399	376	368	
07480	3	1	7	2	58	61		56	
07480	7	1	7	2	62	65		59	
07481	3	1	7	7	77	91	83	82	79
07481	7	1	7	7	106	95	94	93	88
07580	3	1	7	6	208	193	155	177	
07580	7	1	7	6	278	247	211	210	
07581	3	1	7	6	279	281			
07581	7	1	7	6	342	247			
08180	3	2	8	2		110	106	111	
08180	7	2	8	2		116	110	118	
08280	3	2	8	11	3450	3208	2947	3096	
08280	7	2	8	11	3358	2951	2740	2903	
08380	3	2	8	2					820
08380	7	2	8	2					840
08381	1	1	8	6	65	56	51	50	52
08381	5	1	8	6	68	64	57	57	55
08382	3	2	8	11		1287			
08382	7	2	8	11		1148			
08383	1	2	8	16	249	238	239	228	228
08383	5	2	8	16	252	242	245	240	245
08411	3	2	8	11			3420		
08411	7	2	8	11			3342		
08481	1	1	8	14	444	413	364		387
08481	5	2	8	14	374	347	302		314
08580	1	1	8	16	32	52			
08580	5	1	8	16	26	326			
09121	1	2	9	1		1972	1974		
09121	5	2	9	1		2134	1903		
09181	3	2	9	14		291	279	280	
09181	7	2	9	14		199	192	195	
09180	1	1	9	6	113	107	98	121	164
09180	5	1	9	6	113	105	86	107	141
09122	1	2	9	12	555	564	580	609	
09122	5	2	9	12	480	568	547	587	
09280	1	1	9	14		203	164	171	189
09280	5	1	9	14		198	182	198	203
09381	1	1	9	7	29	32	26	31	29
09381	5	1	9	7	25	27	23	27	26
09380	1	1	9	2	172	170	146	140	
09380	5	1	9	2	162	182	158	156	
09480	1	1	9	14	140	117	118		

Table A-3: - *Continued*

Site_ID	Direction	N_Lanes	Region	FC Code	AADTT (2007)	AADTT (2008)	AADTT (2009)	AADTT (2010)	AADTT (2011)
09480	5	1	9	14	147	136	127		
09580	3	3	9	1	957	906	884		921
09580	7	2	9	1	957	880	857		905
09581	1	1	9	7	53	45	45	48	47
09581	5	1	9	7	56	45	46	50	52
09582	3	1	9	16	73	65	69	69	
09582	7	1	9	16	68	64	65	67	
09631	3	2	9	2	528	516	493		
09631	7	2	9	2	569	564	531		

APPENDIX B

CLUSTER ANALYSIS OF VEHICLE CLASSIFICATION DATA

Table B-1: Cluster analysis of vehicle class distribution for different years.

Site	Direction	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
00698	1					2
00698	5					2
00710	1					2
00710	5					2
00797	3					4
00797	7					4
00180	1	2	2	2		
00180	5	2	2	2		
00199	1		3			
00199	5		3			
00280	1	2	4	2		
00280	5	2	4	2		
00299	1		2	2		
00299	5		2	2		
00580	3		2	2		
00580	7		2	2		
00581	1					2
00710	1			2	2	
00710	5			2	2	
00797	3		4	4		
00797	7		4	4		
01280	3	2	2	2	4	
01280	7	2	2	2	4	
01281	1	3	3		2	
01281	5		3		2	
01511	1	1	1			
01511	5	1	1			
01512	1	1	1	1	1	1
01512	5	1	1	1	1	1
01800	1	3	3		3	3
01800	5	3	3		3	3
02180	1		4	4	4	2
02180	5		4	4	4	2
02181	1	2	2	2	4	2
02181	5	2	2	2	4	2
02280	1		2	2	2	2
02280	5		2	2	2	2
02680	1		2	2		2
02680	5		3			3
03311	1		1	1		1
03311	5		1	1		1

Table B-1: *Continued*

Site	Direction	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
03381	1		3		3	3
03381	5		3		3	3
03382	1	1	1			
03382	5	1	1			
03411	1	1	1	1	1	1
03411	5	1	1	1	1	1
03480	1		4	4		4
03480	5		4	4		4
03481	3	2	2			2
03481	7	2	2			2
03482	3	3	3		3	3
03482	7	3	3		3	3
03580	1	2	2	2	2	
03580	5	2	2		2	
03680	1		4	4	4	4
03680	5		4	2	4	4
03681	1		2	2	2	2
03681	5		2	2	2	2
04181	1	1	1	1		
04181	5	1	1	1		
04280	1	2	4			
04280	5	2	4			
04342	1	2	2			2
04342	5	2	2			2
04380	3	4	4	4		
04380	7	4	4	4		
04481	1	2	2	2	2	2
04481	5	2	2	2	2	2
04482	1	4	4	4	4	4
04482	5	4	4	4	4	4
04483	3	3				
04483	7	3				
04780	1		4	4	4	4
04780	5		4	4	4	4
05183	3			1		
05183	7			1		
05280	3	1	1	1		
05280	7	1	1	1		
05281	1	3	3		3	3
05281	5	1	1	1	1	1
05282	3	2	3		3	

Table B-1: *Continued*

Site	Direction	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
05282	7		3		3	
05380	3			2		
05380	7			2		
05381	1		2	2		
05381	5		2	2		
05383	3		2	2	2	2
05383	7		2	2	2	2
05384	1	2	3		3	
05384	5	3	3		3	
05480	1	2	2	2	2	2
05480	5	2	2	2	2	2
05484	3	3			3	3
05484	7	3			3	3
06100	3		1		1	1
06100	7		1		1	1
06280	1	3	3			3
06280	5	3	3			3
06281	3		2	2	4	
06281	7		4	4	4	
06282	3	2	2	2	2	2
06282	7	2	2	2	2	2
06340	1					1
06340	5					1
06480	1	4	4	4	4	4
06480	5	4	4	4	4	4
06500	3	1	1	1		
06500	7	1	1	1		
06680	3	4	4	4	4	4
06680	7	4	4	4	4	4
07100	1	1	1	1	1	
07100	5	1	1	1	1	
07111	1			1	1	
07111	5			1	1	
07181	3	1	1	1		1
07181	7	1	1	1		1
07182	1	4	4	4	4	4
07182	5	4	4	4	4	4
07183	1	3	3		3	3
07183	5	3	3		3	3
07231	3	2		2	4	2
07231	7	4		2	4	2

Table B-1: *Continued*

Site	Direction	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
07280	1	4		2	2	
07280	5	4		2	2	
07380	1		3		3	
07380	5		3		3	
07381	1		1	1	1	
07381	5		1	1	1	
07480	3	2	2		2	
07480	7	2	2		2	
07481	3	3	3		3	3
07481	7	3	3		3	3
07580	3	3	3		3	
07580	7	3	3		3	
07581	3	2	2			
07581	7	4	2			
08180	3		3		2	
08180	7		3		3	
08280	3	1	1	1	1	
08280	7	1	1	1	1	
08380	3					3
08380	7					3
08381	1	2	4	2	4	4
08381	5	2	2	2	4	4
08382	3		1			
08382	7		1			
08383	1	2	2	2	4	2
08383	5	2	2	2	4	2
08411	3			1		
08411	7			1		
08481	1	2	2	2		2
08481	5	2	2	2		2
08580	3	4	2			
08580	7	4	2			
09121	1		1	1		
09121	5		1	1		
09122	1	4	4	4	4	
09122	5	2	4	4	4	
09180	1	2	2	2	2	2
09180	5	2	2	2	2	2
09181	3		2	2	4	
09181	7		4	4	4	
09280	1		3		3	3

Table B-1: *Continued*

Site	Direction	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
09280	5		3		3	3
09380	1	3	3		2	
09380	5	3	3		3	
09381	1	2	2	2	2	2
09381	5	2	2	2	4	2
09480	1	2	2	2		
09480	5	2	2	2		
09580	3	1	1	1		1
09580	7	1	1	1		1
09581	1	2	2	2	2	2
09581	5	2	2	2	2	2
09582	3	2	2	2	4	
09582	7	2	2	2	4	
09631	3	1	1	1		
09631	7	1	1	1		

Table B-2: Cluster analysis of monthly distribution factors for different years.

Site	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
00280	1	1	2		
00581				1	
00698					5
00710				1	5
00797					5
01280	1	2	3	3	
01281	4	1	Outlier	4	
01512				1	1
01800	1	2	3	1	1
02180				3	2
02181	2	3	3	3	5
02280				3	2
02680					5
03311					1
03381				2	5
03411				1	1
03480					5
03481	3	3			3
03482	2	1	3	2	5
03580	1	1	2	1	
03680				3	3

Table B-2: *Continued*

03681				1	1
04181	1	1	3		
04280	2	1			
04380	3	Outlier	1		
04342					1
04481	2	2	2	3	2
04482		3	1	4	5
04780				3	5
05280	1	1	3		
05281	1	1	2	1	1
05282				1	
05383				1	1
05384				2	
05480				2	1
05484	2	1		2	5
06100				2	1
06280	1	2	3		1
06281				2	
06282	2	1	3	1	2
06340					1
06480	3	3	1	Outlier	3
06680	2	1	3	2	5
07100	1	1	2	1	
07111				1	
07181	1	2	3		1
07182	2	1	Outlier	3	3
07183				2	5
07231				3	2
07280				1	
07380				2	
07381				1	
07480	4	3		3	
07481	1	1	3	1	1
07482	4				
07580	1	1	3	1	
08180				1	
08280	1	1	3	1	
08380					1
08381	1	1	2	1	5
08383	1	1	3	1	1
08481	1	1	3		5
09122				1	
09180	4	3	3	2	4

Table B-2: *Continued*

Site	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
09181				2	
09280				1	1
09380	2	1	3	1	
09381	Outlier	3	Outlier	4	5
09480	1	1	2		
09580	1	1	3		5
09581	4	3	3	3	4
09582	1	1	3	2	
09631	1	1	3		

Table B-3: Cluster analysis of hourly distribution factors for different years.

Site	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
00180	4	1	3		
00199		1			
00280	3	1	3		
00299		1	3		
00580		1	3		
00581				3	
00698					4
00710			2	1	1
00797		2	2		2
01280	1	2	2	1	
01281	1	2	1	1	
01511	4	1			
01512	4	1	4	3	4
01800	4	1	3	3	4
02180		2	1	1	1
02181	1	2	2	2	1
02280		2	1	1	3
02680		2	2		2
03311		4	4		4
03381		1	1	3	3
03382		1			
03411	4	1	4	3	4
03480		2	2		3
03481	1	2			2
03482	1	2	1	1	2
03580	1	2	1	1	
03680		2	2	2	1

Table B-3: *Continued*

Site	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
03681		2	1	1	3
04181	4	4	4		
04280	2	2			
04342	1	2			2
04380	3	1	3		
04481	3	2	1	1	3
04482	1	2	2	1	1
04483	1		1		
04780		2	2	2	1
05183			4		
05280	4	1	4		
05281	4	1	3	3	4
05282	3	1	3	3	
05380			1		
05381		3	4		
05382	4				
05383		2	1	1	3
05384	3	1	1	3	
05480	1	2	1	1	3
05484	1	2		1	3
06100		1		4	4
06280	4	1	3		4
06281		2	2	2	
06282	2	2	2	2	3
06340					4
06480	2	2	2	2	1
06500	4	4	4		
06680	2	2	2	1	1
07100	4	4	4	4	
07111			4	4	
07181	4	1	3		4
07182	2	2	2	2	1
07183	3	1	1	3	4
07231	1		1	2	1
07280	3		1	1	
07380		1	2	1	
07381		4	4	4	
07480	1	2		1	
07481	1	2	1	1	2
07580	3	1	3	3	
07581	3	1			

Table B-3: *Continued*

Site	Cluster (2007)	Cluster (2008)	Cluster (2009)	Cluster (2010)	Cluster (2011)
08180		2	2	1	
08280	4	4	4	4	
08380					4
08381	1	2	2	1	1
08382		4			
08383	1	2	1	1	1
08411			4		
08481	1	2	1		3
08580	2	3			
09121		4	4		
09122	1	2	1	1	
09180	1	2	2	1	1
09181		2	2	2	
09280		2	2	1	3
09380	1	2	1	1	
09381	1	2	1	1	3
09480	1	2	1		
09580	4	4	4		4
09581	1	2	1	1	1
09582	1	2	1	1	
09631	4	4	4		

APPENDIX C

STATEWIDE AVERAGE AXLE LOAD SPECTRA (2010)

Table C-1: Statewide Average Single Axle Load Spectra for VC 4

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	1.90	3.05	1.40	1.77	1.24	1.93	1.20	1.15	2.53	1.24	1.56	1.99
2	1.54	0.51	0.57	0.55	0.79	1.37	1.29	0.54	0.56	1.00	0.71	0.45
3	1.66	1.50	1.31	1.88	1.63	2.26	1.79	1.02	1.21	1.90	2.20	2.04
4	3.98	3.06	3.02	2.91	3.49	3.84	3.90	2.45	3.39	4.22	2.85	2.93
5	4.16	3.07	2.55	3.97	3.73	3.58	3.67	2.19	3.68	3.68	2.60	3.28
6	5.57	5.19	4.95	6.41	5.11	4.88	6.25	3.89	3.49	5.09	3.62	3.67
7	6.93	5.96	5.68	6.24	6.32	6.31	6.02	5.40	4.93	6.18	5.93	5.85
8	10.29	10.80	11.29	10.44	9.83	8.94	9.12	10.21	8.88	10.28	11.41	10.48
9	9.38	10.27	11.46	9.73	9.25	8.66	9.95	9.46	9.05	8.66	10.68	9.58
10	12.09	12.21	13.19	11.11	13.32	10.23	11.22	12.94	12.87	11.61	14.82	11.59
11	10.91	11.89	11.93	11.67	11.88	12.80	11.08	14.04	13.12	12.35	11.47	12.52
12	6.51	8.71	8.82	8.68	8.23	8.69	8.39	9.55	9.91	8.95	9.58	8.85
13	6.84	7.55	8.23	7.85	7.67	7.74	8.09	7.96	9.04	8.30	6.94	7.57
14	3.99	3.90	4.81	4.49	4.73	4.30	4.86	5.41	5.72	5.77	4.85	4.67
15	3.64	3.36	3.45	3.55	3.90	3.66	3.81	3.96	3.98	4.17	4.02	3.64
16	2.06	2.67	1.66	2.03	2.26	1.84	1.93	2.18	2.50	2.17	1.97	2.32
17	1.66	1.14	1.35	1.84	1.98	1.35	1.51	2.25	1.42	1.31	1.46	1.74
18	0.79	0.73	0.99	1.26	0.97	1.88	1.15	1.02	0.96	0.79	0.94	1.03
19	0.78	0.85	0.89	0.98	0.78	0.86	1.07	0.73	0.92	0.57	0.65	0.84
20	0.42	0.54	0.44	0.48	0.64	0.49	0.81	0.88	0.34	0.52	0.34	0.47
21	0.37	1.34	0.21	0.34	0.58	0.45	0.67	0.94	0.33	0.22	0.24	0.71

Table C-1: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.44	0.47	0.22	0.41	0.42	0.47	0.67	0.81	0.30	0.28	0.27	1.22
23	0.19	0.20	0.09	0.16	0.19	1.20	0.32	0.22	0.10	0.10	0.21	1.10
24	0.23	0.30	0.27	0.17	0.17	0.51	0.23	0.19	0.19	0.11	0.13	0.51
25	0.27	0.22	0.23	0.07	0.09	0.16	0.12	0.09	0.09	0.10	0.09	0.06
26	0.26	0.06	0.05	0.11	0.13	0.11	0.18	0.06	0.12	0.06	0.09	0.06
27	0.07	0.05	0.07	0.02	0.09	0.22	0.14	0.06	0.08	0.05	0.07	0.15
28	0.34	0.07	0.04	0.04	0.06	0.15	0.03	0.04	0.06	0.03	0.04	0.03
29	0.10	0.18	0.19	0.01	0.02	0.11	0.11	0.21	0.05	0.04	0.02	0.03
30	0.06	0.01	0.23	0.00	0.03	0.09	0.05	0.06	0.01	0.02	0.03	0.02
31	0.13	0.02	0.01	0.03	0.18	0.11	0.02	0.02	0.01	0.03	0.01	0.02
32	0.23	0.00	0.02	0.01	0.04	0.05	0.03	0.00	0.02	0.02	0.00	0.01
33	0.17	0.00	0.06	0.01	0.02	0.04	0.02	0.00	0.01	0.04	0.01	0.00
34	0.03	0.00	0.03	0.00	0.02	0.06	0.01	0.00	0.01	0.01	0.01	0.00
35	0.02	0.00	0.01	0.01	0.01	0.03	0.02	0.01	0.00	0.00	0.00	0.00
36	0.03	0.00	0.01	0.46	0.00	0.02	0.01	0.00	0.01	0.01	0.00	0.00
37	0.06	0.01	0.01	0.12	0.01	0.02	0.00	0.00	0.02	0.02	0.01	0.01
38	0.12	0.01	0.01	0.00	0.04	0.14	0.01	0.01	0.01	0.01	0.03	0.03
39	1.69	0.05	0.19	0.13	0.08	0.39	0.20	0.02	0.03	0.04	0.09	0.48

Table C-2: Statewide Average Single Axle Load Spectra for VC 5

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	4.85	1.60	1.45	1.18	1.23	2.27	1.75	0.94	1.11	1.21	0.99	1.21
2	5.21	2.73	2.86	3.03	2.91	3.63	3.77	2.98	2.68	2.90	2.14	2.49
3	5.35	3.42	3.83	3.86	3.76	4.96	5.15	4.10	3.84	3.95	3.16	3.31
4	8.88	6.93	7.32	7.57	6.76	7.96	7.62	6.50	6.41	6.80	6.69	6.93
5	8.66	8.40	8.94	8.92	8.35	8.61	8.22	7.84	8.14	8.71	8.77	8.85
6	12.77	13.59	13.46	13.41	13.62	13.13	12.42	13.17	13.85	14.39	14.85	14.54
7	9.73	10.74	10.95	10.67	10.91	10.59	10.59	10.65	11.42	11.01	11.45	11.25
8	9.70	11.52	11.90	11.41	11.53	10.86	11.45	12.40	11.96	11.64	12.03	11.67
9	6.71	7.86	8.14	7.46	7.82	7.55	7.92	8.26	8.12	8.12	8.32	7.80
10	6.81	7.68	7.99	8.07	7.82	7.56	7.71	8.39	8.10	7.86	8.15	7.88
11	5.10	6.06	5.83	6.15	6.13	5.57	5.75	6.21	6.32	5.93	6.19	5.86
12	3.13	3.82	3.60	3.76	3.88	3.39	3.69	3.83	3.66	3.69	3.86	3.55
13	2.76	3.30	3.31	3.53	3.83	3.35	3.40	3.62	3.73	3.34	3.46	3.69
14	1.80	2.11	2.16	2.15	2.27	2.04	2.28	2.26	2.22	2.11	1.97	2.35
15	1.55	2.03	1.94	2.05	2.19	1.95	1.99	2.03	2.08	2.05	1.92	1.90
16	1.14	1.39	1.20	1.33	1.39	1.19	1.20	1.30	1.33	1.33	1.23	1.23
17	1.15	1.39	1.14	1.32	1.33	1.19	1.23	1.30	1.23	1.22	1.06	1.23
18	0.83	0.98	0.77	0.83	0.87	0.71	0.77	0.89	0.80	0.77	0.66	0.78
19	0.73	0.92	0.72	0.78	0.85	0.74	0.69	0.81	0.83	0.71	0.68	0.76
20	0.49	0.60	0.44	0.45	0.52	0.47	0.45	0.50	0.45	0.50	0.40	0.46
21	0.50	0.58	0.47	0.44	0.46	0.48	0.44	0.47	0.37	0.47	0.45	0.47

