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ACCOUNTING FOR THE SEASONAL VARIATIONS IN THE DESIGN OF FLEXIBLE PAVEMENTS

by

Hesham A. Ali

**A dissertation submitted to the Graduate Faculty in Engineering in partial
fulfillment of the requirements for the degree of Doctor of Philosophy, The City
University of New York**

1997

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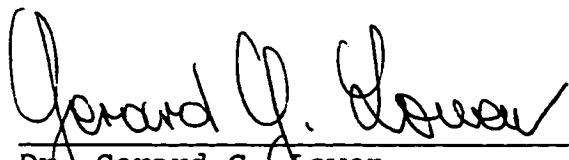
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Abstract

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Hesham A. Ali

Adviser: Professor Neville A. Parker

The first main objective of the work reported here, is to investigate and quantify the relationship between climatic variables and pavements' structural properties, in light of the data collected under the Seasonal Monitoring Program of the Long Term Pavement Performance Program. A series of bivariate and multivariate graphs are plotted to visually explore the spatial and temporal distribution of the pavement structural properties, and to graphically express the relationships between pairs of variables. Semivariogram analysis and ANOVA are used to analyze the spatial variation of the pavement layer moduli. Multivariate correlation analysis is used to correlate changes in pavement structural properties to climatic factors. Principal components and regression analyses are used to formulate and calibrate linear models that correlate climatic factors to the pavement's layer moduli. Nonlinear exponential models are developed to correlate the AC layer modulus to pavement temperature. Sinusoidal models are developed to correlate the layer moduli to the month of the year. Time series analysis is used to quantify the temporal and the spatial variations in pavement layers' moduli.

The second main objective is to develop a methodology to account for the seasonal changes in pavements' structural properties in the design of flexible pavements. Time series approach is used to incorporate the seasonal variations of pavement layers' stiffnesses in both empirical and mechanistic - empirical pavement design methods. A computer program was written to carry out the required calculations based on the proposed methods, and to compare the outputs to those of existing design methods. A sensitivity analysis was performed to examine the sensitivity of the program output (the required Structural Number (SN)), to each of the input parameters and to correlate the required structural number based on the AASHTO method, to that of the proposed method.

The concept of The Equivalent Constant Moduli is proposed to back-calculate the moduli of equivalent pavement layers that: have constant moduli with time, have the same set of thicknesses as the original pavement and will last the same performance life as the original pavement. The concept has the potential of simplifying the design method and evaluating the consequences of the design assumptions in relation to the stiffnesses of the pavement layers.

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CHAPTER 1: INTRODUCTION

It has long been recognized that temperature, moisture conditions and freezing/ thawing cycles have a great impact on pavement structural properties. Some or all of these climatic or "environmental" conditions are continuously changing over the course of a year and within the same day. As these changes take place, pavement stiffness, strength, damage due to unit load and performance change accordingly. Today, more than ever before, highway agencies are faced with the challenge of providing economical designs (or rehabilitation) at specified level of service. A key element towards meeting this challenge relies on our ability to disassociate and accurately account for loss of pavement serviceability due to loading and that of environmental conditions.

While serviceability loss due to loading is given a great emphasis in pavement design, the other equally important source of serviceability loss, environmental conditions, is overlooked primarily because the involved mechanisms are not well understood making it difficult to quantify their effect on pavement deterioration.

When addressing seasonal variations in pavement response, existing design methods utilize empirical methods that involve a great deal of subjectivity and uncertainty. For example the 1993 AASHTO Guide [1], presented an approximate procedure to evaluate the loss of pavement serviceability due to roadbed swelling and frost heave. As indicated in the source, these methods involve a great deal of subjectivity and caution is advised

since the graphs used represent more of qualitative than quantitative relationship between the factors.

Objectives of the Seasonal Monitoring Program (SMP)

In recognition of the utmost necessity to further study the impact of climatic conditions on pavement response, the Seasonal Monitoring Program (SMP) within the Long Term Pavement Performance (LTPP) was devised. The primary objective of the program (as stated in the guidelines [2]) is to provide data needed to attain fundamental understanding of the magnitude and impact of temporal variations in pavement response and material properties due to the separate and combined effect of temperature, moisture and frost/thaw variations. The product of this effort will provide the following :

- The means to link pavement response data obtained at random points in time to critical design conditions
- The means to validate models for relationships between environmental conditions (e.g., temperature and precipitation) and in situ structural properties of pavement materials
- the means to expand knowledge of the magnitude and impact of the changes involved

Experimental Design Cells

Out of the 3,000 LTPP test sections scattered across North America, sixty-four (64) LTPP test sections were selected to obtain a balance of key pavement factors: pavement type, thickness, environment, and subgrade type (see table 1.1.)

TABLE 1.1 : SMP Experimental Design Cells and Target Number of Sections Per Cell

Table I-1 - SMP Core Experiment: Experimental Design Cells and Target Number of Sections per Cell

Pavement Type	Subgrade Soil	No Freeze		Freeze	
		Dry	Wet	Dry	Wet
Flexible - Thin AC (< 127 mm (5 in)) Surface	Fine	1 (3)	2 (3)	3 (3)	4 (3)
	Coarse	5 (3)	6 (3)	7 (3)	8 (3)
Flexible - Thick AC (> 127 mm (5 in)) Surface	Fine	9 (3)	10 (3)	11 (3)	12 (3)
	Coarse	13 (3)	14 (3)	15 (3)	16 (3)
Rigid - Jointed Plain Concrete (JPC)	Fine	17 (1)	18 (1)	19 (1)	20 (1)
	Coarse	21 (1)	22 (1)	23 (1)	24 (1)
Rigid - Jointed Reinforced Concrete (JRC)	Fine	25 (1)	26 (1)	27 (1)	28 (1)
	Coarse	29 (1)	30 (1)	31 (1)	32 (1)

Notes: First number in each cell is the identification number assigned to the cell. The second number, in parenthesis, is the target number of sections for the cell.

The specific data to be collected under the SMP are summarized in table 1.2, not excluding other data collected for LTPP purposes. Key elements of the monitoring plans include:

- Deflection basin testing for evaluating temporal variations in structural properties
- Load transfer testing on joints and cracks in rigid pavements for monitoring load transfer conditions.
- Joint faulting and joint opening measurements for determining the effect of temperature variations on joint condition.
- Surface elevation measurements for evaluating effects of frost heave and swelling of the soil.
- Transverse and longitudinal profile measurements for characterizing pavement rutting and roughness.
- Distress surveys for monitoring progression of pavement distresses over time
- Ambient temperature and precipitation measurements for characterizing ground truth climatic conditions over time.
- Subsurface temperature and moisture content of the pavement layers for monitoring the variation of these factors over time.
- Frost and thaw depth measurements, where applicable, for defining changes in support conditions over time.

Collection of deflection, profile and distress data is accomplished using existing LTPP equipment and testing protocols. This includes Falling Weight Deflectometer (FWD's),

profilers, photographic technology and manual distress surveys. Instrumentation permanently installed at the test sections are gathering the remaining data needed to quantify the impact of temporal variations in pavement response. Time Domain Reflectometry (TDR) sensors and thermistors are used to monitor changes in subsurface moisture and temperature, electrical resistivity probes are used for frost/thaw depth measurements and observation piezometers are used for ground water table depth determinations. In addition, air temperature probes and rain gauge tipping buckets are used to monitor ambient temperature and precipitation.

Scope of Work

As shown in Table 1.1, the experimental design cells include both flexible and rigid pavements in freeze or no-freeze zones (with combination of dry or wet zones.) However, since the rigid pavements data were incomplete, as of the project start time, it is decided that the focus in this report would be on the analysis of flexible (AC) pavements. Further, because of the fact that more work is needed to develop models to interpret resistivity data into meaningful frost/ thaw penetration measures, only flexible pavements located in no-freeze zones are analyzed in this project.

The analysis addresses the following issues:

- How significant are the variations of pavement response measures (represented by deflection data and back-calculated layer moduli) from one point to another along a given site? Should they be treated independently or should they be treated as repeated

measures of the same data set? The answer to this question is addressed by applying Analysis of Variance (ANOVA) and Shuffe test to compare the variability from one testing point to another (presented in Chapter 6.)

- What is the magnitude of the seasonal variations in a given site? This is presented, in Chapter 5, by a series of tables and graphs that show the values of selected structural measures (such as layer elastic moduli) in different months of the year and within the same day.
- Is pavement response in the wheel path significantly different from it's response in the middle of traveling lanes (midlane)? Again, the answer to this question is investigated using ANOVA (presented in Chapter 6.)
- What is the optimum separation distance between testing points such that we do not spend too much of our resources in collecting redundant data, but at the same time we do not sacrifice the accuracy of our estimation? Semivariogram analysis is used to address this concern (Chapter 6.)
- Among tens of variables included in the analysis (i.e. deflection at different radial distances from the load, different drop heights, deflection basin area, pavement layer elastic moduli, ambient temperature, pavement temperature and moisture content at different vertical locations, temperature gradient, ..etc.) what is the linear correlation between each pair of variables? Multivariate, principal components and regression analyses are used to address this question (see Chapter 6.)
- What if the graphical presentation between a group of variables (presented in Chapter 5) indicates that the relationship between such variables is not linear? In this case,

nonlinear models need to be developed and fitted using numerical optimization. Examples of nonlinear models include, the relationships between the back-calculated elastic modulus of the AC layer and pavement temperature which are basically exponential. Models that correlate pavement temperature to the month of the year may follow a sinusoidal form. Chapter 7 presents some nonlinear models

- Although time and space are not causal properties, some variables in the analysis (e.g., temperature, the resilient modulus of the subgrade, etc.) tend to be time dependent. How reliable is this time dependency? And is it possible to use time as an independent variable to construct models that predict future values of such time dependent variables? Sinusoidal time models in Chapter 7 and time series analysis in Chapter 8 are intended to address these questions.
- Finally a general methodology to incorporate the seasonal variations of pavement structural properties and the seasonal variation of traffic volume in pavement design is presented in Chapter 9. A computer program, seasonal variation in pavement design (SVPD), is written to carry out the required calculations.

The statistical analysis methodology is outlined in Chapter 5. In Chapters 6, 7 and 8, an introduction and a brief background about the respective statistical technique is presented first, followed by the outputs, the results and the interpretations of such results. Chapter 10 presents a sensitivity analysis of SVPD and Chapter 11 summarizes the conclusions and the recommendations of this analysis.

TABLE 1.2: SMP Data Elements

DATA ITEM
● DEFLECTION DATA - Deflection Basin - Mid-Lane (Flexible Pavements) - Outer-Wheel Path (Flexible Pavements) - Mid-Slab (Rigid Pavements) - Edge: Corner or Centered on Crack (Rigid Pavements) - Edge: Mid-Panel (Rigid Pavements) - Joint Load Transfer (Rigid Pavements) - Approach, Outer-Wheel Path - Leave, Outer-Wheel Path
● RELATED DATA - Ambient Temperature and Rainfall - Pavement Surface and Air Temperature - Surface Layer Temperature Profile - Moisture - Depth Profile - Temperature - Depth Profile - Depth of Frost/Thaw - Depth of Ground Water Table - Joint Opening (Rigid Pavements) - Joint Faulting (Rigid Pavements)
● ELEVATION AND PROFILE DATA - Surface Elevation (Rod and Level) - Longitudinal Profile (Profiler/Dipstick)
● DISTRESS DATA - Distress (Photographic/Manual)

CHAPTER 2: LITERATURE REVIEW

In this chapter, a review of the literature is presented, followed by a few paragraphs that highlight areas, where more research is needed. Methods of characterizing and evaluating the effect of climatic factors on pavement performance could be classified into two categories: empirical analysis and analysis based on simulation and analytical/empirical models. The review is divided into three sections; empirical analysis, analysis based on simulation and analytical models, and recent research work.

Empirical Analysis

The primary environmental factors studied in the literature are temperature, moisture conditions and freezing and thawing conditions. Other important climatic factors such as solar radiation at pavement surface, wind and precipitation are addressed only in models based on simulation and heat balance, mass balance and water balance equations [3 and 4], which will be discussed in the next section. The work reported in this section, is based on empirical observations that relate climatic factors to pavement response and/or material properties, without going into the complexity of thermodynamic concepts of heat transformation, heat balance, mass balance, etc. The effect of temperature and that of moisture are described under separate subheadings.

Air temperature has direct and indirect effects on flexible pavements. The direct effect is due to the temperature dependency of the stiffness of the bituminous layers. This means that the bituminous materials will be subjected to considerably more fatigue damage at higher temperatures than at lower ones. The softening of the bituminous layer leads to a change in the stress state of the base and subgrade which may lead to a change in their stiffness. Indirect effects of temperature include its effect on the stability of the moisture conditions of the subgrade. The various temperature effects are reflected on the magnitude of deflection measured by an NDT device, such as FWD, and hence the back-calculated properties of all of the pavement layers. Matter and Farouki [5] have conducted an excellent literature review on previous research work related to temperature and moisture effects on pavements which is suitable for this discussion.

Research work into the quantification of the temperature effect on the performance of pavement structures followed two main streams. The first approach was based on correcting the values of the deflections measured by NDT equipment at a certain temperature to a standard deflection at a specified standard temperature. This was achieved by means of temperature adjustment factors or correction charts. The second approach was based on correcting the moduli of the temperature sensitive layers, back-calculated from measured deflections at test conditions, to equivalent moduli at a standard temperature.

Southgate and Deen [6] developed a correction method for adjusting the Benkelman Beam deflection measured at a certain temperature to a standard temperature by applying a dimensionless multiplication factor. They presented this adjustment factor in the form of curves relating it to the mean temperature of the bituminous layer. Having developed different curves for various pavements, even those with similar layer thicknesses, this method was hardly ideal for generalizing. They also used the deflections measured at various temperatures to back-calculate the moduli of the bituminous layer corresponding to these temperatures using a combination of Boussinesq and Burmister equations and reported a good correlation between the values of these moduli and those obtained using deflection adjustment factors. The good correlation is somewhat surprising considering the approximate nature of the equations used for back-calculation and the fact that the adjustment factor, being a multiplicative one, when applied to the measured deflection is in effect implying a change in the modulus of the subgrade layer, proportional to its contribution to the maximum deflection, while in the back-calculation process this modulus was considered to be constant.

Ehrola et al [7] carried out FWD tests on a number of pavement sections for three successive seasons and combining three daily measurements for each season, they correlated the measured maximum deflection with the mean temperature of the bituminous layer (AC) concluding that this relationship is an exponential one. Using the Shell method [8] for calculating the mix stiffness from its components, they also determined the stiffness of various theoretical asphalt concrete mixes (with different

bitumen type and content) at various temperatures. Based on these stiffness values, they calculated the maximum deflection of a number of theoretical structures varying the thickness of the AC layer between 50 mm and 250 mm. Correlating these calculated maximum deflections with the bituminous layer mean temperature, exponential relationships similar to those obtained from field measurement were established. They also concluded that although the type of bitumen and bitumen content affected the temperature dependency of the maximum deflection, this effect was minor compared to that of the thickness of the bituminous layer. Again, the remarkable agreement between temperature and deflection is somewhat surprising considering that, while the method used to determine the mix stiffness is restricted to a temperature range of 0 °C to 20 °C, more than half the field measurements were taken outside this range, 20 °C to 35 °C.

The AASHTO design manual [1] recognized the two approaches that can be used to carry out temperature correction to a standard temperature of 70 °F (21.1 °C). Two sets of correction charts were developed so that either the measured deflection can be converted to its equivalent at the standard temperature or else the modulus back-calculated from the measured deflection can be corrected to a modulus value corresponding to the standard temperature. The AASHTO modulus correction charts were developed using a series of laboratory Indirect Tensile Test (ITT) carried out on a large number of typical bituminous mixes.

While the previously mentioned studies only consider the maximum deflection of an NDT device, Shaat [9] conducted a tentative study into the seasonal variation of the Deflectograph deflection considering the whole of the deflection bowl within its 9 deflection parameters and its area. Having conducted his study on a test strip for a period of 12 months, with tests carried out each month, he used a representative deflection bowl for each month to determine the pattern of seasonal variation of the various deflection parameters and found the season to affect these deflection parameters differently. Although he did not establish relationships between temperature and various deflection parameters, in his discussion he acknowledged that the influence of other seasonal factors, besides that of temperature, should be considered concluding that the temperature correction should be applied to the back-calculated moduli of the temperature sensitive layers. He used the results of the laboratory tests on the bituminous cores recovered from the test section to establish the temperature correction factor to be applied to the back-calculated moduli using the mean pavement temperature at the time of testing.

Bergstedt [10] conducted a comparison of some of the methods used for temperature correction applied to the measured deflections. A test section was used in this study where an FWD test was carried out every 2 hours for a complete 24-hour cycle. The aim of this set up was to achieve as much temperature variation as possible without any change in other seasonal factors such as moisture content. The measured FWD maximum deflection was then correlated with the measured mean pavement temperature and the resulting equipment used to provide the adjusted deflection value at four standard

temperatures (15, 20, 21.1 and 26.7 °C) and used this as the basis of comparison between selected methods. Comparing different methods of deflection correction (including AASHTO [1], Kennedy and Lister [11], Bandyopadhyay [12] and her own method) and applying them to all deflection measurements, she reported a remarkably high accuracy of all the methods stating that these findings were surprising considering that they were developed for different conditions and more importantly for different types of NDT devices. She also concluded that only the maximum FWD deflections and deflection ordinates up to 500 mm away from the load centerline are affected by temperature variation and therefore require correction.

Kim et al [13 and 14] conducted a study in North Carolina to study the temperature effects on pavement deflection. Four test locations were used to collect data: pavement temperature at the surface and various depths, air temperature, moisture content at different depths, wind speed, shading conditions from a nearby weather station, and FWD deflection data. The data were collected for one full day in each season for every location. The analysis consisted of two steps (following the AASHTO Correction prediction procedure); the first is to predict pavement temperature at a given depth (in this case was mid depth), given the surface temperature and 5- day mean temperature. The second is to find the correction factor to adjust deflections measured at any temperature to an equivalent deflection at a standard temperature of 68 °F. Using the data collected, the following observations were made:

- The AASHTO procedure of mid-depth temperature prediction appears to give good results in the range of 50 to 95 °F. Below and above this range, it did not do well.
- Surface temperature moves considerably with time while mid-depth temperature is more consistent.
- Some difficulties were observed in predicting the mid-depth temperature from the surface temperature due to the following: 1) surface temperature peaks at about 2 p.m., while the mid-depth temperature peaks in a delayed time. 2) Not taking into account the effect of temperature gradient. For example, at 11 a.m. and at 5 p.m. the surface temperature was 103 F degrees, while the mid-depth temperature was 82 and 102 respectively.
- The effect of sunshine is noticeable and should be taken into consideration.
- When plotting the corrected deflection data versus mean temperature, significant variations are observed; deflection increases with the increase of temperature--a drawback of the AASHTO procedure (theoretically, corrected deflection should be constant with temperature change since the temperature factor is accounted for by adjusting the deflection).

The authors used the data to develop a statistical model for temperature correction. They reported that the procedure, called NCDOT procedure, seems to agree with collected data and the MODULUS back-calculation program's built-in stiffness-temperature relationships, which were based on laboratory testing. In addition to the temperature correction of deflections, the authors presented a procedure to correct the FWD

back-calculated modulus of the asphalt layer to a reference temperature (68 °F). The Correction factor is given as a function of the AC layer temperature at a depth of one third the AC layer in °C at the time of FWD testing.

Baltzer and Janesen [15] reported their finding in a research conducted in Denmark to come up with a procedure to correct the FWD back-calculated modulus of the asphalt layer to a reference temperature. MODCOMP3 [16] was used to back-calculate deflection data obtained from the 24-hour testing of pavement.

Stubstad et al [17] used a data base from the LTPP, SHRP program, for about 12 sites in different places in Europe and in the USA. The data base, consisting of 165 data points, was used to compare the actual observation to three different temperature prediction models (i.e., models that predict pavement temperature given air temperature and other climatic variables): AASHTO [1], US Army Corps of Engineers (WES) method and Southgate's method [5.] None of these methods provided entirely satisfactory results (they plotted the observations against the predictions of each model and reported a large deviation from the 45- degree line). The authors then developed a new method called the BELLS method to predict the third point temperature (the temperature at a depth equal 1/3 of the AC layer thickness). This method resulted in a line that is identical to the 45 degree line and a R square of 0.97. The model utilizes six independent variables: IR (infrared surface temperature at the time of testing), day of the year, hour, 5-day average temperature and the depth. Future refinement of the model is planned with the arrival of

new data. For example, different weights could be given to different days in the average 5 day temperature variable.

Moisture Effect

In most design standards, the variation in the moisture condition of the subgrade soil is considered only during construction assuming that after construction, provided a good drainage system is present, the moisture condition reaches a state of equilibrium. Among the conditions for such equilibrium is the stipulation that the temperature of the subgrade is constant and does not change with season. Another condition is that the pavement structure provides waterproofing to the soil in preventing it from receiving moisture by infiltration or releasing it by evaporation. However, these conditions were not found to be satisfied in most pavements. Subgrade temperature was found to vary considerably with season. In some seasons (fall and winter) it was found that the subgrade's temperature is higher than the ambient temperature which meant that evaporation did occur from the subgrade. Moreover, moisture content migration to, or from, adjacent soils and seasonal movement of the water table, when present at shallow depth, was found to change the subgrade moisture content appreciably [5].

The importance of the seasonal variations of moisture content has been realized long ago. However, the lack of practical in-situ methods to measure the subgrade moisture content and its variation hindered the development of correction methods similar to those developed for temperature corrections. Smith and Hewitt [18] conducted a study into the

seasonal variation using Benkelman Beam deflection and reported that, after correcting the measured maximum deflection for temperature, seasonal variation in the order of 40% still existed. They stated that this variation was most likely to be due to the variation in the subgrade moisture content, but a method for measuring the moisture movement was not available nor was there a direct correlation available between this deflection variation and rainfall/evaporation, therefore, no firm conclusion for a correction to account for this specific seasonal variation could be drawn.

Researchers working with pavements subjected to tropical climatic conditions found no significant seasonal variation in the moisture condition of subgrade soils which stayed in a state of equilibrium at a water content below or equal to the optimum value (Medina and Motta [19]). The conclusion was that there was no need for any correction regarding moisture content. In areas such as western Europe, where moisture seasonal variation is significant and is clearly reflected on deflection measurements, very few research studies were carried out and assessment methods mostly relied on assumed equilibrium conditions. Carson et al [20] used the Deflectograph to carry out deflection tests for a period of over two years on three test sections with subgrades sensitive to moisture changes. Having installed a number of gypsum cells to measure the moisture content of the subgrade, they developed linear regression equations relating the Deflectograph maximum deflection to the subgrade moisture condition, defining the slope of the linear relationship as deflection sensitivity to moisture content for a particular section.

Shaat et al [21] conducted a seasonal study using the Deflectograph to monitor a controlled test section along the shoulder of which three boreholes were cored to a depth of 9 m and the vertical movement of the water table was monitored. They correlated the elastic modulus of the subgrade, back-calculated from the Deflectograph deflection with the depth of the water table measured concurrently. These findings indicate the importance of the moisture content and its seasonal variation effect on the performance of pavement structures.

Analysis based on Simulation and Analytical Models

In the past two decades great research efforts were put into the field of quantifying and understanding the mechanisms of climate-related phenomena, such as the amount of heat received on the pavement surface, moisture infiltration through pavement layers, drainage mechanism, moisture movement (vertically and horizontally), frost heave, thaw weakening and freezing of pavement layers. How these phenomena are influenced by climatic factors (precipitation, air temperature, solar radiation, wind speed), and how they ultimately affect pavement structural properties, was the subject of an extensive research. The output of such efforts is the Integrated Model [3]. The model is fairly complex and consists of four major interacting components: Precipitation model [22], Infiltration and Drainage (ID) model [23], Climatic/ Material/ Structural (CMS) model [4], and Cold Region Research Engineering Laboratory (CRREL) model for frost heave and settlement calculation [24, 25, 26, 27 and 28]. The following paragraphs briefly describe each component.

Precipitation Model

Input: recorded climatic conditions for 30 years from the National Oceanic and Atmospheric Administration (NOAA). If the required input data are not available, users may use available data input files for 15 representative sites in 9 different climatic regions defined in the model.

Output: predicted amount of rain and the days in which rainfall occurs (required as input for the Infiltration and Drainage model)

Processing: The model is a deterministic algorithm that provides simulation of rainfall events for 15 sites. The model uses recorded climatic data and congruential mathematical concepts to simulate rainfall patterns that are considered acceptable for design purposes. Average monthly values of precipitation from the past 30 years are readily available from the NOAA for a variety of locations of first order weather stations. Elementary statistical methods applied to this data will provide average values, standard deviations and maximum or minimum expected amounts of moisture depending on the confidence level that is considered appropriate for the design.

Infiltration and Drainage (ID) Model

Input: the outputs from the Precipitation model and material properties

Output: evaluates the base course drainage condition, probabilistic analysis of the rainfall data, infiltration analysis and the resulting probabilities of having either a wet or dry base course.

Processing: The drainage model is a numerical technique of computing the degree of drainage (drained area/total area in percent) versus time of an initially saturated granular base course with lateral drainage overlying a permeable or impermeable subgrade. The analysis assumes that the base course is a free draining material. The process uses Casagrande and Shannon model for impermeable subgrade [29] and Liu et al model for permeable subgrade [30] which relate the drainage time to degree of drainage and the lateral slope. Haynes and Yoder [31] concluded that mixtures of gravel and crushed stone experience excessive deformation under repeated loads when the degree of saturation exceeds 85%. This is in accordance with Martin and Toan of New Zealand [32] who showed that under repeated loading excess pore water pressures develop in the base course material when the degree of saturation exceeds 80%. As a result, the critical degree of saturation used in the model is 85%. The drainage analysis determines the time required for the base course to drain a given amount of water. The drainability of a given base layer is evaluated using the tables developed by Carpenter et al [33]. This analysis is followed by rainfall analysis in which the rainfall frequency is predicted using the Gamma distribution. The sequence of rain events is simulated using a combination of Markov chain model [34] and Katz's model [35].

Climatic / Material / Structural (CMS) Model

Input: sunshine percentage, wind speed, air temperature, solar radiation, material properties and pavement geometry

Output: (1) heat flux boundary condition on roadway surface and resulting temperature profile throughout the AC layer. (2) The change in the AC layer stiffness, the resilient modulus and Poisson ratio of the base, the subbase and the subgrade with time. Changes of moisture content of the subgrade are determined by computation from the CRREL model (see below.)

Processing: A one dimensional, forward finite difference, heat transfer model is used to determine frost penetration and temperature distribution in the pavement system. The model considers radiation, convection, conduction and the effect of latent heat. It does not consider transpiration, condensation, evaporation or sublimation. Heat fluxes caused by precipitation and moisture infiltration are also neglected. Future temperatures at a nodal point in the pavement materials and subgrade are a function of the temperature at the nodal point, the temperature at adjacent nodal points and the time increment. The major contribution of the CMS model to the Integrated model is the heat flux surface boundary computations. These computations determine the surface temperatures and thus control the temperature throughout the underlying materials.

The stiffness of the asphalt concrete is computed by the method suggested by Yoder and Witczak [36]. The base and subbase moduli are considered constant when they are unfrozen. Thus the program ignores the effect of moisture on the resilient modulus of these granular materials. The subgrade resilient modulus is considered for the three conditions of frozen, unfrozen and thaw recovering. For fine-grained unfrozen soils two

regression equations [3] are used to relate the resilient modulus to water content. The frozen value of the modulus is one hundred times the unfrozen one.

Frost Heave and Settlement (CRREL) Model

Input: temperature profile through the asphalt layer as established by the CMS model

Output: (1) computes changes in the soil temperature profile, the frost penetration and settlement. (2) Computes the soil suction profile as a function of time.

Processing: A mathematical model of coupled heat and moisture flow in soils. The model includes a phase change of water to ice, thus, it is capable of estimating frost heave. The moisture flow model uses Darcy's law in which both the volumetric unfrozen water content and the volumetric ice content are represented as changing with time. The ice content term is used only in the freezing zone, for it is only there that the ice content is considered to be changing with time. Neither the frozen zone nor the unfrozen zone make use of this term since the soil does not deform outside of the freezing zone. The heat transport model adopted in the CRREL model has the sum of both a heat diffusion term and a heat convection term set equal to the sum of terms involving the time rate of change of temperature and the time rate of change of the volumetric ice content multiplied by the latent heat of fusion of ice. The material properties of the soil that are used in the model include the volumetric heat capacity of the soil and of water, the thermal conductivity of the soil, and in the convection term, the unsaturated permeability of the soil. The convection term takes into account the heat that is brought into or leaves a soil element due to the flow of water into or out of the element. The heat budget in each segment of

the numerical mesh that is used in the model checks during each time step to see if the heat that leaves the segment during that time step is equal to or greater than the amount of heat that is required to freeze all of the remaining unfrozen water. Both the moisture flow and the heat transport differential equations were formulated in one dimension using nodal domain integrated method which is a more general version of the Galerkin [24] weighted residual method of developing finite elements.