Table C-2: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.44	0.49	0.33	0.33	0.34	0.29	0.33	0.34	0.36	0.29	0.36	0.37
23	0.31	0.33	0.19	0.20	0.20	0.23	0.20	0.22	0.22	0.19	0.16	0.24
24	0.31	0.32	0.20	0.21	0.21	0.19	0.20	0.20	0.16	0.17	0.19	0.22
25	0.16	0.20	0.11	0.14	0.12	0.13	0.11	0.11	0.15	0.13	0.20	0.15
26	0.17	0.16	0.12	0.12	0.12	0.13	0.15	0.11	0.12	0.11	0.17	0.17
27	0.11	0.11	0.07	0.09	0.08	0.08	0.07	0.08	0.05	0.07	0.11	0.08
28	0.08	0.17	0.07	0.10	0.08	0.09	0.07	0.09	0.06	0.04	0.08	0.10
29	0.10	0.10	0.04	0.06	0.04	0.06	0.05	0.06	0.05	0.04	0.05	0.06
30	0.08	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.05	0.03	0.06
31	0.06	0.06	0.04	0.04	0.04	0.05	0.02	0.03	0.01	0.02	0.03	0.06
32	0.05	0.04	0.05	0.04	0.04	0.05	0.03	0.04	0.01	0.02	0.02	0.03
33	0.03	0.04	0.03	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02
34	0.03	0.02	0.01	0.01	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.02
35	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.01	0.01	0.02	0.02	0.01
36	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02
37	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01
38	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.03
39	0.11	0.12	0.14	0.06	0.07	0.22	0.07	0.04	0.02	0.03	0.05	0.08

Table C-3: Statewide Average Single Axle Load Spectra for VC 6

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	8.04	1.67	2.00	1.44	1.15	1.57	1.73	0.81	0.48	0.78	0.76	1.13
2	3.12	1.17	1.22	1.54	1.58	1.60	1.48	1.06	1.10	1.02	1.00	1.01
3	3.39	2.00	2.07	2.01	2.13	2.42	2.33	1.91	1.86	2.08	1.94	1.82
4	4.36	3.09	3.15	3.26	2.55	4.13	3.96	2.97	2.68	3.48	2.81	3.02
5	3.03	3.12	3.09	2.77	2.59	3.92	3.41	2.35	2.26	2.54	2.50	2.52
6	4.72	5.00	5.30	5.13	4.54	5.56	4.89	3.34	3.70	4.04	3.74	4.60
7	5.53	6.46	6.64	6.34	5.74	6.15	5.26	4.93	5.55	5.33	5.44	5.94
8	10.52	11.70	11.46	10.75	9.57	11.02	10.02	10.72	11.13	10.49	11.32	11.49
9	9.86	11.14	11.79	10.76	9.81	10.62	10.61	11.47	11.88	12.27	12.03	11.40
10	12.01	13.00	13.28	13.14	12.50	12.47	12.80	14.01	14.60	14.91	16.04	13.51
11	9.59	11.19	10.81	11.06	11.59	11.21	11.68	12.13	11.84	12.27	11.74	10.90
12	6.24	7.17	7.33	7.18	7.92	6.92	7.76	8.06	8.14	7.61	7.64	7.15
13	6.07	6.16	6.20	6.90	8.45	6.51	7.68	8.41	7.83	7.20	6.57	6.82
14	3.13	3.99	3.62	4.23	5.05	3.75	4.45	5.28	4.67	4.51	4.83	4.26
15	2.56	3.47	3.52	3.68	4.28	3.55	3.96	4.01	3.89	3.41	3.53	3.90
16	1.51	2.42	2.13	2.23	2.62	2.08	1.97	2.44	2.33	2.11	1.97	2.17
17	1.65	1.99	1.78	1.93	2.29	1.77	1.84	1.91	1.85	1.70	1.75	2.43
18	0.90	1.28	0.84	1.25	1.10	1.09	1.01	1.17	1.28	1.09	1.09	1.47
19	1.01	1.28	0.91	1.24	1.07	0.91	1.05	1.05	1.02	0.95	1.07	1.45
20	0.66	0.68	0.69	0.73	0.63	0.48	0.47	0.58	0.47	0.68	0.61	0.91
21	0.45	0.55	0.48	0.71	0.49	0.54	0.49	0.49	0.44	0.51	0.56	0.74

Table C-3: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.34	0.38	0.48	0.46	0.36	0.35	0.31	0.29	0.30	0.30	0.25	0.48
23	0.23	0.27	0.18	0.18	0.27	0.27	0.20	0.10	0.14	0.17	0.17	0.23
24	0.19	0.29	0.13	0.16	0.27	0.16	0.16	0.14	0.11	0.11	0.15	0.13
25	0.07	0.14	0.10	0.12	0.24	0.15	0.08	0.07	0.06	0.06	0.06	0.07
26	0.09	0.10	0.09	0.13	0.17	0.07	0.08	0.04	0.06	0.08	0.09	0.09
27	0.10	0.02	0.13	0.12	0.19	0.07	0.05	0.04	0.05	0.04	0.06	0.09
28	0.05	0.03	0.13	0.06	0.14	0.06	0.04	0.03	0.05	0.03	0.05	0.04
29	0.03	0.04	0.05	0.04	0.07	0.03	0.02	0.04	0.03	0.03	0.03	0.03
30	0.07	0.02	0.04	0.05	0.05	0.07	0.01	0.02	0.04	0.02	0.01	0.01
31	0.03	0.01	0.02	0.06	0.06	0.02	0.01	0.02	0.01	0.03	0.00	0.02
32	0.03	0.02	0.03	0.04	0.05	0.06	0.03	0.03	0.01	0.00	0.01	0.04
33	0.01	0.02	0.02	0.03	0.05	0.04	0.02	0.01	0.01	0.01	0.02	0.02
34	0.02	0.00	0.02	0.03	0.04	0.02	0.00	0.00	0.01	0.01	0.01	0.01
35	0.02	0.00	0.01	0.04	0.07	0.02	0.01	0.00	0.00	0.01	0.00	0.00
36	0.03	0.01	0.01	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.01	0.01
37	0.02	0.00	0.02	0.01	0.04	0.04	0.02	0.00	0.01	0.02	0.00	0.00
38	0.01	0.00	0.02	0.02	0.03	0.03	0.01	0.00	0.01	0.01	0.01	0.01
39	0.26	0.05	0.16	0.09	0.17	0.19	0.04	0.01	0.04	0.05	0.04	0.04

Table C-4: Statewide Average Single Axle Load Spectra for VC 7

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	9.20	4.52	3.38	2.97	1.78	2.56	2.25	1.31	1.67	1.26	1.79	4.01
2	2.99	2.47	2.30	2.52	2.79	2.73	3.16	1.82	1.16	1.74	1.40	1.69
3	3.88	2.67	2.99	2.73	2.86	3.56	2.88	2.53	2.61	2.73	1.94	2.96
4	4.58	3.11	3.87	4.93	4.25	5.41	4.56	3.67	4.09	4.25	3.05	1.98
5	6.20	4.31	5.48	3.81	5.24	3.98	5.05	3.76	3.66	3.23	2.84	2.92
6	6.52	4.17	5.79	4.84	5.33	6.14	5.86	4.79	6.22	5.41	6.43	7.16
7	4.09	4.10	3.62	6.16	4.03	5.21	5.50	4.53	4.72	3.92	4.66	5.55
8	5.45	5.45	5.87	6.02	6.65	6.32	6.23	5.50	5.73	5.83	6.02	7.18
9	4.35	4.56	5.50	4.78	4.93	5.90	5.14	4.95	5.90	5.33	3.92	4.65
10	5.73	7.15	7.06	6.68	6.49	7.05	7.25	8.81	7.12	6.65	6.53	6.74
11	6.74	7.11	6.73	6.46	7.84	8.20	8.75	7.57	7.66	8.54	7.18	6.18
12	4.95	6.08	5.01	6.35	5.49	5.55	6.81	5.89	6.61	5.68	8.28	5.88
13	6.33	6.75	6.40	6.73	7.12	6.83	6.56	9.13	7.81	8.29	7.57	6.78
14	4.71	5.50	6.61	5.56	5.69	5.78	4.99	5.77	6.09	6.61	5.57	6.53
15	5.46	6.81	5.75	5.87	6.01	6.42	5.77	7.01	6.98	6.34	9.06	7.91
16	3.82	5.11	4.57	5.30	4.41	4.49	3.47	6.46	5.45	5.07	8.75	6.01
17	2.87	5.08	4.63	5.90	4.58	3.81	4.51	5.01	4.92	4.98	4.56	5.69
18	2.52	4.64	3.25	3.05	3.47	2.92	2.70	3.17	3.29	4.03	2.49	3.37
19	2.06	3.17	3.03	2.75	2.79	3.36	2.80	2.54	2.74	4.02	2.15	1.98
20	2.03	2.17	3.09	1.71	1.56	1.16	1.80	1.68	1.46	1.78	2.03	1.31
21	1.76	1.36	1.89	1.69	1.40	0.93	1.09	1.22	1.40	1.53	1.49	0.76

Table C-4: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.81	0.93	1.26	0.97	0.96	0.45	1.17	1.00	0.75	1.10	0.77	0.76
23	0.69	0.73	0.70	0.40	0.99	0.40	0.66	0.48	0.45	0.41	0.51	0.59
24	0.45	0.82	0.22	0.37	1.31	0.23	0.35	0.47	0.41	0.25	0.16	0.26
25	0.30	0.26	0.13	0.25	0.38	0.20	0.22	0.26	0.15	0.13	0.11	0.23
26	0.36	0.15	0.22	0.15	0.33	0.07	0.11	0.13	0.24	0.13	0.18	0.18
27	0.14	0.12	0.10	0.12	0.18	0.10	0.05	0.03	0.03	0.11	0.17	0.15
28	0.33	0.05	0.03	0.22	0.14	0.03	0.11	0.12	0.23	0.14	0.08	0.16
29	0.14	0.01	0.09	0.10	0.10	0.01	0.05	0.06	0.06	0.02	0.01	0.01
30	0.15	0.01	0.11	0.09	0.11	0.01	0.01	0.03	0.01	0.05	0.02	0.07
31	0.02	0.02	0.02	0.06	0.11	0.01	0.01	0.01	0.01	0.02	0.02	0.06
32	0.08	0.00	0.04	0.06	0.06	0.02	0.02	0.03	0.10	0.01	0.06	0.06
33	0.04	0.00	0.01	0.02	0.05	0.01	0.01	0.02	0.01	0.01	0.04	0.00
34	0.03	0.00	0.02	0.03	0.02	0.01	0.01	0.03	0.00	0.04	0.01	0.00
35	0.00	0.05	0.03	0.03	0.05	0.01	0.00	0.07	0.05	0.04	0.00	0.06
36	0.00	0.00	0.01	0.04	0.04	0.00	0.00	0.03	0.02	0.01	0.02	0.01
37	0.00	0.05	0.01	0.03	0.07	0.00	0.01	0.00	0.01	0.03	0.04	0.01
38	0.03	0.03	0.01	0.05	0.03	0.00	0.01	0.01	0.02	0.03	0.01	0.02
39	0.13	0.36	0.12	0.15	0.24	0.06	0.02	0.05	0.09	0.17	0.04	0.03

Table C-5: Statewide Average Single Axle Load Spectra for VC 8

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	11.10	7.49	11.52	18.99	21.44	20.73	20.99	18.05	17.69	13.48	8.11	6.73
2	4.29	3.45	3.62	6.17	10.13	9.37	11.56	10.42	9.36	6.69	4.47	3.21
3	3.55	3.45	3.14	3.60	5.03	5.27	5.97	5.35	4.52	3.76	3.39	3.06
4	4.55	4.40	4.24	4.77	4.46	5.19	4.87	4.24	3.73	3.74	3.52	4.33
5	4.85	4.57	3.98	4.54	3.82	4.37	3.99	3.40	3.25	3.88	3.77	4.49
6	8.56	8.46	8.41	7.23	6.67	7.02	5.87	5.92	6.19	7.04	8.52	8.45
7	9.30	9.83	9.27	7.82	7.22	7.22	6.82	6.97	7.60	9.22	10.06	11.03
8	12.00	13.17	12.97	9.99	9.14	9.59	9.14	9.96	11.00	12.07	14.16	14.24
9	7.90	8.87	8.14	6.58	5.99	6.19	5.96	7.18	6.97	7.92	8.73	8.82
10	7.09	7.66	6.74	6.24	5.40	5.53	5.25	6.02	5.99	6.74	7.73	7.22
11	5.29	5.89	5.19	4.74	4.06	3.99	3.58	4.24	4.48	5.03	5.49	5.37
12	3.11	3.61	4.03	3.33	2.92	2.64	2.59	2.98	3.12	3.30	3.89	3.65
13	3.56	3.88	4.06	3.61	2.90	2.87	2.72	3.08	3.33	3.59	3.86	3.84
14	2.37	2.89	2.72	2.50	2.08	1.87	1.94	2.31	2.34	2.34	2.66	2.73
15	2.45	2.54	2.95	2.52	2.20	1.96	1.98	2.32	2.33	2.55	2.51	2.91
16	1.68	1.80	2.07	1.54	1.32	1.31	1.37	1.49	1.71	1.90	1.74	2.12
17	1.72	1.76	1.69	1.49	1.35	1.32	1.35	1.65	1.77	1.80	1.86	1.86
18	1.05	1.19	1.25	1.01	0.87	0.81	0.95	1.13	1.11	1.17	1.20	1.32
19	1.04	1.10	1.04	0.95	0.83	0.79	0.88	0.99	1.09	1.05	1.21	1.22
20	0.70	0.74	0.68	0.58	0.54	0.52	0.56	0.60	0.65	0.66	0.83	0.78
21	0.68	0.73	0.48	0.49	0.48	0.45	0.53	0.49	0.60	0.62	0.65	0.71

Table C-5: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.64	0.51	0.46	0.32	0.32	0.26	0.26	0.31	0.33	0.40	0.47	0.48
23	0.32	0.26	0.24	0.21	0.19	0.15	0.17	0.19	0.20	0.21	0.28	0.29
24	0.30	0.36	0.23	0.23	0.17	0.10	0.12	0.19	0.18	0.18	0.21	0.25
25	0.21	0.22	0.16	0.09	0.07	0.09	0.09	0.09	0.08	0.11	0.12	0.16
26	0.22	0.16	0.09	0.08	0.07	0.08	0.08	0.11	0.06	0.11	0.12	0.17
27	0.18	0.09	0.09	0.04	0.05	0.04	0.05	0.04	0.04	0.06	0.09	0.12
28	0.17	0.09	0.06	0.04	0.05	0.03	0.05	0.03	0.05	0.05	0.06	0.08
29	0.09	0.09	0.03	0.02	0.04	0.03	0.04	0.02	0.03	0.03	0.02	0.05
30	0.14	0.08	0.07	0.03	0.03	0.02	0.03	0.03	0.02	0.04	0.01	0.06
31	0.10	0.06	0.05	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.04
32	0.07	0.05	0.01	0.02	0.01	0.01	0.02	0.03	0.01	0.04	0.03	0.02
33	0.09	0.06	0.01	0.01	0.01	0.02	0.03	0.02	0.00	0.01	0.03	0.02
34	0.08	0.05	0.00	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
35	0.02	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
36	0.07	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01
37	0.03	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.00	0.00	0.02	0.01
38	0.06	0.00	0.01	0.01	0.00	0.02	0.03	0.02	0.01	0.00	0.01	0.01
39	0.31	0.28	0.14	0.05	0.03	0.04	0.04	0.02	0.03	0.05	0.03	0.09

Table C-6: Statewide Average Single Axle Load Spectra for VC 9

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	6.43	0.72	0.71	0.89	0.73	1.05	1.04	0.66	0.71	0.82	0.73	0.73
2	1.44	1.13	1.41	1.67	1.48	1.86	1.53	1.33	1.41	1.46	1.49	1.33
3	2.10	1.84	2.11	2.29	2.05	2.23	2.05	2.13	2.20	2.15	2.37	2.21
4	3.36	3.15	2.94	3.23	2.93	4.33	3.72	2.83	2.95	2.85	2.88	3.48
5	2.72	2.53	2.64	3.06	2.24	4.25	3.68	1.93	1.90	2.25	2.07	2.36
6	4.17	3.57	3.66	5.17	4.20	5.07	3.55	2.69	2.93	3.37	3.17	3.56
7	5.97	5.77	5.87	6.52	6.30	6.32	4.77	5.07	5.36	6.15	5.88	5.61
8	13.96	15.01	15.01	14.81	15.42	14.54	13.41	15.04	15.42	15.64	16.74	15.54
9	15.88	17.51	17.42	16.41	16.79	16.36	17.40	18.92	19.00	18.83	19.11	18.77
10	17.39	19.00	19.16	17.63	18.33	17.87	19.65	21.05	21.09	19.89	19.75	20.06
11	9.39	10.89	10.67	9.88	10.22	9.65	10.99	11.08	10.94	10.56	10.21	10.41
12	3.78	4.58	4.24	4.28	4.20	3.89	4.31	4.12	3.93	4.16	3.79	3.77
13	2.91	3.37	3.21	3.30	3.39	2.66	3.20	3.06	2.78	2.78	2.60	2.72
14	1.93	2.04	1.96	2.01	2.03	1.81	2.07	1.95	1.88	1.74	1.80	1.58
15	2.07	2.13	2.29	2.28	2.24	2.03	2.24	2.22	1.92	1.99	1.92	1.98
16	1.33	1.46	1.64	1.51	1.61	1.38	1.48	1.43	1.48	1.39	1.33	1.36
17	1.40	1.42	1.40	1.44	1.58	1.44	1.48	1.48	1.34	1.29	1.33	1.34
18	0.77	0.88	0.89	0.83	0.98	0.83	0.84	0.84	0.79	0.76	0.75	0.77
19	0.78	0.88	0.71	0.85	0.83	0.68	0.82	0.68	0.66	0.62	0.60	0.68
20	0.44	0.49	0.47	0.45	0.53	0.38	0.49	0.36	0.36	0.32	0.37	0.40
21	0.46	0.34	0.36	0.38	0.50	0.27	0.31	0.30	0.28	0.24	0.30	0.33

Table C-6: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.31	0.34	0.27	0.22	0.35	0.24	0.26	0.24	0.18	0.20	0.20	0.21
23	0.19	0.15	0.14	0.13	0.21	0.13	0.16	0.12	0.12	0.10	0.12	0.14
24	0.18	0.19	0.14	0.17	0.18	0.11	0.11	0.14	0.10	0.09	0.10	0.14
25	0.09	0.11	0.10	0.12	0.10	0.09	0.07	0.08	0.07	0.07	0.04	0.11
26	0.08	0.08	0.11	0.10	0.08	0.08	0.04	0.04	0.05	0.06	0.06	0.08
27	0.07	0.07	0.06	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.03	0.04
28	0.06	0.07	0.06	0.06	0.07	0.02	0.02	0.05	0.04	0.04	0.04	0.05
29	0.03	0.03	0.02	0.03	0.04	0.04	0.03	0.02	0.02	0.02	0.05	0.01
30	0.01	0.02	0.03	0.02	0.05	0.03	0.02	0.02	0.01	0.02	0.03	0.03
31	0.01	0.01	0.05	0.02	0.03	0.01	0.01	0.01	0.01	0.00	0.02	0.02
32	0.02	0.01	0.03	0.01	0.03	0.02	0.01	0.00	0.00	0.01	0.01	0.02
33	0.02	0.01	0.01	0.01	0.02	0.03	0.02	0.00	0.00	0.01	0.01	0.01
34	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00
35	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01
36	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01
37	0.02	0.00	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
38	0.01	0.00	0.00	0.01	0.01	0.03	0.01	0.00	0.00	0.00	0.01	0.01
39	0.10	0.09	0.09	0.05	0.08	0.11	0.05	0.02	0.00	0.01	0.02	0.07

Table C-7: Statewide Average Single Axle Load Spectra for VC 10

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	2.75	7.29	2.18	1.31	0.49	1.22	0.78	0.40	0.82	1.45	0.66	2.68
2	1.28	0.55	0.62	0.79	0.57	1.42	0.79	0.59	0.64	0.50	0.65	0.68
3	1.67	1.10	1.12	1.09	1.15	1.67	1.56	1.10	1.25	1.15	1.06	1.04
4	2.05	2.21	2.05	2.39	1.92	3.05	3.04	1.71	1.88	1.89	2.98	2.03
5	1.81	2.20	1.65	2.61	1.97	4.04	3.66	1.89	1.65	2.78	1.51	2.02
6	6.14	3.50	3.11	5.34	3.97	5.36	4.26	2.97	3.24	3.34	3.59	3.03
7	4.98	5.79	6.48	6.88	7.07	6.33	5.67	5.98	5.79	5.51	7.25	5.64
8	13.45	14.95	16.49	14.56	14.76	14.36	13.85	15.59	16.04	16.66	14.30	16.02
9	14.43	17.03	17.81	16.50	17.86	16.52	17.67	17.92	19.85	17.86	20.35	19.42
10	16.53	17.15	19.46	20.60	20.11	18.84	18.73	20.97	21.04	21.03	20.18	20.62
11	13.24	11.60	12.37	10.44	11.98	10.72	12.96	13.34	13.30	13.14	12.89	11.54
12	4.57	6.03	5.09	5.34	8.06	6.08	5.61	6.21	5.06	4.92	4.82	4.77
13	2.93	4.05	4.14	3.68	3.55	4.71	3.73	4.87	2.97	3.38	4.09	3.90
14	2.02	1.75	1.45	2.13	1.90	1.77	3.16	1.96	1.83	2.09	2.02	1.55
15	1.72	1.35	1.77	1.32	1.34	1.16	1.92	1.52	1.70	1.38	1.13	1.31
16	1.08	0.88	0.99	0.86	0.55	0.71	0.66	1.03	0.70	0.72	0.44	0.79
17	0.91	0.68	0.76	0.68	0.70	0.60	0.48	0.66	0.79	0.70	0.69	1.32
18	0.46	0.45	0.74	1.19	0.69	0.27	0.36	0.31	0.25	0.38	0.31	0.46
19	0.40	0.44	0.34	0.47	0.39	0.23	0.37	0.32	0.52	0.35	0.31	0.37
20	0.44	0.20	0.21	0.28	0.31	0.13	0.24	0.33	0.24	0.15	0.07	0.24
21	5.25	0.18	0.09	0.17	0.10	0.14	0.08	0.11	0.18	0.09	0.13	0.15

Table C-7: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.51	0.18	0.08	0.23	0.12	0.09	0.11	0.09	0.03	0.14	0.04	0.06
23	0.21	0.06	0.38	0.11	0.05	0.07	0.06	0.01	0.03	0.07	0.06	0.07
24	0.22	0.03	0.07	0.10	0.07	0.03	0.01	0.03	0.07	0.02	0.04	0.06
25	0.12	0.03	0.03	0.03	0.07	0.01	0.03	0.02	0.03	0.06	0.01	0.03
26	0.12	0.02	0.10	0.06	0.02	0.01	0.02	0.00	0.03	0.04	0.00	0.02
27	0.04	0.02	0.03	0.07	0.02	0.14	0.01	0.00	0.00	0.03	0.32	0.05
28	0.07	0.02	0.02	0.01	0.01	0.08	0.01	0.05	0.01	0.01	0.03	0.03
29	0.08	0.04	0.01	0.00	0.00	0.00	0.03	0.01	0.00	0.02	0.01	0.02
30	0.07	0.11	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00
31	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
32	0.04	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00
33	0.02	0.00	0.05	0.00	0.08	0.01	0.07	0.00	0.00	0.01	0.00	0.00
34	0.00	0.01	0.02	0.00	0.03	0.00	0.01	0.00	0.01	0.01	0.00	0.00
35	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
36	0.02	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
37	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	0.02	0.00	0.01	0.08	0.00	0.07	0.00	0.00	0.00	0.01	0.00	0.01
39	0.23	0.04	0.18	0.62	0.01	0.09	0.01	0.00	0.00	0.04	0.00	0.01

Table C-8: Statewide Average Single Axle Load Spectra for VC 11

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	10.77	4.93	7.02	7.46	4.04	7.24	5.91	2.27	4.76	6.04	5.29	3.32
2	3.22	2.03	4.26	4.22	3.05	3.45	2.45	2.03	2.39	2.81	1.63	1.65
3	3.52	3.84	4.18	4.81	4.08	5.17	3.03	2.11	2.25	3.29	2.70	2.25
4	6.41	5.87	5.28	7.17	5.45	8.61	6.13	4.86	5.49	5.91	6.57	6.42
5	5.95	6.60	5.12	7.51	7.39	8.48	4.90	7.10	4.04	5.83	5.67	6.87
6	5.85	8.32	8.10	8.95	9.83	9.43	7.49	8.70	7.32	8.72	7.89	9.31
7	6.95	9.38	7.92	6.91	7.94	7.15	8.13	6.82	8.90	8.97	7.71	7.94
8	9.44	9.25	11.51	9.19	10.97	10.95	11.38	14.61	11.30	11.67	12.58	12.90
9	7.77	9.23	7.93	7.82	7.79	7.45	9.52	8.53	10.13	8.83	8.12	8.99
10	7.96	9.07	8.04	8.86	8.37	7.97	9.44	9.16	9.71	9.17	6.49	8.27
11	6.63	6.11	6.95	6.53	7.89	5.76	7.07	8.61	7.66	6.94	6.46	6.34
12	4.97	5.07	5.70	5.23	5.08	4.03	5.64	5.45	5.39	4.58	10.80	5.11
13	4.77	6.13	5.90	4.93	5.85	4.07	5.26	5.15	5.18	4.85	4.79	5.55
14	2.81	3.46	3.48	2.47	2.64	2.78	3.36	3.50	2.98	3.29	3.61	3.60
15	2.34	3.60	2.63	2.40	2.44	2.10	2.76	3.09	3.31	2.90	2.78	3.63
16	1.96	1.91	1.54	2.19	1.89	1.50	1.68	1.83	2.51	1.61	1.54	1.70
17	2.68	1.75	1.24	1.15	1.56	1.22	1.47	1.32	1.56	1.47	1.61	1.60
18	1.17	0.89	1.40	0.65	1.04	0.70	0.94	1.70	0.81	0.87	0.58	1.01
19	0.71	0.46	0.89	0.42	0.58	0.74	0.77	1.55	1.81	0.59	0.64	0.79
20	0.77	0.23	0.38	0.38	0.23	0.36	0.44	0.36	0.52	0.28	1.09	0.81
21	0.75	0.17	0.19	0.29	0.31	0.23	0.35	0.23	0.25	0.21	0.44	0.43

Table C-8: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.42	0.16	0.07	0.12	0.40	0.17	0.34	0.03	0.30	0.12	0.49	0.13
23	0.19	0.09	0.02	0.02	0.24	0.06	0.24	0.13	0.29	0.15	0.23	0.08
24	0.13	0.09	0.02	0.09	0.31	0.03	0.10	0.42	0.05	0.05	0.01	0.06
25	0.15	0.18	0.01	0.03	0.10	0.04	0.04	0.06	0.02	0.02	0.03	0.04
26	0.12	0.12	0.02	0.04	0.07	0.07	0.18	0.18	0.00	0.17	0.02	0.03
27	0.03	0.02	0.02	0.02	0.03	0.01	0.04	0.07	0.00	0.20	0.03	0.02
28	0.05	0.05	0.01	0.00	0.04	0.02	0.03	0.06	0.14	0.03	0.00	0.02
29	0.11	0.07	0.02	0.00	0.03	0.01	0.07	0.00	0.20	0.00	0.01	0.00
30	0.10	0.02	0.00	0.01	0.00	0.07	0.09	0.00	0.00	0.01	0.03	0.00
31	0.03	0.78	0.00	0.00	0.05	0.07	0.03	0.00	0.00	0.06	0.00	0.00
32	0.07	0.05	0.00	0.00	0.02	0.01	0.05	0.00	0.12	0.01	0.03	0.21
33	0.06	0.01	0.01	0.02	0.05	0.00	0.05	0.00	0.28	0.01	0.03	0.00
34	0.02	0.00	0.01	0.00	0.04	0.00	0.02	0.00	0.17	0.00	0.00	0.00
35	0.01	0.01	0.00	0.00	0.01	0.00	0.05	0.00	0.06	0.00	0.00	0.00
36	0.13	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	0.16	0.01	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.01	0.03	0.00
38	0.50	0.00	0.00	0.01	0.04	0.01	0.18	0.00	0.00	0.09	0.00	0.22
39	0.26	0.01	0.03	0.01	0.05	0.01	0.30	0.00	0.02	0.16	0.00	0.65

Table C-9: Statewide Average Single Axle Load Spectra for VC 12

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	18.78	12.42	9.28	14.14	6.55	10.19	12.17	13.59	14.37	6.65	9.02	10.49
2	3.02	3.52	2.66	2.67	2.49	3.24	4.08	3.13	3.71	2.60	4.59	3.10
3	2.57	4.68	3.98	2.56	2.28	3.02	3.21	2.79	2.45	2.65	2.45	2.85
4	3.69	4.31	3.41	4.10	5.41	4.13	4.28	3.39	3.18	3.22	3.30	5.30
5	3.51	3.84	5.41	3.86	5.57	6.61	5.79	4.51	3.47	3.75	7.35	5.94
6	8.49	6.52	8.54	7.80	7.27	8.52	7.38	6.87	6.86	9.65	6.55	7.30
7	4.93	7.06	7.84	6.36	10.06	7.35	6.17	6.98	6.78	7.21	6.86	6.39
8	8.69	9.00	11.51	11.95	12.42	11.18	9.21	10.46	9.42	10.50	11.64	10.55
9	8.95	9.82	11.13	11.30	9.46	9.11	8.49	9.84	10.18	10.37	9.07	10.09
10	7.97	10.02	9.55	9.05	8.93	8.13	9.65	9.79	9.09	9.99	10.75	10.30
11	5.86	6.10	6.47	5.63	8.63	4.77	4.84	6.45	6.01	6.56	9.17	7.09
12	3.74	4.77	4.82	4.59	4.00	3.54	4.59	4.42	4.62	6.27	5.11	4.45
13	3.81	3.40	3.90	3.39	4.49	5.55	4.79	4.25	4.84	4.65	3.33	3.88
14	2.43	3.05	1.72	2.59	2.86	3.07	2.89	3.46	2.10	3.28	2.79	2.04
15	2.54	2.56	3.95	2.48	1.98	1.99	2.26	2.90	2.65	2.43	1.51	1.88
16	1.79	2.20	1.97	1.89	1.42	2.68	1.30	1.51	1.61	1.80	0.93	3.00
17	1.88	2.36	1.44	1.44	1.36	2.59	2.19	2.32	2.16	2.70	1.96	1.95
18	1.77	1.56	0.85	1.32	1.07	0.80	1.33	0.80	1.53	1.75	1.55	0.87
19	1.18	0.95	0.35	0.49	1.10	1.63	0.66	0.45	1.28	1.08	0.83	0.66
20	0.67	0.49	0.15	0.29	0.50	0.79	0.33	0.46	0.97	0.84	0.32	0.43
21	0.93	0.25	0.21	0.64	0.78	0.34	0.44	0.55	0.64	0.60	0.15	0.78

Table C-9: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.45	0.21	0.28	0.91	0.67	0.28	1.58	0.41	0.54	0.70	0.45	0.18
23	0.42	0.28	0.25	0.14	0.14	0.10	0.96	0.27	0.25	0.17	0.12	0.03
24	0.45	0.33	0.05	0.18	0.06	0.04	0.11	0.05	0.04	0.07	0.04	0.07
25	0.13	0.04	0.02	0.11	0.01	0.03	0.22	0.01	0.03	0.06	0.01	0.02
26	0.13	0.04	0.03	0.01	0.09	0.03	0.11	0.01	0.07	0.05	0.04	0.01
27	0.11	0.01	0.03	0.01	0.05	0.01	0.06	0.06	0.00	0.05	0.01	0.10
28	0.09	0.02	0.04	0.01	0.00	0.00	0.17	0.06	0.22	0.03	0.00	0.04
29	0.08	0.01	0.00	0.01	0.00	0.00	0.17	0.02	0.31	0.03	0.03	0.01
30	0.13	0.01	0.02	0.00	0.00	0.00	0.05	0.03	0.00	0.03	0.00	0.05
31	0.06	0.01	0.02	0.00	0.00	0.00	0.00	0.06	0.19	0.03	0.00	0.03
32	0.07	0.01	0.03	0.00	0.00	0.02	0.00	0.01	0.34	0.03	0.01	0.00
33	0.10	0.00	0.00	0.00	0.01	0.19	0.00	0.00	0.00	0.03	0.00	0.02
34	0.04	0.00	0.01	0.01	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00
35	0.02	0.01	0.01	0.00	0.03	0.00	0.00	0.00	0.01	0.01	0.00	0.00
36	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
37	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.00
38	0.06	0.00	0.01	0.00	0.06	0.01	0.28	0.00	0.00	0.02	0.01	0.02
39	0.35	0.05	0.01	0.01	0.13	0.02	0.15	0.00	0.00	0.03	0.01	0.03

Table C-10: Statewide Average Single Axle Load Spectra for VC 13

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	17.01	14.22	14.89	12.67	13.84	11.43	11.74	10.33	7.97	9.05	14.60	13.00
2	5.36	4.56	4.16	5.34	5.10	5.56	5.90	5.23	5.34	5.08	5.64	4.38
3	6.19	3.04	3.90	3.47	6.24	5.64	5.56	6.07	5.94	4.37	4.69	4.43
4	7.60	7.71	8.65	5.94	7.69	8.37	9.03	7.10	7.09	6.10	6.62	6.24
5	3.80	6.18	6.40	5.35	5.61	7.43	6.54	6.47	5.69	5.16	5.49	7.06
6	6.79	10.14	10.40	9.24	6.93	8.28	9.12	6.65	8.81	10.00	7.78	7.91
7	4.98	8.64	7.52	15.44	7.57	8.88	6.99	8.92	9.22	9.82	6.52	6.43
8	7.34	7.28	7.70	9.67	9.52	8.62	7.83	9.07	9.19	11.78	6.81	9.06
9	7.76	4.96	6.78	6.84	6.07	4.73	6.75	8.70	7.32	5.02	10.74	6.98
10	6.14	7.88	8.37	5.59	7.25	9.45	7.35	6.91	7.56	6.28	4.28	5.75
11	4.15	5.04	3.91	4.13	5.00	3.82	6.54	6.35	6.65	5.23	4.29	5.22
12	2.55	3.22	2.91	3.60	2.93	3.10	2.69	3.46	4.61	3.19	8.76	3.68
13	2.87	2.68	3.45	3.43	3.67	5.56	3.60	3.65	3.88	4.08	3.42	3.77
14	4.23	2.59	1.70	1.90	3.26	1.98	2.40	1.82	1.99	2.74	2.31	2.68
15	2.57	1.86	1.88	2.34	2.89	2.03	2.45	2.52	2.61	2.73	2.12	2.87
16	1.70	1.59	1.50	1.47	1.47	1.39	1.74	1.37	1.46	2.41	1.19	1.96
17	1.43	2.37	0.72	0.95	1.57	1.25	1.01	1.52	2.04	1.99	1.82	1.70
18	1.05	0.99	0.82	0.61	0.87	0.31	0.40	1.29	0.56	1.07	0.81	1.82
19	0.49	0.63	1.08	0.55	0.61	0.45	0.52	0.67	0.49	0.77	0.85	1.55
20	0.48	0.29	0.18	0.43	0.15	0.35	0.32	0.48	0.27	0.59	0.40	0.70
21	1.02	0.75	0.65	0.31	0.37	0.49	0.10	0.31	0.51	0.43	0.20	0.79

Table C-10: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.67	0.38	0.51	0.13	0.19	0.13	0.20	0.59	0.17	0.39	0.13	0.59
23	0.85	0.25	0.12	0.20	0.09	0.11	0.17	0.28	0.13	0.36	0.10	0.11
24	0.14	0.15	0.09	0.09	0.06	0.05	0.10	0.02	0.11	0.20	0.02	0.27
25	0.13	0.30	0.05	0.04	0.19	0.21	0.09	0.03	0.10	0.06	0.05	0.06
26	0.12	0.23	0.02	0.05	0.04	0.17	0.01	0.02	0.04	0.10	0.05	0.00
27	0.04	0.73	0.01	0.04	0.01	0.06	0.02	0.01	0.04	0.06	0.06	0.12
28	0.03	0.02	0.00	0.04	0.01	0.03	0.04	0.00	0.06	0.11	0.06	0.01
29	0.32	0.08	0.02	0.00	0.02	0.00	0.01	0.01	0.03	0.07	0.00	0.03
30	0.11	0.08	0.23	0.00	0.08	0.01	0.07	0.02	0.02	0.06	0.00	0.14
31	0.07	0.06	0.02	0.00	0.00	0.00	0.02	0.01	0.00	0.05	0.00	0.00
32	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.10
33	0.04	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.06	0.00	0.07
34	0.07	0.01	0.04	0.00	0.01	0.01	0.01	0.01	0.00	0.06	0.00	0.00
35	0.07	0.01	0.23	0.00	0.12	0.00	0.07	0.00	0.00	0.02	0.02	0.05
36	0.06	0.17	0.00	0.00	0.01	0.00	0.04	0.01	0.00	0.03	0.01	0.05
37	0.05	0.10	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.12	0.00	0.00
38	0.10	0.02	0.11	0.01	0.07	0.01	0.05	0.00	0.00	0.06	0.00	0.01
39	1.52	0.67	0.89	0.04	0.43	0.01	0.43	0.02	0.01	0.19	0.12	0.35

Table C-11: Statewide Average Tandem Axle Load Spectra for VC 4

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	1.03	0.18	0.11	0.49	0.14	0.53	0.22	0.17	0.19	0.17	0.16	0.35
2	1.90	0.10	0.28	0.13	0.08	0.15	0.05	0.38	0.04	0.12	0.12	0.13
3	0.43	0.42	0.22	0.21	0.19	0.32	0.46	0.42	0.23	0.14	0.30	0.21
4	1.20	0.73	0.45	0.49	0.48	0.79	1.06	0.32	0.28	0.51	0.36	0.34
5	1.42	1.41	0.97	1.09	1.29	0.92	1.42	0.58	0.77	0.97	0.69	1.46
6	1.81	2.72	1.71	1.64	1.27	1.74	1.37	1.24	1.42	2.30	1.19	0.97
7	2.91	3.83	1.49	2.47	1.76	3.57	2.43	1.67	1.65	1.70	1.26	1.52
8	3.54	3.14	3.00	3.32	4.00	4.90	3.77	2.21	1.95	3.35	4.36	2.33
9	6.91	5.21	7.32	5.04	4.45	5.23	4.78	3.22	2.48	3.08	4.07	4.78
10	8.44	7.33	8.23	6.26	8.02	7.26	7.33	5.80	7.17	6.82	9.35	7.79
11	10.27	10.51	11.86	10.49	10.05	10.15	10.31	9.59	14.21	12.14	10.60	11.11
12	13.34	13.40	15.09	13.01	12.06	12.33	12.72	14.68	14.35	14.29	14.42	14.83
13	13.50	15.92	15.39	13.78	12.83	15.95	15.44	16.02	16.28	15.73	18.15	15.43
14	11.68	13.74	13.06	12.03	13.47	14.59	13.80	13.89	14.49	14.52	13.72	13.92
15	6.53	8.57	8.92	9.76	11.61	7.55	8.54	11.37	11.06	9.67	7.48	12.12
16	4.16	4.32	5.74	6.53	5.46	3.68	4.35	5.68	5.50	5.34	6.52	4.45
17	3.04	2.86	2.94	4.72	3.78	2.84	3.62	3.01	3.10	4.12	4.16	3.29
18	2.10	1.28	1.17	2.66	3.32	1.75	2.16	2.05	1.71	1.96	0.96	1.62
19	1.06	0.70	0.70	2.60	1.13	1.14	1.72	1.15	0.74	1.04	0.38	0.44
20	0.36	1.03	0.34	0.72	1.02	0.99	0.69	0.74	0.53	0.77	0.28	0.65
21	1.25	0.25	0.24	0.54	0.99	0.16	0.52	3.38	0.41	0.34	0.20	0.67

Table C-11: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.36	0.18	0.14	0.34	0.58	0.26	0.24	0.34	0.37	0.12	0.24	0.14
23	0.15	0.86	0.09	0.60	0.21	0.42	0.17	0.30	0.20	0.10	0.12	0.16
24	0.21	0.22	0.07	0.29	0.21	0.30	0.76	0.23	0.08	0.12	0.12	0.40
25	0.15	0.15	0.08	0.09	0.31	0.40	0.25	0.37	0.12	0.09	0.17	0.43
26	0.06	0.56	0.04	0.14	0.20	0.38	0.26	0.25	0.06	0.04	0.14	0.06
27	0.02	0.01	0.05	0.09	0.11	0.11	0.14	0.56	0.08	0.03	0.08	0.04
28	0.65	0.00	0.02	0.06	0.20	0.13	0.17	0.12	0.13	0.04	0.05	0.06
29	1.34	0.02	0.01	0.10	0.22	0.13	0.12	0.03	0.10	0.04	0.07	0.06
30	0.04	0.01	0.01	0.04	0.09	0.10	0.05	0.04	0.03	0.02	0.06	0.02
31	0.02	0.02	0.02	0.03	0.10	0.07	0.38	0.03	0.04	0.02	0.05	0.02
32	0.00	0.18	0.03	0.02	0.03	0.12	0.29	0.03	0.03	0.02	0.02	0.02
33	0.02	0.10	0.02	0.00	0.09	0.04	0.07	0.02	0.03	0.01	0.01	0.01
34	0.00	0.00	0.01	0.01	0.03	0.03	0.06	0.00	0.02	0.07	0.00	0.01
35	0.00	0.00	0.02	0.02	0.03	0.03	0.05	0.02	0.02	0.04	0.02	0.02
36	0.00	0.00	0.02	0.00	0.00	0.09	0.01	0.01	0.03	0.02	0.00	0.02
37	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.02	0.00	0.00	0.01
38	0.00	0.00	0.01	0.02	0.02	0.04	0.03	0.01	0.01	0.01	0.01	0.04
39	0.00	0.01	0.12	0.15	0.11	0.73	0.15	0.03	0.06	0.09	0.05	0.04