Recent Related Research Work

Recently, as the technique of pavement instrumentation (with devices that measure temperature, moisture content, frost penetration, stresses and strains, etc.) has become popular, more research work has become possible with the advances in data collection techniques. The following is some recently reported research work in the analysis of the effect of seasonal variations on pavement performance.

Zhou and Elkins [37] presented a preliminary evaluation of the data collected in the LTPP Seasonal Monitoring Pilot site in Central Montana. It presents each type of data collected in the SMP; deflection data, pavement temperature data, moisture data, electrical receptivity data. The authors presented their analysis in a form of charts which describe how two, or more, variables relate to one another, without attempting to quantify or measure these effects. The presented charts show the relationship between:

- deflection and sensor locations (deflection decreases with increase in distance away from the loading plate), for different temperature and different months (the innermost deflection sensors are sensitive to temperature change).
- average AC modulus (both MODULUS and BOUSDEF are used to back-calculate the moduli) and the average pavement temperature. Generally the AC layer modulus decreases with temperature increase.
- layer moduli calculated by MODULUS and those calculated by BUOSDEF, were found to be comparable .
- temperature and pavement depth, for different months. Daily temperature variations affected the top 20 inches of the pavement, while the seasonal temperature variations affected deeper layers.
- contact resistance (a measure of frost penetration) and pavement depth and
- gravimetric moisture content and pavement depth; generally moisture content increases with depth, and is affected by the spring thaw.

Matter and Farouki [5] conducted a detailed study on the effect of seasonal variation on the measured pavement deflection and the back-calculated layer elastic moduli. The objectives and testing procedures presented in their work are identical to those of the Seasonal Monitoring Program of the Long-Term-Pavement-Performance data collection program. The paper started by emphasizing that the effect of seasonal climatic variation contributes to a change of about 70% in the magnitude of the maximum deflection measured under impulsive loading devices. Three major climatic factors are thought to

affect the structural properties of pavements; frost/ thaw action, temperature changes and moisture conditions. Assuming that the frost / thaw action is accounted for in pavement design by furnishing a non-frost susceptible material on top of the frost- susceptible layers, the authors studied the effect of the other two climatic factors-- temperature and moisture content.

After reviewing other researcher's work, the authors presented their work. Five pavement sections, selected to present a wide range of pavements, were instrumented to monitor the seasonal parameters i.e. temperature and moisture content. They also observed the meteorological conditions and related seasonal cycles at the testing sections. Temperature at different depths in the pavement layers, pavement surface temperature, in-situ air temperature as well as FWD and Deflectograph deflection data were measured.

Observations on the temperature seasonal cycles:

- The seasonal cycles of the temperature at various depths in the pavement structure followed closely the sinusoidal wave trend of the in-situ air temperature. However, the relation between individual temperature measurements at various depths varied with season.
- Although all the test sections belonged to the same climatic region, there were significant differences between their temperatures; the maximum temperature ranged from 20 to 33 °C

Observations on the moisture content seasonal cycles

- The soil subgrade (silt and clay) have a much higher moisture content than those of the capping layers. Also the seasonal variations of the subgrade moisture content are more pronounced and occur over a much wider range compared with the capping layers.
- The moisture content of the base and subbase layers are more stable and much lower than those of the subgrade. This may be explained as being due to the existence of the water table at shallow depths thus significantly affecting the moisture content of the subgrade with its seasonal movement.

Observations on seasonal variation effects on the FWD deflections

- The FWD measured deflections, as well as the stresses applied by this device, were found to vary considerably from one testing point to the next along the length of the testing section. The use of deflections averaged over a specific length would reveal the trend of the deflection variation but could lead to the results being biased as it would include errors induced in the averaging process. Therefore a series of deflection data for one testing point was compared for different temperatures (seasons).
- Some sections were observed to be affected differently by seasonal cycles even though they were subjected to the same climatic conditions.
- Even for the same pavement, the seasonal variations of some deflection bowl parameters seemed to have opposite trends.
- With such contradicting trends observed, a detailed analysis was required into the seasonal variation related to each test section.

- Comparing the stress values against pavement average temperature, a pattern was observed in all points tested by FWD.
- Regression equations were developed for the deflection at each sensor. These equations relate the normalized deflection to temperature at a fixed (given) moisture content.
- Pavement deflection is influenced by the combined effect of both temperature and moisture content. In the cases where the pavement has moisture- nonsensitive layers, the effect of temperature will dominate the seasonal variation. Whereas in cases where moisture sensitive layers exist, the effect of moisture will overcome the effect of temperature. In general, both effects exist, with the temperature influencing the inner sensors (it mostly affects the AC layer) and the moisture content influencing the outer sensors (it mostly affects the lower unbound layers)
- It is evident from this study that the seasonal variations differ significantly from one pavement section to the other, from one device to the other and even for the same device and section it differs from one deflection parameter to the other. Although the developed equations could be used to correct individual parameters to a standard condition, this will result in a distortion of the deflection bowl shape resulting in a bias in the back-calculated structural properties of the pavement layers. Therefore, it is recommended to use deflection data at a particular season to back-calculate the elastic moduli of the pavement layers and then use the measured seasonal condition to correct these properties to the standard conditions.

- The effect of various non-climatic factors on the moisture conditions of the pavement layers meant that no direct relationships to predict these changes from climatic data could be obtained.

Observations on the Seasonal Variation Effect on the Back-calculated Moduli

- The back-calculated AC elastic modulus correlated well with the average pavement temperature ($R = 0.967$) and it decreased with the increase of the average pavement temperature.

The back-calculated subgrade elastic modulus seemed to decrease with the increase in its moisture content.

RESEARCH WORK NEEDED

Based on the literature review presented above the following conclusions are drawn:

- Although great amount of research have been conducted to correlate climatic conditions to pavement structural properties, less effort have been directed toward evaluating the effect of such variations on pavement life expectancy and accommodating such variations in pavement design. For example in an attempt to account for the serviceability loss due to swelling and frost heave in pavement design, the 1993 AASHTO Guide [1], presented an approximate procedure. As indicated in the source, this method involves a great deal of subjectivity. Caution is advised since the graphs used represent more of qualitative than quantitative relationship between the factors. The Guide uses drainage coefficients to account for the effect of the

existence of free water in the base and subbase layers. It is obvious that this procedure is approximate, consequently, either overdesign or underdesign will result. A generic methodology is required in which the variations in pavement structural properties are matched with the concurrent loading frequency and magnitude such that the exact effect of climatic variations on pavement life is evaluated.

- The efforts to correlate climatic factors to pavement structural properties have attained various degrees of success. For example, correlating the elastic modulus of the AC layer to temperature have been more successful than correlating the subgrade resilient modulus to moisture content, soil type, gradation and plasticity index. Part of the reason relies on the fact that the AC layer is laid according to a controlled process and subject to some degree of quality control, whereas the subgrade soil is a heterogeneous material that is subject to relatively more complex mechanisms that are yet to be studied and understood (such as the interactive effect between temperature gradient and moisture movement, suction effect, freezing and thawing, frost heave, etc.) Moreover soil hysteresis that is known to exist in the relationship between moisture condition and suction and hence between the resilient modulus and moisture content, make the relationship between these variables not unique. More research is required to shed light on the association between moisture content and the subgrade resilient modulus.

- The Integrated model uses simulation techniques to predict climatic conditions then uses heat balance, water balance and mass balance equations to predict the corresponding changes in pavement temperature, moisture content, freezing, thawing and heave. Finally, it uses these conditions to predict the corresponding changes in pavement layer moduli. While this approach is conceptually appealing, there are many limitations and concerns about these models in their present state. The simplifying assumptions on which these models are based impose limitations and uncertainty of the results. Moreover, the considerable time required to run these programs and the huge amount of input variables that are required for such programs, which may not be available to the design engineer, make the use of these models in pavement design impractical. Another concern about these models is the validity and the accuracy of some of the empirical models within some of these programs. For instance, the regression equation which is used to predict the change of the subgrade resilient modulus in response to a change in temperature and moisture content does not account for soil gradation and plasticity. Therefore, the accuracy gained by applying simulation processes and thermodynamic principles may well be offset by the errors in such empirical models.

- The output of the Integrated model is the predicted values of pavement layers' properties as a function of time. A program is required to carry the analysis one step further by using these time related layers' stiffnesses and the expected traffic volumes to evaluate the required Structural Number for the pavement to survive a given

number of years. Alternatively, mechanistic-empirical design equations may be used to calculate the performance life of a pavement, given the time functions of the stiffnesses of the pavement layers and the expected traffic volume.

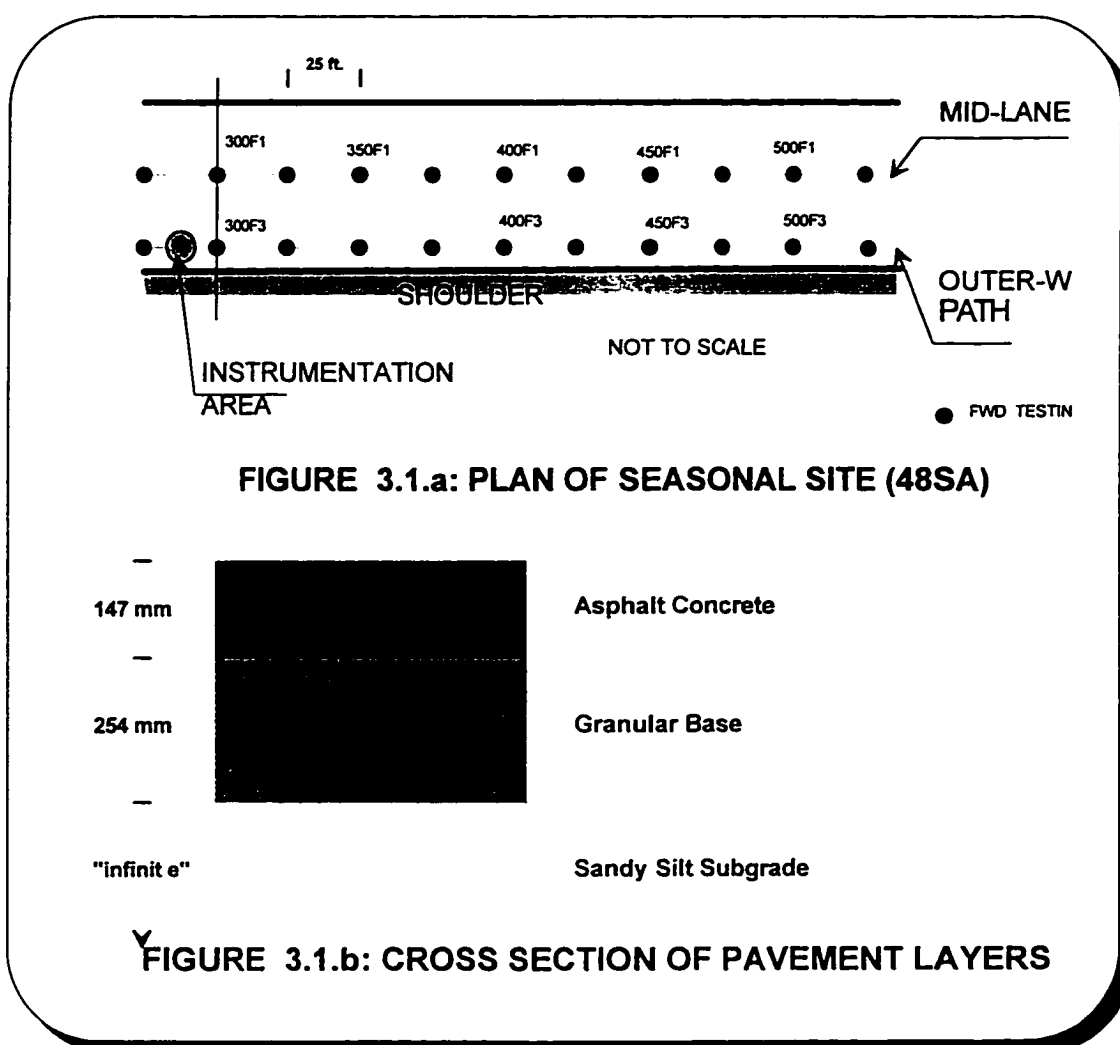
- A more practical alternative to using the Integrated model to predict timely values of a pavement layer elastic moduli is needed. The AC layer modulus monthly values may be predicted using existing models that correlate air temperature to the AC layer elastic modulus. This approach is very practical since temperature data are available in all weather stations scattered in the United States. However, predicting the monthly values of the subgrade resilient modulus is a more challenging task. The reason being that the subgrade resilient modulus may be influenced by the subsurface moisture levels, which are not easy to measure outside the research arena. Moreover, even when measuring the moisture levels in the subgrade is possible, the existing models that correlate moisture conditions to the subgrade modulus are poor, because of soil hysteresis, effect of suction (which is a function of the chemical composition of the soil) and the uniqueness of each testing site. A more practical approach is to use deflection testing (on roads in the vicinity of the proposed road, in case of new construction, or on the road itself in case of rehabilitation) to back-calculate monthly values of the subgrade resilient modulus. The practicality of this approach relies on the fact that many highway agencies are using deflection testing, such as FWD, routinely. Another fact that supports the use of this approach is that the reliability of the back-calculated subgrade resilient modulus is higher than that of any other layer.

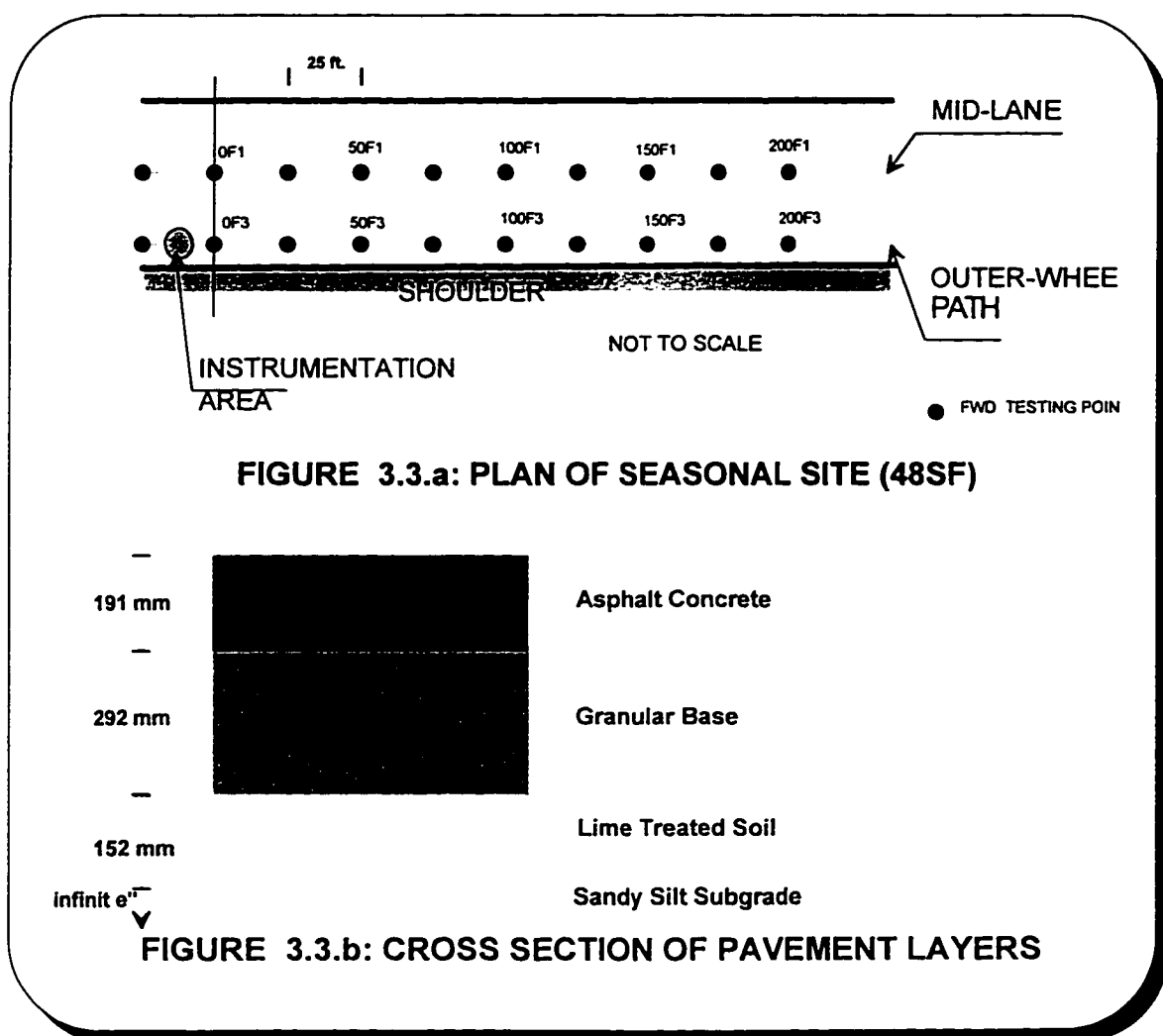
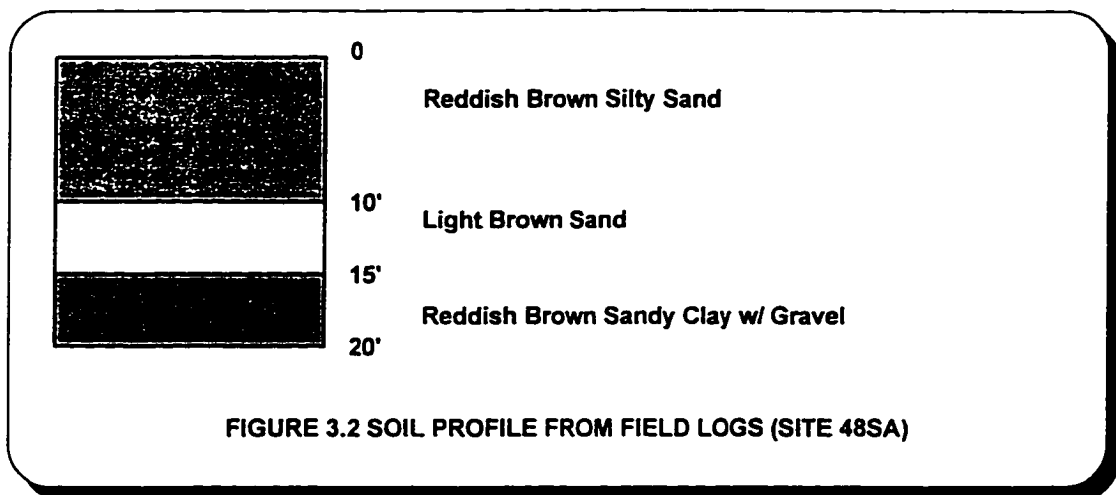
The results of most back-calculation programs will agree, within a reasonable tolerance, on the values of the subgrade resilient modulus, whereas they may well converge on a totally different surface layer modulus.

CHAPTER 3: DATA COLLECTION

In this chapter a detailed description of data collection activities is presented. Locations, cross sections showing component layers of the pavement, material characterization, type and both vertical and horizontal locations of the instruments used to collect data are presented for each testing site.

Site #1: SHRP# 481077 (48SA)





This site is located in a dry no-freeze zone (Cell 1 in Table 1.1.) The site is in the southbound lanes on US. Highway 287, approximately 0.5 kilometers south of the Estelline city limits, Texas. The divided highway consists of two 3.7 m wide travel lanes in each direction. The outside shoulder is 3.0 m wide.

The average maximum daily temperature for the months of June through August is 34° C and the average minimum daily temperature for the months of December through February is -3° C. The average precipitation is 579 mm. A plan and a cross section of the pavement are shown in Figure 3.1. Pavement layers and thicknesses are shown in Figure 3.1.b. The subgrade material is classified as Fine Sandy Silt (SHRP material code is 145) in which 30 percent or more of the test sample retained on the #200 sieve as determined by field inspection and judgment. Figure 3.2 shows that no hard layers were encountered in 20-feet deep field logs.

Site 481060 (48SF)

This site is located in a wet no-freeze zone (Cell 9 in Table 1.1.) The site is in the northbound lanes on US. Highway 77, approximately 1.1 kilometers south of SH-239, Texas. The divided highway consists of two 3.7 m wide travel lanes in each direction. The outside shoulder is 3.0 m wide.

The average maximum daily temperature for the months of June through August is 33.6° C and the average minimum daily temperature for the months of December through

February is 8.2° C. The average annual precipitation is 838 mm. A plan and a cross section of the pavement are shown in Figure 3.3. Pavement layers and thicknesses are shown in Figure 3.3.b. The subgrade material is classified as Course Silty Sand (SHRP material code is 214) in which 15 percent or more of the fines passing the #200 sieve have low or no plasticity as determined by field inspection and judgment. No hard layers were encountered in 20-foot deep field logs.

Deflection Data

Deflection testing was performed routinely in all LTPP seasonal sites. Each site is visited once a month to collect climatic and FWD data and to download the climatic data. The FWD deflection testing procedure is identical to that currently used for GPS sites; refer to Manual for FWD Testing in the LTPP Study, Version 2.0, April 1993. Major changes to this procedure include the number of test points, number of test cycles per day, and test frequency.

Figures 3.1.a and 3.3.a illustrate the test patterns for both outer wheel path and mid-lane locations. The lateral location (distance from edge reference) of test points is determined according to the procedure specified in the LTPP Manual for FWD testing. For Site 48SA, ten points along each path at 7.6 m (25 ft) spacing are tested, starting from station 3+00. The extension "F1" to the station number indicates a testing point on the mid-lane, while the extension "F3" to the station number indicates a testing point on the outer wheel path. FWD are not taken directly over the instruments to prevent possible damage to

instrumentation and bias to deflection data. As a minimum, the FWD load plate should be 1.2 radial meters (4 radial feet) away from any instrumentation, bore hole or test pit, except for the mid-lane test which is about 1 m (3 ft) from the instrumentation.

Typically, FWD testing for flexible pavements takes 1.0 to 1.5 h to complete. The test cycle is repeated a minimum of four times per test day, at 1.5 to 2.0 h. intervals. Where possible, additional FWD test cycles per day to cover a 12- to 24-h time span should start 0.5 h before sunrise. Several ancillary data elements are collected in conjunction with FWD testing. They include: FWD pavement surface and air temperature, manual surface layer temperature profile, moisture profiles, automated temperature profiles, depth of frost/ thaw, depth to ground water table, ambient air temperature and precipitation. These data elements are described briefly below.

Temperature Data

Temperature is measured in the following ways:

1. Automatic sensors on LTPP FWD's measure pavement surface temperature and ambient air temperature
2. Manual surface layer temperature measurements at three depths are taken with each testing pass.
3. An elevated temperature probe is used to measure ambient temperature, See Figure 3.4.

4. Eighteen (18) thermistors are installed vertically in the instrumentation area.

These sensors are very sensitive to temperature (since a very small change in temperature leads to a large change in resistance.) Table 3.1 shows the vertical depths at which these thermistors are located.

Table 3.1: Thermistor Sensor Locations

Thermistor #	Depth from Pavement Surface (mm)		Remarks
	Site 48SA	Site 48SF	
1	25	25	Installed in the AC layer
2	69	99	
3	112	173	
4	182	249	Installed in the base and subgrade
5	257	326	
6	334	401	
7	410	477	
8	486	553	
9	638	709	
10	790	857	
11	941	1,010	
12	1,096	1,163	
13	1,248	1,315	
14	1,400	1,466	
15	1,553	1,620	
16	1,704	1,773	
17	1,858	1,925	
18	2,007	2,075	

Temperatures at the 18 thermistors are recorded every 4 hours. Other temperature measures are recorded. For example, the maximum air temperature of the day and the time in which it was recorded, the minimum air temperature of the day and the time in which it was measured, minimum soil temperature and its corresponding time, average air temperature in a given day.

Operation, theory and design of temperature thermistors are shown in LTPP Seasonal Monitoring Program Instrumentation Installation and Data Collection Guidelines, April 1994 [2].

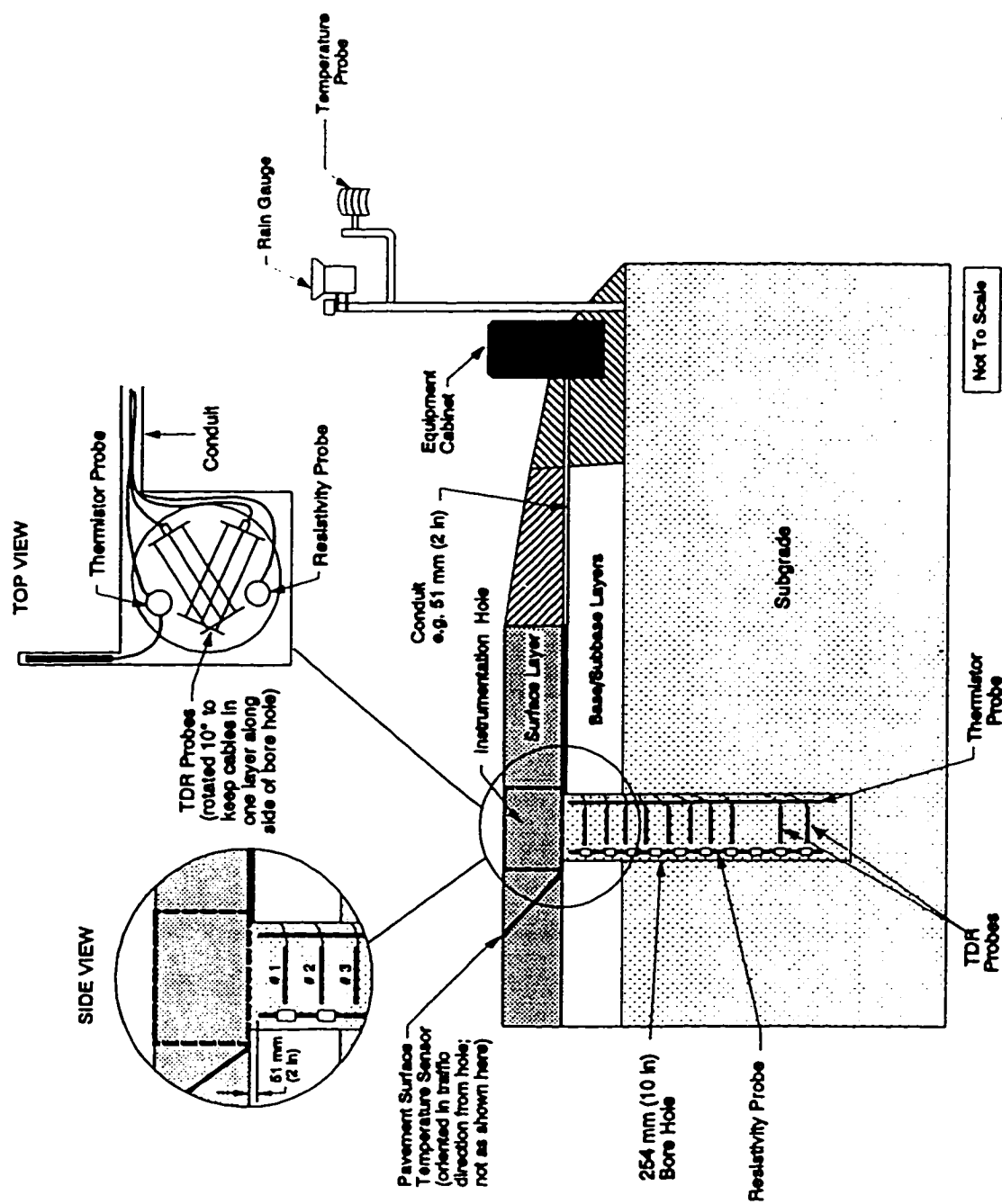


FIGURE 3.4: ILLUSTRATION OF INSTRUMENTATION INSTALLATION [2]

Moisture Content Measurements by TDR Sensors

Time Domain Reflectometry (TDR's) are used to measure the moisture levels at different depths of the pavement layers. The principle of the TDR system is similar to a radar system, in that an electromagnetic waveform is transmitted and the reflected waveform is recorded and analyzed to characterize the nature of the medium which reflects the waves.