Table C-12: Statewide Average Tandem Axle Load Spectra for VC 5

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	17.62	11.42	11.81	18.66	20.20	15.11	14.71	17.03	17.66	17.80	20.50	19.09
2	7.07	8.32	6.38	7.58	7.49	6.53	8.54	6.66	10.95	5.99	4.33	3.01
3	10.04	6.58	9.37	7.89	7.26	14.41	10.65	8.90	9.11	8.62	5.80	4.73
4	4.96	5.34	6.03	7.27	7.41	10.80	9.49	9.82	7.11	9.71	6.94	9.40
5	7.95	16.12	8.98	8.15	9.01	8.19	10.78	6.93	9.00	5.11	9.14	10.70
6	4.24	9.19	4.37	5.93	8.35	7.01	7.53	9.89	7.66	5.13	10.42	10.11
7	6.45	8.24	5.52	7.15	4.00	6.78	5.23	8.89	3.39	6.30	6.60	6.50
8	6.97	3.76	6.43	5.78	7.24	5.96	4.50	2.88	5.67	2.79	8.39	7.44
9	3.86	3.11	3.37	2.07	3.13	4.17	2.56	3.35	4.00	6.33	3.08	8.05
10	6.00	3.86	8.02	3.76	3.85	5.06	1.80	5.03	3.94	6.43	5.85	3.69
11	3.06	4.30	7.99	5.80	5.81	6.08	6.07	4.00	5.13	4.46	2.52	4.18
12	4.15	3.36	6.61	5.22	2.91	2.28	5.38	3.84	3.14	6.85	2.32	3.18
13	2.49	2.69	3.91	2.93	2.17	1.95	2.90	2.10	5.09	3.22	2.89	3.16
14	3.26	2.53	2.61	3.38	2.62	1.91	4.64	2.14	2.91	2.22	2.30	2.58
15	2.45	2.17	4.59	2.10	3.02	0.77	1.22	1.83	2.15	3.10	1.92	0.84
16	1.94	1.93	1.40	3.19	1.79	0.72	2.18	1.31	1.73	0.96	1.42	0.37
17	5.57	3.38	0.35	0.64	0.73	0.39	1.15	1.13	0.17	1.03	1.08	0.23
18	0.64	0.65	0.76	0.39	0.18	0.39	0.42	0.21	0.07	0.51	0.83	0.15
19	0.36	0.42	0.42	0.52	0.44	0.36	0.04	0.67	0.37	1.86	1.57	0.31
20	0.31	0.28	0.28	0.38	0.68	0.24	0.05	0.11	0.11	0.67	0.68	0.43
21	0.22	1.34	0.14	0.37	0.74	0.09	0.08	0.18	0.00	0.09	0.30	0.14

Table C-12: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.13	0.37	0.32	0.01	0.13	0.12	0.00	2.39	0.00	0.08	0.16	0.07
23	0.07	0.20	0.15	0.03	0.12	0.11	0.00	0.49	0.07	0.04	0.10	0.03
24	0.00	0.14	0.01	0.02	0.01	0.11	0.00	0.04	0.09	0.00	0.07	0.00
25	0.07	0.01	0.00	0.01	0.00	0.13	0.00	0.00	0.15	0.03	0.07	0.00
26	0.06	0.05	0.04	0.02	0.00	0.11	0.00	0.00	0.11	0.01	0.08	0.34
27	0.03	0.00	0.02	0.24	0.06	0.00	0.01	0.02	0.00	0.03	0.11	1.12
28	0.00	0.02	0.00	0.42	0.19	0.08	0.02	0.07	0.06	0.01	0.15	0.06
29	0.00	0.05	0.00	0.00	0.20	0.08	0.01	0.07	0.00	0.00	0.11	0.00
30	0.00	0.00	0.02	0.01	0.02	0.02	0.00	0.00	0.00	0.03	0.06	0.00
31	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.06	0.05	0.00
32	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00
33	0.00	0.01	0.00	0.00	0.10	0.00	0.00	0.00	0.06	0.00	0.02	0.00
34	0.00	0.05	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
36	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.02
37	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.03	0.00	0.00
38	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00
39	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.01	0.00

Table C-13: Statewide Average Tandem Axle Load Spectra for VC 6

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	12.38	4.06	4.71	4.02	2.33	3.66	4.53	2.62	2.28	2.85	2.95	3.11
2	7.69	5.93	6.51	5.95	4.44	6.12	6.40	5.96	5.71	6.46	5.77	5.11
3	8.31	7.79	7.73	7.17	6.52	8.09	7.13	6.92	7.85	7.62	7.66	8.00
4	6.17	6.23	7.12	6.34	6.64	7.17	7.04	7.00	7.40	7.04	7.58	6.19
5	5.96	5.70	6.48	6.58	6.70	6.49	7.16	7.72	6.55	7.61	7.16	6.24
6	6.77	6.71	7.00	8.14	7.48	6.97	7.88	7.92	8.00	8.01	6.92	6.91
7	6.19	6.40	7.48	8.36	8.01	7.54	8.21	8.09	8.42	8.19	9.45	7.13
8	5.76	6.94	7.34	6.99	7.72	7.28	7.48	7.59	7.70	7.03	7.82	7.52
9	5.36	6.45	6.15	6.33	6.29	6.33	6.12	6.50	6.74	6.40	5.95	7.25
10	5.65	6.60	6.94	6.44	6.24	6.65	6.22	6.20	6.72	6.37	6.26	7.31
11	4.85	5.99	5.81	5.41	4.93	5.37	5.33	4.95	5.25	5.19	5.17	5.65
12	4.78	5.71	4.68	4.77	4.61	4.79	4.53	4.67	4.81	4.57	4.54	5.28
13	4.38	4.72	4.45	4.41	4.83	4.34	3.73	4.26	4.09	4.18	4.25	4.40
14	3.03	4.64	3.96	3.52	3.75	3.10	3.15	3.58	3.63	3.36	4.32	3.70
15	2.25	3.64	2.61	2.70	3.34	2.84	2.47	2.75	2.86	2.75	2.93	3.00
16	2.29	2.63	2.27	2.34	2.93	2.50	2.07	2.33	2.28	2.28	1.98	2.80
17	1.30	1.96	1.67	1.75	2.75	2.07	1.79	1.84	1.85	1.74	1.64	2.16
18	1.29	1.68	1.34	1.39	2.02	1.69	1.55	1.53	1.53	1.35	1.46	1.50
19	0.96	1.25	1.02	1.42	1.33	1.22	1.22	1.20	1.32	1.18	1.17	1.35
20	0.63	0.81	0.74	1.13	1.04	1.01	0.93	1.29	1.02	0.87	1.03	1.16
21	0.61	1.04	0.60	0.89	1.08	0.99	1.12	0.97	0.86	0.91	0.79	0.83

Table C-13: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.57	0.73	0.51	0.63	0.75	0.74	0.90	0.93	0.76	0.72	0.54	0.74
23	0.55	0.53	0.57	0.50	0.66	0.55	0.54	0.67	0.43	0.60	0.42	0.58
24	0.40	0.34	0.36	0.50	0.45	0.54	0.59	0.52	0.44	0.56	0.45	0.57
25	0.31	0.34	0.32	0.40	0.47	0.42	0.44	0.48	0.37	0.43	0.39	0.32
26	0.18	0.23	0.27	0.28	0.35	0.32	0.34	0.28	0.17	0.40	0.31	0.27
27	0.20	0.15	0.22	0.26	0.29	0.24	0.26	0.31	0.17	0.24	0.22	0.17
28	0.13	0.19	0.21	0.23	0.31	0.13	0.20	0.19	0.09	0.20	0.16	0.10
29	0.19	0.10	0.13	0.22	0.24	0.15	0.12	0.12	0.13	0.20	0.13	0.10
30	0.12	0.06	0.07	0.11	0.24	0.09	0.10	0.07	0.09	0.13	0.06	0.07
31	0.11	0.07	0.11	0.09	0.15	0.08	0.07	0.09	0.05	0.08	0.05	0.08
32	0.06	0.04	0.07	0.11	0.12	0.10	0.09	0.07	0.05	0.08	0.09	0.06
33	0.05	0.05	0.05	0.06	0.09	0.03	0.04	0.05	0.05	0.06	0.05	0.04
34	0.07	0.02	0.04	0.06	0.07	0.04	0.03	0.04	0.03	0.05	0.04	0.02
35	0.06	0.02	0.04	0.04	0.07	0.02	0.05	0.02	0.04	0.04	0.04	0.02
36	0.03	0.02	0.04	0.03	0.04	0.03	0.02	0.02	0.04	0.04	0.02	0.03
37	0.04	0.02	0.04	0.06	0.07	0.04	0.02	0.04	0.02	0.02	0.03	0.01
38	0.04	0.03	0.02	0.05	0.06	0.02	0.01	0.02	0.01	0.03	0.04	0.02
39	0.19	0.09	0.24	0.21	0.49	0.17	0.07	0.06	0.09	0.09	0.11	0.11

Table C-14: Statewide Average Tandem Axle Load Spectra for VC 7

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	66.89	61.69	56.36	56.60	53.96	58.53	48.47	50.85	50.12	53.85	48.44	55.76
2	14.16	13.82	15.14	14.06	14.55	11.88	18.51	16.09	14.83	16.05	12.65	15.59
3	5.33	6.82	10.00	8.66	11.62	8.51	10.75	10.35	11.48	8.57	10.82	8.73
4	3.90	4.97	4.60	6.22	6.07	6.35	9.00	9.10	9.34	6.18	6.13	5.41
5	2.89	3.59	3.94	4.18	3.59	4.56	5.13	4.62	4.79	4.18	6.78	4.15
6	1.47	0.80	2.59	2.39	2.81	2.33	2.73	2.46	2.32	3.03	4.48	2.28
7	0.36	0.70	1.87	2.20	1.20	1.97	1.29	1.41	1.42	1.14	3.04	1.55
8	0.44	0.89	1.30	0.97	1.34	0.76	0.71	1.39	1.39	0.97	1.13	1.17
9	0.57	1.31	0.29	0.52	0.66	0.59	0.63	0.75	0.96	1.12	1.18	0.78
10	0.28	0.40	0.44	0.56	0.27	0.34	0.25	0.60	0.49	0.89	1.52	0.51
11	0.09	0.45	0.40	0.14	0.36	0.33	0.17	0.32	0.13	0.56	0.14	0.33
12	0.24	0.69	0.34	0.71	0.55	0.35	0.48	0.22	0.24	0.64	0.52	0.93
13	0.27	0.35	0.60	0.53	0.61	0.37	0.31	0.04	0.45	0.61	0.26	0.30
14	0.49	0.36	0.29	0.44	0.23	0.39	0.40	0.34	0.57	0.18	0.36	0.32
15	0.55	0.37	0.25	0.14	0.19	0.31	0.37	0.29	0.38	0.38	0.31	0.40
16	0.16	0.49	0.19	0.42	0.35	0.45	0.26	0.13	0.17	0.35	0.81	0.33
17	0.36	1.21	0.32	0.01	0.34	0.41	0.08	0.22	0.30	0.13	0.21	0.44
18	0.06	0.18	0.79	0.38	0.48	0.44	0.14	0.20	0.26	0.17	0.57	0.61
19	0.00	0.12	0.15	0.30	0.35	0.19	0.05	0.23	0.23	0.17	0.03	0.00
20	0.16	0.21	0.05	0.16	0.12	0.09	0.06	0.18	0.06	0.26	0.11	0.00
21	0.10	0.56	0.00	0.06	0.18	0.13	0.04	0.05	0.05	0.20	0.17	0.00

Table C-14: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.45	0.00	0.04	0.02	0.03	0.16	0.00	0.00	0.00	0.02	0.01	0.00
23	0.22	0.00	0.00	0.16	0.01	0.13	0.02	0.00	0.00	0.11	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.17	0.05	0.04	0.00	0.04	0.24	0.00
25	0.00	0.00	0.00	0.16	0.08	0.05	0.05	0.05	0.00	0.01	0.05	0.00
26	0.00	0.00	0.00	0.00	0.03	0.02	0.05	0.00	0.00	0.03	0.00	0.02
27	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.36
28	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.02	0.00	0.10	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.02	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
31	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00

Table C-15: Statewide Average Tandem Axle Load Spectra for VC 8

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	11.15	8.74	7.39	10.29	7.05	8.69	8.99	7.13	6.66	6.06	4.64	5.20
2	6.22	5.21	4.40	4.70	4.48	5.66	5.84	4.04	4.18	4.52	3.19	3.60
3	8.68	7.52	7.05	7.02	6.57	8.42	7.59	6.63	7.15	7.44	6.39	7.33
4	11.02	11.61	11.74	11.24	10.95	11.18	10.72	11.00	12.38	12.00	13.05	12.45
5	12.69	14.35	15.14	13.23	14.32	13.10	13.33	13.74	13.97	14.47	15.94	16.03
6	11.52	12.82	13.54	13.01	13.29	12.94	12.65	13.57	13.57	13.32	15.01	13.96
7	9.18	11.09	11.14	10.88	10.78	10.23	9.91	10.96	11.46	10.37	11.73	10.36
8	7.41	7.36	8.04	8.16	9.00	8.32	7.71	8.67	8.49	8.83	8.29	7.80
9	5.33	6.36	5.95	5.85	6.70	5.56	6.44	6.73	6.56	6.70	6.41	6.56
10	4.01	4.20	5.17	5.08	4.94	4.88	4.91	5.34	4.90	4.90	4.76	4.97
11	2.86	2.72	3.05	3.14	3.27	2.94	3.09	3.48	3.24	3.21	2.87	3.08
12	2.16	2.01	2.44	1.76	2.82	2.06	2.18	2.49	2.19	2.54	1.84	2.37
13	1.36	1.45	1.49	1.71	1.63	1.39	1.48	1.93	1.50	1.47	1.84	1.57
14	1.30	1.05	0.97	1.05	1.11	0.91	1.32	1.09	0.89	0.96	0.89	1.32
15	0.95	0.81	0.55	0.76	0.81	0.52	0.88	0.79	0.69	0.72	0.58	0.80
16	0.75	0.46	0.47	0.50	0.49	0.50	0.47	0.58	0.48	0.57	0.56	0.63
17	0.64	0.47	0.40	0.27	0.40	0.40	0.39	0.43	0.37	0.37	0.36	0.37
18	0.57	0.48	0.28	0.34	0.26	0.37	0.37	0.31	0.32	0.34	0.30	0.43
19	0.41	0.32	0.14	0.17	0.21	0.32	0.21	0.20	0.28	0.26	0.30	0.21
20	0.25	0.13	0.08	0.15	0.14	0.45	0.30	0.17	0.13	0.28	0.20	0.19
21	0.27	0.14	0.08	0.16	0.14	0.30	0.26	0.17	0.16	0.18	0.07	0.07

Table C-15: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.22	0.19	0.08	0.09	0.14	0.23	0.19	0.09	0.05	0.08	0.17	0.14
23	0.23	0.05	0.08	0.04	0.07	0.13	0.15	0.08	0.08	0.05	0.10	0.08
24	0.08	0.05	0.05	0.03	0.10	0.10	0.08	0.08	0.06	0.06	0.04	0.03
25	0.06	0.04	0.08	0.04	0.06	0.03	0.08	0.04	0.05	0.06	0.06	0.07
26	0.06	0.04	0.02	0.03	0.05	0.04	0.05	0.03	0.02	0.01	0.05	0.08
27	0.05	0.05	0.04	0.02	0.03	0.03	0.03	0.06	0.05	0.04	0.08	0.05
28	0.04	0.05	0.02	0.02	0.03	0.05	0.03	0.02	0.01	0.03	0.08	0.02
29	0.03	0.03	0.01	0.01	0.02	0.02	0.03	0.01	0.02	0.03	0.06	0.08
30	0.01	0.01	0.01	0.03	0.02	0.02	0.03	0.01	0.01	0.01	0.01	0.01
31	0.10	0.00	0.01	0.00	0.01	0.02	0.04	0.00	0.00	0.01	0.00	0.00
32	0.10	0.01	0.01	0.00	0.01	0.00	0.04	0.02	0.00	0.00	0.02	0.01
33	0.06	0.02	0.01	0.02	0.01	0.03	0.05	0.04	0.00	0.00	0.04	0.01
34	0.02	0.03	0.00	0.10	0.00	0.01	0.01	0.01	0.00	0.03	0.01	0.01
35	0.03	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01
36	0.00	0.00	0.00	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00
37	0.00	0.01	0.00	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
38	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
39	0.08	0.02	0.01	0.02	0.01	0.07	0.06	0.00	0.01	0.01	0.00	0.07

Table C-16: Statewide Average Tandem Axle Load Spectra for VC 9

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	1.23	0.85	0.74	0.91	0.79	0.96	0.73	0.57	0.61	1.09	0.77	0.86
2	2.16	1.91	1.72	1.98	1.78	2.35	2.11	1.53	1.61	2.23	1.87	2.22
3	4.83	4.15	3.83	4.22	3.61	4.35	3.79	3.45	3.85	4.33	4.41	4.30
4	7.18	7.06	6.77	6.97	6.56	7.03	6.51	6.58	6.95	7.42	7.51	7.38
5	8.30	8.78	8.36	8.35	8.33	8.24	8.22	8.47	8.60	8.63	8.56	8.50
6	7.94	8.13	8.57	8.68	8.35	8.46	8.66	8.57	8.70	8.17	8.36	8.05
7	7.23	7.37	7.38	7.58	7.83	7.47	7.75	8.06	7.47	7.33	7.16	7.32
8	6.17	6.22	6.42	6.37	6.47	6.73	6.77	6.93	6.63	6.32	6.11	6.18
9	5.42	5.33	5.48	5.71	5.47	5.81	5.79	5.65	5.67	5.43	5.61	5.37
10	5.56	5.46	5.75	5.57	6.04	5.85	5.67	5.68	5.80	5.68	5.74	5.55
11	4.90	4.93	5.23	4.97	5.20	5.18	5.01	5.21	5.11	5.11	5.29	5.03
12	5.26	5.78	5.79	5.55	5.68	5.57	5.52	5.74	5.75	5.87	6.05	5.47
13	6.05	6.16	6.64	6.29	6.21	6.19	6.37	6.58	6.68	6.60	6.56	6.32
14	5.84	6.42	6.83	6.43	6.43	6.13	6.51	6.68	6.95	6.58	6.85	6.53
15	5.33	5.81	5.71	5.58	5.73	5.43	5.57	5.85	6.06	5.64	5.73	5.94
16	4.11	4.53	4.26	4.25	4.38	4.18	4.27	4.35	4.37	4.14	4.13	4.53
17	3.00	3.11	2.96	3.00	3.07	2.73	2.98	2.94	2.89	2.77	2.67	2.98
18	2.14	2.13	2.04	2.06	2.02	1.96	2.05	1.94	1.87	1.88	1.73	1.99
19	1.77	1.56	1.32	1.47	1.47	1.27	1.42	1.41	1.23	1.30	1.30	1.37
20	1.36	1.15	1.06	1.02	1.10	0.98	1.09	1.02	0.91	0.97	0.93	1.05
21	1.08	0.81	0.87	0.87	0.85	0.75	0.88	0.84	0.72	0.78	0.79	0.91