TDR data are collected using a mobile data-logging system. The TDR signals are downloaded and recorded. Ten TDR thermistors are installed in the instrumentation hole (see Figure 3.4). The design, theory and operation of TDR are presented in LTPP Seasonal Monitoring Program Instrumentation Installation and Data Collection Guidelines [2]. The vertical locations in which each TDR is installed are shown in Table 3.2.

Table 3.2: Location of TDR Sensors

Sensor #	Sensor Depth from Pavement Surface	
	Site 48SA	Site 48SF
1	305	320
2	457	495
3	610	650
4	762	803
5	914	960
6	1,067	1,110
7	1,219	1,257
8	1,372	1,412
9	1,676	1,732
10	1,981	2,019

Other Data

Thirty five resistivity probes are installed in the instrumentation hole. These probes are used to detect frost- or thaw- penetration. Precipitation data are collected using tipping pocket rain gauges. Water table level is measured using observation piezometers. These instruments are shown in Figure 3.4.

CHAPTER 4:

PRELIMINARY DATA ANALYSIS

The step that follows data collection and precedes data analysis is data processing, reduction and preliminary analysis. The first objective of this activity is to filter out any inconsistent or erratic measurement. This is done through data quality checks or Quality Assurance (QA) measures implemented by LTPP Information Management System (IMS). Such QA measures are devised to check the values of measured variables. For example, a mechanical problem in a data collection device (TDR, Thermistor, etc.) may cause out of range or irrational readings. These readings are detected and filtered out (replaced by missing data code.) The second objective is to prepare the raw data for analysis by compiling it into an easy- to- understand form, conducting any data transformation and/or performing necessary unit convergence.

Quality Assurance measures are described in detail in other documents, for example see LTPP IMS Data Quality Checks (1994)[38]. This chapter documents preliminary analysis of deflection, moisture content and temperature data.

Manipulation and Back-Calculation of Deflection Data

After performing QA checks on FWD data files, deflection files look as shown in Figure 4.1.

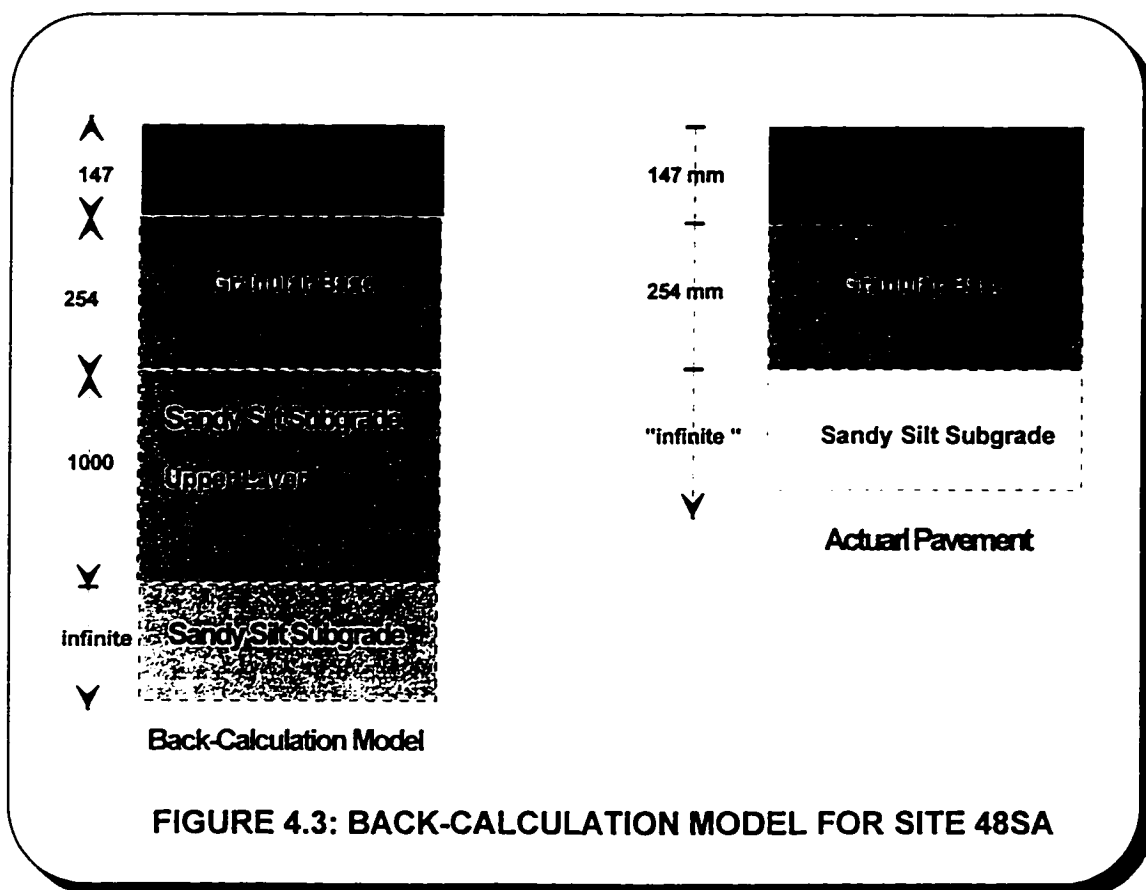
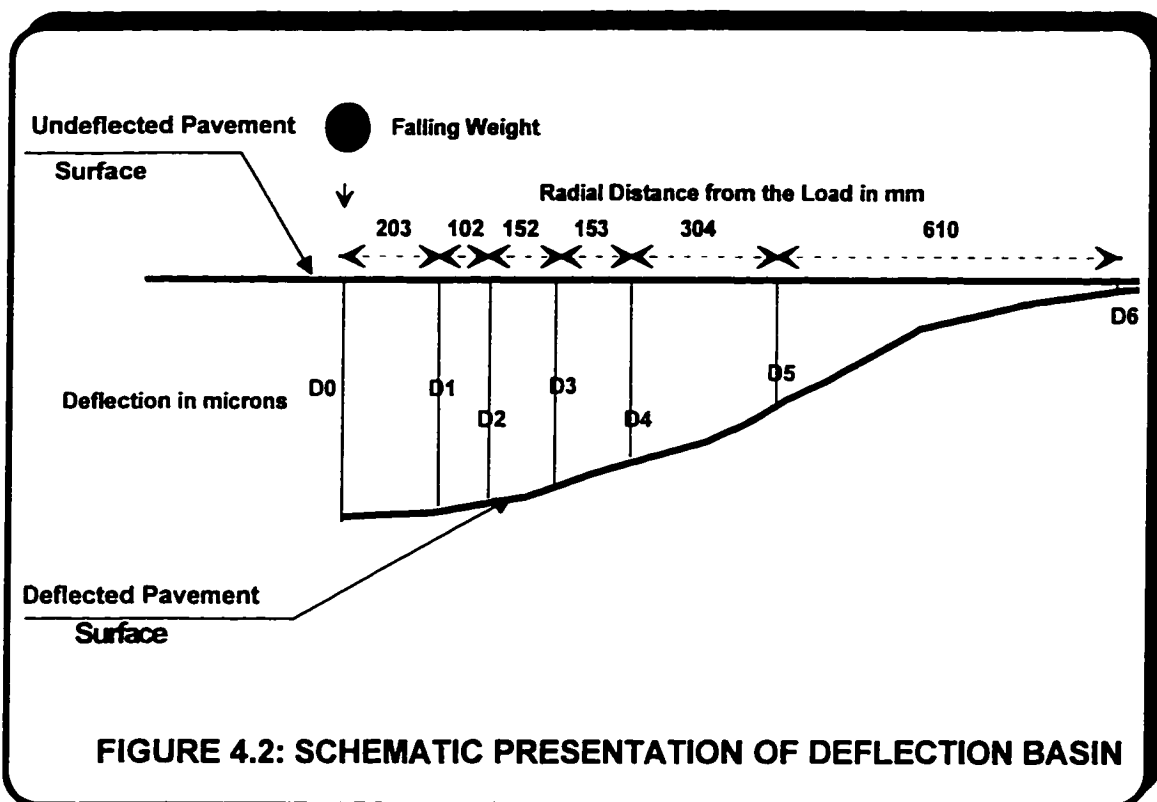
```

S  520F1      14 6 I60908  56 43 Heights .....
402 144 119 100 83 69 48 30 6384 5.69 4.67 3.96 3.26 2.70 1.90 1.20
403 144 117 103 81 67 46 29 6400 5.69 4.59 4.04 3.17 2.66 1.81 1.16
401 144 118 103 82 67 47 30 6368 5.69 4.63 4.04 3.22 2.66 1.85 1.20
403 143 117 103 81 67 46 30 6400 5.64 4.59 4.04 3.17 2.66 1.81 1.20
586 214 172 151 120 101 69 45 9312 8.42 6.77 5.95 4.72 3.98 2.74 1.76
588 212 171 149 120 100 69 44 9336 8.34 6.73 5.87 4.72 3.94 2.74 1.71
592 213 171 149 119 99 68 42 9408 8.38 6.73 5.87 4.67 3.89 2.69 1.67
589 214 172 151 122 101 69 44 9360 8.42 6.77 5.95 4.80 3.98 2.74 1.71
774 277 224 196 158 132 93 60 12304 10.90 8.83 7.70 6.22 5.18 3.66 2.36
775 277 224 194 157 130 92 57 12320 10.90 8.83 7.66 6.17 5.13 3.62 2.23
774 276 223 194 157 130 91 57 12304 10.86 8.79 7.66 6.17 5.13 3.57 2.23
776 275 224 193 157 132 92 57 12328 10.82 8.83 7.61 6.17 5.18 3.62 2.23
1056 373 302 261 213 178 127 79 16776 14.67 11.88 10.29 8.40 6.99 4.99 3.13
1060 373 302 260 212 176 126 77 16840 14.67 11.88 10.25 8.36 6.95 4.94 3.04
1059 373 302 261 213 178 126 76 16832 14.67 11.88 10.29 8.40 6.99 4.94 3.00
1060 371 301 261 213 178 126 78 16848 14.63 11.83 10.29 8.40 6.99 4.94 3.08
S  300F1      13 10 I60932  55 50 Heights .....
405 135 115 103 86 73 54 34 6440 5.30 4.55 4.04 3.39 2.88 2.12 1.33
406 131 114 100 85 72 54 34 6456 5.17 4.50 3.96 3.34 2.83 2.12 1.33

```

FIGURE 4.1: SAMPLE OF FWD PEAKS FILE

The first row shows the station number, pavement temperature and air temperature in Celsius, time, pavement and air temperature in Fahrenheit. The following sixteen rows read load and deflection for each of the four drop heights (4 drops for each drop height). The first column reads the plate pressure (kPa), the following seven columns read the deflection, in micrometer, in seven radial distances from the load. The ninth column reads the load in pounds and the tenth through the sixteenth columns read deflection, in mils, in seven radial distances from the load plate (the outer four readings are not shown here). The radial distances of deflection sensors from the load plate are given along with site identification and calibration data at the beginning of the file. Figure 4.2



is a schematic of deflection basin. There are 16 deflection basins for each point tested.

The following measures are calculated using the fourth drop of the fourth drop height.

$$\text{Basin Area in mm}^2 = [(D0 + D1) * 203 + (D1 + D2) * 102 + (D2 + D3) * 152 + (D3 + D4) * 153 + (D4 + D5) * 304 + (D5 + D6) * 610] / 2000$$

Where D0 through D6 are measured deflections in microns, as shown in Figure 4.2.

$$\begin{aligned} \text{Deflection Area Under The Outer Three Sensors (a measure of subgrade strength) in mm}^2 \\ = [(D3 + D4) * 153 + (D4 + D5) * 304 + (D5 + D6) * 610] / 2000 \end{aligned}$$

$$\text{Unit Deflection Area (mm)} = \frac{\text{Basin Area}}{D0 \text{ in mm}}$$

$$\text{Approximate Unit Deflection Area (a measure often used by engineers)} = \frac{305 * (D0 + 2D2 + 2D4 + D5)}{2D0}$$

These values, along with back-calculated layer moduli are tabulated in Appendix A

Back-Calculation of Pavement layer Moduli

The back-calculation program MODCOMP3 [16] was used to back-calculate pavement layer elastic moduli. Owing to the fact that the solution is not unique, back-calculation is known to involve a great deal of subjectivity and experimentation. One source of subjectivity is in how to model the actual pavement. That is, are all pavement layer moduli unknowns, or are some known? How many distinct layers constitute the pavement in question? In cases when pavement layers are too thin, then combining those thin layers might be necessary. Conversely, some thick pavement layers are best analyzed by

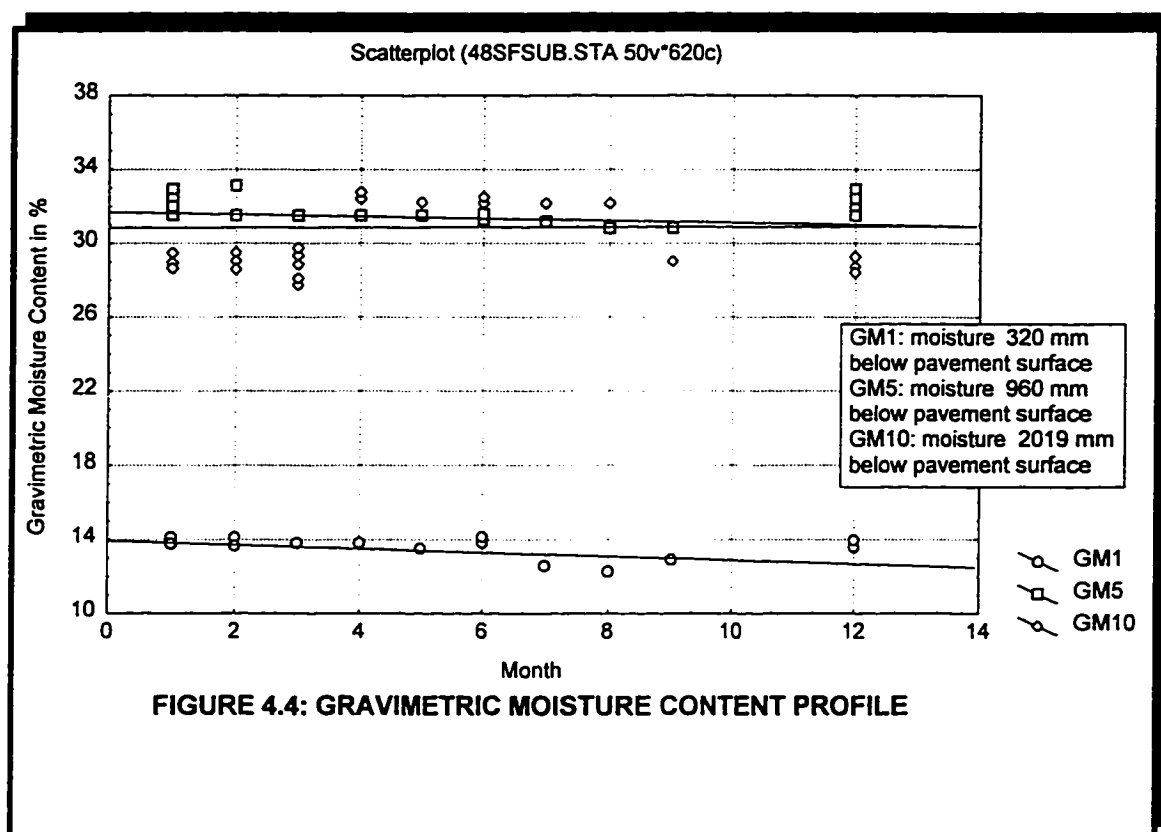
subdividing them into a few layers, if there are reasons to believe that such layers will behave differently at different depths. As far as constitutive relationships, MODCOMP3 is capable of accommodating a wide range of assumptions. Nine different models are available (models 0 to 8). With this flexibility come a great deal of subjectivity as to which of those models suit each layer of the pavement.

For each site in the analysis many combinations of assumptions were tried by combining different layers and assuming different constitutive models for each layer. The goodness of fit measures (root mean square (RMS) error and deflection match between observed and calculated individual deflection sensors) were recorded for each trial.

A) Site 48SA

As shown in Figure 4.3, the actual pavement section is a 147 mm AC layer followed by a 254 mm granular base layer followed by a sandy silt subgrade. The back-calculation model shown in Figure 4.3 is about the same as the actual pavement cross section. The only difference is that the subgrade is subdivided into two layers; the upper 1.0 meter and the lower layer. The reason for this subdivision is the fact that the upper 1.0 meter of the subgrade is more susceptible to seasonal changes. For example, on 10 January 1993, moisture content data shows that after a depth of 960 mm, moisture content reaches a stable condition. Figure 4.4 shows that at a depth of 320 mm below the asphalt surface, gravimetric moisture content averaged 14 %. At a depth of 960 mm below the asphalt surface, gravimetric moisture content averaged 32 %. At a depth of 2019 mm from the

pavement surface, gravimetric moisture content averaged 30%. This indicates that there is a significant difference in moisture content measured by TDR's at depths of 320 and 960 mm from the surface, while the difference in gravimetric moisture content measured by TDR's at depths of 960 and 2019 mm from the surface is not significant, given the vertical distance between the two TDR's.

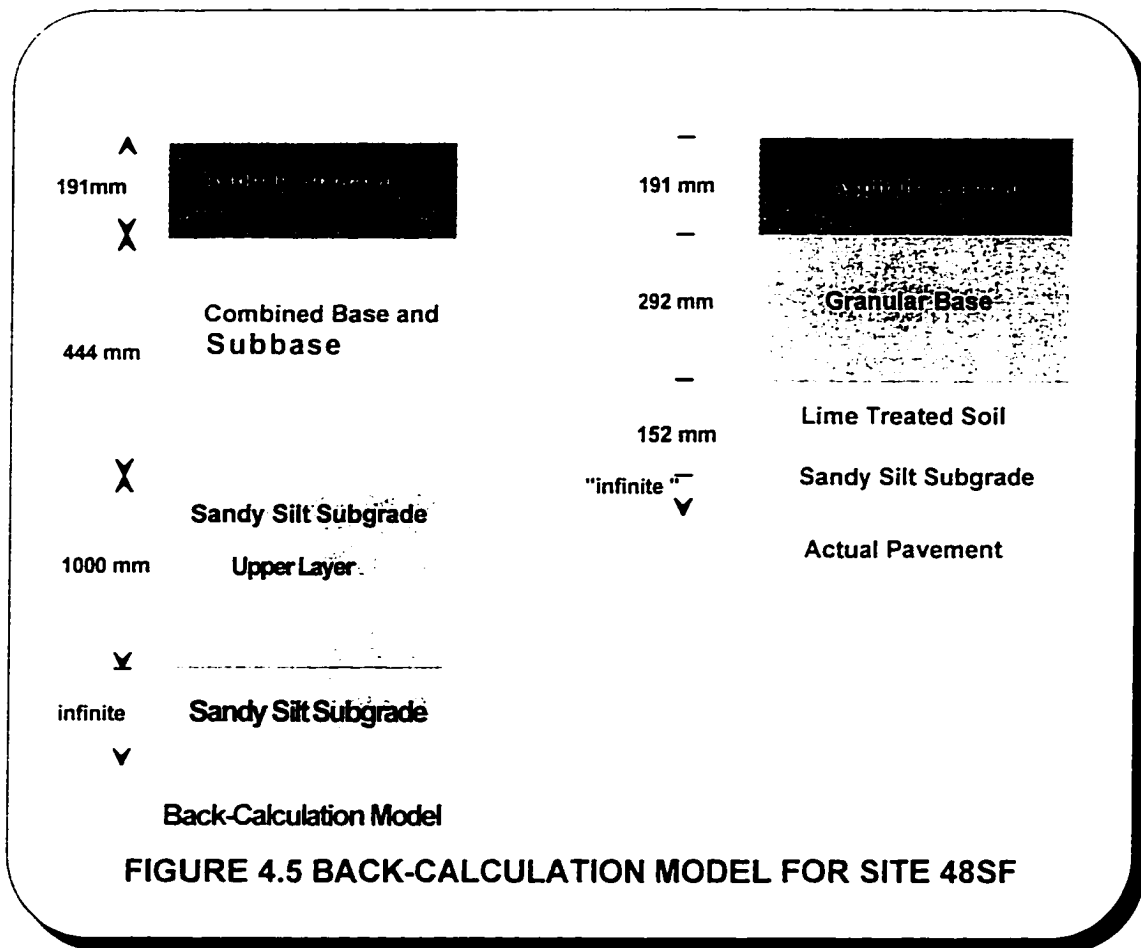


The best goodness of fit measures were achieved using the model shown in Figure 4.3 and assuming linear constitutive relationship for all layers. The back-calculated elastic moduli for the four layers, along with the RMS error (mainly less than 2 %, many stations

had RMS error of less than 1 %) and the number of iterations to convergence are presented in Appendix A.

B) Site 48SF

As shown in Figure 4.5, the actual pavement cross section for site 48SF is a 191 mm deep AC layer followed by a 292 mm deep granular base, followed by a 154 mm deep lime treated soil, followed by a Sandy Silt subgrade. Because the lime treated layer was too thin to analyze as a separate layer (compared to the base course and the subgrade), the granular base and the lime treated layers are combined into one layer in the back-calculation model. As in site 48SA, the subgrade is subdivided into an upper 1.0 meter and a lower subgrade. This model with the assumption of linearity produced the best fit. The back-calculated moduli along with deflection measures and goodness of fit measures are tabulated in Appendix A.



Calculation of the Gravimetric Moisture Content

Moisture content at a given layer is measured indirectly by measuring the dielectric constant of the material by TDR's. Dielectric constant is then correlated to volumetric moisture content by Topp's model [2]:

$$\theta = (-0.053 + 0.029\varepsilon - 0.00055\varepsilon^2 + 0.0000043\varepsilon^3) * 100 \quad \text{.....(4.1)}$$

Where θ is the volumetric moisture content, in percent and ε is dielectric constant.

Gravimetric moisture content is then calculated using :

$$W = \theta \frac{\sigma_w}{\sigma_d} \quad \text{.....(4.2)}$$

Where

W = gravimetric water content, in percent

θ = volumetric water content, in percent

σ_w = unit weight of water (1.0 gm/cm³)

σ_d = dry density of soil in (gm/cm³)

As mentioned in Chapter 3, TDR's were installed in the base and subbase layers at ten different vertical locations so that moisture content at different layers and depths could be evaluated. For seasonal sites in the analysis, the exact location of each TDR is given in Table 3.2.

Linear Interpolation of Temperature and Moisture Data

In every FWD testing day (about once a month), TDR readings are downloaded three to five times in two- to three- hour intervals. FWD testing was conducted continuously in about 3- to 5- minute intervals between one testing point and another. In order to evaluate moisture conditions at the time of FWD testing, linear interpolation was used.

Pavement- and soil temperature at 5 different vertical points are recorded every hour. In order to evaluate temperature profile at the time of FWD testing, linear interpolation and/or extrapolation is used to come up with intermediate readings.

Organization of Data

After preliminary analysis, all data (i.e., post-processed deflection data, moisture content, temperature, station identification, time, data, etc.) were imported into STATISTICA data files. STATISTICA is a software package for modeling and statistical analysis. In this software, data are compiled in a database structure, i.e., rows (or records) represent

different readings or cases while columns (or fields) represent variables. For each site, a data file with about fifty fields and a thousand records was created. The records are hierarchically sorted according to station identification then according to date then according to time.

For example, Figure 4.6 shows the first few records and fields of data sheet 48SA. The first field is the station identification number. The second field is S_COD (station code; 2 for wheel path and 1 for mid-lane) this variable was created to compare and test for significant differences between testing points at wheel path and those located at mid-lane. The third field is DATE in yymmdd format. The fourth field is the MONTH of the year, this variable is used in time series analysis. The fifth variable is TIME. The next field is COD (time code); this variable is created to differentiate between readings taken at different times of the day. The rest of the fields are shown in Appendix A, which contains a complete list of all variables and their units.

Some variables are used to calculate others. For example T_GRAD is the temperature gradient of the AC layer, in $^{\circ}\text{C}/\text{m}$. It is calculated by dividing the difference between AC temperature at different depths by the vertical separation between the two points in meters.

#	2	3	4	5	6	7	8	9	10	11	12	13	14
	S_COD	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE	OUT
1	300F1	2940110	1	746	1	-1.0	-3.0	33	19	33	32	289	7.159
2	300F1	2940110	1	936	2	6.0	3.0	33	20	34	34	293	4.156
3	300F1	2940110	1	1132	3	15.0	11.0	37	22	37	37	300	1.156
4	300F1	2940110	1	1331	4	20.0	14.0	39	24	39	39	302	6.156
5	300F1	2940110	1	1457	4	21.0	16.0	41	25	42	41	301	5.154
6	300F3	1940110	1	822	1	1.0	-1.0	33	20	34	34	296	5.158
7	300F3	1940110	1	1023	2	11.0	6.0	36	22	37	36	310	5.164
8	300F3	1940110	1	1221	3	17.0	12.0	39	24	39	40	313	7.163
9	300F3	1940110	1	1411	4	21.0	14.0	42	25	42	42	315	9.162
10	300F3	1940110	1	1547	4	19.0	15.0	44	26	44	43	318	3.161
11	325F1	2940110	1	749	1	-1.0	-2.0	41	24	41	40	352	2.186
12	325F1	2940110	1	941	2	6.0	3.0	42	25	42	41	361	1.192
13	325F1	2940110	1	1135	3	15.0	12.0	44	27	45	44	359	9.184
14	325F1	2940110	1	1224	4	20.0	15.0	48	28	48	48	361	2.184

Ready Output: OFF Set: OFF Weight: OFF

FIGURE 4.6: SAMPLE STATISTICA DATA FILE

CHAPTER 5: GRAPHICAL PRESENTATION OF TEMPORAL AND SPATIAL VARIATIONS OF PAVEMENT STRUCTURAL PROPERTIES

The objective of the analysis in this report is to investigate the relationship between climatic variables and pavement structural properties. This Chapter first outlines the analysis process that will be followed in subsequent chapters, then triggers a chain of statistical analyses by presenting two dimensional plots of variables in interest as a function of time and space.

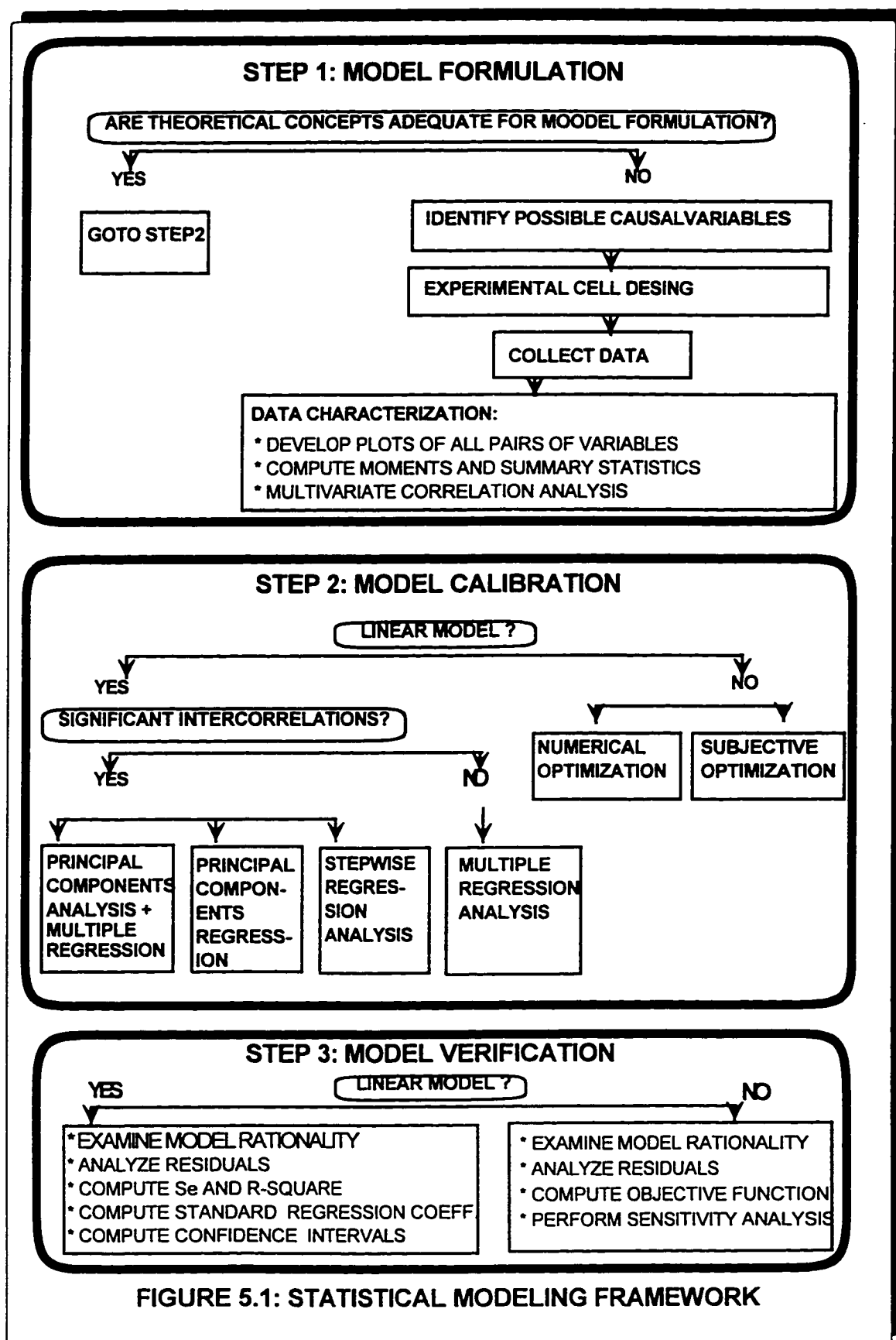
Methodology

In order to achieve the aforementioned objective, it is important to outline the analysis process that will be followed. Technically speaking, in multivariate analysis, investigating the relationship between variables may have either or both of the following two objectives; inference and/ or prediction. Statistical inference provides for a "yes-no" type of decision. For example Analysis of Variance (ANOVA), presented in Chapter 6, is used to test the hypothesis of equal means or equal variances between different groups (e.g., if the elastic modulus of AC layer is the same in the wheel path as in mid-lane). Correlation coefficients (see Chapter 6) are used to decide if there is a linear relationship between two variables. In many cases, the simple "yes-no" answer is insufficient for providing a complete picture of variables interdependency. In these cases, a quantitative

index of the effect is necessary for investigation purposes. Statistical methods for prediction provide both a model for prediction and a measure of an effect. For example, in multivariate analysis, a model could be developed to predict the value of a criterion variable and to show the effect of a predictor variable on the criterion variable. Statistical prediction is a higher level of information for decision making since it has the ability to quantify the effects of predictor variables on the criterion variable.

To develop a multivariate prediction model, three steps are required; model formulation, model calibration and model verification. In model formulation, the form of the model is developed based on theoretical concepts and the graphical shape of the relationship between variables. For example theory or observation may suggest that the relationship between the elastic modulus of an AC layer and the layer temperature is exponential rather than linear. In model calibration, a set of model constants are evaluated such that the best fit between the formulated model and the collected data is achieved. Finally, model verification is aimed at testing and evaluating the model accuracy with different data sets.

The following process outlined in Figure 5.1, will be followed. However, before discussing this process it is important to recognize that modeling is part science and part art. The science part involves identifying the physical principles that affect the system. The artistic part consists of deciding which of these processes are sufficiently important with respect to the goals and objectives of the study to be included in the model and



placing the processes in a form that reflects the interactions involved. The artistic component in modeling makes possible that more than one valid model may be developed for the same system. In the following paragraphs, the modeling process is discussed in the context of seasonal variation of climatic factors, particularly temperature and moisture content, as they influence pavement structural properties (represented by the elastic moduli of pavement layers)

In the first step, model formulation, the first important question to be asked is are theoretical concepts adequate for model formulation? If the answer to this question is yes, then a model is formulated based on theory, then the model is calibrated and verified. With respect to seasonal variation in pavement analysis, the answer to this question is no. That is, the exact mechanisms that cause changes in the properties of pavement layers is complex, and until recently measuring in-situ moisture condition and freezing penetration frequently enough was not feasible. The course of actions that follows this answer (the "no" answer) is to identify possible causal variables, use experimental design methods to estimate the required sample size and to collect data.

SMP program was initiated to collect required data. Theory suggests that temperature, moisture content and frost penetration are the key explanatory variables. Experimental Cell Design, presented in Chapter 1, introduced pavement thickness and subgrade type as additional explanatory variables.

The collected data, are then used in the three-step modeling framework. In model formulation, data are used to develop plots of all pairs of variables and to calculate the correlation coefficients. This task, data characterization, helps answer the following question: is the underlying relationship linear? And if not, what mathematical model would best describe the relationship between the variables in question? If the answer is yes, that is the relationship is linear, then a model is developed and calibrated using Multiple Regression, Principal Components Regression analysis, Stepwise Regression analysis or Principal Components analysis followed by Multiple Regression analysis. The decisive factor of which type of regression to be used is the extent of intercorrelation between predictor variables. If the answer is no, that is the model is not linear, then a nonlinear (eg., power, exponential, sinusoidal, composite, etc.,) model is developed and calibrated using Numerical Optimization or Subjective Optimization techniques.

After the model has been calibrated the next step is to evaluate the model accuracy. If the model is linear, then model evaluation is done by computing and analyzing residuals, examining model rationality, computing standard error of estimate and percentage of variance accounted for, examining standard errors of partial regression coefficients and/or computing confidence intervals. If the model is nonlinear, then model evaluation is done by examining model rationality, computing and analyzing residuals, computing the standard error of estimate associated with the model, computing the values of the objective function and/or performing sensitivity analysis. The model is further verified using an independent set of data.

The remainder of this chapter is devoted to visual data characterization. Chapter 6, is devoted to calibration of linear models, by means of Bivariate Correlations, Regression analysis and Principal Components analysis. Also presented in Chapter 6, is some statistical inference techniques such as Semivariogram and ANOVA, to investigate the spatial variation of the pavement layer's moduli. Chapter 7 is devoted to development and calibration of nonlinear models. Chapter 8 presents Time Series analysis in which time is the only predictor variable.

Graphical Presentation Of Individual Testing Points

It was shown in Figures 3.1 and 3.3 that each seasonal site contained about twenty FWD testing points. Ten points located at the wheel path and ten points at mid-lane. It is of interest to see if and how pavement response varies from one point to another. In addition to spatial variations, temporal variations of pavement properties are of particular interest.

A) Selected Points at Site 48SA

1. Points Located At Mid-Lane

Figure 5.2 shows temporal changes in layer elastic moduli for seasonal site 48SA at station 300F1 which is located at mid-lane (stations with extension F1 are located at mid-lane, while those with extension F3 are located at wheel path). The horizontal axis, represents the month of the year (1 for January and 12 for December). The vertical axis represents the elastic modulus in MPa. E1 is the elastic modulus of the AC layer, E2 is

the elastic modulus of the base course and E3 is the subgrade resilient modulus. The Figure shows that E1 has a maximum value in January and December (months 1 and 12). The minimum value of E1 is between June and August (months 6 and 8). The timing of minimum and maximum values is well expected since temperature plays an important role in softening the AC layer. The magnitude of change in E1 is significant, the maximum value is about 10,000 MPa, and the minimum value is 2000 MPa. Further analysis of temperature and E1 interdependency is presented in Chapter 7.

E2 and E3 exhibited much less variation throughout the year, this is expected since this site is located at a no-freeze zone. However, because the vertical scale is large (1 inch represents 4,000 MPa), changes in E2 and E3 are not clearly visible. Figure 5.3 shows the variations of E3 with the month of the year measured at Station 300F1 plotted separately. E3 reaches a maximum value of about 230 MPa in July, and reaches minimum value of 165 MPa in November. The scatter around the least square curve is caused by the fact that in each testing day three to five measurements are taken in different temperature and moisture conditions. If the daily average is taken, then the scatter around least square curve will disappear.

Figure 5.3 shows the variation in the subgrade resilient modulus with time. The data points are fitted with a fifth degree polynomial curve. The changes follow a sinusoidal pattern, with a peak values in the months of June through August and lowest values occurring in December through February. Figure 5.4 shows gravimetric moisture (GM)

content readings at three vertical locations within the subgrade; GM3, GM4 and GM7 are located 610, 726 and 1219 mm below pavement surface, respectively. The subgrade is located 400 through 1400 mm below pavement surface. GM3 and GM4 peak during the winter time and reach their lowest values in the summer time; this pattern would explain the temporal variation in E3, that is, to hypothesize that the value of E3 increases as moisture levels go down and vice versa. However, GM7 follows an opposite pattern to that observed in GM3 and GM4. This may be explained by the vertical moisture migration. Bivariate analysis, presented in Chapter 6, calculates correlation coefficients for every pair of variables to identify persistent linear correlations between variables.

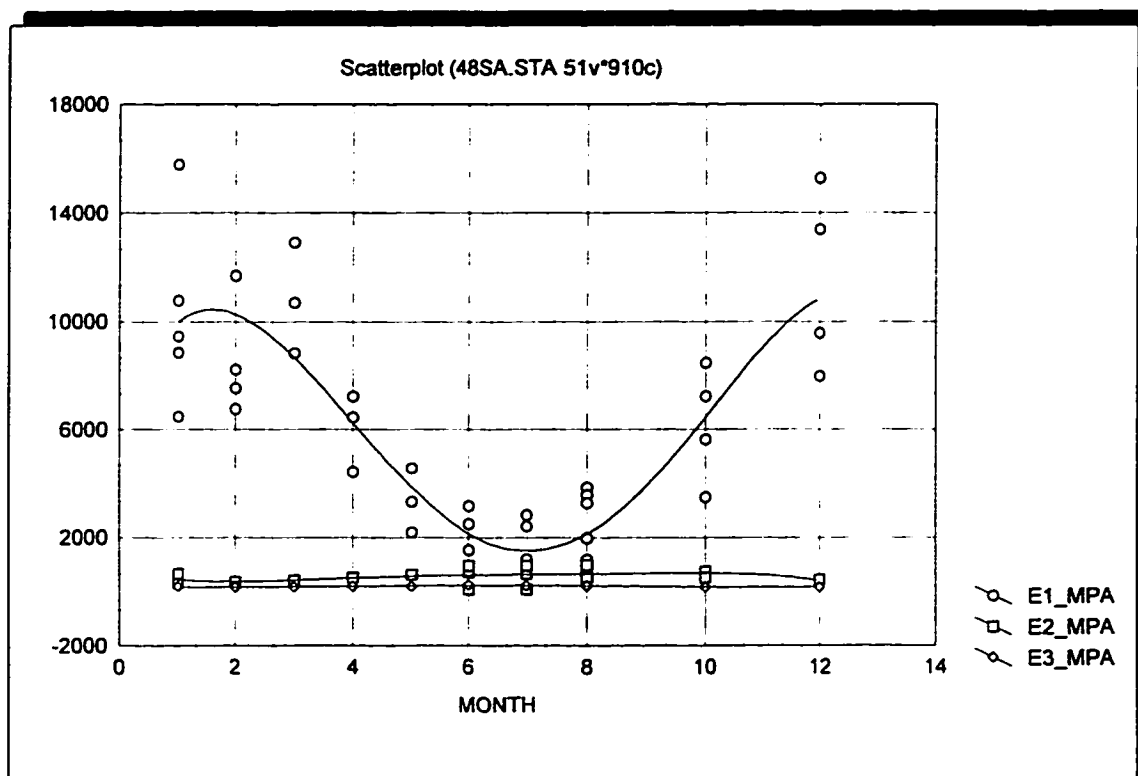


**FIGURE 5.2: MONTHLY VARIATIONS IN PAVEMENT PROPERTIES
SITE 48SA, STATION 300F1**

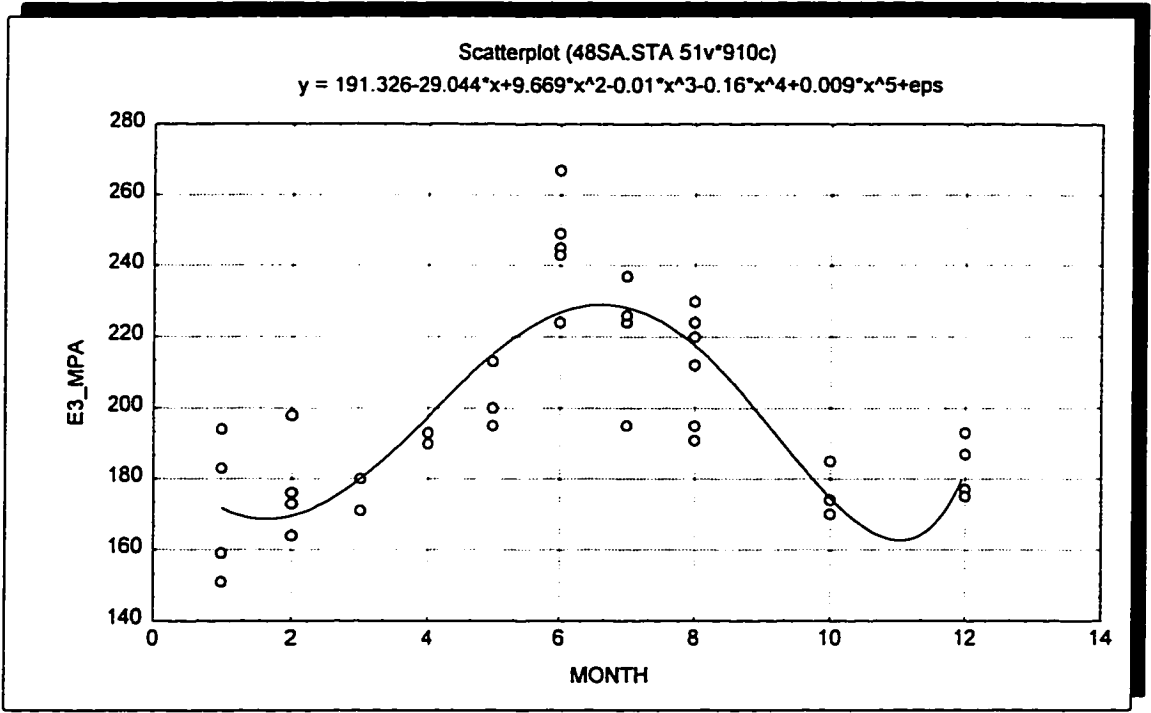


FIGURE 5.3: TIME VARIATION OF SUBGRADE RESILIENT MODULUS
SITE 48SA (STATION 300F1)

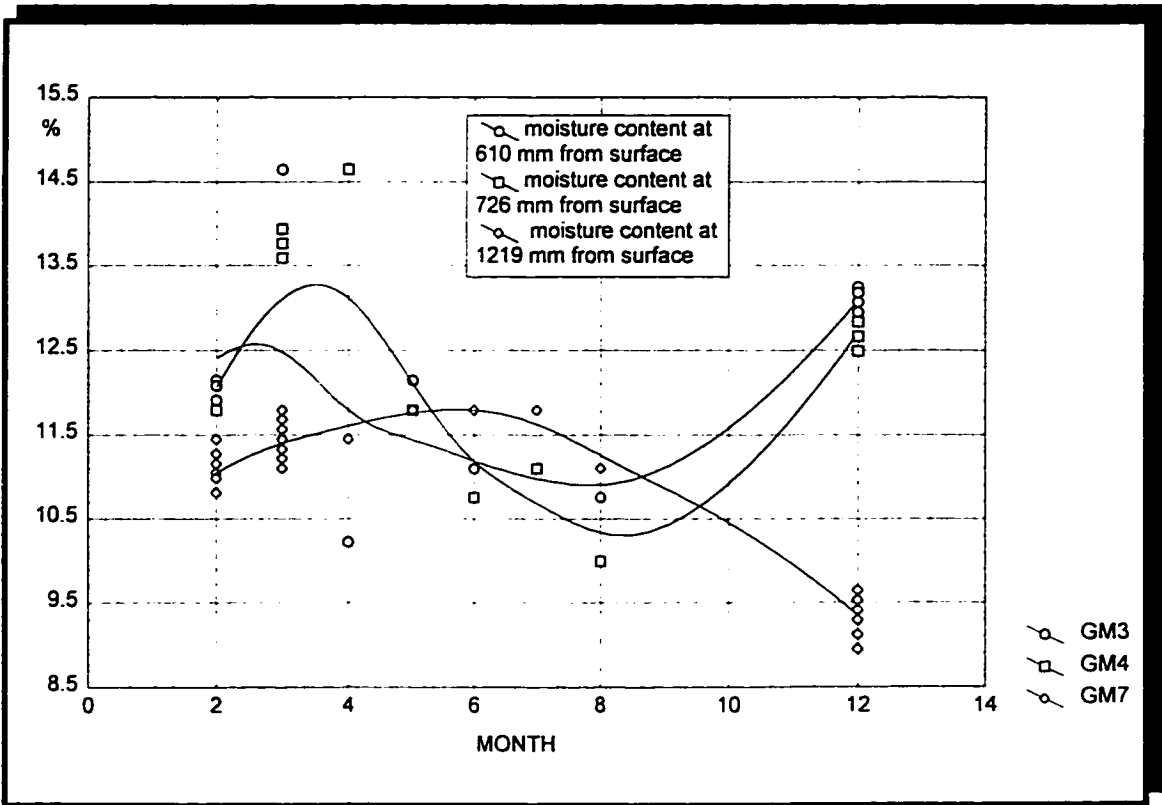


FIGURE 5.4: TEMPORAL VARIATION IN GRAVIMETRIC
MOISTURE CONTENT, SITE 48SA

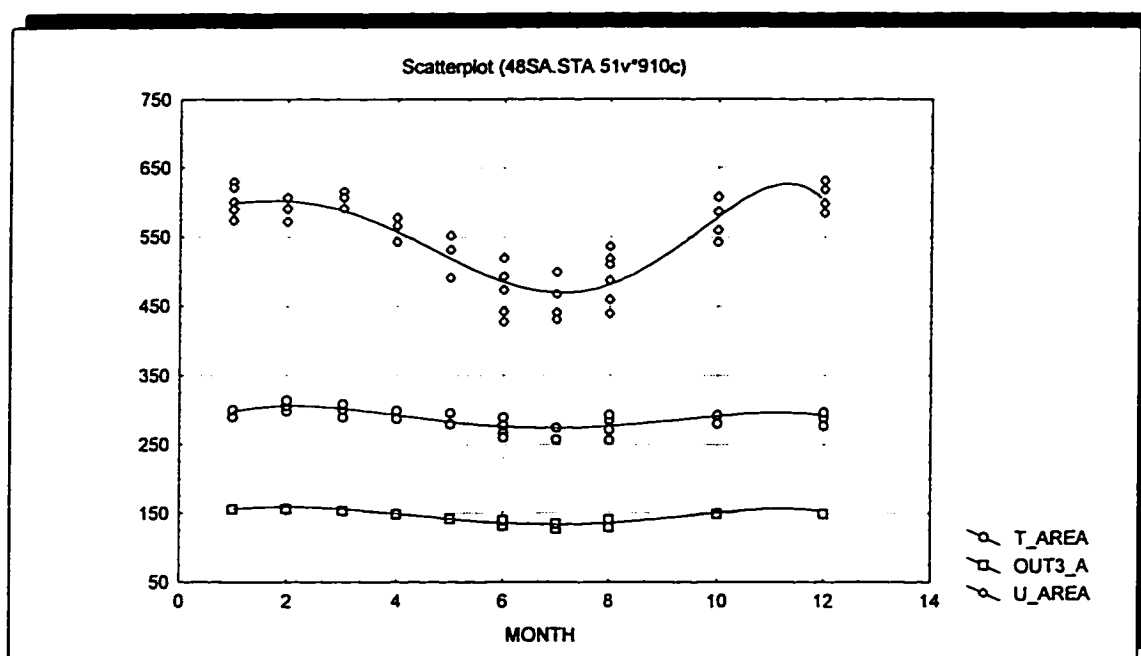


**FIGURE 5.5: TEMPORAL VARIATION IN DEFLECTION MEASURES
SITE 48SA, STATION 300F1**

Figure 5.5 shows monthly changes in the area of deflection basin (T_AREA) in mm², area under outer three deflection sensors (OUT3_A) in mm², and unit deflection area (basin area divided by central deflection "U_AREA") in mm. Because central (innermost) deflection is usually less than one millimeter, unit deflection area in mm is greater than deflection area. It is interesting to note that temporal changes in unit deflection area are parallel to changes in E1, the reason being that the central deflection sensor is sensitive to E1 and the latter is sensitive to temperature. As the total deflection area (which did not change significantly with season) is divided by the value of the central deflection, the unit deflection area decreases as the central deflection increases due to higher temperature and consequent lower AC elastic modulus. Figure 5.6 shows the variation in both basin area and the area under the outer three deflection sensors, in a magnified vertical scale. It is evident that the total deflection area experienced more variation (ranged between 260 and

320 mm²) than the variation of the area under the outer three sensors (ranged between 135 to 160 mm²). This observation is as expected since the innermost deflection sensors are sensitive to the surface layer (AC layer) and the latter is exponentially related to pavement temperature. On the other hand, the outermost deflection sensors tend to reflect the subgrade deflection and hence, are less affected by temperature.

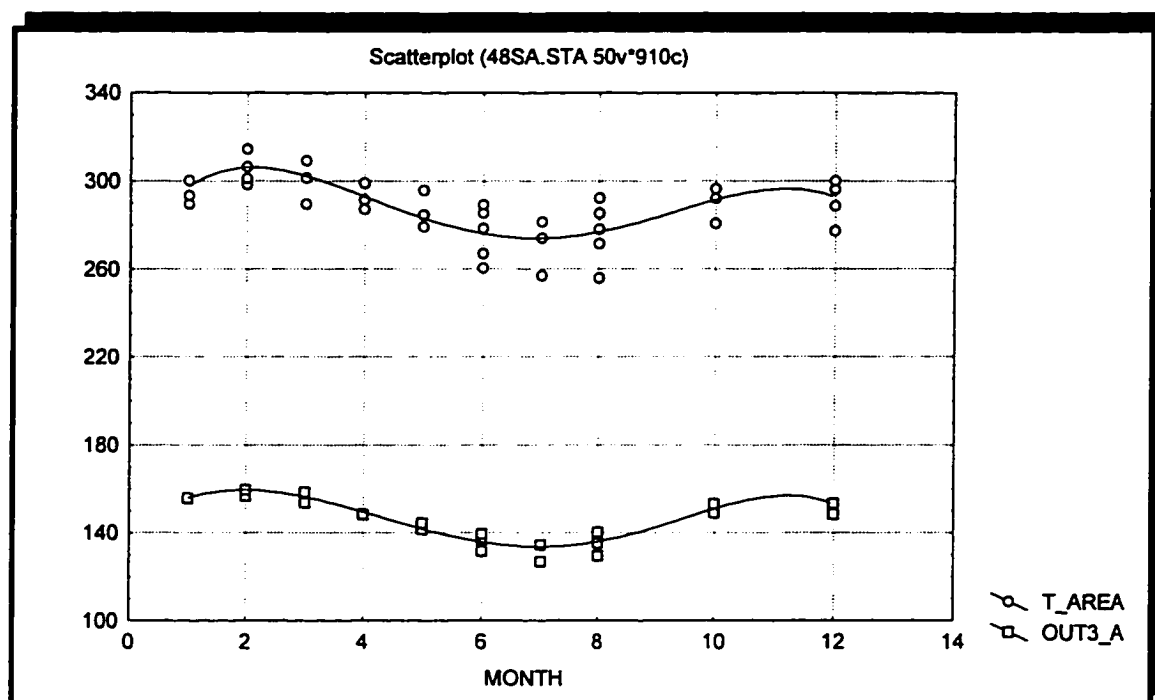


FIGURE 5.6: TEMPORAL VARIATIONS IN DEFLECTION BASIN AREA

It is interesting to note that the minimum value of deflection area occurs between June and August, the same period of minimum E1, and maximum E3. One might have expected that deflection area should have been maximum when E1 was at its lowest value. However, in this case, since the subgrade resilient modulus (E3), which had a maximum value (i.e., as stiff as it could be), affects all deflection sensors, whereas E1

affects only the innermost sensors, the effect of E3 on the total deflection area is greater than that of E1. The same effect is also shown in deflection area under the outer three sensors.

2. Points On the Wheel Path

Figure 5.7 shows the back-calculated layer elastic moduli for station 300F3 in the same seasonal site. Figure 5.8 shows measures of deflection area. The same patterns discussed for station 300F1 apply to station 300F3. The subgrade elastic modulus peaks in the summer time (June through August), at the same time when the AC layer is at its lowest value. Since stations 300F1 and 300F3 are separated by only a few inches, it is expected that deflection measures and elastic moduli, for both sections, more or less follow the same pattern. The mean monthly values of E1 and E3 at each month, for all stations, are tabulated in Appendix B. ANOVA is performed to test the hypothesis that testing points located at mid lane and those located at wheel path have equal means. This analysis is presented in Chapter 6.

In Figure 5.8, the scatter around the least square curve represents diurnal variations. All readings in the same month are taken in the same day, but at different times. Diurnal variation in U_AREA (unit deflection area) and T_AREA (total basin area) are larger than those of OUT3_A (area under outer 3 deflection sensors). This is explained by the fact that the first two measures are affected by the surface layer and hence by temperature, while the third measure is indicative of the stiffness of the lower layers

which are not that sensitive to ambient temperature. Ambient temperature at the time of testing ranged from -3 to 47 °C.

B) Selected Points at Site 48SF

1. Points Located at Mid-Lane

Figure 5.9 shows the variation of the elastic modulus of Station 25F1 at Site 48SF. The maximum values of the elastic modulus of the AC layer is about 18,000 MPa; this takes place in February and in December. The minimum value is about 4,000 MPa, occurring in July and August. The timing of the maximum and the minimum values is as expected and corresponds with the coldest and the hottest months of the year.

The subgrade resilient modulus (E_3) varies between 100 and 200 MPa, with minimum values in July through September. Note that there is a great variation in the AC layer stiffness. This change is attributed to changes in pavement temperature which ranged from 5 to 55 °C at testing time. A temperature correction algorithm for the back-calculated AC layer modulus is presented in Chapter 7.

Figure 5.10 shows variation in deflection measures. In comparing these patterns to those of Station 300F1 of site 48SA, both the total deflection area and the area under the outer 3 deflection sensors reach their peak in the summer time (while E_1 is minimal) when the unit deflection area is minimum. It is expected that deflection area increases when the AC layer is in its softest condition. Unit deflection area decreases as the deflection area

increases and the central deflection increases. In this case the effect of the increase in the central deflection is greater than that of the increase in the deflection area, therefore, the minimum unit deflection area corresponds to the maximum deflection area.