Table C-16: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.78	0.59	0.57	0.51	0.63	0.50	0.60	0.51	0.47	0.49	0.46	0.58
23	0.61	0.40	0.43	0.41	0.40	0.39	0.42	0.37	0.32	0.29	0.31	0.35
24	0.37	0.28	0.31	0.27	0.32	0.32	0.30	0.27	0.19	0.22	0.23	0.25
25	0.27	0.23	0.21	0.21	0.23	0.22	0.20	0.20	0.11	0.17	0.14	0.19
26	0.22	0.14	0.14	0.16	0.18	0.15	0.14	0.14	0.09	0.10	0.12	0.12
27	0.15	0.11	0.11	0.11	0.12	0.08	0.10	0.08	0.08	0.08	0.10	0.09
28	0.10	0.09	0.07	0.07	0.08	0.07	0.08	0.06	0.05	0.05	0.08	0.08
29	0.07	0.04	0.06	0.06	0.08	0.07	0.06	0.05	0.05	0.03	0.06	0.06
30	0.05	0.05	0.05	0.05	0.06	0.04	0.07	0.03	0.03	0.03	0.04	0.04
31	0.05	0.04	0.03	0.04	0.07	0.05	0.03	0.03	0.02	0.03	0.03	0.03
32	0.04	0.04	0.02	0.03	0.05	0.04	0.04	0.02	0.01	0.02	0.03	0.03
33	0.05	0.03	0.01	0.02	0.04	0.03	0.02	0.03	0.01	0.02	0.03	0.02
34	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.02	0.02	0.02
35	0.03	0.01	0.02	0.02	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01
36	0.02	0.02	0.01	0.02	0.03	0.02	0.02	0.01	0.00	0.00	0.03	0.01
37	0.01	0.02	0.01	0.02	0.03	0.03	0.01	0.00	0.01	0.01	0.01	0.02
38	0.04	0.01	0.00	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.03
39	0.16	0.10	0.10	0.08	0.15	0.24	0.09	0.03	0.02	0.04	0.07	0.13

Table C-17: Statewide Average Tandem Axle Load Spectra for VC 10

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	1.68	6.14	0.74	0.46	0.31	1.38	0.49	0.27	0.17	0.34	0.22	0.86
2	1.13	0.98	0.46	0.50	0.57	0.93	0.63	0.51	0.52	0.81	0.38	0.59
3	2.25	2.07	2.41	1.60	1.46	2.24	2.03	1.61	1.63	2.00	1.82	1.84
4	6.62	3.44	3.04	3.16	3.05	3.39	2.95	2.98	3.30	2.91	3.43	2.87
5	4.26	4.44	4.53	5.04	4.59	5.19	4.38	5.39	4.45	4.45	4.32	4.60
6	5.25	5.21	5.34	5.73	5.33	6.89	5.05	5.29	6.78	5.10	4.39	5.86
7	7.69	4.52	4.66	4.52	4.35	5.08	7.57	7.08	5.39	4.46	4.10	5.49
8	4.29	2.95	3.48	3.77	4.57	5.48	3.34	4.19	3.99	3.28	6.21	5.43
9	3.47	3.07	2.73	4.08	4.84	3.36	3.39	2.99	4.23	3.96	2.60	3.71
10	3.76	2.60	3.97	5.35	3.64	4.18	4.33	3.65	3.53	3.78	2.67	2.37
11	3.80	3.40	3.88	3.87	3.65	4.02	4.07	3.90	3.62	4.19	3.77	3.00
12	4.20	4.65	4.69	4.40	4.34	4.70	4.34	3.69	4.16	3.61	5.64	3.65
13	3.78	4.20	5.75	4.56	4.70	4.42	4.57	4.14	4.37	5.28	3.85	4.72
14	4.54	4.05	6.17	4.94	6.34	4.62	4.38	4.63	4.62	5.86	5.89	5.67
15	5.45	6.01	5.87	6.24	5.22	5.50	5.16	5.83	6.23	5.02	5.55	6.01
16	4.55	5.50	6.00	5.87	5.77	5.59	8.02	5.41	6.67	6.14	5.43	5.61
17	5.20	5.27	6.55	5.72	5.81	5.35	5.97	6.43	6.78	8.05	7.25	6.01
18	4.39	5.72	6.24	6.07	5.32	7.06	5.53	5.98	6.13	6.30	6.68	6.82
19	4.23	5.20	5.66	5.18	6.23	5.14	4.89	5.91	6.35	5.92	6.69	5.64
20	3.37	4.61	4.07	3.96	4.50	3.96	4.78	4.87	4.73	4.76	5.39	5.08
21	3.50	4.13	3.43	3.99	3.91	3.14	4.09	4.31	3.60	3.78	3.65	3.70

Table C-17: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	2.42	2.95	2.52	2.84	2.88	2.16	2.56	2.68	2.66	2.34	2.47	2.58
23	2.04	2.00	2.07	1.87	2.30	1.49	1.84	1.87	1.86	2.06	1.95	1.99
24	1.66	1.66	1.47	1.15	1.61	1.18	1.54	1.39	1.33	1.30	1.44	1.91
25	1.17	1.46	1.03	0.81	0.91	0.70	1.12	1.17	0.76	0.97	0.96	0.97
26	1.05	0.84	0.77	0.53	0.77	0.48	0.63	0.82	0.44	0.51	0.71	0.67
27	1.07	0.66	0.61	0.63	0.60	0.35	0.36	0.85	0.26	0.49	0.51	0.61
28	0.62	0.30	0.41	0.46	0.48	0.31	0.33	0.47	0.17	0.28	0.45	0.44
29	0.64	0.33	0.24	0.30	0.23	0.15	0.31	0.19	0.15	0.38	0.30	0.25
30	0.28	0.22	0.26	0.67	0.25	0.16	0.20	0.24	0.20	0.43	0.29	0.11
31	0.24	0.17	0.15	0.18	0.19	0.15	0.08	0.23	0.08	0.18	0.08	0.13
32	0.16	0.17	0.13	0.26	0.12	0.14	0.09	0.18	0.05	0.17	0.17	0.12
33	0.13	0.18	0.04	0.04	0.22	0.07	0.18	0.16	0.09	0.18	0.09	0.05
34	0.21	0.14	0.08	0.12	0.12	0.08	0.17	0.11	0.02	0.07	0.10	0.07
35	0.11	0.05	0.02	0.05	0.00	0.11	0.03	0.02	0.14	0.02	0.11	0.09
36	0.08	0.06	0.07	0.12	0.12	0.13	0.04	0.01	0.02	0.03	0.06	0.08
37	0.08	0.04	0.02	0.11	0.14	0.05	0.04	0.10	0.07	0.18	0.02	0.07
38	0.04	0.20	0.07	0.09	0.09	0.15	0.10	0.17	0.08	0.12	0.07	0.06
39	0.46	0.35	0.29	0.69	0.40	0.45	0.33	0.18	0.27	0.21	0.25	0.18

Table C-18: Statewide Average Tandem Axle Load Spectra for VC 11

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	38.04	23.02	35.16	22.92	18.44	34.06	28.91	24.79	38.96	30.60	29.15	27.85
2	17.14	13.27	11.27	9.84	15.59	11.20	13.96	15.25	12.80	7.76	6.07	7.37
3	5.27	8.68	2.96	7.84	6.72	5.17	7.02	6.65	3.55	10.99	4.27	5.00
4	3.85	3.46	3.74	11.76	7.30	5.91	5.66	6.92	3.56	2.17	5.27	3.43
5	5.42	3.28	8.19	8.29	4.71	6.68	5.42	4.56	5.74	4.88	7.70	7.14
6	2.31	1.59	4.01	9.20	4.68	8.61	5.53	2.25	1.63	3.06	4.28	3.35
7	2.94	5.40	3.05	2.27	7.52	2.62	6.72	2.61	1.23	2.29	8.66	3.10
8	4.02	2.68	3.76	2.43	7.95	4.50	1.63	1.84	4.53	3.42	9.38	2.36
9	4.38	1.85	2.46	2.57	2.48	2.98	1.15	2.68	4.25	2.49	1.79	2.95
10	3.00	2.37	4.55	2.67	2.75	1.72	1.20	2.54	2.12	8.22	3.51	3.95
11	1.81	3.01	2.96	2.42	4.00	1.84	2.88	2.46	2.52	2.48	2.00	3.14
12	2.39	2.19	2.50	2.79	2.40	1.53	1.82	2.33	4.40	1.95	3.65	2.28
13	1.67	6.71	1.56	2.93	2.67	1.79	1.88	6.16	2.14	2.68	2.82	3.37
14	1.02	1.43	1.44	2.13	1.26	1.42	2.18	1.28	1.15	0.94	0.96	1.92
15	1.10	1.13	1.71	1.97	1.53	0.69	0.63	1.39	0.97	1.98	0.91	1.56
16	1.29	1.64	2.90	2.56	0.99	1.18	1.17	2.65	1.11	3.61	1.53	2.47
17	0.48	5.04	2.46	1.54	1.47	3.18	2.92	2.72	1.30	3.04	2.16	5.65
18	0.42	4.14	0.35	0.83	1.52	0.95	1.67	2.84	1.25	1.93	1.81	2.35
19	0.25	1.27	0.66	0.56	1.70	0.33	3.70	1.08	1.22	0.87	0.74	0.50
20	0.36	0.75	0.38	0.48	0.62	0.52	0.68	1.23	1.75	1.63	0.33	2.11
21	0.91	1.54	0.49	0.43	0.47	1.16	0.17	2.71	0.90	0.57	0.57	1.97

Table C-18: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.77	0.83	0.48	0.23	1.39	0.68	0.21	0.57	0.25	0.44	0.61	0.65
23	0.28	0.73	0.14	0.12	0.30	0.22	0.18	0.51	0.30	0.64	0.54	0.38
24	0.18	0.33	0.25	0.06	0.34	0.31	0.29	0.38	0.65	0.10	0.28	0.79
25	0.11	0.39	0.98	0.37	0.50	0.39	0.94	0.53	0.41	0.35	0.11	0.18
26	0.05	0.51	0.87	0.37	0.32	0.14	0.40	0.34	0.33	0.28	0.01	0.86
27	0.02	0.10	0.22	0.05	0.07	0.09	0.33	0.02	0.16	0.08	0.09	0.39
28	0.01	0.08	0.06	0.03	0.08	0.02	0.03	0.03	0.09	0.03	0.08	0.31
29	0.02	0.28	0.01	0.02	0.05	0.00	0.03	0.02	0.07	0.03	0.02	0.63
30	0.00	0.09	0.00	0.01	0.06	0.00	0.03	0.00	0.02	0.05	0.18	0.54
31	0.02	0.28	0.00	0.04	0.01	0.00	0.07	0.12	0.11	0.03	0.14	0.20
32	0.01	0.00	0.02	0.00	0.00	0.02	0.20	0.31	0.18	0.03	0.02	0.25
33	0.16	0.36	0.10	0.00	0.00	0.02	0.16	0.11	0.05	0.03	0.03	0.43
34	0.02	0.69	0.19	0.00	0.03	0.00	0.06	0.02	0.00	0.05	0.01	0.00
35	0.16	0.40	0.08	0.01	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00
36	0.03	0.35	0.00	0.04	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
37	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00
38	0.01	0.00	0.01	0.00	0.00	0.05	0.04	0.01	0.26	0.02	0.18	0.03
39	0.02	0.08	0.04	0.21	0.07	0.03	0.06	0.00	0.04	0.22	0.11	0.50

Table C-19: Statewide Average Tandem Axle Load Spectra for VC 12

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	6.62	6.60	1.50	3.40	2.62	4.77	3.55	4.41	5.27	2.50	2.38	3.41
2	1.75	2.07	1.49	2.51	2.39	2.34	2.58	1.05	1.88	1.85	2.92	1.65
3	2.20	3.30	2.61	4.14	3.28	4.98	4.32	1.96	3.27	2.91	3.10	3.72
4	4.49	4.33	4.69	6.07	5.46	6.73	6.20	5.33	4.45	4.82	4.75	3.68
5	6.80	7.59	11.59	8.69	11.42	11.22	11.38	10.22	8.89	9.06	10.00	8.21
6	8.61	8.52	12.17	11.81	10.79	10.86	11.17	11.78	11.26	11.87	10.52	13.16
7	10.67	12.95	10.70	10.87	10.85	10.74	10.72	13.05	13.84	12.80	15.86	10.71
8	7.71	10.83	14.60	12.30	9.17	9.72	11.58	13.23	11.74	9.25	9.86	12.19
9	12.13	6.66	9.14	8.55	11.00	7.25	7.32	9.32	7.39	12.39	8.30	10.73
10	5.04	5.13	5.87	4.04	5.14	5.28	7.63	5.11	5.29	5.97	7.32	6.41
11	2.96	3.78	3.55	4.44	3.76	2.72	2.32	3.75	2.55	3.25	2.78	2.89
12	3.65	2.88	3.41	3.37	3.74	2.83	2.92	4.45	2.62	4.80	1.82	4.14
13	6.76	4.64	2.07	2.91	4.66	4.33	3.69	4.25	4.03	3.16	1.92	6.31
14	6.30	4.84	2.55	3.56	2.91	3.19	2.65	1.99	3.30	3.03	1.47	2.53
15	3.87	4.26	1.27	1.71	1.74	3.14	2.37	2.79	3.23	1.69	1.04	2.27
16	2.29	2.18	1.25	1.60	1.70	3.92	1.08	1.02	2.87	1.30	5.71	0.97
17	1.60	1.77	1.60	2.55	1.77	2.48	2.19	1.40	1.87	3.81	2.26	1.80
18	2.56	1.90	2.74	1.66	4.11	1.87	2.19	1.80	1.77	1.63	2.24	1.42
19	1.15	1.44	1.19	2.22	0.99	0.54	2.27	0.79	1.80	0.64	1.82	0.25
20	0.42	0.68	0.61	1.49	1.04	0.18	0.36	0.32	0.72	0.12	1.57	1.01
21	0.34	0.14	0.61	0.79	0.60	0.14	0.12	0.40	0.22	1.71	0.17	0.95

Table C-19: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.27	1.18	0.72	0.56	0.47	0.22	0.01	0.14	0.09	0.75	0.02	0.23
23	0.20	1.62	0.33	0.30	0.04	0.08	0.11	0.22	0.11	0.02	0.59	0.01
24	0.27	0.18	0.00	0.07	0.04	0.02	0.01	0.17	0.05	0.09	0.78	0.02
25	0.16	0.07	0.01	0.29	0.02	0.05	0.18	0.04	0.06	0.04	0.07	0.30
26	0.22	0.04	0.73	0.00	0.00	0.03	0.33	0.04	0.01	0.03	0.04	0.16
27	0.08	0.01	1.16	0.00	0.02	0.00	0.05	0.17	0.41	0.00	0.02	0.12
28	0.08	0.05	0.01	0.02	0.13	0.00	0.01	0.17	0.52	0.03	0.00	0.02
29	0.12	0.05	0.54	0.04	0.04	0.02	0.01	0.09	0.07	0.06	0.12	0.03
30	0.06	0.03	1.28	0.01	0.00	0.05	0.16	0.03	0.11	0.18	0.06	0.28
31	0.05	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.02	0.02	0.04	0.12
32	0.07	0.02	0.00	0.00	0.04	0.02	0.00	0.00	0.06	0.01	0.02	0.02
33	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.10	0.02	0.00	0.00
34	0.05	0.01	0.00	0.00	0.00	0.03	0.16	0.01	0.02	0.01	0.02	0.02
35	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.21	0.06	0.00	0.02	0.01
36	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.14	0.03	0.04	0.00	0.00
37	0.00	0.05	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.07	0.00	0.01
38	0.01	0.02	0.00	0.00	0.00	0.09	0.17	0.02	0.00	0.02	0.13	0.06
39	0.31	0.06	0.00	0.00	0.00	0.05	0.16	0.00	0.00	0.01	0.22	0.13

Table C-20: Statewide Average Tandem Axle Load Spectra for VC 13

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	13.69	12.07	7.44	11.08	13.71	9.45	9.16	5.52	9.26	9.08	5.40	7.32
2	4.08	2.35	2.78	3.36	2.80	3.56	3.81	2.83	4.26	3.28	2.85	2.96
3	5.37	10.62	5.69	6.60	5.47	6.01	6.42	5.16	4.69	4.71	6.47	4.61
4	9.86	4.69	4.35	5.94	5.68	9.84	6.21	4.76	5.14	6.70	6.09	6.15
5	3.29	6.27	5.22	9.16	7.93	6.09	7.28	9.43	4.41	6.46	6.51	4.97
6	4.91	7.16	5.87	4.03	6.54	5.36	4.62	8.08	6.05	9.62	4.80	7.68
7	7.47	7.88	7.61	6.56	9.54	6.74	6.25	5.54	8.00	9.36	4.36	10.03
8	10.86	6.50	5.27	6.63	6.63	12.69	9.36	8.65	8.44	7.02	8.15	10.27
9	3.68	5.50	6.15	4.25	8.85	8.87	6.30	7.54	7.00	8.14	16.74	4.32
10	4.57	4.54	7.01	5.30	7.02	7.11	5.63	7.54	6.99	6.14	7.13	7.23
11	5.01	3.14	5.26	11.47	3.08	4.93	5.76	7.94	5.00	3.83	6.61	3.20
12	2.54	2.04	4.39	4.06	2.87	3.40	6.10	6.22	4.58	2.38	5.23	5.76
13	2.26	0.99	3.20	2.12	2.71	2.60	2.31	5.20	5.35	4.16	2.65	4.11
14	2.07	1.68	3.91	2.26	1.78	1.72	2.09	2.33	3.05	2.27	3.40	3.08
15	3.27	1.40	5.98	2.03	2.42	0.92	3.02	2.49	2.67	3.53	2.48	3.76
16	1.75	3.09	8.55	5.00	2.55	2.76	4.70	2.37	2.92	3.46	2.16	1.56
17	2.63	4.13	3.37	3.47	2.30	2.46	2.64	2.32	4.12	2.98	3.12	1.52
18	1.21	2.87	1.40	2.87	3.26	1.38	2.39	1.76	2.20	1.60	1.42	0.52
19	3.26	2.18	1.05	1.26	0.38	0.94	0.95	0.98	2.43	0.72	1.18	1.10
20	3.53	2.04	2.01	0.63	0.98	0.42	1.19	0.16	0.65	1.04	0.44	2.41
21	0.35	1.13	1.64	0.88	0.85	0.70	1.31	1.10	0.29	0.56	1.71	2.76

Table C-20: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.58	0.27	0.39	0.16	0.45	0.44	0.47	0.52	0.87	0.70	0.14	0.24
23	0.15	0.07	0.26	0.39	0.32	0.20	0.20	0.35	0.03	0.30	0.06	0.40
24	0.30	0.12	0.05	0.06	0.11	0.09	0.19	0.08	0.11	0.17	0.07	0.17
25	0.14	0.39	0.00	0.00	0.33	0.04	0.23	0.00	0.30	0.14	0.19	0.39
26	0.11	0.15	0.00	0.00	0.15	0.01	0.06	0.03	0.08	0.02	0.10	0.54
27	0.08	0.11	0.00	0.09	0.03	0.16	0.02	0.05	0.00	0.04	0.00	0.16
28	0.22	0.02	0.00	0.02	0.00	0.01	0.11	0.09	0.00	0.09	0.00	0.13
29	0.04	0.03	0.00	0.10	0.15	0.03	0.05	0.00	0.02	0.02	0.00	0.30
30	0.03	0.04	0.05	0.01	0.15	0.03	0.00	0.00	0.08	0.01	0.00	0.25
31	0.04	0.02	0.00	0.00	0.04	0.01	0.00	0.04	0.00	0.01	0.00	0.06
32	0.03	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.03	0.07	0.00
33	0.04	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.05	0.13
34	0.11	0.02	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.01	0.00	0.12
35	0.04	0.05	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.12
36	0.08	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.08	0.04
37	0.44	0.03	0.07	0.00	0.02	0.42	0.03	0.01	0.02	0.16	0.04	0.10
38	0.69	0.03	0.98	0.00	0.62	0.40	0.59	0.34	0.12	0.70	0.18	1.35
39	1.21	6.30	0.00	0.18	0.16	0.05	0.42	0.53	0.86	0.40	0.07	0.15

Table C-21: Statewide Average Tridem Axle Load Spectra for VC 4

Table C-21: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C-22: Statewide Average Tridem Axle Load Spectra for VC 5

Table C-22: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C-23: Statewide Average Tridem Axle Load Spectra for VC 6