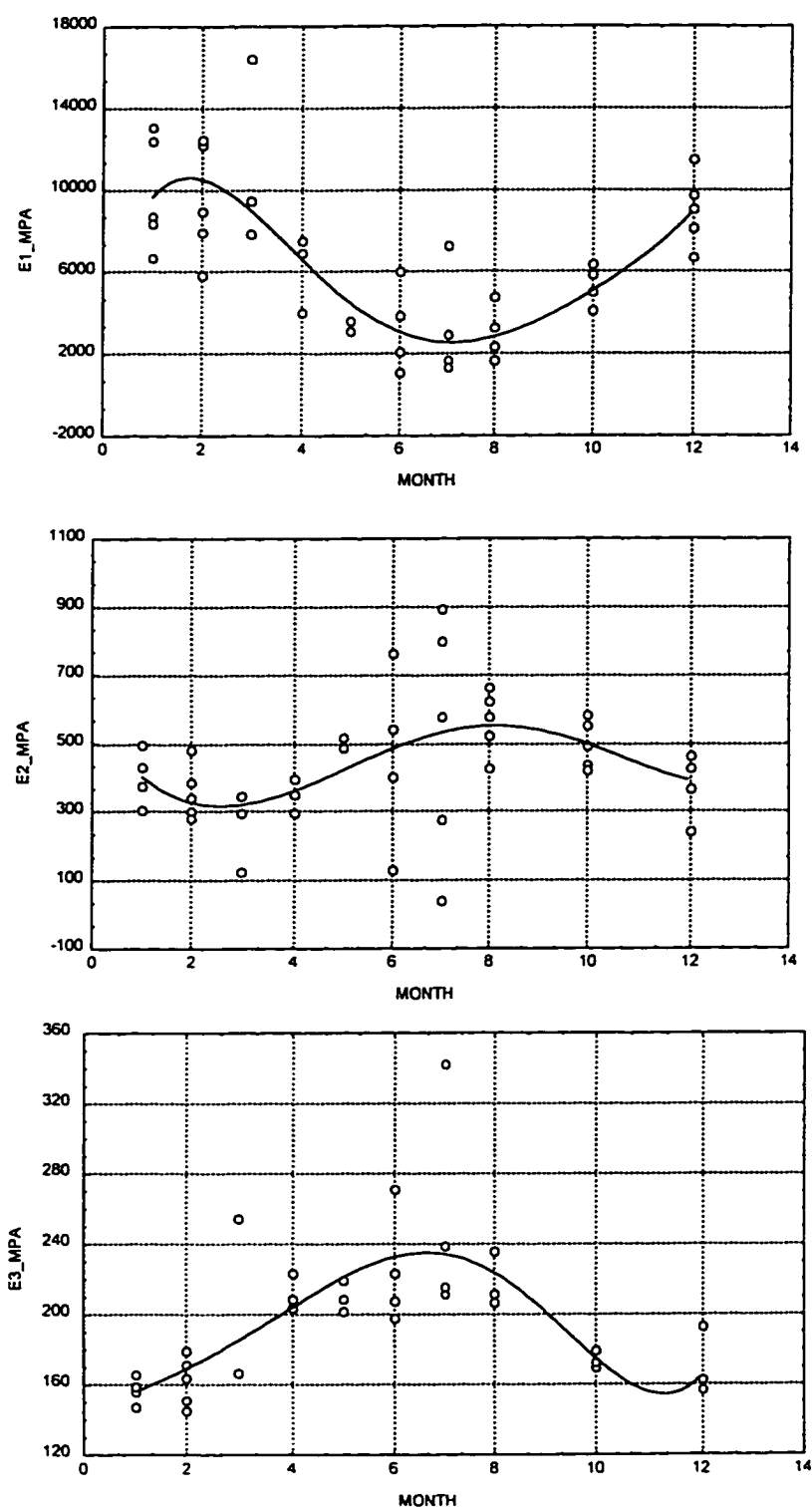


**FIGURE 5.7 TEMPORAL VARIATION IN LAYER ELASTIC MODULI
SITE 48SA, STATION 300F3**

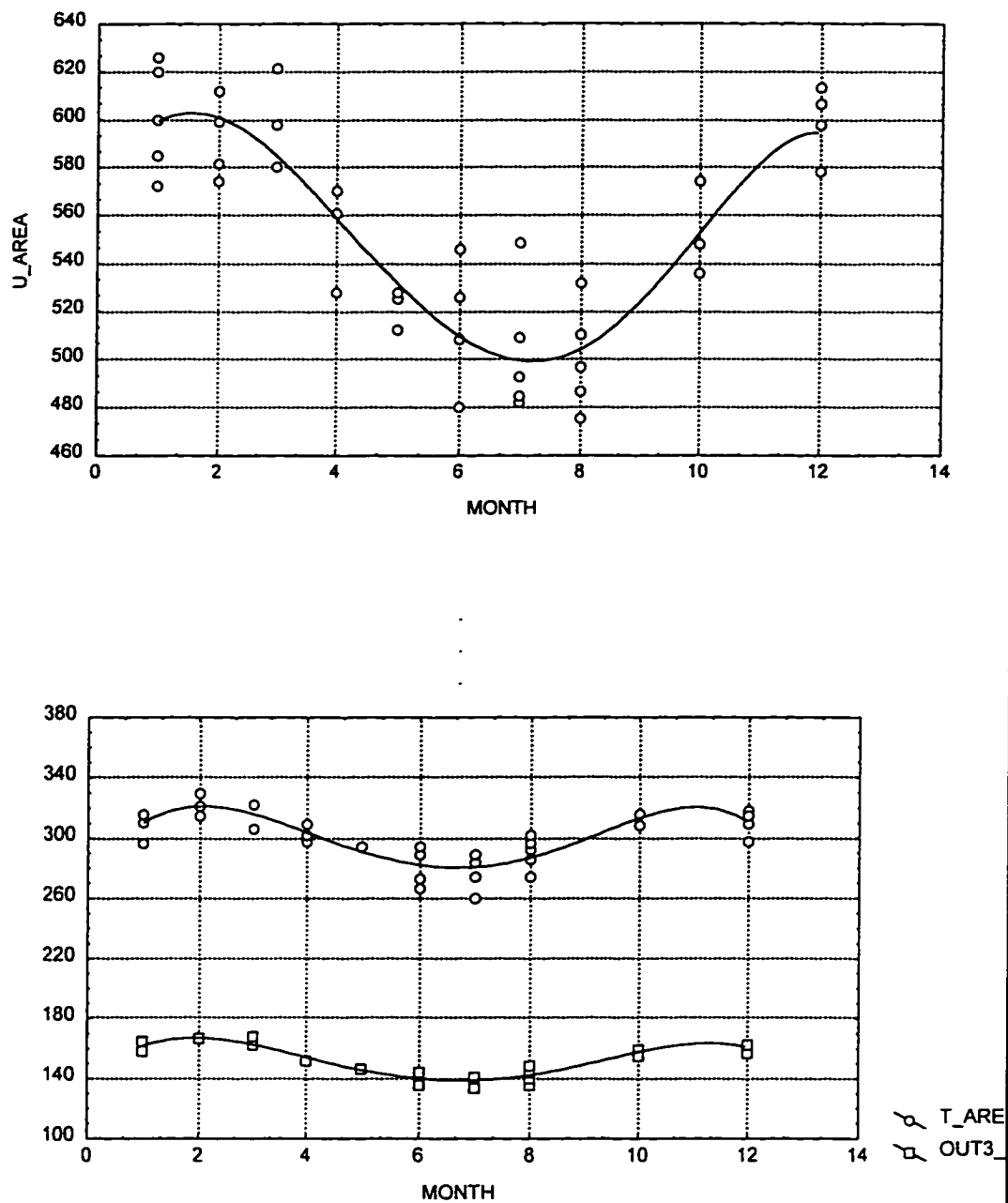


FIGURE 5.8: DEFLECTION MEASURES AT STATION 300F3, SITE 48SA

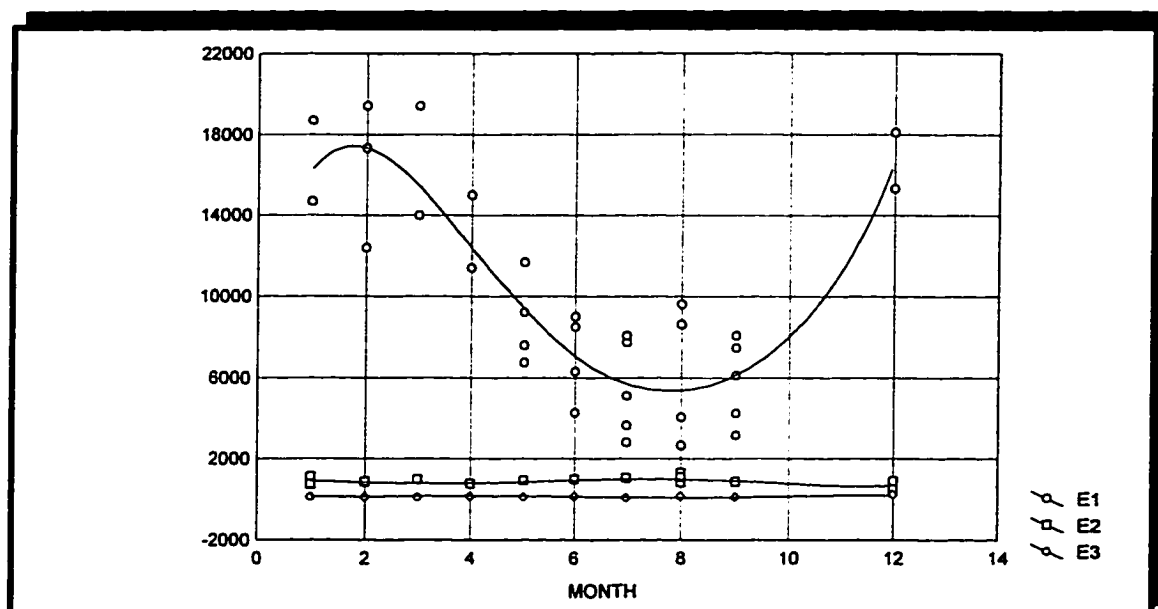


FIGURE 5.9: ELASTIC MODULI FOR STATION 25F1 AT SITE 48SF

2. Points at the Wheel Path

Figures 5.11 and 5.12 show the temporal variations of layer elastic moduli and the deflection measures respectively, for station 25F3 at site 48SF. The same pattern that was observed in station 25F1 is more or less observed in Station 25F3, as one would expect. The mean monthly values of E1 and E3, for all testing points are tabulated in Appendix B.

In Figure 5.11, the scatter around the least square line represents diurnal variation. Diurnal variations are significant for the AC layer elastic modulus and less significant for other layers' moduli.

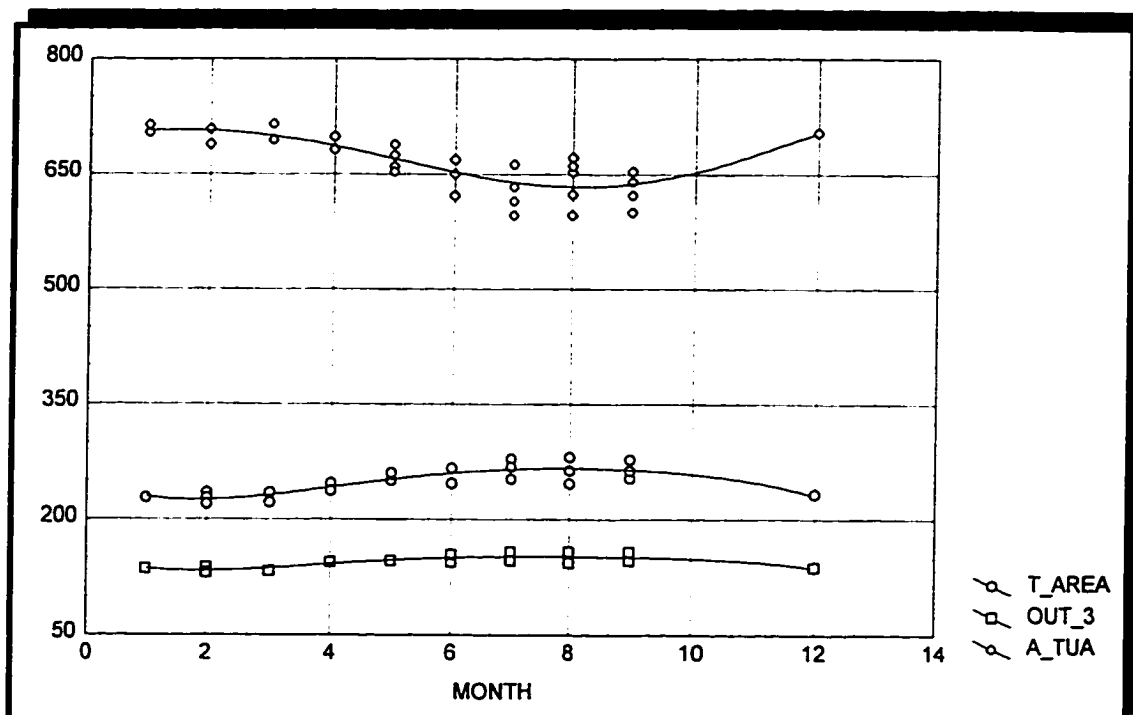


FIGURE 5.10: MEASURES OF DEFLECTION AREA AT STATION 25F1
SITE 48SF

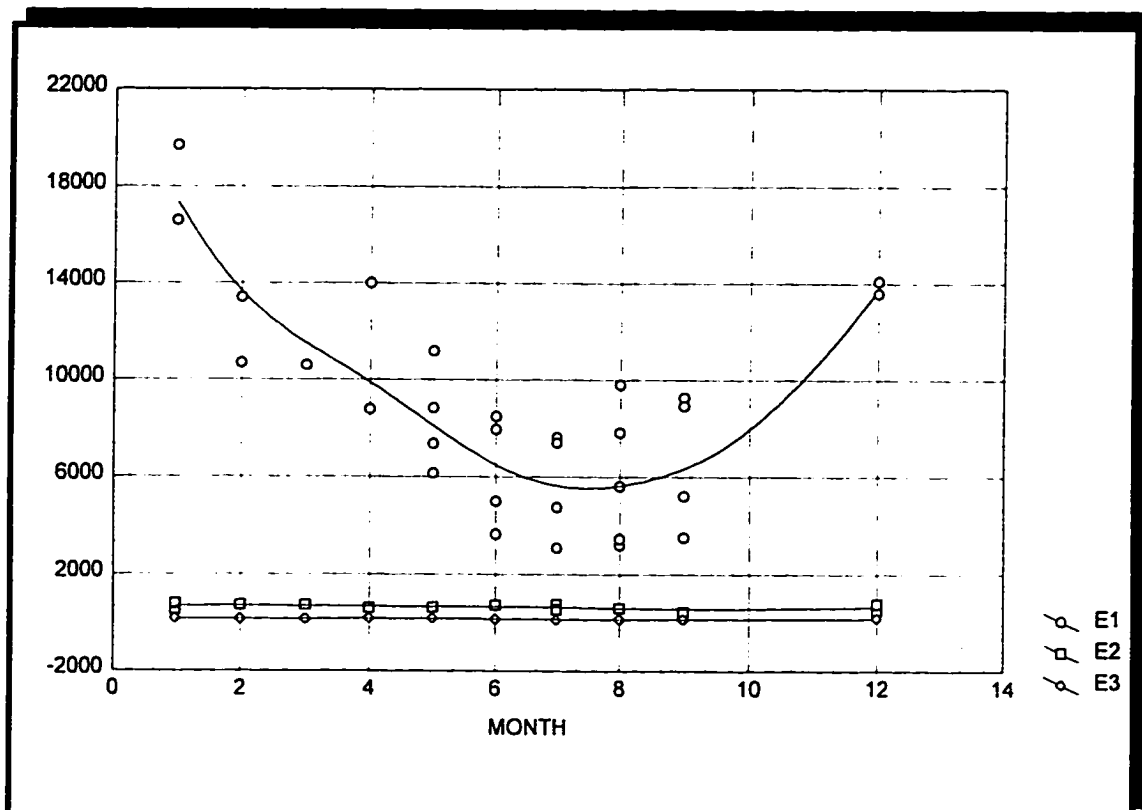


FIGURE 5.11: ELASTIC MODULI FOR STATION 25F3 AT SITE 48SF

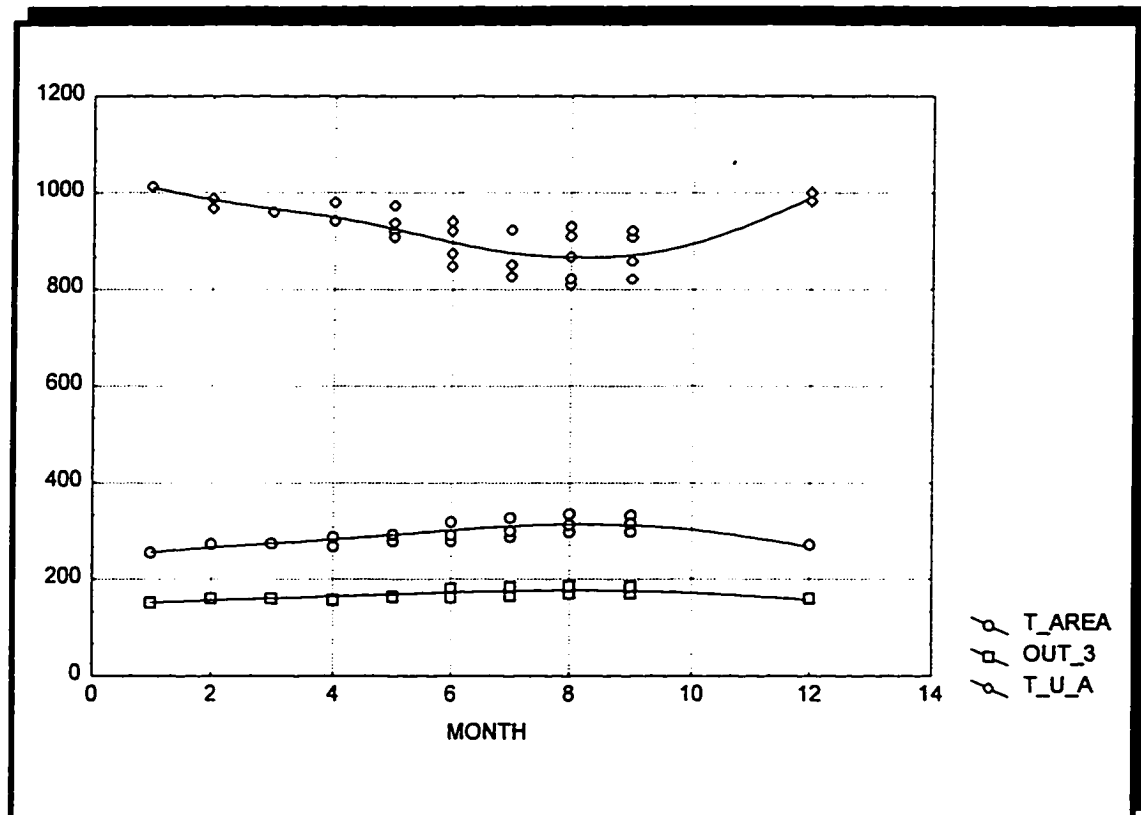


FIGURE 5.12: MEASURES OF DEFLECTION AREA, STATION 25F3, SITE 48SF

Environmental and Pavement Structural Variables for the Entire Site

In this section, instead of focusing on one testing point and studying temporal variations of a specified criterion variable at that point, the seasonal site, including all testing points, is analyzed as one entity. This facilitates the task of looking at spatial variation of pavement properties along the site.

A) Environmental Variables

It is important to realize that environmental variables (moisture content and temperature) are measured at an instrumentation area located outside the testing area (See Figures 3.1 and 3.3). The data values obtained at the instrumentation area are assumed to apply to all

testing points. However, pavement surface temperature measurements taken from FWD vehicle are taken for individual testing points. Figures 5.13 and 5.14 present the temporal variations in pavement temperature at different vertical locations for sites 48SA and 48SF respectively. These values are daily means calculated for each month.

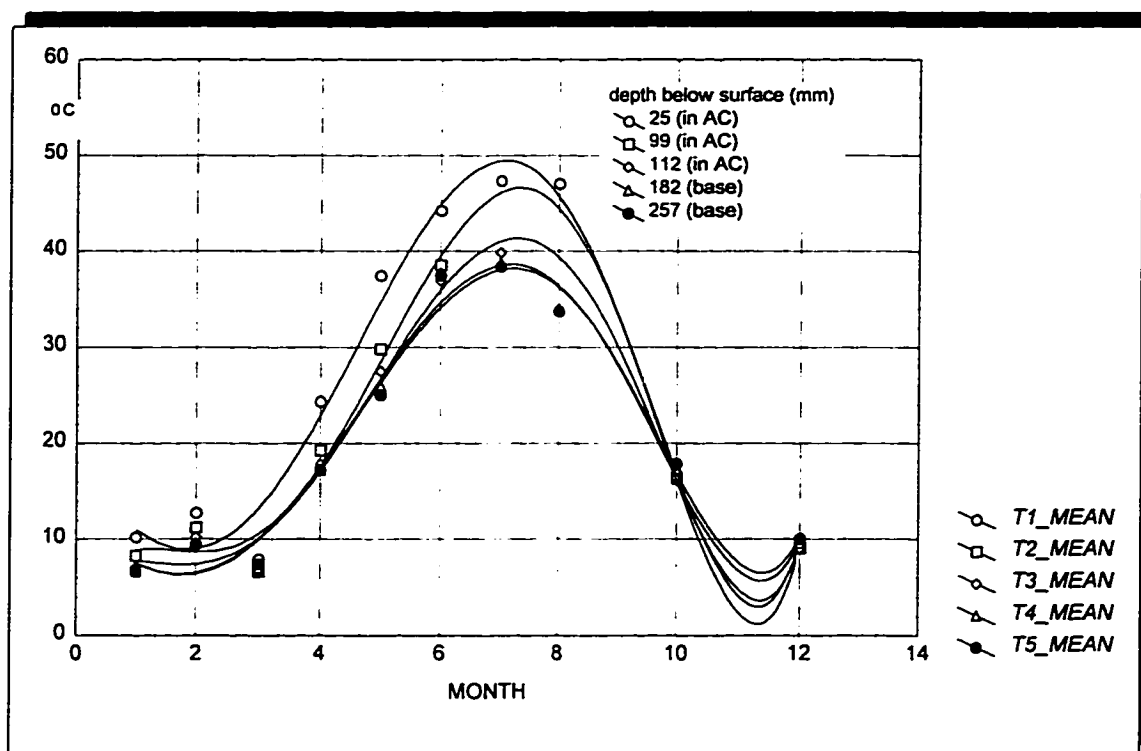


FIGURE 5.13: AVERAGE MONTHLY PAVEMENT TEMPERATURE (SITE 48SA)

Figure 5.13 shows pavement temperature to follow a sinusoidal pattern that decays as we go deeper, the peak value is 50 °C and the lowest value is 10 °C (for T1). The range between maximum and minimum values decreases as we go further from the heating source (away from pavement surface). The effect of temperature on layers' stiffness decreases for the lower pavement layers, partly because less temperature variation is exhibited in lower layers and partly because the lower layers are usually unbound

material and do not have the temperature dependency behavior of the surface (AC) layer. Figure 5.13 indicates that in the summer months (June through August), temperature gradient is at its peak value, that is, the differences between layer temperatures are maximum. On the other hand, in the cold months (December through February), differences between layer temperatures are less than those of the summer time.

Figure 5.14 also shows an annual sinusoidal pattern with a peak value of 41 °C and a lower value of 14 °C for T1. Temperature values for the months of August through December are missing. Therefore, for these months, temperature taken from FWD device is used in the analysis.

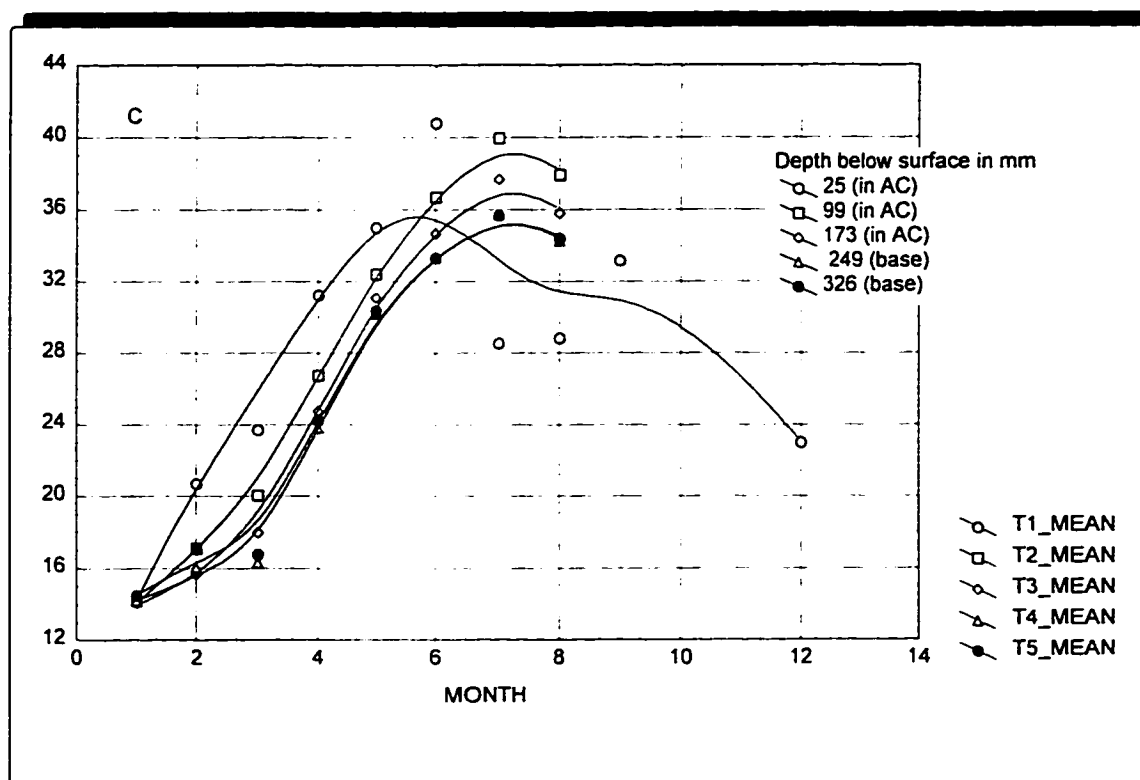


FIGURE 5.14: AVERAGE MONTHLY PAVEMENT TEMPERATURE (SITE 48SF)

Unlike Site 48SA, the differences between layer temperature in Site 48SF appears to be consistent regardless the time of the year. This may be explained by the fact the temperature variation is greater in Site 48SA.

Figures 5.15 and 5.16 show monthly variations in moisture content values for selected TDR's at Sites 48SA and 48SF respectively. The Figures show that the moisture content increases as we go deeper. After some depth, about 1.0 meter below the pavement's surface, moisture conditions tend to stabilize. For example in Site 48SF, GM6 located at a depth of 1110 mm below pavement surface shows a constant reading throughout the year at about 32.5 %; it is not significantly different from that obtained by GM10 (about 32%) located 2019 mm below pavement surface. Site 48SA exhibited much lower moisture content values than those exhibited in Site 48SF (14% to 33% in Site 48SF compared to 4% to 13 % for Site 48SA). This might be explained by the fact that Site 48SF is located in a wet zone while Site 48SA is located in a dry zone.

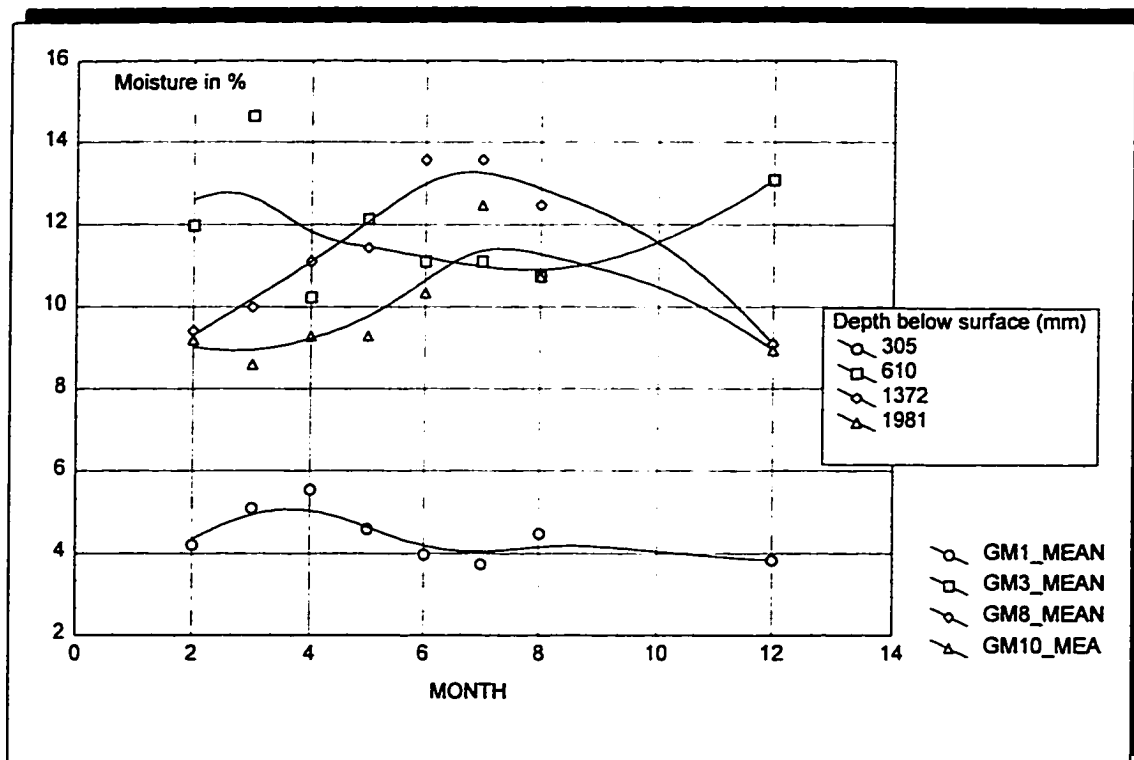


FIGURE 5.15 : MONTHLY AVERAGE MOISTURE CONTENT AT DIFFERENT DEPTHS (SITE 48SA)

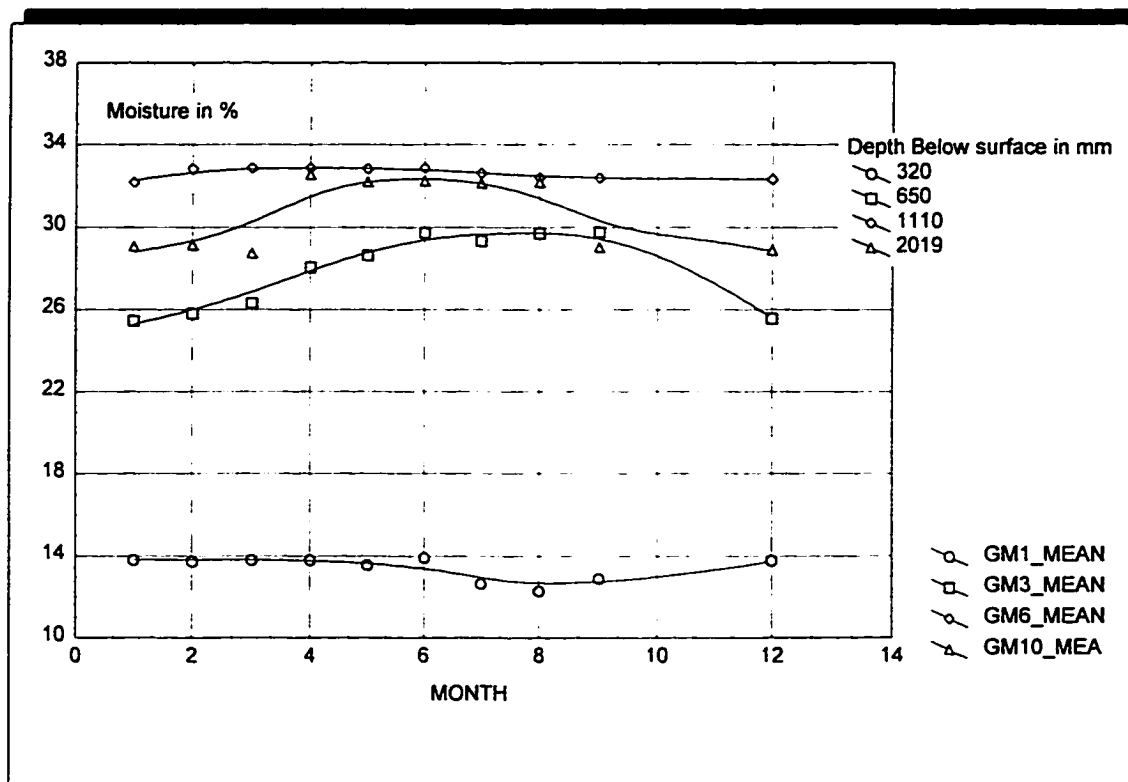


FIGURE 5.16 : MONTHLY AVERAGE MOISTURE CONTENT AT DIFFERENT DEPTHS (SITE 48SF)

Spatial- Temporal Variations in Pavement Properties

In order to present both temporal and spatial variations in a single graph, space- time series are constructed for selected variables. Figures 5.17 and 5.18 represent space- time series for Site 48SA, for the back-calculated elastic modulus of the AC layer (E1) and resilient modulus of subgrade (E3), respectively. Figures 5.19 and 5.20 represent space- time series at Site 48SF for the values of E1 and E3, respectively.

Data points in space- time series are organized such that the first twelve points represent the mean monthly values (January through December) of the selected variable at the first testing point (station). The second twelve readings represent mean monthly values for the next testing point and so forth. The horizontal axis indicates only station identifications and does not show the month (for clarity). Note that stations are 25 feet apart, stations with extension F1 are located at the mid-lane and stations with extension F3 are located at the outer wheel path. For instance, in Figure 5.17, twelve E1 monthly values of testing point 300F3 (the first station at the outer wheel path) are plotted. The following twelve values are the corresponding values for testing point 325F3. After plotting the values of all points located at the wheel path (stations 300F3 through 530F3), the corresponding values for the points located at the mid-lane are plotted (stations 300F1 through 530F1). The order is reversed in Figures 5.19 and 5.20.

Figure 5.17 shows that, for all testing points in Site 48SA, the elastic modulus of the AC layer follows an annual cycle which peaks in the winter months and reaches the lowest

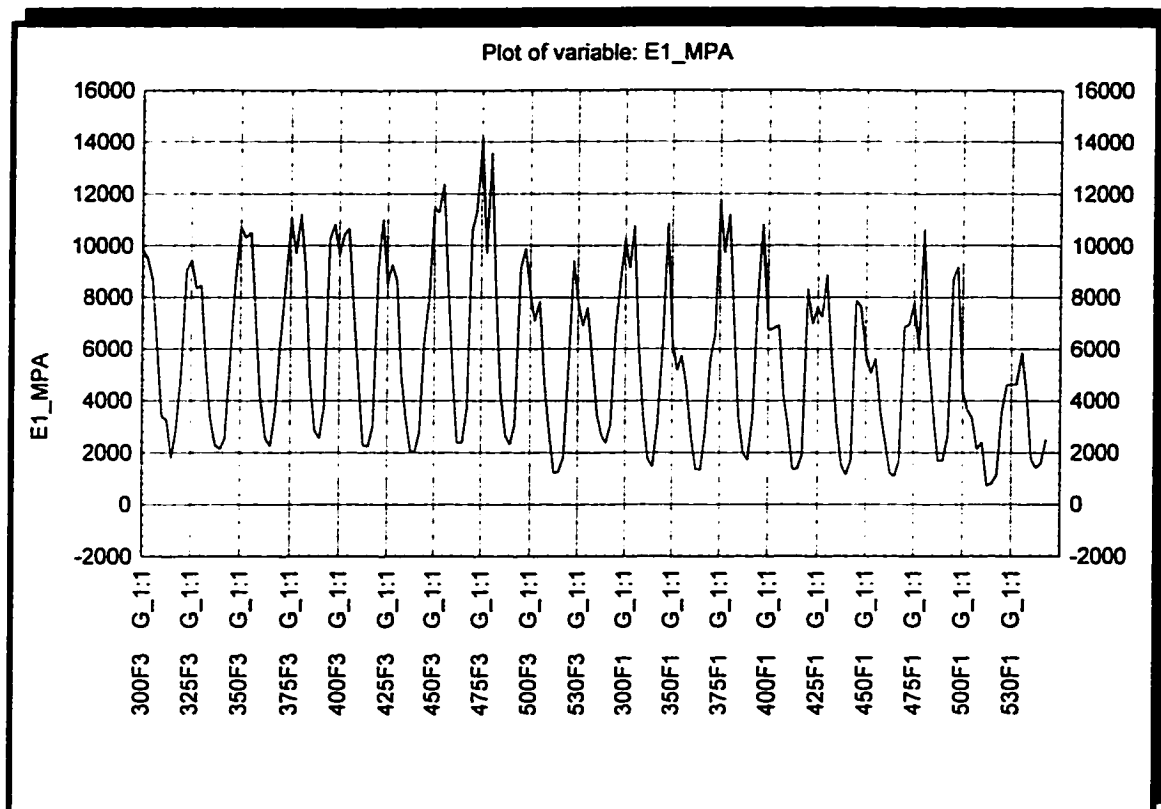


FIGURE 5.17: SPACE- TIME SERIES FOR E1 (SITE 48SA)

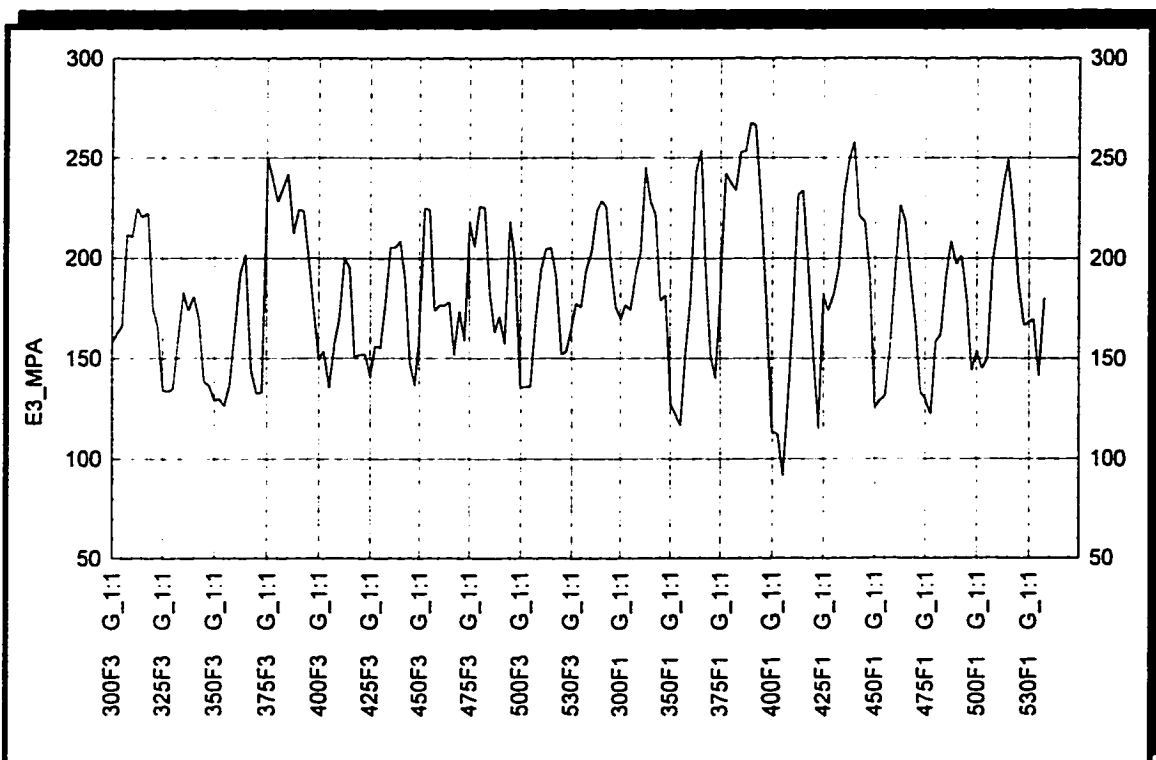


FIGURE 5.18: SPACE- TIME SERIES FOR E3 (SITE 48SA)

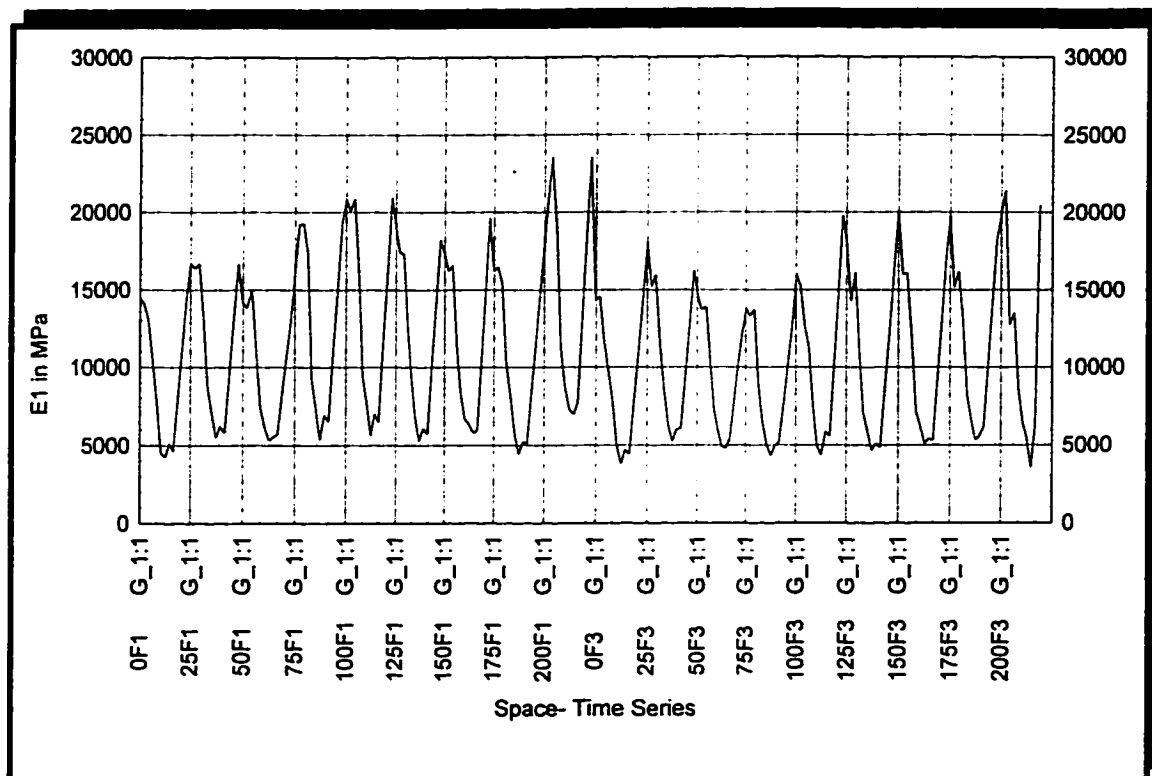


FIGURE 5.19: SPACE- TIME SERIES FOR E1 (SITE 48SF)

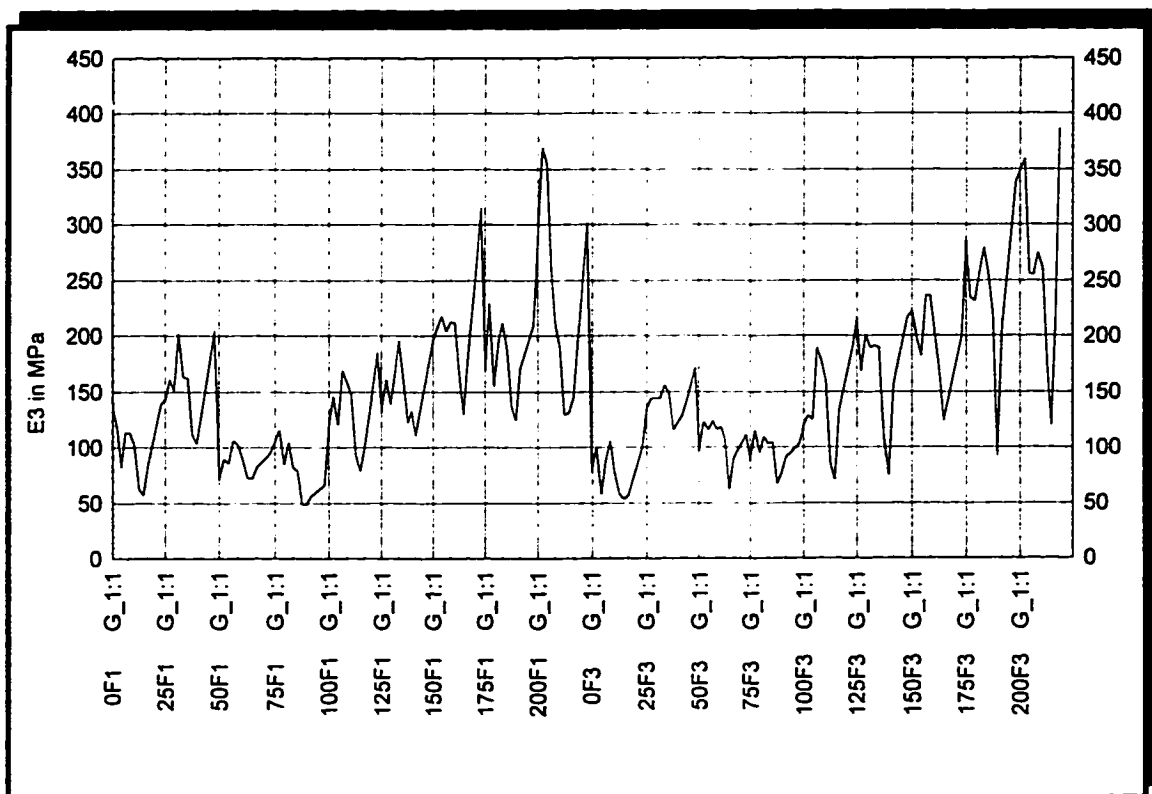


FIGURE 5.20: SPACE- TIME SERIES FOR E3 (SITE 48SF)

value in the summer. However E_1 values vary from one point to another. Figure 5.18 shows that, for all testing points in the Site 48SA, the resilient modulus of the subgrade have an annual cycle that peaks in the summer months and reaches its lowest value in the winter. The amount of variation appears to be higher in the mid-lane stations compared to that of the wheel-path ones.

Figure 5.19 shows the elastic modulus of the AC layer values for Site 48SF. The annual cycle observed in Figure 5.17 is also present here. However, in this Site, the stations located at the wheel path appear to replicate the signature of their corresponding stations at the mid-lane. In other words, the signature of Station 0F1, for example, matches the signature of Station 0F3. This pattern is even more apparent in Figure 5.20, where the E_3 series at Station 0F1 through 200F1 is almost replicated at Stations 0F3 through 200F3. In Chapter 8, time series analysis is used to separate the variation into spatial and temporal components, and to detect if there is a structure in the spatial variation.

Unlike the annual E_3 cycle observed at Site 48SA, the E_3 cycle at Site 48SF is reversed. That is, the minimum values of E_3 occur in the summer time and the peak value occur in the winter. Bivariate analysis (presented in Chapter 6) investigates the intercorrelations between E_3 and environmental variables, for the purpose of formulating hypotheses as to what causes the subgrade resilient modulus to change in the way described above.

The magnitude of monthly changes of E3 values is different from one point to another. The magnitude of seasonal variation appears to have a trend that increases in the direction from station 0 to 200. That is to say that some stations showed more temporal variations than others in the same site and the location of a testing point influences the values of the variables.

Selected Bivariate Graphs

In the first step of modeling, model formulation, it is important to characterize the underlying relationship between the variables in the analysis. This is done by various techniques such as plotting the variables, calculating linear coefficients between pairs of variables and conducting principal components analysis to identify the system's major constructs. The remainder of this chapter represents graphical relationships between some selected environmental and pavement structural variables. Of particular interest is to address the question of linearity, determine the degree of association between variables (sensitivity of one variable to another, which is expressed by the curve slope "gradient") and if the variables are directly or inversely proportional to each other (expressed by the slope sign).

The following graphs present the change of the AC layer elastic modulus as a function of pavement temperature and pavement temperature gradient, and the change of the subgrade resilient modulus as a function of moisture content.

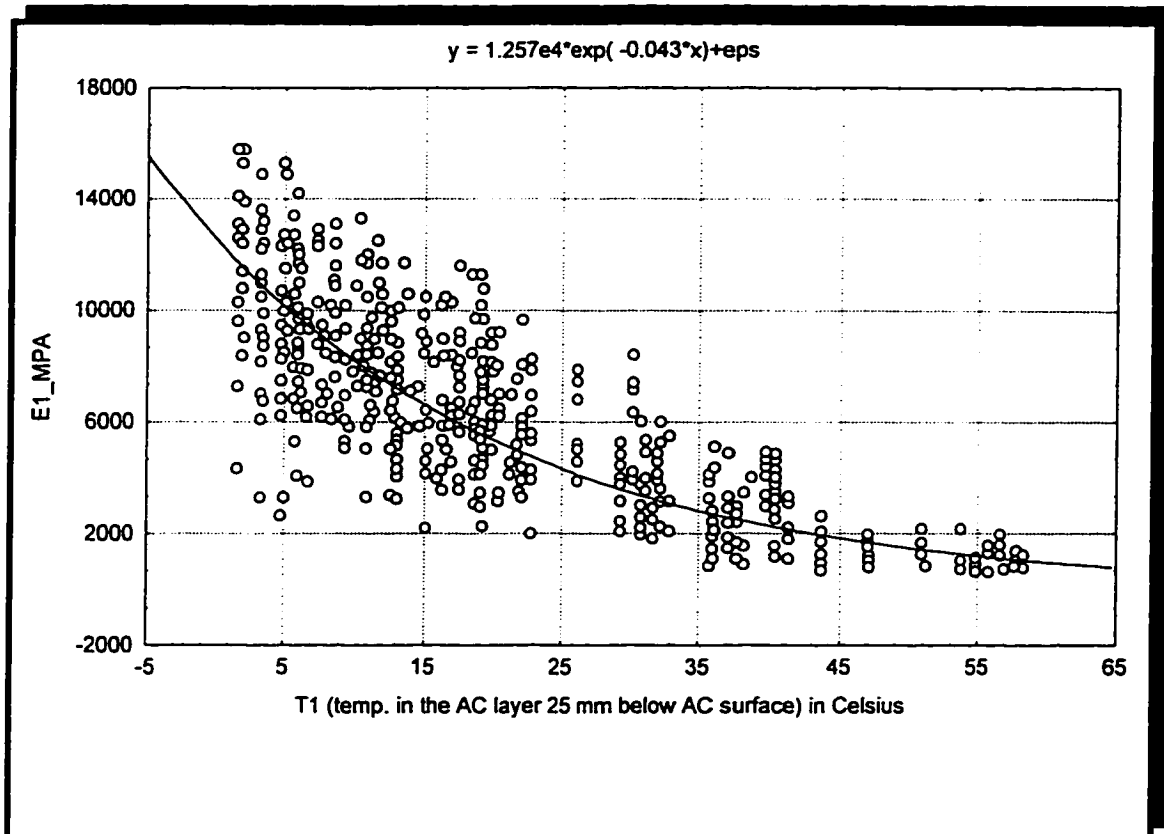


**FIGURE 5.21 : AC ELASTIC MODULUS VS. TEMPERATURE
FOR SITE 48SA**

In Figures 5.21 and 5.22 the AC layer elastic modulus is plotted as a function of pavement temperature for Sites 48SA and 48SF, respectively. The Figures show that the AC modulus is highly influenced by temperature. The relationship appears to be negatively exponential. The great scatter around the best fit exponential curve may be explained by the fact that while pavement temperature is measured at one point, deflection and E1 values are given for different stations, located as far as 300 feet away from the point at which temperature is taken.

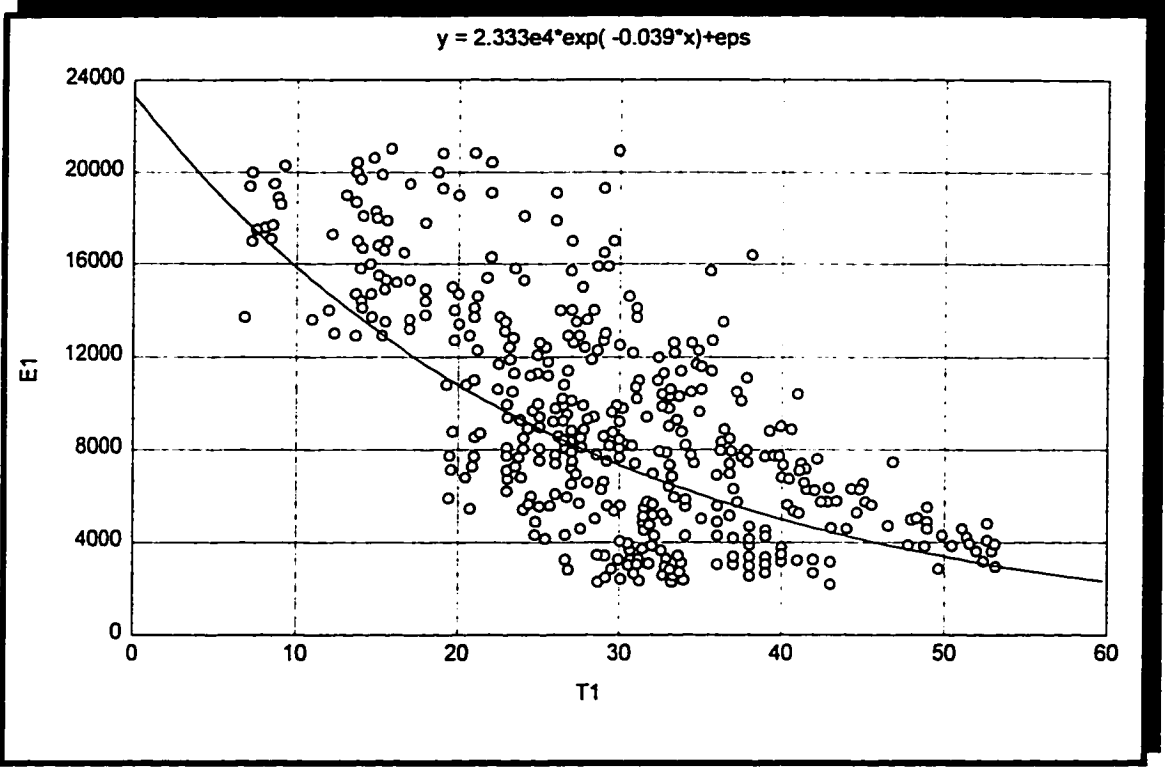


**FIGURE 5.22 : AC ELASTIC MODULUS VS. TEMPERATURE PLOT
FOR SITE 48SF**

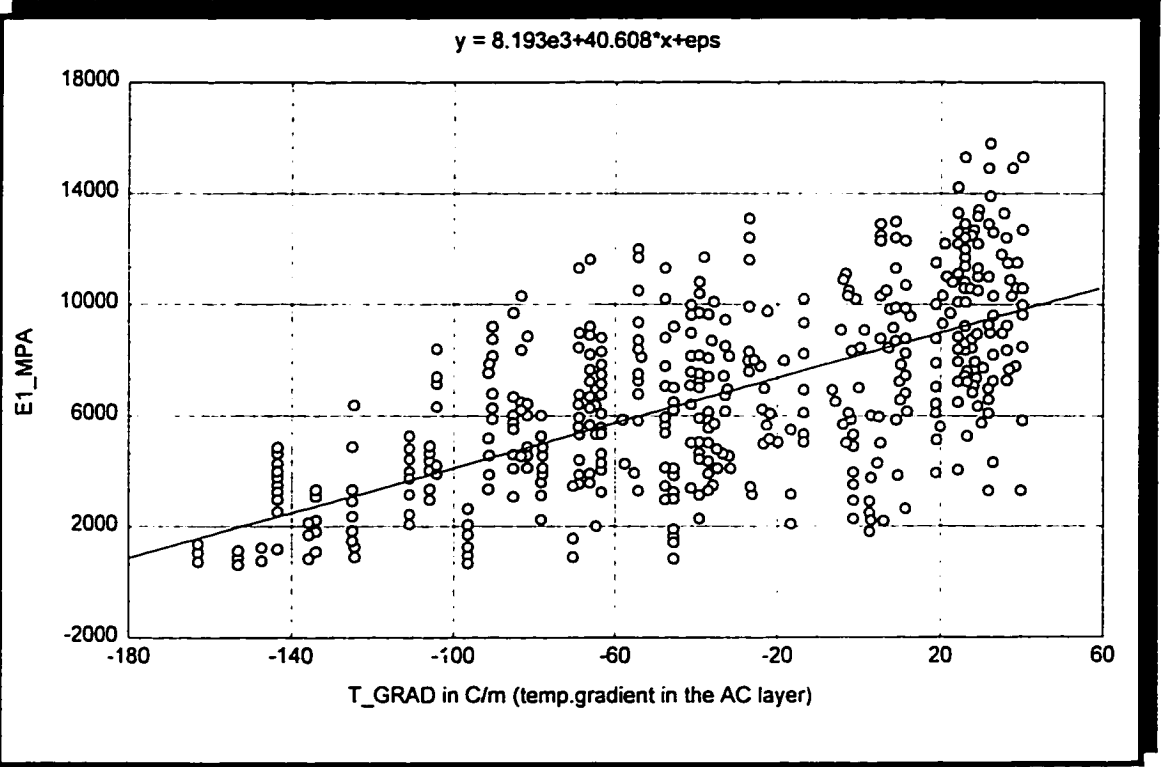


**FIGURE 5.23 : AC ELASTIC MODULUS VS. TEMPERATURE GRADIENT
FOR SITE 48SA**

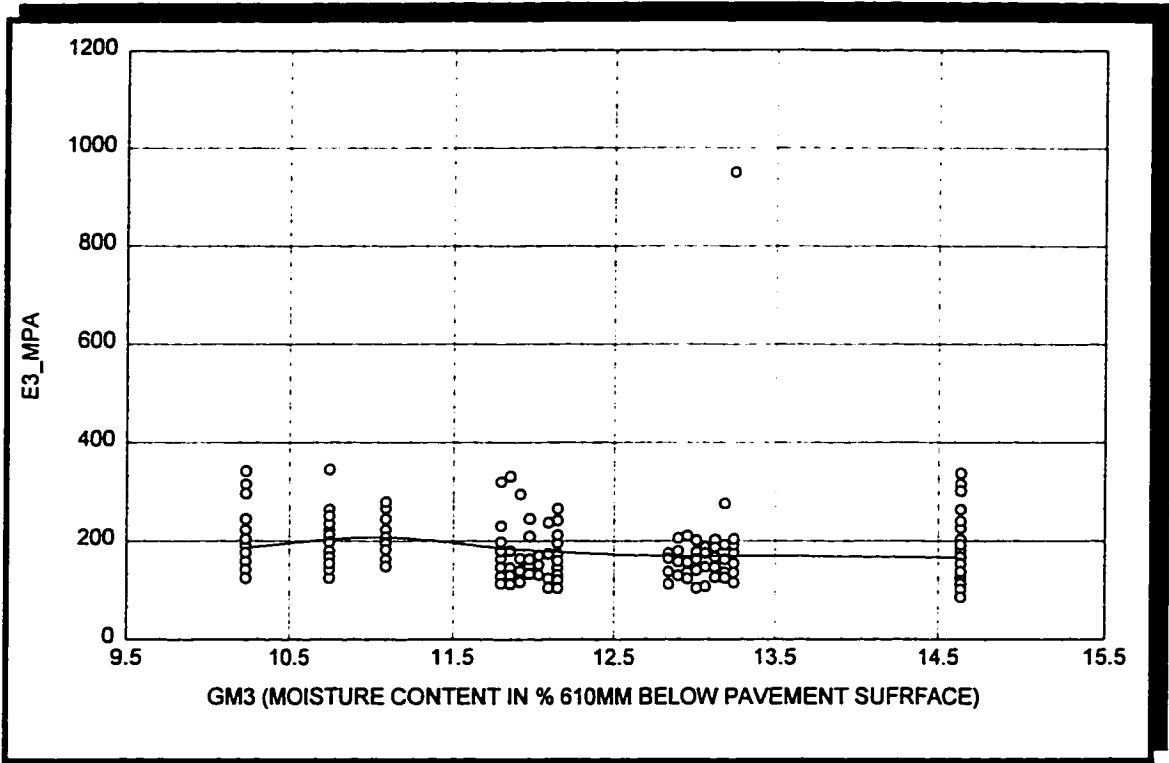


FIGURE 5.24 : SUBGRADE RESILIENT MODULUS VS. MOISTURE CONTENT (SITE 48SA)