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	72.93	80.82	62.42	68.31	63.63	76.09	73.24	80.94	68.98	73.25	72.24	66.13
2	4.68	5.67	3.38	7.07	4.83	4.31	5.65	3.01	2.47	4.15	3.96	9.69
3	2.93	3.22	1.77	2.02	2.12	1.74	4.75	2.38	2.06	3.87	1.83	1.96
4	2.30	0.78	3.92	3.35	6.47	1.80	0.68	0.06	2.10	1.65	5.52	5.71
5	1.21	0.18	6.06	1.75	3.51	4.17	0.42	1.69	0.96	2.32	2.29	0.49
6	0.64	0.51	0.71	2.39	3.80	1.56	0.45	1.09	0.68	1.92	0.73	0.45
7	1.08	0.67	1.90	1.96	0.78	0.74	0.20	0.97	0.71	1.68	0.44	1.28
8	5.21	0.32	0.76	0.80	0.26	0.84	0.62	0.09	0.89	0.57	0.63	1.47
9	0.74	0.13	4.01	0.51	3.02	0.11	0.09	1.72	2.97	1.25	0.47	5.12
10	0.66	0.50	7.21	0.22	1.26	0.26	1.25	0.10	4.01	1.95	1.87	0.28
11	0.24	0.42	0.31	0.08	0.90	0.01	0.86	0.00	0.30	0.02	0.63	0.03
12	0.38	0.18	0.26	0.14	0.14	0.03	0.21	0.00	0.32	0.40	0.99	0.03
13	0.00	0.39	0.03	0.07	0.08	0.03	0.00	0.00	0.71	0.39	0.02	0.15
14	0.00	0.25	0.18	0.00	0.00	0.30	0.01	0.22	0.16	0.00	0.00	1.01
15	0.06	0.16	0.00	0.37	1.25	0.50	0.14	0.09	0.00	0.00	0.08	0.00
16	0.14	0.04	0.01	0.72	0.14	0.08	0.00	0.00	0.04	0.00	1.67	0.01
17	0.00	0.00	0.14	0.12	0.08	0.19	0.00	0.93	0.62	0.00	0.00	0.05
18	0.01	0.07	0.04	0.09	0.11	0.02	0.00	0.03	0.01	0.01	0.01	0.00
19	0.00	0.00	0.00	0.00	0.02	0.35	0.39	0.01	0.00	0.01	0.01	0.00
20	0.01	0.07	0.00	0.00	0.00	0.01	0.52	0.00	0.00	0.00	0.00	0.00
21	0.13	0.03	0.18	0.14	0.02	0.00	1.03	0.00	0.65	0.02	0.08	0.00

Table C-23: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.12	0.00	0.19	1.18	0.01	1.29	0.16	0.08	1.98	0.51	0.16	0.00
23	0.18	0.02	0.13	0.09	0.05	0.02	0.88	0.96	0.00	0.00	0.06	0.00
24	0.04	0.00	0.05	1.82	1.35	0.00	0.17	0.24	0.73	0.01	0.15	0.00
25	0.32	0.00	0.18	0.96	0.20	0.00	0.17	0.10	1.90	0.16	0.21	0.00
26	0.14	0.00	0.24	0.00	0.11	0.10	0.06	0.02	0.00	0.06	0.05	0.00
27	0.14	0.15	0.22	0.04	0.04	0.04	2.63	0.00	0.00	0.00	0.00	0.00
28	0.12	0.07	0.06	0.15	0.17	0.00	0.01	0.00	0.14	0.00	0.00	0.00
29	0.30	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
30	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.13	0.03	0.12	0.38
31	0.00	0.05	0.35	0.37	0.38	0.14	0.13	0.00	1.19	0.50	0.46	0.50

Table C-24: Statewide Average Tridem Axle Load Spectra for VC 7

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	14.37	8.01	0.36	0.69	0.19	0.82	0.59	0.36	0.42	0.49	0.36	5.92
2	1.99	1.38	0.32	0.89	0.55	0.27	0.56	0.25	0.42	0.38	0.63	2.02
3	1.47	1.42	0.75	0.52	1.17	0.73	1.17	0.87	1.77	0.87	1.01	1.00
4	1.97	3.02	2.41	1.93	1.18	1.87	1.49	2.75	5.23	1.32	2.68	3.95
5	4.59	4.06	2.14	3.07	1.58	2.31	3.15	2.03	2.50	2.31	2.40	4.91
6	3.83	4.17	2.98	4.68	1.73	3.64	6.66	5.15	2.16	3.05	2.44	2.82
7	3.72	3.57	6.11	3.19	2.29	4.00	4.92	3.93	2.60	3.94	3.37	4.25
8	6.96	3.24	4.04	2.95	3.01	6.27	3.38	3.24	2.49	3.95	2.82	4.89
9	4.84	3.45	8.50	2.92	4.20	5.92	6.42	3.72	4.66	5.50	3.53	5.09
10	4.57	4.44	6.24	8.27	5.28	5.70	4.44	3.99	3.87	4.24	5.65	3.07
11	4.00	4.73	5.06	5.47	6.03	5.47	5.41	5.20	5.82	6.99	6.90	3.72
12	5.53	6.29	6.65	6.74	9.99	6.31	7.50	5.84	6.38	7.22	6.52	4.77
13	5.17	6.05	7.19	9.31	7.26	7.74	5.94	7.49	7.95	7.46	7.31	6.39
14	5.21	6.53	7.14	6.96	6.80	7.70	7.02	7.50	9.10	6.94	10.20	7.86
15	4.72	7.16	7.88	6.98	9.41	8.79	9.71	9.68	8.52	8.34	13.40	8.29
16	5.42	7.11	9.47	7.74	10.93	9.26	7.49	10.68	8.59	9.66	7.19	7.62
17	5.60	6.84	5.02	6.76	6.74	6.54	6.49	7.15	7.31	7.03	7.25	6.53
18	4.05	5.57	4.72	5.90	6.16	5.27	4.96	5.86	6.80	6.17	4.29	5.12
19	3.36	3.80	3.87	3.84	4.56	3.36	3.75	4.67	5.25	4.94	3.29	3.20
20	2.50	2.35	2.24	2.87	3.43	2.47	3.22	2.79	2.76	2.62	2.41	2.13
21	2.04	1.54	1.82	1.71	1.79	1.55	1.88	2.11	1.84	2.01	1.69	1.96

Table C-24: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	1.32	1.31	1.11	1.16	1.03	0.98	0.94	1.47	1.00	1.06	1.11	1.10
23	0.56	0.62	0.62	1.05	0.73	0.74	1.07	0.94	1.09	1.03	0.99	1.83
24	0.57	0.86	0.83	0.60	0.63	0.51	0.50	0.66	0.48	0.46	0.70	0.54
25	0.40	0.51	0.35	0.71	0.37	0.32	0.35	0.40	0.25	0.64	0.40	0.26
26	0.16	0.84	0.47	0.33	0.41	0.20	0.20	0.32	0.11	0.33	0.28	0.09
27	0.12	0.22	0.38	0.22	0.28	0.16	0.24	0.20	0.04	0.26	0.46	0.18
28	0.04	0.05	0.13	0.28	0.19	0.09	0.18	0.17	0.05	0.21	0.15	0.17
29	0.19	0.13	0.11	0.10	0.25	0.06	0.05	0.04	0.09	0.16	0.06	0.15
30	0.12	0.41	0.16	0.41	0.20	0.24	0.18	0.09	0.12	0.07	0.15	0.04
31	0.57	0.26	0.88	1.67	1.60	0.65	0.10	0.38	0.28	0.29	0.32	0.07

Table C-25: Statewide Average Tridem Axle Load Spectra for VC 8

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	36.10	22.92	15.21	10.80	12.73	19.96	17.44	15.89	14.67	12.89	16.70	21.08
2	9.05	6.81	4.01	1.72	2.20	2.37	6.24	1.92	1.79	1.36	4.02	5.52
3	3.78	5.27	1.78	0.32	1.83	1.22	3.07	0.86	1.62	1.93	2.36	4.53
4	2.34	7.58	1.58	1.89	3.93	1.14	1.42	1.45	1.71	0.93	2.20	3.82
5	3.44	3.48	1.97	3.18	3.16	3.91	2.29	4.76	1.73	2.64	2.34	4.57
6	0.87	4.99	2.38	3.34	3.91	2.61	3.32	2.02	2.15	3.13	3.30	4.18
7	1.72	2.92	4.43	7.70	2.03	3.73	2.26	2.27	3.25	1.22	2.79	2.73
8	4.27	2.71	2.79	4.49	2.24	4.33	5.76	2.93	3.69	2.06	1.73	3.92
9	3.06	1.65	2.79	7.94	3.54	5.51	2.76	2.61	3.14	3.50	2.36	4.41
10	3.70	1.36	3.43	3.35	5.21	9.97	7.23	6.78	4.00	3.16	2.95	4.03
11	1.45	2.53	2.55	2.12	2.62	3.55	3.32	7.90	5.33	3.08	2.84	1.42
12	2.49	7.25	3.36	2.49	2.67	3.72	3.69	6.21	6.86	7.80	6.75	3.05
13	2.60	4.60	4.42	5.09	2.09	4.61	3.69	5.81	10.15	6.79	8.55	3.04
14	2.03	4.06	8.47	4.21	2.20	4.52	2.60	6.03	9.08	11.27	7.40	5.63
15	4.39	6.12	8.36	6.62	9.86	7.62	5.64	9.56	8.21	8.59	9.19	7.81
16	4.01	3.17	10.24	8.38	7.28	7.08	7.90	10.05	6.47	6.86	7.57	5.81
17	2.96	1.39	8.13	7.75	6.48	4.29	7.24	4.32	6.29	7.16	4.55	4.54
18	1.06	0.91	5.80	7.37	5.00	3.29	5.17	2.72	2.87	5.48	3.16	2.69
19	2.13	0.91	2.84	1.14	5.21	2.14	1.49	2.30	2.87	2.11	2.58	4.01
20	0.88	1.28	2.36	1.97	8.95	2.45	3.17	1.98	1.88	4.47	2.36	0.62
21	0.93	0.71	1.18	4.43	4.52	1.59	0.89	0.52	0.73	1.66	3.04	0.27

Table C-25: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	1.16	0.61	0.37	1.51	0.56	0.16	1.74	0.75	0.45	1.02	1.05	0.43
23	0.45	2.64	0.16	0.48	0.19	0.00	0.12	0.00	0.10	0.04	0.03	0.19
24	0.99	2.65	0.42	0.61	0.29	0.17	0.17	0.00	0.07	0.10	0.02	0.33
25	1.65	0.33	0.37	0.44	0.11	0.05	0.01	0.00	0.60	0.21	0.03	0.16
26	0.14	0.03	0.17	0.01	0.08	0.00	0.00	0.00	0.00	0.04	0.03	1.16
27	0.35	0.00	0.00	0.00	0.21	0.00	0.34	0.00	0.00	0.45	0.02	0.00
28	0.08	0.33	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.03	0.03	0.00
29	0.00	0.20	0.00	0.34	0.22	0.00	0.00	0.12	0.00	0.00	0.02	0.00
30	0.00	0.00	0.00	0.28	0.00	0.00	0.31	0.03	0.07	0.00	0.00	0.00
31	1.90	0.59	0.38	0.00	0.58	0.00	0.69	0.21	0.19	0.00	0.00	0.00

Table C-26: Statewide Average Tridem Axle Load Spectra for VC 9

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	25.16	30.13	32.37	20.47	28.69	32.41	29.82	32.98	35.62	29.62	29.53	22.71
2	7.59	10.81	4.85	11.37	7.17	7.82	11.50	5.06	8.13	7.47	5.46	17.26
3	3.15	6.91	2.03	3.41	3.70	5.78	7.34	3.47	10.62	4.92	4.62	4.07
4	9.73	11.69	5.66	7.27	8.69	7.58	7.26	5.82	5.04	9.29	6.43	9.94
5	4.46	8.77	2.20	3.86	6.89	6.04	3.14	2.81	2.79	5.23	4.30	7.64
6	7.28	4.87	1.08	11.15	4.63	3.00	7.92	7.93	2.45	3.73	5.92	4.83
7	4.83	3.45	9.02	4.57	5.49	2.04	3.40	2.90	2.72	3.19	7.72	3.22
8	7.40	4.46	8.77	12.60	5.05	6.58	4.95	4.48	3.51	4.76	16.17	4.09
9	6.91	3.35	2.38	2.38	2.79	2.60	1.38	1.83	6.58	1.51	3.78	1.36
10	2.67	4.32	1.81	7.75	4.17	2.64	2.78	8.91	4.19	4.58	0.88	6.99
11	0.74	1.07	6.96	0.90	2.76	2.06	0.73	0.53	0.52	1.14	0.65	3.61
12	2.01	1.28	1.14	1.30	8.36	5.89	2.74	0.63	0.35	3.93	0.46	0.82
13	0.83	0.61	2.00	1.02	0.39	5.49	0.76	0.96	1.59	1.03	3.07	0.50
14	0.85	0.93	1.85	2.58	1.70	2.34	1.62	7.95	3.91	4.96	5.31	5.72
15	1.80	0.10	10.41	1.32	1.97	2.53	3.24	2.58	3.69	5.36	0.14	2.48
16	5.61	2.58	2.76	2.22	3.15	3.08	6.59	1.16	1.83	1.05	0.31	0.96
17	0.94	0.40	0.68	0.75	0.34	1.84	0.26	3.63	0.56	1.50	0.14	2.24
18	5.18	0.22	1.58	0.32	0.09	0.08	2.06	0.04	2.38	1.64	0.23	0.65
19	0.00	0.01	1.93	0.23	1.16	0.00	0.78	0.83	0.00	1.91	1.32	0.21
20	0.76	1.36	0.19	1.83	1.69	0.00	1.23	1.29	0.00	2.65	0.55	0.10
21	1.04	0.61	0.07	0.40	0.43	0.00	0.10	0.51	0.00	0.31	0.01	0.00

Table C-26: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.31	0.04	0.01	1.49	0.05	0.04	0.10	0.77	0.00	0.00	0.35	0.00
23	0.00	0.00	0.00	0.31	0.15	0.16	0.09	0.55	1.60	0.00	2.33	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.01	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	0.05	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.16	0.00	0.01	0.00
27	0.00	1.75	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.01	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.19	0.21	0.00
30	0.00	0.00	0.00	0.00	0.07	0.00	0.05	0.00	0.00	0.01	0.04	0.01
31	0.75	0.26	0.26	0.46	0.40	0.00	0.15	0.00	0.00	0.00	0.00	0.58

Table C-27: Statewide Average Tridem Axle Load Spectra for VC 10

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	15.00	8.50	8.23	9.13	7.47	9.41	7.27	7.50	7.32	8.70	8.75	7.85
2	7.59	7.56	6.57	6.98	6.90	8.05	7.26	8.19	8.80	7.64	8.35	10.31
3	5.16	4.95	5.76	4.63	5.98	5.17	5.14	5.41	4.63	4.12	4.68	6.13
4	3.23	7.84	4.14	2.71	6.08	3.18	4.70	4.26	4.12	2.42	2.77	2.27
5	5.84	2.49	2.02	3.43	2.17	4.32	3.16	3.78	2.74	3.20	1.55	1.92
6	3.50	2.65	1.69	2.53	1.88	2.34	2.35	2.29	1.86	2.10	1.63	1.74
7	2.38	2.54	2.51	3.98	2.61	3.23	3.83	3.33	3.36	2.20	3.39	2.10
8	2.48	2.72	2.86	3.51	3.07	4.47	3.71	2.82	3.25	4.24	2.64	2.60
9	3.59	3.71	3.97	4.97	5.60	4.82	5.37	3.99	3.88	4.01	3.24	4.55
10	4.00	4.26	5.42	4.57	4.50	4.84	4.61	4.35	5.10	4.63	6.66	5.33
11	4.22	4.45	5.43	4.77	4.15	6.29	4.52	4.69	4.80	4.80	6.28	5.21
12	4.70	4.65	6.14	5.43	4.84	4.98	5.20	6.87	5.60	6.96	6.43	5.31
13	5.41	5.44	6.77	6.65	6.58	5.37	7.72	6.19	6.75	6.22	5.93	6.04
14	5.56	6.45	6.63	5.33	5.82	5.62	6.13	5.88	6.20	6.63	6.18	6.68
15	5.49	7.75	6.80	5.93	7.15	5.98	5.75	5.89	6.92	7.41	6.24	6.56
16	4.58	5.36	5.66	5.70	6.01	5.38	5.25	5.90	5.97	5.96	5.45	6.35
17	4.11	4.35	4.19	4.54	4.80	4.70	4.00	4.60	5.23	4.42	4.00	5.92
18	3.23	3.82	3.71	3.59	3.53	3.76	5.05	3.67	3.41	3.74	3.58	3.44
19	2.36	2.61	4.61	2.41	2.74	2.07	2.34	2.57	2.27	1.95	2.92	2.30
20	1.62	2.05	1.45	1.88	1.87	1.64	1.91	1.85	1.64	2.06	1.83	1.89
21	1.18	1.60	0.94	1.27	1.35	0.96	1.07	1.38	1.96	1.31	1.04	1.19

Table C-27: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.75	0.65	0.77	1.00	1.04	0.60	0.87	0.86	0.68	0.97	1.32	1.09
23	0.74	0.60	0.70	1.52	0.62	0.58	0.53	0.82	0.69	0.92	1.02	0.71
24	0.70	0.74	0.49	0.66	0.58	0.45	0.38	0.48	0.48	0.73	0.75	0.56
25	0.53	0.40	0.29	0.45	0.42	0.20	0.27	0.66	0.30	0.52	0.66	0.50
26	0.39	0.27	0.18	0.31	0.24	0.12	0.38	0.38	0.41	0.44	0.62	0.40
27	0.27	0.40	0.11	0.28	0.41	0.09	0.26	0.19	0.22	0.29	0.49	0.19
28	0.23	0.15	0.21	0.26	0.21	0.11	0.18	0.25	0.17	0.28	0.47	0.13
29	0.17	0.18	0.14	0.20	0.15	0.22	0.16	0.23	0.16	0.30	0.13	0.18
30	0.29	0.23	0.12	0.30	0.15	0.14	0.10	0.09	0.11	0.20	0.27	0.16
31	0.62	0.58	1.43	1.00	1.01	0.87	0.49	0.58	0.91	0.57	0.65	0.31

Table C-28: Statewide Average Tridem Axle Load Spectra for VC 11

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	55.73	45.96	52.01	50.58	49.30	48.01	44.33	39.48	47.34	46.43	44.33	51.66
2	9.49	16.06	18.07	16.20	13.77	15.61	15.11	23.05	15.56	14.88	18.14	10.79
3	6.88	11.66	10.97	8.83	10.85	10.11	12.99	13.43	11.40	9.45	13.93	9.18
4	5.96	7.61	5.06	6.84	5.07	5.47	7.55	7.38	6.00	10.00	9.43	6.69
5	5.74	5.02	3.89	5.08	7.02	4.80	9.64	4.00	5.26	4.57	3.34	2.25
6	1.79	1.80	2.71	3.13	1.70	7.35	2.64	3.58	3.37	1.87	1.24	3.87
7	1.06	2.11	0.71	3.03	2.85	3.06	1.06	0.89	1.04	1.13	1.17	2.29
8	1.50	1.74	0.48	1.75	1.27	0.77	0.43	0.63	2.05	0.65	0.69	0.73
9	1.32	0.80	0.87	0.71	0.48	1.19	0.39	1.36	0.90	0.68	0.73	1.71
10	2.12	0.62	0.40	0.71	1.69	0.11	1.22	0.47	0.80	1.05	0.66	1.26
11	3.76	0.52	0.74	0.20	0.53	0.48	0.54	1.36	1.14	0.42	0.87	1.73
12	1.03	0.71	0.56	0.35	0.11	0.13	0.60	0.62	1.14	0.59	0.85	1.64
13	0.45	1.99	0.71	0.40	0.69	0.39	0.32	0.50	0.64	2.27	0.97	1.05
14	0.82	0.54	0.40	0.31	0.39	0.33	0.41	0.52	0.76	1.41	0.84	0.93
15	0.69	1.15	0.52	0.39	0.38	0.20	0.55	0.70	0.66	2.06	0.56	0.62
16	0.11	0.67	0.26	0.23	0.55	0.32	0.34	0.59	0.30	1.20	0.49	0.59
17	0.19	0.39	0.36	0.08	0.52	0.18	0.30	0.48	0.46	0.14	0.41	0.85
18	0.17	0.30	0.18	0.22	0.18	0.48	0.23	0.51	0.13	0.27	0.90	0.78
19	0.08	0.02	0.07	0.07	0.07	0.22	0.12	0.03	0.64	0.16	0.08	0.41
20	0.07	0.01	0.13	0.21	0.20	0.26	0.07	0.07	0.08	0.44	0.01	0.04
21	0.82	0.04	0.11	0.16	0.69	0.17	0.00	0.25	0.00	0.00	0.07	0.05