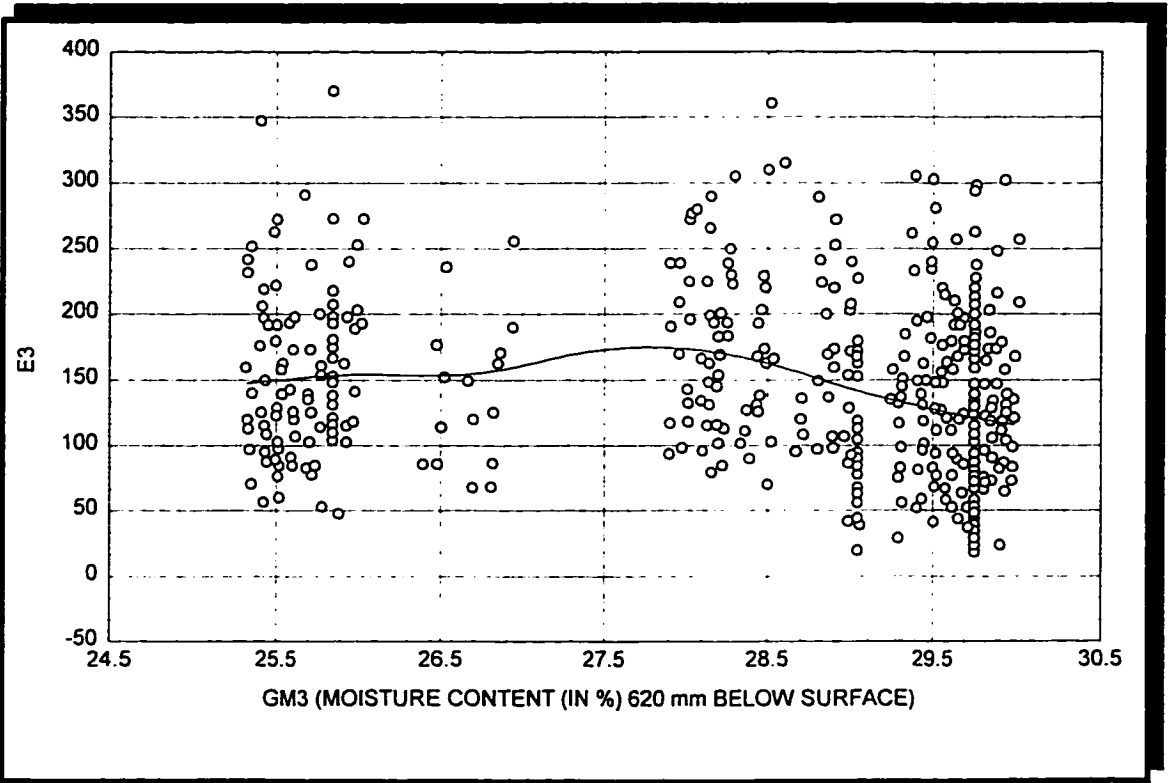


FIGURE 5.25 : SUBGRADE RESILIENT MODULUS VS. MOISTURE CONTENT (SITE 48SF)

Other possible causes of this scatter are the variation in pavement thickness from one point to another, and the heterogeneity of the AC material from one point to another. The amount of scatter is greatly reduced at higher temperatures. Figure 5.22 shows that the scatter in Site 48SF is larger than that of Site 48SA, possibly because the AC layer is thicker in site 48SF, allowing for increasing amount of variation.

Figure 5.23 shows the elastic modulus of subgrade as a function of temperature gradient (in $^{\circ}\text{C}/\text{m}$) in the AC layer at Site 48SA. The AC layer temperature gradient is defined as:

$$\frac{1}{2} \left(\frac{\text{Temp at 25 mm deep} - \text{Temp at 69 mm deep}}{\text{vertical Separation between the two points (m)}} + \frac{\text{Temp at 69 mm deep} - \text{Temp at 112 mm deep}}{\text{vertical Separation between the two points (m)}} \right) \dots\dots\dots (5.1)$$

This definition indicates that when the upper part of the AC layer is warmer than the bottom one, the gradient is positive and vice versa. The Figure indicates that there appears to be a linear relationship with a positive slope, in other words, when the upper part of the AC layer is much warmer than the lower part, less deflection will take place, consequently, the modulus of elasticity is of greater value and vice versa.

This may be explained by the hypothesis that the total deflection in the AC layer is the resultant of two components; compression within the layer and bending of the layer under beam action. Bending deflection is translated into a horizontal tensile forces at the bottom of the layer (below the neutral axis) and compressive stresses at the top of the layer (above the neutral axis). In an extreme situation when the upper part of the layer is extremely hot, the binder material offers zero resistance but the aggregate can still

withstand resulting compressive stresses. Conversely, when the lower part of the layer is very hot, and the binder material fails, aggregate particles alone can not withstand tensile stresses, consequently the pavement will experience a large amount of deflection.

When FWD load is applied to pavements, the bending deflection is translated into a horizontal tensile stress at the bottom of the AC layer (below the neutral axis), therefore, the stiffness of lower part of the layer has more bearing on determining the layer resistance to bending deflection (modulus of elasticity). The stiffness of the lower part of the layer is influenced by temperature at the lower part.

Looking at Figure 5.23 from left to right, at the left end of the Figure, the lower part of the AC layer was much warmer than the top layer (negative gradient) this softens the micro layers at the bottom that fail to provide the required tensile stresses to support larger loads and consequently have less resistance to deflection (low modulus of elasticity). At the right end of the Figure, the situation is reversed. The upper part of the layer is warmer than the lower part.

Another hypothesis to explain the positive slope between E_1 and the AC layer temperature gradient is the fact that the higher temperature gradient corresponds to low pavement temperature, as shown in Figure 5.13. The relationship between the two variables is further discussed in Multivariate correlation analysis presented in Chapter 6.

Figures 5.24 and 5.25 show the variation of the subgrade resilient modulus as a function of gravimetric moisture content for Sites 48SA and 48SF, respectively. Apparently, the two variables are not highly correlated; this is indicated by a linear horizontal line. The large amount of scatter makes it difficult to assess the true association between the two variables.

The scatter is caused by the influence of other explanatory variables. For example, in Figure 5.24 many points are located vertically on top of each other. This indicates that for the same moisture levels at a depth of 610 mm below pavement surface, there is more than one value for the resilient modulus of subgrade. Other variables (such as readings at different testing points which may have slightly different layer thicknesses, moisture levels at other depths and pavement temperature) may have changed and caused the resilient modulus values to change. In fact, the uniqueness and peculiarity of each testing point causes much of that scatter when the above relationship is plotted for all testing points in the Site. If we were to construct the same figure for one testing point at a time, much of the scatter will disappear.

CHAPTER 6: STATISTICAL ANALYSES

In this chapter, a series of statistical analyses are conducted to investigate the relationship between the climatic variables and pavement structural properties. The effect of temperature on the AC layer elastic modulus, and the effect of subsurface moisture conditions on the subgrade resilient modulus will be analyzed using the methodology described in Chapter 5.

Bivariate analysis is used to evaluate linear association between pairs of variables. Principal Components analysis is used to identify principal constructs of the system. Multiple Regression is used to calibrate linear models. But before starting these analyses, statistical inference techniques, such as Semivariogram and ANOVA, are used to shed some light on the spatial variations of pavement structural properties.

Semivariogram Analysis

Semivariogram analysis, often referred to as geostatistics, is a statistical inference technique that is used to examine if there exists a spatial local structure in the values of a measured variable. In terms of spatial estimation, if we have a set of measurements of a property and the coordinates of each measurement, and we wish to make an estimate of the property at a point where measurements were not taken, we will assume that a local systematic structure exists in the vicinity of any point within the sample space. The spatial extent of this local structure is referred to as the region of influence. Therefore, the

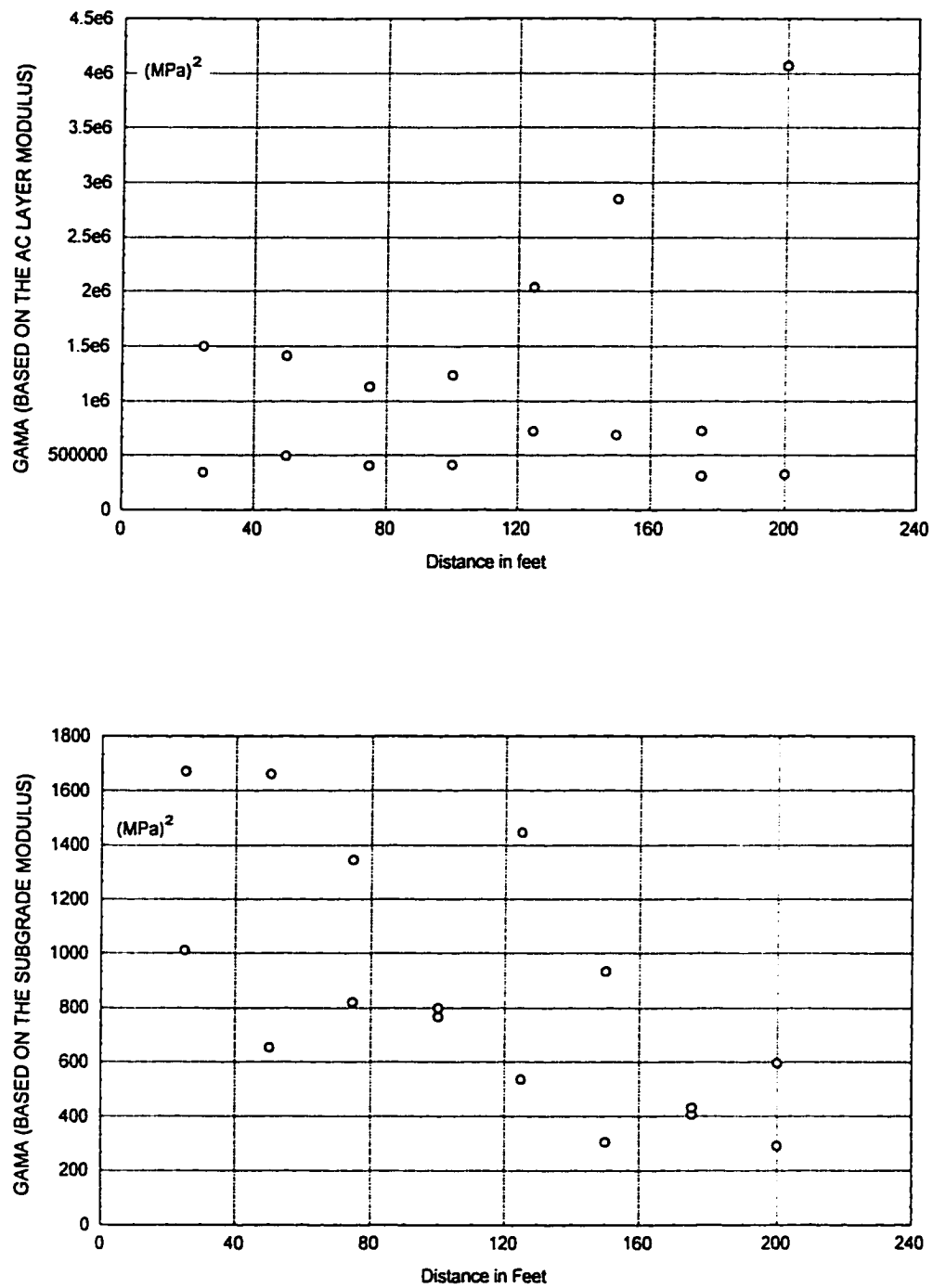
estimated value of the property at any point will be influenced only by the values of the sample measurements that are located within the region of influence. We will assume that the field of measurements represents a statistically stationary field, which means that the difference in the measured values of any two points in the field depends only on the distance between the two points, and possibly their orientation within the field but not the location within the field.

A measure of variation (one half the variance) of the dependent variable is plotted versus the separation distance between testing points that is used to calculate that variance (this plot is called semivariogram.) If the plot shows that the variance increases with separation until it reaches the sample variance, then the data is said have a local structure with a radius of influence equals the distance corresponding to sample variance. This radius of influence is the optimum separation distance between testing points. Conversely, if the semivariogram does not show an increase in the variance with the separation distance increase, then it could be concluded that the field does not have a local structure. That is, the testing points are independent, and therefore, ANOVA is used to analyze the spatial variation.

Results of Semivariogram

Site 48SA

Semivariogram analysis for this site, based on the values of the elastic modulus of the AC layer and the subgrade resilient modulus, are shown in Figures 6.1. The Figure shows

**FIGURE 6.1: SEMIVARIOGRAMS (SITE 48SA)**

GAMA as a function of the distance between the testing points, where GAMA is the sample variance of the differences, defined as:

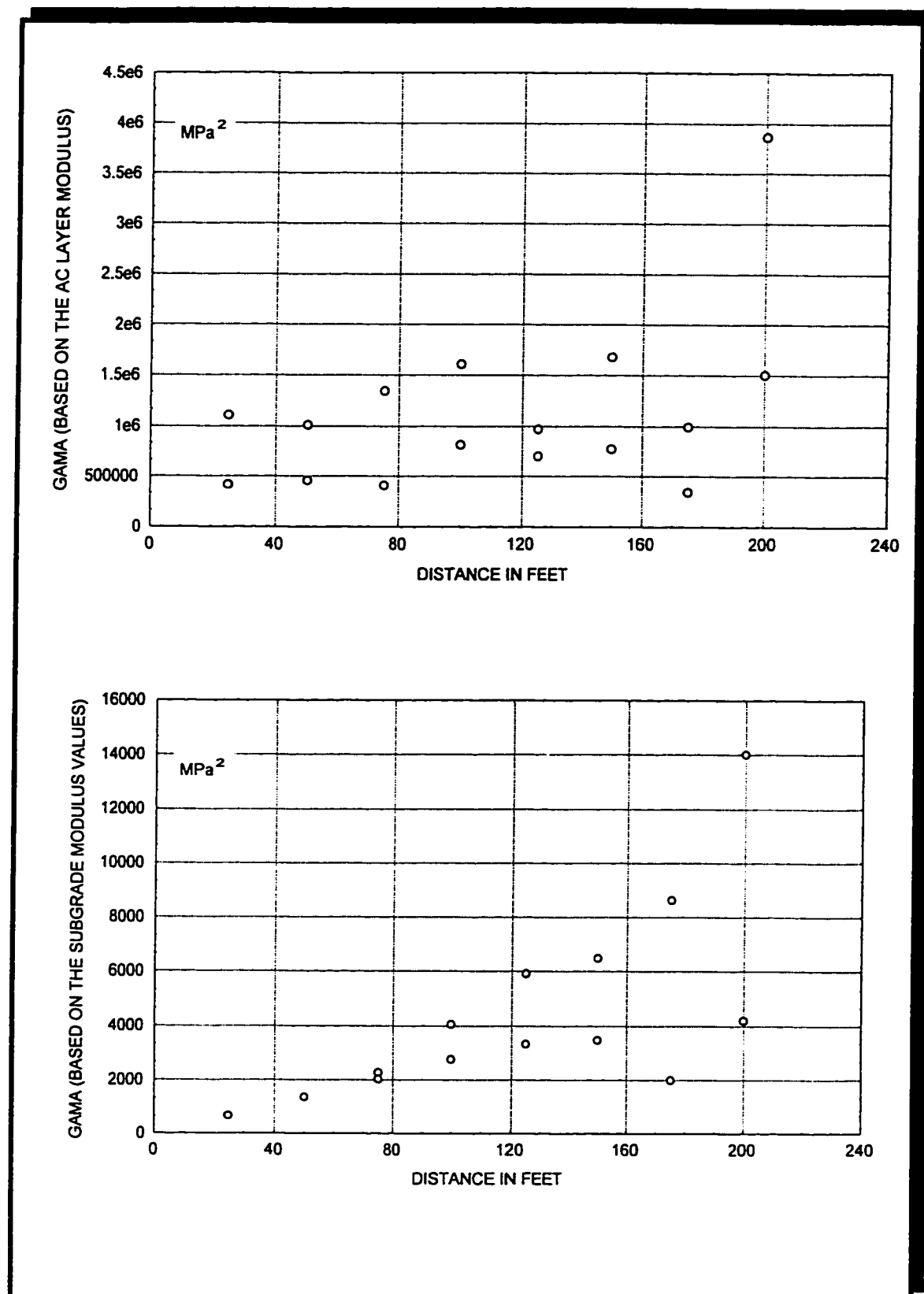
$$GAMA(h) = \frac{1}{n} \sum [Y(x) - Y(x+h)]^2$$

where: h is the separation distance, $Y(x)$ is the value of the dependent variable at coordinate x , and n is the number of points that are separated by a distance h .

Figure 6.1 indicates that the moduli variations are random and are not dependent on the separation distance, therefore, the data points do not have a local structure.

Site 48SF

Figure 6.2 shows the semivariograms based on the AC layer modulus and the subgrade modulus at Site 48SF. The semivariogram of the AC layer modulus looks random; there is no increase in the modulus values as the distance increases. Based on that, one could conclude that there is no structure in the AC modulus values. Conversely, the subgrade modulus appears to have a structure (expressed by the positive slope.) This is supported by a) ANOVA, below, which indicates that there is a significant difference between different spacing, and b) the time- space series (presented in Chapter 8), shows that the modulus value increases with distance.

**FIGURE 6.2: SEMIVARIOGRAM (SITE 48SF)**

ANOVA: Effect of the Separation Distance Between Testing Points

Site 48SA

ANOVA is a statistical test that compares the variation explained by a grouping factor, called the effect variation, to the random variation of the elements of the group, called error variation. If the ratio between the variations (after adjusting it to the number of degrees of freedom) is greater than a critical value, then the grouping factor is significant. ANOVA is used here to test the significance of the separation between testing points. Four separation distances (25, 50, 75 and 100 feet (7.6, 15.2, 22.8, and 30.5 meters respectively)) are used as a grouping variable. In other words, the average values of the layer elastic moduli are calculated when the separation between testing points is 25, 50, 75 and 100 ft respectively. Table 6.1a shows the results based on the values of E1 and E3. The results are reported in the last column, p-level, the level at which the separation between testing points is significant. In other words, the p-level is the error (risk) associated with accepting the hypothesis that the grouping factor is significant. In this case, the risk is too high (92% for E1 values and 52% for E3 values), therefore, the hypothesis that the spacing between testing points makes a difference in the average values is rejected. Table 6.1b shows the mean values of E1 and E3 for each separation distance between testing points. In conclusion, ANOVA shows that the moduli values that would have been obtained using less testing points, spacing of as large as 100 ft. (30.05 m), are not significantly different from those obtained based on 25 ft (7.6 m) spacing.

Site 48SF

Table 6.2a is the ANOVA table which shows that the error associated with accepting the hypothesis that the spacing between the testing points has a significant effect on the moduli values is too high to accept the hypothesis, for the AC layer modulus. Therefore one could conclude that a spacing of 100 feet is as good as that of 25 feet (from E1 point of view). However, the values of the resilient modulus are significantly different, based on the separation distance. Apparently, the values associated with 75 ft. spacing is less than that of the other values as shown in Table 6.2b.

Table 6.2b shows the average values of the moduli based on the spacing between testing points. The error (in accepting the above hypothesis) in the subgrade modulus is 1% (less than 5 %, the significance threshold) as shown in Table 6.2a. This is further explained by the fact that the variation in the subgrade modulus is higher than that of the AC modulus as shown in Table 6.2b.

ANOVA: Comparison Between Wheel Path And Mid-Lane Testing Points***Site 48SA***

Table 6.3a shows an ANOVA table for comparing the wheel path and mid-lane testing points. The results of the test are given based on E1 and E3 values, respectively. The results are reported in the level of significance, p-level, column (last column). The Table indicates that the level at which the difference between E1 values at the wheel path and that at the mid-lane is significant is 0.000011, while that of E3 values is 0.054501. For a significance level of 5% (reliability of 95%), the difference between E1 values at the

wheel path and that at the mid-lane is significant (p-level is less than 0.05). Whereas the difference between E3 values at wheel path and that at the mid-lane is not significant (p-level is greater than 0.05). This may be explained by the fact that the wheel path is subject to load applications that eventually cause compaction and hardening of the AC layer. Table 6.3b, shows that the mean value of E1 at the wheel path is larger than that of mid-lane. Since the pressure acting on the subgrade is much less than that of the surface layer, loading impact does not affect the subgrade resilient modulus significantly.

Site 48SF

Table 6.4a shows that, for site 48SF, there is a significant difference in the moduli values for both the AC layer modulus and the subgrade modulus. In this case, the moduli values at the mid-lane are much higher than those measured at the wheel path.

MULTIVARIATE CORRELATION ANALYSIS

In the analysis of multivariate systems, the bivariate correlation coefficients are computed for each pair of variables; this includes the correlation between the criterion variable and each predictor variable as well as the correlation between each pair of predictor variables (called intercorrelations). The correlation coefficient between two variables is a measure of the degree of linear association between the two variables. The Pearson product-moment correlation coefficient is the most commonly used correlation coefficient.

If observations of two random variables are fitted with the least square linear model, the ratio of the explained variance to the total variance is called the coefficient of determination (R^2). It represents the fraction of the total variation that is explained by the linear relationship. The correlation coefficient (R) is the square root of the coefficient of determination. If the explained variation equals the total variation, the correlation coefficient equals 1.0, which indicates a perfect association. If the explained variation equals zero, the correlation coefficient equals 0, which indicates that no linear association between the variables is present.

TABLE 6.1A: ANALYSIS OF VARIANCE (SITE 48SA)
EFFECT OF SPACING BETWEEN TESTING POINTS

Dependent Variable	SS Effect	df Effect	MS Effect	SS Error	df Error	MS Error	F	p-level
E1_MPA	227,751.3	3	75,917.09	8,083,384	18	449,076.9	0.17	0.92
E3_MPA	1,601.7	3	533.9	12,162	18	675.7	0.79	0.52

TABLE 6.1.B
SUMMARY TABLE OF LAYER MODULI MEANS (SITE 48SA)

Spacing between Testing Points	E1_MPA (AC Layer Elastic Modulus)	E3_MPA (Subgrade Resilient Modulus)
25 ft. (7.6 m)	5,852.25	178.77
50 ft. (15.2 m)	6,055.32	167.79
75 ft. (22.8 m)	5,762.22	193.82
100 ft. (30.5 m)	5,954.01	173.02

TABLE 6.2A: ANALYSIS OF VARIANCE (SITE 48SF)
EFFECT OF SPACING BETWEEN TESTING POINTS

Dependent Variable	SS Effect	df Effect	MS Effect	SS Error	df Error	MS Error	F	p-level
E1_MPA	860822E2	3	286941E2	230249E2	687	335151E2	0.86	0.46
E3_MPA	110,113	3	36,704	4,722,294	687	6,874	5.34	0.0012

TABLE 6.2.B
SUMMARY TABLE OF LAYER MODULI MEANS (SITE 48SF)

Spacing between Testing Points	E1_MPA (AC Layer Elastic Modulus)	E3_MPA (Subgrade Resilient Modulus)
25 ft. (7.6 m)	9,050.51	150.87
50 ft. (15.2 m)	9,133.78	148.12
75 ft. (22.8 m)	8,249.62	115.72
100 ft. (30.5 m)	9,472.97	153.25

TABLE 6.3A: ANOVA TABLE SITE 48SA
COMPARISON BETWEEN WHEEL PATH AND MID-LANE TESTING POINTS

Dependent Variable	df Effect	MS Effect	df Error	MS Error	F	p-level (significance level)
E1	1	224,985,984	821	11,504,747	19.56	0.000011
E3	1	6,786.7	821	1,830.34	3.71	0.054501

TABLE 6.3B: SUMMARY TABLE OF PAVEMENT MODULI MEANS
SITE 48SA

Group	E1 (MPa)	E3 (MPa)
Wheel Path	5,834.05	180.43
Mid- Lane	4,785.46	186.19
All	5,348.61	183.1

TABLE 6.4A: ANOVA TABLE SITE 48SF
COMPARISON BETWEEN WHEEL PATH AND MID-LANE TESTING POINTS

Dependent Variable	df Effect	MS Effect	df Error	MS Error	F	p-level (significance level)
E1	1	322980E3	712	346322E2	9.33	0.002343
E3	1	142,041	712	4,675	30.38	0.000000

TABLE 6.4B: SUMMARY TABLE OF PAVEMENT MODULI MEANS
SITE 48SF

Group	E1 (MPa)	E3 (MPa)
Wheel Path	8,895.73	136.53
Mid- Lane	10,244.19	164.81
All	9,522.75	149.68

Interpretation of the Correlation Matrix

SITE 48SA

Table 6.5 shows the correlation matrix that is calculated based on observation at Site 48SA. Table 6.6 defines variable names and units. The variables of interest in this data set are the ones that represent pavement layers' structural properties, namely, the back-calculated elastic moduli of the AC layer, the base course and the subgrade E1, E2 and E3, respectively. These variables will be treated as criterion variables. On the other hand, the climatic variables (temperature and moisture content in various layers) are treated as predictor variables. The subsequent analysis is based on the assumption that the back-calculated moduli are unique and accurate.

The third column from the right in Table 6.5 shows the correlation coefficients between the elastic modulus of the AC layer (E1) with all other variables (variable names are identified in Table 6.6). It is evident that there is a high negative linear association between E1 and all temperature measures. This is expected since the warmer the AC layer the less resistant it is to deflection. T1 through T3, T_P and T_AV have a range of correlation coefficients between -0.81 and -0.79 which indicates that the values of E1 are well correlated with that of T1 to T3, T_P and T_AV. The correlation coefficient of E1 and T_A, the air temperature measured from the FWD vehicle, is -0.74, lower than that of the asphalt layer temperature. This is expected since there is a time lag for pavement temperature to catch up with air temperature and pavement temperature is what actually influences its stiffness not air temperature. However, there is a large intercorrelation

between air and pavement temperature. The intercorrelations between climatic variables are shown in Table 6.7. T4 and T5, base layer temperature at two different depths, are also well correlated to E1, the reason being that T4 and T5 are highly correlated to the AC layer temperature, and the latter affects the stiffness of the layer.