Table C-28: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.21	0.07	0.04	0.00	0.13	0.01	0.00	0.01	0.00	0.00	0.00	0.15
23	0.00	0.09	0.00	0.00	0.00	0.00	0.06	0.02	0.21	0.02	0.01	0.47
24	0.00	0.04	0.16	0.07	0.00	0.03	0.10	0.00	0.02	0.01	0.02	0.24
25	0.00	0.00	0.00	0.00	0.22	0.00	0.24	0.00	0.03	0.00	0.00	0.00
26	0.00	0.00	0.04	0.04	0.15	0.00	0.00	0.02	0.00	0.00	0.00	0.00
27	0.00	0.00	0.18	0.00	0.03	0.00	0.00	0.02	0.03	0.00	0.00	0.00
28	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
30	0.00	0.01	0.04	0.13	0.00	0.06	0.52	0.00	0.00	0.04	0.09	0.00
31	0.00	0.03	0.14	0.24	1.13	0.24	0.15	0.00	0.00	0.21	0.15	0.00

Table C-29: Statewide Average Tridem Axle Load Spectra for VC 12

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	27.43	25.28	23.14	22.63	26.67	24.64	28.54	26.55	32.42	23.51	29.46	24.29
2	6.97	5.00	6.34	10.48	11.45	8.56	4.64	7.44	7.31	5.41	7.04	5.29
3	8.41	7.22	4.89	4.90	9.77	7.51	2.74	4.70	3.59	3.80	2.69	9.04
4	2.20	3.65	2.65	2.43	2.44	2.11	3.39	2.99	1.76	2.40	2.66	1.36
5	2.53	3.05	2.85	2.09	0.98	1.90	2.38	2.91	4.21	2.13	2.62	6.07
6	2.07	5.96	3.09	5.06	2.86	2.90	1.68	3.54	1.44	1.37	2.41	2.58
7	1.42	1.66	1.39	2.23	1.77	0.56	5.62	1.72	1.00	1.15	1.25	1.70
8	1.60	0.80	1.70	2.05	1.82	0.73	3.23	2.21	1.41	1.32	2.06	0.80
9	5.52	1.52	11.87	5.07	4.27	6.82	7.69	8.32	8.25	8.48	12.69	7.91
10	6.10	6.90	3.13	7.54	2.44	7.14	7.27	3.70	3.11	10.41	1.88	8.60
11	1.66	1.54	0.40	1.22	2.48	1.35	0.49	0.63	0.51	0.51	0.80	0.40
12	1.33	1.19	1.83	1.11	3.16	2.50	0.50	1.13	0.70	0.52	2.02	0.96
13	0.19	1.61	1.91	1.96	1.81	1.98	0.70	4.16	2.35	3.02	2.96	1.57
14	2.14	1.50	5.71	2.59	1.76	3.08	3.42	1.89	5.65	3.16	1.42	0.57
15	2.41	8.58	1.70	1.79	1.34	1.51	1.14	1.19	2.19	4.07	1.21	0.60
16	1.16	1.17	1.21	1.30	0.43	1.02	1.03	1.13	1.63	3.00	0.49	0.71
17	0.63	0.64	1.17	1.61	0.20	1.68	1.72	1.71	0.41	0.86	1.82	0.58
18	1.34	0.19	1.27	0.64	1.83	0.82	0.75	0.78	0.30	0.60	2.24	2.21
19	1.55	0.26	0.55	0.57	0.42	0.45	0.37	0.50	0.25	0.48	0.20	1.14
20	0.35	0.24	0.40	0.24	0.00	0.25	0.25	0.25	0.15	0.20	0.00	0.36
21	0.26	0.00	0.13	0.16	0.00	0.20	0.17	0.20	0.02	0.04	0.00	0.52

Table C-29: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.23	0.00	0.43	0.11	0.11	0.19	0.22	0.16	0.00	0.10	0.11	0.18
23	0.38	0.05	0.34	0.24	0.20	0.20	0.20	0.20	0.00	0.20	0.20	0.19
24	0.24	0.19	0.15	0.13	0.10	0.05	0.01	0.08	0.00	0.09	0.08	0.19
25	0.00	0.15	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.05	0.07	0.13	0.17	0.18	0.13	0.06	0.12	0.13	0.00
28	0.20	0.02	0.14	0.12	0.07	0.03	0.00	0.07	0.14	0.25	0.06	0.19
29	0.00	0.17	0.01	0.17	0.00	0.09	0.21	0.12	0.04	0.02	0.01	0.00
30	0.00	0.00	0.15	0.18	0.28	0.47	0.37	0.43	0.02	0.56	0.32	0.01
31	0.60	0.39	0.30	0.23	0.11	0.02	0.00	0.10	0.00	1.14	0.12	0.91

Table C-30: Statewide Average Tridem Axle Load Spectra for VC 13

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	21.96	27.34	18.86	21.33	23.85	26.17	25.51	25.26	22.20	18.96	32.73	11.11
2	5.54	9.35	11.65	9.67	11.25	10.53	11.41	13.47	19.11	20.84	8.43	4.71
3	12.70	8.48	9.25	13.83	9.35	8.29	7.00	15.30	8.33	11.29	14.49	18.16
4	5.86	8.95	6.40	4.35	9.28	4.24	4.22	8.28	5.91	4.15	5.51	7.74
5	3.98	6.31	3.14	6.69	4.64	4.72	3.95	3.56	3.04	2.13	2.01	3.63
6	1.47	1.38	1.94	2.24	2.39	2.31	2.18	3.18	1.37	2.11	2.38	4.06
7	1.78	1.42	8.36	3.45	0.83	8.50	2.15	1.60	0.58	1.12	2.51	2.88
8	1.52	1.08	2.16	1.97	1.42	3.73	2.46	0.96	2.16	2.03	1.96	1.74
9	3.15	1.05	2.43	1.80	4.89	2.12	2.68	0.55	3.93	2.10	2.49	2.09
10	6.91	3.01	2.61	3.38	4.37	2.54	4.96	1.80	2.98	4.08	2.24	9.31
11	7.83	2.21	2.10	5.32	1.70	1.82	3.66	0.75	2.23	2.90	1.99	3.61
12	3.22	2.61	3.48	4.69	3.01	1.46	2.49	2.23	3.63	2.28	2.91	5.56
13	2.58	3.29	4.73	3.55	4.55	3.36	4.27	3.22	3.51	3.95	2.68	3.70
14	2.07	3.15	2.49	2.20	3.04	2.23	4.24	3.01	1.92	3.59	1.85	2.05
15	1.07	3.18	2.81	1.95	3.54	3.36	3.37	2.74	3.52	3.02	2.46	3.03
16	2.88	2.04	2.64	0.84	1.81	2.24	4.22	2.39	2.46	2.43	1.82	3.79
17	3.56	3.53	2.93	1.63	1.30	1.36	2.01	1.68	2.03	2.33	1.44	2.53
18	1.26	0.95	2.57	1.59	0.71	0.93	1.36	1.31	1.25	1.99	0.87	1.51
19	1.42	1.33	0.84	0.91	0.16	0.46	0.58	1.41	0.39	0.96	1.67	0.53
20	0.73	0.87	1.84	0.44	0.85	1.09	0.35	0.92	1.67	0.70	0.51	1.31
21	1.11	0.87	0.35	0.70	0.15	1.20	0.44	0.16	0.89	0.38	0.47	0.02

Table C-30: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.30	0.10	0.04	0.02	0.00	0.17	0.49	0.04	1.07	0.29	0.33	0.00
23	0.09	0.09	0.24	0.14	0.26	0.40	0.08	0.16	0.15	0.05	0.31	0.20
24	0.34	0.09	0.15	0.02	0.05	0.41	0.26	0.35	0.00	0.09	0.07	0.36
25	0.04	0.23	0.12	0.00	0.28	0.08	0.04	0.03	0.01	0.21	0.09	0.25
26	0.08	0.93	0.17	0.38	0.43	0.40	0.00	0.00	0.17	0.17	0.04	0.00
27	0.08	0.09	0.02	0.02	0.03	0.00	0.26	0.00	0.00	0.04	0.04	0.00
28	0.09	0.14	0.04	0.00	0.37	0.01	0.05	0.34	0.00	0.04	0.00	0.18
29	0.19	0.22	0.02	0.00	0.20	0.21	0.00	0.03	0.00	0.24	0.03	0.10
30	0.17	0.08	0.07	0.75	0.00	0.27	0.00	0.00	0.01	0.10	0.29	0.00
31	0.71	0.36	0.26	0.85	0.00	0.09	0.00	0.00	0.17	0.13	0.08	0.54

Table C-31: Statewide Average Quad Axle Load Spectra for VC 4

Table C-31: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C-32: Statewide Average Quad Axle Load Spectra for VC 5

Table C-32: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C-33: Statewide Average Quad Axle Load Spectra for VC 6

Table C-33: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C-34: Statewide Average Quad Axle Load Spectra for VC 7

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	48.56	47.26	35.67	41.89	37.31	51.82	49.20	45.21	42.85	40.08	40.97	41.04
2	2.77	1.82	1.31	3.96	4.00	4.95	1.89	1.65	10.68	5.21	1.03	7.03
3	3.87	1.28	5.54	0.49	1.99	0.74	0.54	1.78	1.85	2.74	3.25	0.05
4	1.69	0.58	0.30	1.91	0.54	1.04	1.14	3.42	0.41	0.19	0.28	0.90
5	3.98	0.53	0.70	2.81	0.56	4.82	1.78	2.17	0.28	0.49	2.92	1.64
6	0.81	0.33	1.13	1.10	0.65	0.59	0.70	6.37	0.45	1.66	0.53	1.18
7	0.75	0.48	0.41	3.09	3.65	1.06	1.73	1.13	3.17	1.01	3.57	1.47
8	1.87	0.45	1.74	0.34	1.70	7.51	2.95	0.40	0.61	1.66	0.59	3.19
9	1.02	0.77	0.92	0.64	1.09	0.37	2.36	0.45	1.66	1.69	2.62	0.47
10	1.15	3.00	0.74	0.35	1.17	0.21	2.32	2.10	0.73	1.70	5.62	0.85
11	0.83	1.33	1.82	3.55	3.93	0.48	0.52	1.36	0.33	2.33	1.44	0.31
12	3.66	4.02	1.85	1.65	2.03	1.29	2.25	2.49	3.15	1.68	2.45	2.23
13	6.28	0.30	9.76	3.39	6.08	0.90	3.40	0.63	0.46	2.53	8.01	1.04
14	0.64	0.42	8.58	3.54	0.50	0.94	0.61	3.25	3.77	1.44	1.12	0.30
15	1.31	1.18	2.05	4.79	2.16	2.21	0.91	2.68	5.65	1.43	1.65	4.01
16	0.72	1.51	3.23	4.19	3.34	3.55	0.86	3.08	3.27	1.59	7.33	4.67
17	1.76	2.37	2.60	4.78	2.12	3.11	1.36	3.09	3.19	3.48	3.96	2.15
18	2.19	7.03	4.06	2.37	5.52	2.41	1.90	2.38	6.20	5.89	2.74	3.78
19	0.35	7.52	2.66	2.73	2.96	2.48	2.87	2.64	3.03	3.42	1.31	6.42
20	2.09	3.36	1.84	1.88	6.87	2.22	2.53	2.59	1.03	1.59	0.71	5.50
21	2.53	2.21	2.28	0.67	1.42	0.36	6.52	2.01	0.53	1.85	0.52	1.47

Table C-34: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	1.01	2.88	1.64	0.78	0.97	0.48	0.93	2.83	0.31	2.29	0.43	1.90
23	1.68	1.18	1.06	0.29	1.11	0.31	0.56	0.30	0.26	3.30	0.25	1.76
24	0.94	0.59	0.66	0.13	2.06	0.13	0.47	0.11	0.12	1.10	0.24	0.91
25	0.41	0.35	0.51	2.50	0.20	0.18	0.62	0.16	0.16	1.13	0.08	0.05
26	0.34	0.50	0.51	0.45	0.21	0.17	0.98	0.12	0.11	1.50	0.24	0.03
27	0.47	0.27	0.15	0.07	0.14	0.06	0.14	0.09	0.13	0.53	0.17	0.03
28	0.30	0.28	0.14	0.00	0.07	0.00	0.60	0.00	0.01	0.73	0.05	0.13
29	0.11	0.47	0.07	0.25	0.08	0.03	0.55	0.03	0.11	0.40	0.16	0.15
30	0.04	0.09	0.11	0.06	0.09	0.05	0.55	0.07	0.09	0.00	0.10	0.00
31	0.57	0.35	0.67	0.07	0.18	0.27	0.99	0.09	0.13	0.08	0.38	0.05

Table C-35: Statewide Average Quad Axle Load Spectra for VC 8

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	55.42	55.56	44.70	53.64	53.38	62.99	53.88	50.30	57.85	52.13	52.91	53.72
2	1.97	3.30	2.44	2.22	3.72	0.53	1.07	2.17	2.19	3.88	2.03	1.63
3	0.67	1.24	1.23	0.60	2.29	0.22	3.77	1.59	1.64	1.48	1.33	0.45
4	3.29	0.64	2.39	0.64	1.18	0.00	0.90	0.69	0.66	0.80	0.54	6.62
5	0.01	0.67	0.79	0.40	1.31	0.00	0.02	1.96	0.34	0.63	0.70	1.11
6	0.00	0.20	0.09	0.24	0.36	0.00	0.51	0.27	0.25	0.11	0.01	0.76
7	0.00	4.03	0.00	0.01	0.13	0.00	0.01	0.03	0.71	0.82	0.75	0.69
8	1.97	2.11	0.92	5.12	1.43	1.48	0.00	0.34	1.55	1.09	1.17	1.22
9	0.75	0.83	0.79	6.21	1.85	1.73	0.00	1.25	1.59	1.19	1.18	1.20
10	0.10	0.04	1.62	0.88	0.41	2.17	0.00	0.39	0.62	0.28	0.33	0.79
11	2.43	1.14	0.66	0.40	0.04	0.96	0.47	0.09	0.14	0.01	0.42	0.69
12	2.19	0.06	0.56	0.13	0.11	0.13	4.61	0.05	0.08	0.08	0.16	0.15
13	1.69	2.39	0.79	0.76	0.41	0.35	1.37	0.07	0.05	0.33	0.72	0.77
14	0.08	0.38	0.06	0.04	0.10	0.13	0.07	0.01	0.00	0.09	0.11	0.13
15	1.19	0.68	0.63	0.41	0.40	0.00	0.00	0.05	0.08	0.40	0.52	0.34
16	0.74	0.96	0.52	0.37	0.47	0.00	0.08	0.12	0.19	0.42	0.36	0.38
17	0.00	0.35	0.05	0.01	0.11	0.00	0.44	0.28	0.07	0.13	0.09	0.07
18	0.12	0.20	0.49	0.53	0.69	1.05	3.00	4.91	1.34	0.73	0.53	0.50
19	0.83	2.65	4.26	1.25	1.13	1.87	3.01	2.83	6.62	9.89	3.87	3.30
20	5.66	3.26	5.70	2.96	7.69	6.43	5.15	7.64	6.42	6.11	1.98	5.14
21	3.74	3.52	5.14	5.72	3.72	3.07	1.18	4.30	2.69	1.03	6.31	2.91

Table C-35: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	1.29	1.78	1.16	5.02	0.27	0.90	1.44	0.28	0.18	0.17	0.70	1.63
23	0.52	1.23	0.37	1.18	1.35	0.51	0.85	0.45	0.18	0.45	0.39	1.12
24	0.17	0.25	0.12	0.18	1.95	0.56	0.67	0.47	0.77	0.28	0.58	0.34
25	1.28	0.31	1.30	1.17	6.16	1.29	1.12	0.95	0.85	0.87	1.38	1.36
26	0.32	0.84	6.20	1.12	0.63	0.49	0.71	0.20	0.17	0.53	0.45	0.38
27	0.03	0.19	1.65	2.06	1.31	0.68	5.73	0.47	0.85	2.38	0.89	0.55
28	0.29	3.73	1.92	1.22	1.04	1.00	1.05	0.52	1.69	3.07	1.62	0.81
29	1.17	2.23	3.33	1.43	0.32	1.49	1.62	1.87	3.10	1.09	1.29	1.36
30	2.24	1.04	5.99	2.09	1.59	3.57	3.39	6.18	2.17	1.87	0.78	3.64
31	9.83	4.16	4.13	1.99	4.44	6.39	3.86	9.26	4.94	7.67	15.89	6.25

Table C-36: Statewide Average Quad Axle Load Spectra for VC 9

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	29.78	21.97	18.13	21.33	15.89	26.24	23.93	33.94	24.19	16.03	20.73	19.16
2	6.33	8.27	5.90	7.54	8.00	5.50	15.84	7.71	11.63	9.44	7.39	4.99
3	11.89	16.38	15.67	12.80	8.47	9.04	10.34	8.87	9.70	9.86	9.85	16.19
4	4.80	4.13	0.98	2.17	2.53	1.81	1.25	2.58	2.42	2.63	1.56	5.87
5	0.87	5.16	0.91	2.15	0.96	1.11	0.80	2.60	2.46	2.49	1.42	2.32
6	4.51	9.71	1.43	1.71	1.88	2.01	0.88	2.65	2.07	2.33	2.65	3.76
7	3.25	1.68	1.47	2.24	2.65	6.46	1.95	2.13	1.70	3.30	5.59	2.37
8	0.56	2.02	0.94	3.73	5.75	2.27	5.36	1.98	0.84	2.05	2.61	0.36
9	1.06	3.31	1.01	1.46	1.42	1.89	2.84	1.76	0.84	1.67	1.77	2.33
10	1.84	2.46	0.91	4.81	1.02	0.62	0.08	1.21	0.60	0.90	0.99	0.52
11	0.69	2.16	0.78	1.43	0.06	3.12	1.13	1.37	0.47	0.62	5.09	0.28
12	0.88	0.79	1.00	1.05	3.62	0.61	0.34	0.71	0.06	0.24	1.21	0.46
13	2.70	0.39	0.12	0.48	1.64	1.83	1.37	1.32	0.92	0.95	1.03	0.24
14	2.77	0.45	0.35	1.17	0.57	0.76	1.56	1.10	1.11	0.70	0.82	3.43
15	0.68	0.82	5.07	1.79	5.68	2.84	2.90	1.28	1.01	1.94	0.90	1.31
16	4.11	0.36	1.95	0.91	0.60	5.58	1.87	0.85	7.09	0.53	0.89	0.15
17	0.24	1.14	0.56	1.31	1.00	2.98	0.40	1.08	2.09	4.91	2.59	1.45
18	0.00	0.87	0.34	1.36	0.08	2.37	1.23	0.76	0.73	3.00	1.24	0.56
19	0.00	0.27	4.63	0.50	0.00	1.75	0.16	1.25	1.71	1.04	1.49	5.14
20	1.13	0.35	3.55	1.99	1.14	0.57	0.38	0.27	1.92	0.24	0.41	0.49
21	4.13	0.50	1.80	2.11	4.86	0.17	1.00	0.26	0.12	0.60	0.79	0.69

Table C-36: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.00	0.84	5.57	0.38	0.37	0.06	0.53	1.72	0.15	0.44	1.16	1.13
23	0.00	0.45	0.56	1.28	0.02	0.24	0.44	1.62	0.43	1.96	1.22	2.70
24	0.00	2.42	0.67	0.83	0.35	1.43	0.45	1.45	1.56	3.38	0.56	1.20
25	0.89	0.73	0.79	0.78	0.34	0.82	1.24	0.44	2.60	5.92	0.67	1.66
26	0.45	0.68	2.49	0.93	2.58	0.68	2.17	0.55	0.23	1.74	1.59	2.36
27	2.97	4.11	2.65	2.62	3.24	5.70	7.82	2.34	5.29	2.18	2.88	0.89
28	0.90	2.13	0.58	1.25	1.27	0.64	1.11	0.50	2.78	3.01	1.95	0.60
29	1.05	1.46	4.06	6.35	5.96	1.01	2.30	0.43	4.41	7.00	0.75	0.83
30	0.20	0.17	2.66	1.04	4.83	1.01	2.79	4.05	4.05	1.11	2.02	3.78
31	11.32	3.81	12.45	10.49	13.20	8.85	5.52	11.21	4.81	7.77	16.16	12.76

Table C-37: Statewide Average Quad Axle Load Spectra for VC 10

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	10.72	7.02	7.47	12.96	6.18	12.89	9.05	18.65	11.43	9.61	13.55	9.88
2	5.49	3.98	4.41	5.97	8.39	7.35	4.00	3.40	8.93	7.02	4.19	5.03
3	4.20	3.76	4.19	3.24	3.67	4.35	4.02	3.25	3.66	9.21	2.10	6.95
4	5.29	5.44	5.35	10.60	4.33	3.98	5.56	6.72	4.38	3.63	2.63	4.71
5	6.24	3.67	2.43	5.15	4.36	2.11	4.78	2.06	3.05	2.80	2.81	2.39
6	2.63	2.35	2.35	1.29	3.21	3.77	1.59	4.68	3.44	1.25	1.69	1.79
7	2.06	1.61	0.90	0.73	1.97	3.96	1.76	2.77	4.94	2.06	3.98	1.70
8	1.43	1.51	0.81	0.79	3.89	0.82	1.90	2.88	2.21	1.91	1.05	0.70
9	2.23	6.61	1.31	1.21	1.20	2.32	2.88	1.88	0.74	1.82	1.19	1.18
10	3.64	2.25	1.06	2.41	0.65	2.11	2.19	2.35	0.56	0.64	0.66	1.03
11	5.00	1.21	1.41	3.38	1.30	2.35	1.33	1.78	1.56	1.29	5.58	1.35
12	2.01	2.59	1.07	1.90	1.36	2.61	2.03	0.89	3.25	1.58	1.11	2.67
13	1.64	0.74	2.60	1.85	2.11	2.60	1.32	0.92	1.19	2.16	1.22	2.19
14	1.76	7.67	3.03	2.00	2.54	3.20	1.64	6.65	1.20	2.45	2.52	1.66
15	1.95	3.34	5.01	5.00	3.76	2.15	2.42	1.67	2.60	3.87	3.04	5.02
16	2.30	5.65	6.97	3.52	7.84	4.35	8.09	1.42	3.51	4.71	5.39	5.20
17	3.39	4.86	6.20	6.46	4.74	4.86	9.05	4.41	4.30	6.10	7.13	4.95
18	5.05	6.54	7.29	5.10	6.91	8.30	6.42	4.35	6.66	5.90	7.02	6.70
19	4.18	4.02	5.57	3.88	4.93	5.18	4.82	3.78	7.38	6.27	7.03	5.25
20	5.04	1.91	4.91	5.92	4.30	5.41	5.57	3.93	4.09	4.79	4.60	6.07
21	2.65	5.16	3.96	4.10	3.52	2.43	3.84	3.03	3.29	2.83	3.15	8.83

Table C-37: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	7.62	2.97	3.18	0.65	0.64	1.53	1.76	2.75	3.41	2.75	1.98	3.94
23	2.60	2.71	1.97	2.43	2.83	2.10	2.18	3.11	2.00	2.43	1.38	1.87
24	1.75	4.29	4.83	1.24	1.35	1.01	2.24	2.53	2.62	2.03	1.27	1.42
25	1.50	2.37	8.69	1.21	2.18	1.13	2.17	1.48	1.64	2.42	3.15	1.14
26	1.38	0.50	0.17	0.26	0.82	2.66	1.53	1.72	1.67	1.67	1.98	1.33
27	0.72	0.97	0.46	2.68	1.46	0.51	0.90	0.56	1.13	0.73	1.46	0.91
28	0.95	1.29	0.60	1.11	1.55	0.59	0.97	1.64	1.83	0.95	1.18	0.38
29	0.48	0.76	0.18	0.14	5.43	0.26	0.66	0.98	1.52	1.31	1.86	1.03
30	0.85	0.51	0.28	0.43	1.11	0.35	1.88	0.84	0.26	1.71	1.05	0.85
31	3.20	1.73	1.29	2.36	1.43	2.69	1.42	2.87	1.52	2.06	2.97	1.82

Table C-38: Statewide Average Quad Axle Load Spectra for VC 11

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	32.46	37.75	34.32	32.86	30.20	43.20	31.01	38.56	40.25	40.24	38.45	32.42
2	5.72	11.06	5.02	5.60	5.21	4.77	6.04	5.51	5.59	5.51	3.04	5.87
3	0.92	2.14	2.56	3.08	2.54	1.51	1.16	1.63	1.93	1.68	2.08	1.53
4	4.26	1.96	2.64	4.57	1.87	1.40	7.10	2.97	2.60	1.90	1.58	4.78
5	2.05	0.20	0.77	1.26	0.76	0.35	2.25	1.45	1.70	1.58	0.76	5.55
6	2.94	2.56	3.10	2.57	2.68	2.85	4.38	1.76	2.24	2.10	2.66	6.65
7	1.25	1.05	1.70	2.07	1.98	5.58	6.07	2.62	2.43	2.11	2.33	2.99
8	4.99	5.57	4.49	4.68	4.53	3.72	3.88	3.62	3.98	4.14	4.02	3.18
9	3.41	1.23	2.36	2.15	7.10	1.86	1.75	2.17	1.99	2.60	1.96	0.68
10	2.85	2.32	1.94	1.66	1.60	0.77	2.06	0.97	1.88	1.66	1.61	1.64
11	4.03	1.38	2.17	1.78	1.96	3.14	5.21	3.27	1.50	1.05	2.70	2.57
12	3.21	4.62	2.17	2.03	1.98	0.96	0.98	3.34	2.96	2.67	3.11	2.13
13	3.63	3.55	3.88	4.02	3.54	0.95	0.74	2.58	2.79	3.10	2.87	2.09
14	0.57	2.02	1.10	1.36	1.43	0.00	0.00	0.05	0.34	0.59	0.38	0.72
15	0.08	0.00	0.00	0.27	0.17	0.63	0.04	0.00	0.00	0.00	0.00	0.00
16	0.18	0.00	0.00	0.80	0.00	0.12	0.11	0.10	0.07	0.00	0.00	0.00
17	0.47	0.61	0.13	0.65	0.36	0.62	0.20	0.32	0.13	2.47	0.00	0.00
18	0.57	0.05	0.07	0.52	1.49	0.13	0.41	0.03	0.43	0.67	0.00	0.00
19	0.36	0.00	0.02	0.14	0.53	0.27	0.42	0.15	0.16	0.74	0.00	1.97
20	0.79	0.00	0.13	0.39	0.04	4.15	0.40	1.21	0.51	0.26	3.24	0.66
21	1.42	0.00	4.28	1.41	1.07	0.46	0.74	1.28	1.67	0.00	2.02	1.91

Table C-38: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.85	0.00	1.06	0.52	0.85	0.00	0.93	1.72	1.11	1.37	0.00	0.72
23	0.72	0.00	0.00	0.70	0.45	1.16	0.77	1.42	0.56	1.33	0.00	0.00
24	0.45	0.00	1.66	0.35	0.40	0.35	0.61	0.40	0.86	0.31	0.00	0.00
25	0.09	0.00	0.97	0.00	0.05	0.00	0.32	0.05	0.18	0.00	0.00	0.00
26	0.10	0.00	0.00	0.89	0.00	0.00	0.05	0.13	0.01	0.00	0.88	0.00
27	0.13	0.72	0.69	2.19	1.51	0.00	0.00	0.10	0.85	0.42	0.00	0.31
28	0.00	0.16	0.30	0.43	4.63	0.00	0.00	1.05	0.22	0.45	0.00	0.57
29	0.04	0.00	0.09	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00
30	0.23	0.00	1.18	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
31	0.21	0.00	0.13	0.00	0.00	0.00	1.32	0.08	0.00	0.00	5.26	0.00

Table C-39: Statewide Average Quad Axle Load Spectra for VC 12

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	9.30	13.25	9.53	9.32	9.29	9.28	9.29	8.02	9.32	7.92	9.37	7.82
2	6.31	5.17	6.11	6.09	5.92	5.95	6.16	5.14	6.27	4.99	6.04	9.80
3	0.17	0.00	0.14	0.37	0.56	0.53	0.32	0.00	0.19	0.25	0.38	0.80
4	0.01	0.00	0.00	0.01	0.02	0.35	0.28	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.74	0.74	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.69	0.76	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.71	0.56	0.01	0.00	0.01	0.00	0.00
8	0.01	0.01	0.01	0.01	0.01	1.82	1.85	0.99	0.11	0.89	0.67	0.04
9	0.98	0.62	1.25	1.52	1.74	2.80	4.06	5.06	5.90	5.07	4.59	6.66
10	4.27	5.38	4.91	4.59	4.36	3.44	2.30	0.43	0.34	0.30	0.00	0.32
11	0.00	5.94	4.01	4.10	4.39	4.30	3.62	4.73	5.05	4.76	4.11	1.29
12	0.00	3.70	2.10	2.06	1.78	0.97	1.64	1.15	0.92	1.26	1.16	3.82
13	0.01	0.14	0.17	0.11	0.12	0.02	0.08	0.70	0.49	0.27	1.70	0.17
14	0.96	0.16	1.30	1.59	1.38	0.60	1.93	2.50	2.89	1.44	4.58	1.88
15	10.21	8.22	10.87	10.46	10.55	7.80	7.12	8.84	8.55	10.26	9.28	10.53
16	9.52	2.13	1.20	1.17	1.21	2.01	1.33	1.85	2.01	1.98	0.22	1.56
17	0.35	0.01	0.49	0.70	0.78	0.10	0.06	0.06	0.05	0.08	0.00	0.05
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00
20	0.82	0.00	0.98	0.86	0.36	0.04	0.18	0.00	0.94	4.51	0.98	0.00
21	0.44	0.00	0.31	0.41	0.82	1.08	0.97	0.00	0.34	0.75	0.16	0.00

Table C-39: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.05	0.00	0.03	0.05	0.13	0.19	0.17	0.00	0.03	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.61	0.83	1.42	1.84	2.32	1.44	1.59	1.39	1.50	0.09
25	2.31	0.53	1.79	1.60	1.10	0.74	0.31	1.08	0.95	1.13	1.06	2.23
26	0.43	1.84	0.37	0.32	0.14	0.06	0.00	0.79	0.23	0.12	0.48	0.31
27	0.79	0.25	0.98	0.85	0.27	0.12	0.15	4.59	0.94	0.00	0.90	0.00
28	0.41	0.00	0.20	0.35	1.02	0.84	1.01	0.00	0.25	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.35	0.16	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C-40: Statewide Average Quad Axle Load Spectra for VC 13

LG	January	February	March	April	May	June	July	August	September	October	November	December
1	27.31	25.66	27.12	25.22	31.75	35.15	25.92	21.05	22.41	24.72	16.02	25.50
2	7.16	12.03	6.67	13.64	9.09	10.38	9.33	18.53	10.58	11.90	12.79	7.52
3	12.46	12.13	6.94	11.32	18.71	6.28	10.30	13.24	14.35	7.59	9.60	9.79
4	6.53	8.72	9.49	5.96	7.00	8.61	8.61	6.92	10.42	8.62	9.16	7.17
5	12.52	4.88	8.25	4.62	9.75	10.31	12.36	5.83	14.28	10.89	8.53	9.95
6	5.39	6.84	6.91	4.99	4.80	4.80	8.58	7.97	10.61	7.11	11.34	5.69
7	2.88	3.15	2.82	3.11	2.26	6.32	2.56	5.60	3.69	8.00	6.51	3.47
8	2.46	2.26	2.95	1.65	2.97	3.91	1.02	2.35	1.31	1.91	8.03	2.59
9	1.48	1.25	1.20	1.01	1.50	2.51	1.20	2.87	0.82	1.03	1.42	2.09
10	1.17	1.72	0.30	6.55	1.00	0.98	3.38	1.39	0.82	0.77	0.61	1.36
11	0.76	0.79	0.39	2.97	0.89	0.54	0.06	0.31	0.04	0.63	0.34	1.21
12	1.21	5.20	3.47	0.06	0.22	0.05	0.01	0.31	0.15	0.30	0.33	1.19
13	0.69	0.83	1.55	0.03	0.21	0.04	1.59	0.24	0.35	0.32	0.13	0.57
14	0.29	0.25	0.53	0.73	0.01	0.00	1.16	0.00	0.33	0.38	0.00	0.31
15	2.75	0.34	0.54	0.18	0.17	0.00	0.45	0.33	0.87	0.48	0.14	0.12
16	0.22	0.42	0.53	0.18	0.15	0.08	0.72	0.05	0.39	2.87	0.43	0.21
17	1.01	0.60	1.64	1.56	0.04	0.11	1.05	0.44	0.84	0.94	0.49	0.33
18	1.12	0.38	0.60	0.55	0.72	2.04	0.67	0.56	1.15	0.46	1.85	1.78
19	2.02	0.15	8.68	1.01	1.15	0.43	0.56	0.67	0.16	0.56	0.46	1.69
20	2.01	0.31	1.65	0.76	0.32	0.06	0.71	0.51	0.30	0.42	0.28	3.18
21	0.45	2.53	1.53	0.89	1.68	0.14	1.19	4.79	0.03	0.32	0.16	0.14

Table C-40: *Continued*

LG	January	February	March	April	May	June	July	August	September	October	November	December
22	0.32	0.15	0.95	0.10	0.29	0.18	0.38	0.00	0.06	0.01	0.04	0.21
23	0.38	0.48	0.00	0.27	0.06	1.73	0.35	0.14	0.13	2.33	0.59	0.00
24	0.19	2.54	0.00	0.71	0.00	0.07	0.46	0.40	0.25	0.61	3.23	3.56
25	0.11	0.14	0.00	0.00	0.00	0.00	1.31	0.07	0.19	0.28	0.29	1.90
26	0.11	0.16	0.00	4.89	0.00	0.00	0.11	0.10	0.15	0.18	1.38	0.18
27	0.19	0.07	0.00	0.42	0.00	0.00	0.37	0.02	0.03	0.16	0.08	0.18
28	0.05	0.02	0.00	0.70	0.00	0.00	0.28	0.00	0.00	0.17	0.11	0.07
29	0.23	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.17	0.62
30	0.11	0.08	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.14	0.18	0.42
31	1.11	0.60	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.40	0.03	1.72

REFERENCES

1. Bethu, V.S. *Contribution to the Implementation of the NCHRP Design Guide for Flexible Pavement Structures*. M.S. Thesis. Kansas State University, Kan., 2005.
2. Diamond Traffic Products. <http://supportdiamondtraffic.com> (Nov. 8, 2012).
3. *Guide for Mechanistic-Empirical Design of New and Rehabilitated Pavement Structures*. Final Report, NCHRP Project 1-37A. TRB, National Research Council, Washington, D.C., March 2004. <http://trb.org/mepdg/guide.htm>.
4. Haider S.W., Buch N., Chatti K., and Brown J. Development of Traffic Inputs for Mechanistic-Empirical Pavement Design Guide in Michigan. In *Transportation Research Record: Journal of the Transportation Research Board*, No. 2256, Transportation Research Board of the National Academies, Washington, D.C., 2011, pp. 179-190.
5. Jadoun F. M., Sayyady,F., Kim Y. R., Stone J. R. Damage-Based Analysis to Guide the Development of MEPDG Axle Load Distribution Factors and Clustering for North Carolina. Presented at the 90th Annual Meeting of the Transportation Research Board, Washington, D.C., 2011.
6. Jiang Y., Li S., Nantung T.E., Chen H. Analysis and Determination of Axle Load Spectra and Traffic Input for the Mechanistic-Empirical Pavement Design Guide. Joint Transportation Research Program, October, 2008.
7. Kim J. R., Titus-Glover L. Darter M. I., and Kumapley, R.K. Axle Load Distribution Characterization for Mechanistic Pavement Design. In *Journal of the Transportation Research Board*, No. 1629, Transportation Research Board of the National Academies, Washington, D.C., 1998, pp. 13-17.

8. Kweon, Y.J. and Cottrell Jr., B.H. Analysis of Weigh-in-Motion Data for Truck Weight Grouping Mechanistic-Empirical Pavement design Guide. In *Journal of the Transportation Research Board*, No. 2256, Transportation Research Board of the National Academies, Washington, D.C., 2011, pp. 169-178.
9. Lu, Q. and Harvey, J.T. Characterization of Truck Traffic in California for Mechanistic Empirical Design. Presented at 85th Annual TRB Meeting, Washington, D.C. January 2006.
10. Lu Q., Zhang Y., and Harvey J.T. Estimation of Truck Traffic Inputs for Mechanistic Empirical Pavement Design in California. In *Transportation Research Record: Journal of the Transportation Research Board*, No. 2095, Transportation Research Board of the National Academies, Washington, D.C., 2009, pp. 62-72.
11. Momin, S.A. *Local Calibration of Mechanistic Empirical Pavement Design Guide for North Eastern United States*. M.S. Thesis. The University of Texas at Arlington, Texas, 2011.
12. Neeraj Buch, Syed Waqar Haider, Joel Brown, Karim Chatti. Characterization of Truck Traffic in Michigan for the New Mechanistic Empirical Pavement Design Guide. Michigan State University, 2009.
13. Papagiannakis A. T., Bracher M., Jackson N. C. Utilizing Clustering Techniques in Estimating Traffic Data Input for Pavement Design. *Journal of Transportation Engineering*, American Society of Civil Engineers, Vol. 132, Issue 11, Nov. 2006, pp. 872-879.
14. Prozzi, J. A., and F. Hong. Hierarchical Axle Load Data for Mechanistic-Empirical Design. Presented at 84th Annual Meeting of the Transportation Research Board, Washington, D.C., 2005.
15. Qu T., Lee C. E. and Huang, L. Traffic-Load Forecasting Using Weigh-In-Motion Data. Center for Transportation Research: The University of Texas at Austin, March 1997.
16. Romanoschi S. A., Momin S., Bethu S. and Bendana L. Development of Traffic Inputs for the new ME Pavement Design Guide: a case study. In *Transportation Research Record*:

Journal of the Transportation Research Board, No. 2256, Transportation Research Board of the National Academies, Washington, D.C., 2011, pp. 142-150.

17. Sayyady F., Stone J.R., Jadoun F. M., Kim Y. R., and Sajjadi S. Clustering Analysis to Characterize Mechanistic-Empirical Design Guide Traffic Data in North Carolina. In *Journal of the Transportation Research Board*, No. 2160, Transportation Research Board of the National Academies, Washington, D.C., 2010, pp. 118-127.
18. Sayyady F., Stone J. R., List G.F., Jadoun F. M., Kim Y. R., and Sajjadi S. Axle Load Distribution for Mechanistic-Empirical Design in North Carolina: Multidimensional Clustering Approach and Decision Tree Development. In *Journal of the Transportation Research Board*, No. 2256, Transportation Research Board of the National Academies, Washington, D.C., 2011, pp. 159-168.
19. Sridhar B.K. *Characterization and Development of Axle Load Spectra to Enhance Pavement Design and Performance on the Basis of New Mechanistic-Empirical Pavement Design Guide in Louisiana*. The Department of Civil and Environmental Engineering, Louisiana State University, 2008.
20. Sung, Y.-L., W. H-Huang, and J.-D. Lin. Development of Axle Load Distribution Model of Heavy Vehicles. Presented at 81st Annual TRB Meeting, Washington, D.C., 2002.
21. Swan D.J., Tardif R., Hajek J. J., and Hein D.K. Development of Regional Traffic Data for the Mechanistic-Empirical Pavement Design Guide. In *Journal of the Transportation Research Board*, No. 2049, Transportation Research Board of the National Academies, Washington, D.C., 2008, pp. 54-62.
22. Timm D. H., Bower J. M., Turochy R. E. Effect of Load Spectra on Mechanistic-Empirical Flexible Pavement Design. In *Journal of the Transportation Research Board*, No. 1947, Transportation Research Board of the National Academies, Washington, D.C., 2006, pp. 146-154.

23. Tisdale, S.M. *Development of truck Equivalency Factors and Axle Load Spectra for Pavement Design*. M.S. Thesis. Auburn University, Ala., 2003.
24. Wang K. C.P., Li Q., Hall K.D., Nguyen V., Xiao D. X. Development of Truck Loading Groups for the Mechanistic-Empirical Pavement Design Guide. *Journal of Transportation Engineering*, American Society of Civil Engineers, Vol. 137, Issue 12, Dec. 2011, pp. 855-862.

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Ferdous Intaj is originally from Dhaka, Bangladesh. He received his Bachelor of Science in Civil Engineering degree from the Bangladesh University of Engineering and Technology (Dhaka), Bangladesh in October, 2009. In August, 2010, he started his Masters of Science program in Civil Engineering at The University of Texas at Arlington in the area of pavement and transportation engineering. Throughout his masters he was guided by his supervising professor Dr. Stefan A. Romanoschi and graduated in December, 2012.