The correlation coefficients between E1 and the moisture content readings at various depths within the base and lower layers, GM1 through GM10, assumed values ranging from -0.59 to 0.63. This indicates that the direction of increase (or decrease) in moisture content is not consistent in the pavement layers and the subgrade. This also may suggest that moisture does not follow a systematic simple mechanism in moving vertically between the layers. This is apparent in Table 6.7 which shows the intercorrelations between moisture measures to have a great discrepancy. In theory, unless nonlinear behavior is evident, moisture levels within the lower layers of the pavement and within the subgrade should not directly affect the elastic modulus of the AC layer.

The temperature gradient in the AC layer (T_GRAD is defined as the temperature difference between the upper and the lower parts of the AC layer per unit depth) is highly correlated with E1; the correlation coefficient is 0.69. This might indicate that, depending on the intercorrelation between the temperature gradient in the AC layer and the pavement temperature, the temperature gradient may or may not be an important predictor variable of E1. This is further investigated later in Chapter 7. The correlation coefficient between E1 and T_U_A, total unit area in mm (deflection basin area divided

by the central deflection), is 0.87. This high correlation reflects the fact that the central deflection is highly influenced by the surface layer's (AC) elastic modulus-- a phenomenon that is utilized in the back-calculation process. Based on this observation, unit deflection area may be used as a measure of the stiffness of the upper pavement layers.

Table 6.7.b shows that the intercorrelations between temperature at various depths are very high, which suggests that in constructing a model to predict the value of $E1$, only one measure of temperature should be included in the model. There is no need to include more than one temperature measure since there exists a large degree of redundancy between temperature measures.

The resilient modulus of the subgrade, $E3$, shown in Table 6.5, the first column from the right, is well correlated to the deflection area under the outer three sensors (OUT3_A) with a correlation coefficient of -0.61. The negative sign indicates that the larger the deflection area the lower is the value of $E3$. Note that the total deflection area (T_AREA) is less correlated to $E3$ ($R = -0.5$). This might be explained by the fact that the central part of the deflection basin reflects the stiffness of the surface layer(s), while the deflection measured under the outer deflection sensors tends to reflect the stiffness of the lower layer(s).

TABLE 6.5: CORRELATION MATRIX (SITE 48SA)

	STATION	MONTH	T_P	T_A	T_AREA	OUT3_A	T_U_A	E1	E2	E3
STATION	1.00	-.03	-.09	-.06	-.13	-.16	-.17	-.22	.28	-.03
MONTH	-.03	1.00	-.06	-.02	-.19	-.13	.07	.08	.04	-.04
T_P	-.09	-.06	1.00	.87	-.24	-.47	-.83	-.79	.12	.36
T_A	-.06	-.02	.87	1.00	-.32	-.51	-.80	-.74	.15	.38
T_AREA	-.13	-.19	-.24	-.32	1.00	.92	.34	.30	-.29	-.50
OUT3_A	-.16	-.13	-.47	-.51	.92	1.00	.63	.51	-.23	-.61
T_U_A	-.17	.07	-.83	-.80	.34	.63	1.00	.87	-.17	-.46
E1	-.22	.08	-.79	-.74	.30	.51	.87	1.00	-.41	-.18
E2	.28	.04	.12	.15	-.29	-.23	-.17	-.41	1.00	-.21
E3	-.03	-.04	.36	.38	-.50	-.61	-.46	-.18	-.21	1.00
E4	.14	.09	-.05	.01	-.50	-.43	-.07	-.11	.35	-.17
GM1	.03	-.50	-.15	-.24	.08	.08	.15	.11	-.03	-.03
GM2	.02	-.49	-.05	-.11	-.05	-.08	-.03	-.04	.02	.08
GM3	.02	.19	-.44	-.38	.27	.40	.50	.48	-.12	-.29
GM4	.03	-.04	-.53	-.60	.24	.32	.50	.44	-.14	-.23
GM5	.02	.49	-.65	-.64	.28	.44	.67	.63	-.16	-.37
GM6	.02	-.79	-.04	.00	.26	.24	.02	.03	-.09	-.03
GM7	-.01	-.75	.58	.53	-.16	-.32	-.56	-.53	.11	.34
GM8	-.04	-.13	.76	.78	-.49	-.65	-.81	-.73	.23	.48
GM9	-.01	-.02	.68	.72	-.47	-.57	-.66	-.59	.24	.41
GM10	-.04	-.03	.61	.66	-.44	-.54	-.66	-.59	.22	.36
AGM	.04	-.17	-.56	-.60	.28	.38	.55	.50	-.15	-.26
T1	-.07	-.08	.91	.85	-.35	-.56	-.88	-.81	.15	.40
T2	-.07	-.05	.89	.86	-.38	-.58	-.88	-.80	.16	.41
T3	-.06	-.03	.86	.85	-.44	-.62	-.87	-.79	.19	.44
T4	-.05	.00	.82	.84	-.50	-.66	-.85	-.77	.23	.47
T5	-.05	.02	.80	.82	-.52	-.68	-.83	-.75	.24	.47
T_AV	-.07	-.06	.90	.86	-.39	-.59	-.88	-.81	.17	.42
T_GRAD	.06	.19	-.83	-.68	.06	.30	.71	.69	-.01	-.24

**TABLE 6.6: VARIABLE NAMES
SITE 48SA**

<u>VARIABLE</u>	<u>MEANING AND UNITS</u>
STATION	TESTING POINT IDENTIFICATION WITHIN THE SITE
MONTH TAKEN	MONTH OF THE YEAR IN WHICH MEASUREMENTS ARE TAKEN
T_AREA	TOTAL DEFL. BASIN AREA IN MM SQ.
OUT_3	DEFL. AREA UNDER THE OUTER 3 DEFLECTION SENSORS
T_U_A	UNIT DEFLECTION ARE IN MM = DEF AREA/ CENTRAL DEF.
E1	E1 IN MPA (ELASTIC MODULUS OF AC LAYER)
E2	E2 IN MPA (ELASTIC MODULUS OF BASE)
E3	E3 IN MPA (RESILIENT MODULUS OF SUBGRADE)
GM1	GRAVIMETRIC MOISTURE CONTENT MEASURED AT: @ 305 mm (BELOW SURF.)
GM2	@ 457 MM
GM3	@ 610 MM
GM4	@ 726 MM
GM5	@ 914 MM
GM6	@ 1067 MM
GM7	@ 1219 MM
GM8	@ 1372 MM
GM9	@ 1667 MM
GM10	@ 1981 MM
A_GM	AVERAGE GRAVIMETRIC MOISTURE CONTENT
T1	TEMP. IN °C AT 25MM IN AC LAYER
T2	TEMP. IN C AT 69 MM @ AC LAYER
T3	TEMP. IN C AT 112 MM IN AC LAYER
T4	TEMP. IN C IN THE BASE LAYER @ 182
T5	TEMP. IN C IN THE BASE LAYER @ 257
T_AV	(T1+T2+T3)/3; AVERAGE AC TEMP. IN °C
T_GRAD	(T1-T3)/(VERTICAL DISTANCE IN M) ; IN °C/M

TABLE 6.7: INTERCORRELATIONS OF CLIMATIC VARIABLES, SITE 48SA
A) Moisture Variables

	GM1	GM2	GM3	GM4	GM5	GM6	GM7	GM8	GM9	GM10
GM1	1.00	.85	-.11	.73	.06	.13	.40	.00	-.18	-.18
GM2	.85	1.00	-.41	.66	-.17	.10	.46	.20	-.12	-.02
GM3	-.11	-.41	1.00	.15	.76	.27	-.37	-.56	-.17	-.62
GM4	.73	.66	.15	1.00	.59	-.11	-.19	-.47	-.66	-.62
GM5	.06	-.17	.76	.59	1.00	-.20	-.71	-.74	-.56	-.76
GM6	.13	.10	.27	-.11	-.20	1.00	.55	.00	.06	-.16
GM7	.40	.46	-.37	-.19	-.71	.55	1.00	.69	.56	.41
GM8	.00	.20	-.56	-.47	-.74	.00	.69	1.00	.83	.83
GM9	-.18	-.12	-.17	-.66	-.56	.06	.56	.83	1.00	.64
GM10	-.18	-.02	-.62	-.62	-.76	-.16	.41	.83	.64	1.00

B) Temperature Variables

	T1	T2	T3	T4	T5	T_AV	T_GRAD
T1	1.00	.99	.97	.93	.90	.99	-.84
T2	.99	1.00	.99	.96	.93	1.00	-.78
T3	.97	.99	1.00	.98	.97	.99	-.70
T4	.93	.96	.98	1.00	1.00	.96	-.59
T5	.90	.93	.97	1.00	1.00	.94	-.54
T_AV	.99	1.00	.99	.96	.94	1.00	-.79
T_GRAD	-.84	-.78	-.70	-.59	-.54	-.79	1.00

The correlation coefficients between E3 and moisture levels at the subgrade (GM3 through GM10) ranged between -0.37 to 0.48. The upper four TDR's (GM3 through GM6) have a negative correlation coefficient that ranges between -0.03 to -0.37. Whereas the lower TDR's (GM7 through GM10) have positive coefficients that ranged between 0.34 and 0.48.

Theoretically, the resilient modulus of an unsaturated soil mass is expected to decrease with the increase in the moisture content of the soil. Without going into too much details, Unsaturated Soil Mechanics (USM) theory, proposed by Fredlund and Rahardjo [39], holds that unsaturated soil is comprised of four phases: soil solids, water, air, and air-water interface (contractile skin). Contractile skin could be visualized as an elastic membrane that could exert a tensile pull on the soil particles. The tensile pull, which plays an important role in determining the mechanical properties of the soil mass, has a radius of curvature that is inversely related to the soil matrix suction. A partly saturated soil can be visualized as a mixture with two phases (soil solids and contractile skin) that come to equilibrium under applied stress gradients and the flow of the other two phases (water and air) under applied stress gradient [40]. At saturation levels less than 85%, the air phase in the soil is continuous and has interaction with soil solids [41]. At saturation levels greater than around 90%, the air phase is occluded in the water phase leaving a negligible interaction of air phase with soil solids [42]. When the air phase is occluded, the contractile skin disappears and so does its effect on soil strength. In the existence of contractile skin, at a constant level of effective stress, the volumetric strain is inversely

related to the matrix suction. Therefore, increasing matrix suction (i.e., decreasing water content) decreases the volumetric strain under the same load, thus increasing the resilient modulus of the soil. The sensitivity of soil resilient modulus to moisture content depends on the soil type and other factors. Sands tend to be less sensitive whereas soils with higher fine content tend to be more sensitive since the particles' surface area and hence the contractile skin interface is larger.

Based on theory described above, moisture levels in the soil are expected to be inversely related to the subgrade resilient modulus (i.e., negative correlations are expected). The positive correlation coefficients for the lower TDR's may be explained by a the hypothesis that vertical moisture movement within the soil, caused by temperature gradient within the soil mass, gravity and other forces, draws water from the upper part of the subgrade to the lower parts and vice versa. This hypothesis is supported by negative intercorrelations between GM3 through GM6 (upper part) and GM7 through GM10 (lower part). The upper part of the subgrade is where volumetric changes due to effective stresses take place, it is therefore the place where moisture levels mostly influence the resilient modulus of the soil. Simply put, when the moisture migrates from the lower part of the subgrade up, it causes an increase in the moisture content at the upper part and consequently a lower soil resilient modulus. However, because the drying of the lower subgrade is concurrent to a decrease in resilient modulus, a positive correlation coefficient is observed.

The correlation coefficients between E3 and the base layer temperature (T4 and T5) is moderate and positive, $R = 0.47$. Again moisture migration hypothesis may explain these positive correlations. The higher the temperature the more moisture loss from the upper subgrade to lower subgrade, and thus less moisture content at the upper part of subgrade and consequently a higher resilient modulus value.

SITE 48SF

Table 6.8 shows the correlation matrix that is calculated based on observation at Site 48SF. Table 6.9 defines variable names and units. The variables of interest in this data set are the ones that represent pavement layers' structural properties, namely, the back-calculated elastic moduli of the AC layer, the base course and the subgrade E1, E2 and E3 respectively. The fourth column from the right in Table 6.8 shows the correlation coefficients between the elastic modulus of the AC layer (E1) with all other variables. Again, the high negative linear association between E1 and all temperature measures is evident (ranged from -0.69 to -0.9.) There is a large intercorrelation between air and pavement temperatures (0.84). The intercorrelations between climatic variables are shown in Table 6.10. T4 and T5, base layer temperature at two different depths, are also well correlated to E1.

In contrast to Site 48SA, as the pavement thickness in this site is larger than that of Site 48SA, the temperature gradient in the AC layer is not well correlated with E1, the correlation coefficient is 0.2. This might indicate that, the temperature difference between

the upper and the lower parts of the AC layer does not have a great effect on the layer elastic modulus. However, in viewing the graphical relationship between the temperature gradient and $E1$, Figure 6.3, it appears that there is a positive relationship between the two variables when the temperature gradient is less than zero (the correlation coefficient = 0.58), and a negative one, when the gradient is greater than zero (the correlation coefficient = -0.46.) Figure 6.4 shows the change in $T1$ and $T3$ as the day progresses. The Figure shows that the negative gradient ($T1$ is less than $T3$) is associated with low temperatures, and vice versa. This explains the right part of the figure. $T3$, the temperature of the bottom of the AC layer, remains unchanged until $T1$ exceeds $T3$ (at about 9:40 a.m.) and that is when $T3$ starts to increase, and the layer modulus starts to decrease. Due to the overwhelming scatter, it is difficult to draw sound conclusions about the underlying relationship between the two variables.

The correlation coefficient between $E1$ and A_TUA , total unit area in mm (deflection basin area divided by the central deflection), is 0.91. This high correlation reflects the fact that the central deflection is highly influenced by the surface layer's (AC) elastic modulus. Table 6.10.b shows the intercorrelations between temperature at various depths. As in Site 48SA, temperature measures are highly correlated.

The resilient modulus of the subgrade, $E3$, shown in Table 6.8, at the second column from the right, is well correlated to the deflection area under the outer three sensors ($OUT3\_A$) with a correlation coefficient of -0.61.

The correlation coefficients between E3 and moisture levels at the subgrade (GM3 through GM7) ranged between -0.26 to 0.37. The upper two TDR's (GM2 and GM3) have negative correlation coefficients, -0.17 and -0.26, respectively, whereas the lower TDR's, within the top 1.0 meter of the subgrade (GM4 through GM7) have positive coefficients that ranged between 0.18 and 0.31. This pattern is identical to that observed at Site 48SA. Again, Unsaturated Soil Mechanics theory may be used to explain this pattern in a similar fashion.

TABLE 6.8: CORRELATION MATRIX (SITE 48SF)

	MONTH	T_PAV	T_AIR	T_AREA	OUT_3	A_TUA	E1	E2	E3	E4
MONTH	1.00	.54	.81	.25	.19	-.79	-.79	.45	-.33	.19
T_PAV	.54	1.00	.84	.32	.28	-.77	-.79	.35	-.21	-.01
T_AIR	.81	.84	1.00	.33	.27	-.90	-.89	.46	-.33	.13
T_AREA	.25	.32	.33	1.00	.99	-.34	-.41	-.40	-.61	-.03
OUT_3	.19	.28	.27	.99	1.00	-.27	-.36	-.42	-.61	-.04
A_TUA	-.79	-.77	-.90	-.34	-.27	1.00	.91	-.48	.34	-.10
E1	-.79	-.79	-.89	-.41	-.36	.91	1.00	-.49	.47	-.11
E2	.45	.35	.46	-.40	-.42	-.48	-.49	1.00	-.18	.37
E3	-.33	-.21	-.33	-.61	-.61	.34	.47	-.18	1.00	-.33
E4	.19	-.01	.13	-.03	-.04	-.10	-.11	.37	-.33	1.00
GM1	-.77	-.23	-.63	-.21	-.15	.63	.56	-.35	.39	-.29
GM2	.83	.65	.76	.21	.17	-.70	-.77	.40	-.17	.02
GM3	.94	.68	.85	.24	.19	-.78	-.83	.43	-.26	.11
GM4	-.07	.25	.04	-.01	.00	.08	-.06	-.09	.18	-.18
GM5	-.84	-.31	-.54	-.18	-.13	.57	.56	-.33	.31	-.21
GM6	-.16	.27	-.13	-.01	.01	.06	-.01	-.06	.18	-.23
GM7	-.50	.12	-.23	-.03	-.00	.16	.17	-.11	.21	-.23
GM8	.31	.32	.16	.08	.06	-.24	-.29	.12	-.04	-.04
GM9	-.75	-.19	-.58	-.19	-.14	.63	.54	-.37	.37	-.25
GM10	.79	.65	.79	.21	.17	-.67	-.76	.36	-.17	.04
A_GM	.59	.69	.61	.17	.14	-.51	-.63	.26	-.05	-.07
T1	.44	.90	.69	.24	.21	-.61	-.69	.27	-.10	-.07
T2	.80	.86	.94	.34	.28	-.94	-.90	.48	-.32	.08
T3	.87	.79	.93	.32	.26	-.93	-.91	.50	-.31	.09
T4	.94	.63	.85	.25	.20	-.83	-.84	.48	-.28	.10
T5	.95	.60	.83	.24	.19	-.80	-.83	.47	-.27	.11
T_AV	.75	.91	.92	.32	.27	-.89	-.89	.45	-.26	.03
T_GRAD	-.49	.23	-.22	-.06	-.03	.33	.20	-.24	.24	-.20

TABLE 6.9: VARIABLE NAMES**SITE 48SF**

<u>VARIABLE</u>	<u>MEANING AND UNITS</u>
STATION	TESTING POINT IDENTIFICATION WITHIN THE SITE
MONTH	MONTH OF THE YEAR IN WHICH MEASUREMENTS ARE TAKEN
T_AREA	TOTAL DEFL. BASIN AREA IN MM SQ.
OUT_3	DEFL. AREA UNDER THE OUTER 3 DEFLECTION SENSORS
T_U_A	UNIT DEFLECTION ARE IN MM = DEF AREA/ CENTRAL DEFLECTION
E1	E1 IN MPA (ELASTIC MODULUS OF AC LAYER)
E2	E2 IN MPA (THE COMBINED MODULUS OF BASE AND SUBBASE LAYERS)
E3	IN MPA, THE RESILIENT MODULUS OF THE UPPER 1.0 METER OF THE SUBGRADE
E4	IN MPA, THE RESILIENT MODULUS OF THE LOWER SUBGRADE
GM1	GRAVIMETRIC MOISTURE CONTENT MEASURED AT: @ 320 mm (BELOW PAVEMENT SURFACE)
GM2	@ 495 MM
GM3	@ 650 MM
GM4	@ 803 MM
GM5	@ 960 MM
GM6	@ 1110 MM
GM7	@ 1257 MM
GM8	@ 1412 MM
GM9	@ 1732 MM
GM10	@ 2019 MM
A_GM	AVERAGE GRAVIMETRIC MOISTURE CONTENT
T1	TEMP. IN °C AT 25MM IN AC LAYER
T2	TEMP. IN C AT 99 MM @ AC LAYER
T3	TEMP. IN C AT 173 MM IN AC LAYER
T4	TEMP. IN C IN THE BASE LAYER @ 249 MM
T5	TEMP. IN C IN THE BASE LAYER @ 326 MM
T_AV	$(T1+T2+T3)/3$; AVERAGE AC TEMP. IN °C
T_GRAD	$(T1-T3)/(\text{VERTICAL DISTANCE IN M})$; IN °C/M

TABLE 6.10: INTERCORRELATIONS, SITE 48SF

A) Moisture Variables											
	GM1	GM2	GM3	GM4	GM5	GM6	GM7	GM8	GM9	GM10	A_GM
GM1	1.00	-.46	-.61	.33	.65	.43	.58	-.05	.64	-.27	-.04
GM2	-.46	1.00	.93	.37	-.69	.26	-.23	.54	-.38	.75	.75
GM3	-.61	.93	1.00	.10	-.79	.04	-.47	.41	-.58	.61	.55
GM4	.33	.37	.10	1.00	.02	.65	.41	.48	.42	.57	.75
GM5	.65	-.69	-.79	.02	1.00	-.14	.64	-.64	.68	-.32	-.32
GM6	.43	.26	.04	.65	-.14	1.00	.43	.81	.37	.32	.62
GM7	.58	-.23	-.47	.41	.64	.43	1.00	.00	.65	.08	.22
GM8	-.05	.54	.41	.48	-.64	.81	.00	1.00	-.03	.46	.67
GM9	.64	-.38	-.58	.42	.68	.37	.65	-.03	1.00	.19	.27
GM10	-.27	.75	.61	.57	-.32	.32	.08	.46	.19	1.00	.93
A_GM	-.04	.75	.55	.75	-.32	.62	.22	.67	.27	.93	1.00

B) Temperature Variables

	T1	T2	T3	T4	T5	T_AV	T_GRAD
T1	1.00	.74	.69	.55	.53	.87	.47
T2	.74	1.00	.98	.86	.84	.97	-.23
T3	.69	.98	1.00	.94	.92	.95	-.32
T4	.55	.86	.94	1.00	1.00	.84	-.42
T5	.53	.84	.92	1.00	1.00	.81	-.43
T_AV	.87	.97	.95	.84	.81	1.00	-.03
T_GRAD	.47	-.23	-.32	-.42	-.43	-.03	1.00

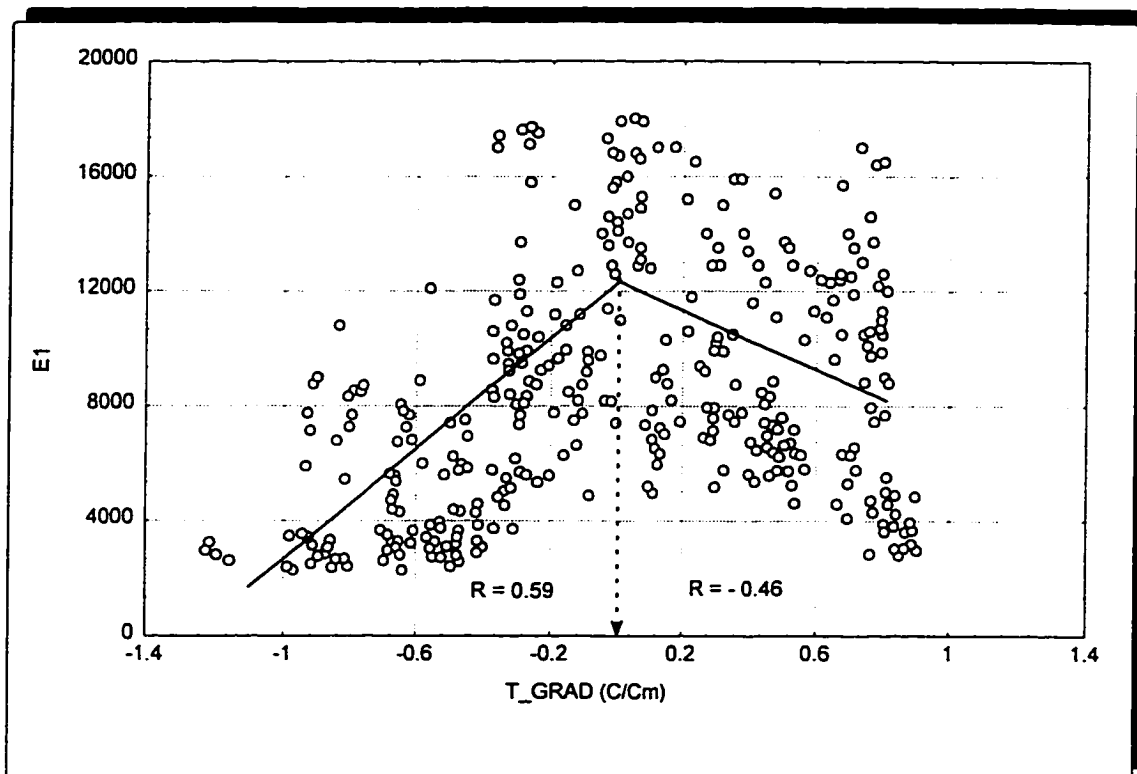


FIGURE 6.3: TEMPERATURE GRADIENT VS. THE AC ELASTIC MODULUS

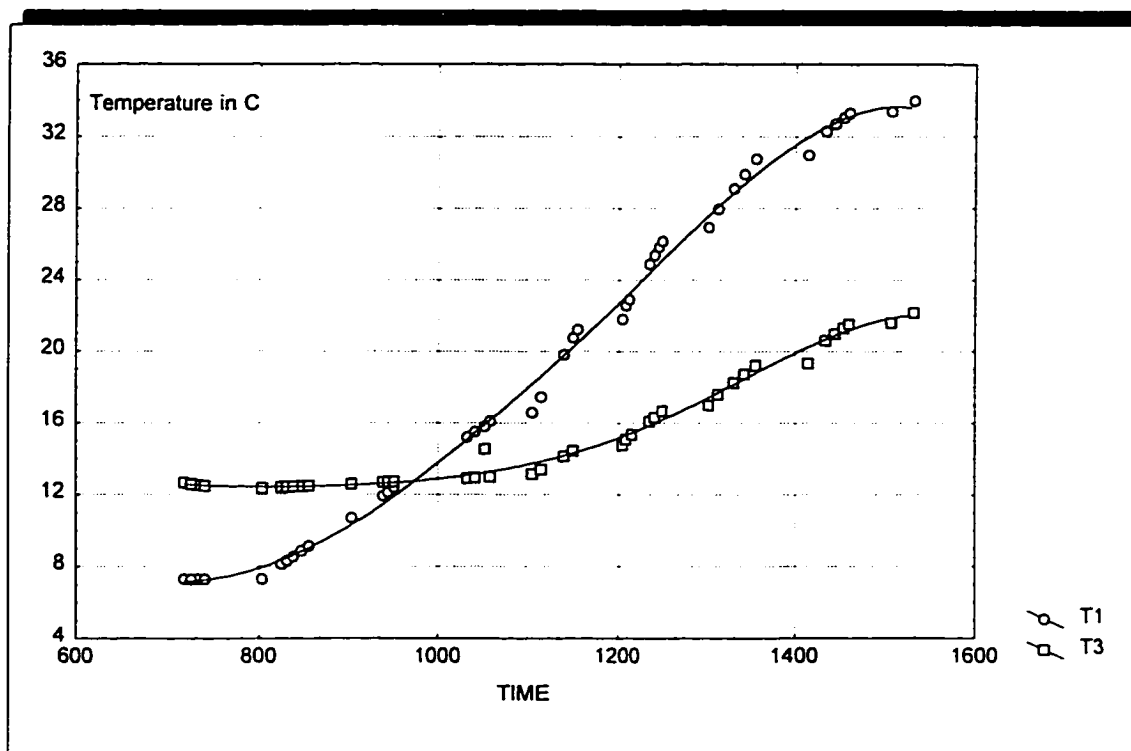


FIGURE 6.4: TEMPERATURE VS. TIME

PRINCIPAL COMPONENTS ANALYSIS

PCA is a statistical technique that is used in data reduction or in detecting the principal constructs of a system. It is often referred to as Factor Analysis. When there are too many predictor variables, PCA may be used to screen out the less important predictor variables and retain the more important ones. PCA is also used to detect structure in the relationships between variables, that is, to classify variables.

The basic idea of PCA could be explained as follows: assume that two variables are linearly correlated. A regression line can then be fitted that represents the "best" summary of the linear relationship between the variables. If a variable can be defined to approximate the regression line in such a plot, then that variable would capture most of the "essence" of the two items. Single scores on that new factor, represented by the regression line, could then be used in future data analyses to present that essence of the two items [43]. In so doing, the two variables have been reduced to one factor, which is a linear combination between the two variables. Details about computational aspects of PCA can be found in [43, 44 and 45]. Basically, the extraction of principal components amounts to a variance maximization (varimax) rotation of the original variable space. The rotation is to maximize the variance of the new variable (factor), while minimizing the variance around the factor. In this analysis, PCA is used to select a group of climatic factors that may be used to predict the value of the resilient modulus of the subgrade.

Results of PCA (Site 48SA)

Tables 6.11 and 6.12 present a summary of the outputs of PCA. Table 6.11 shows that four principal components (or factors) are significant (according to Kaiser's rule of thumb, factors with eigenvalues greater than 1.0 are significant). Figure 6.5 shows that the eigenvalues of the first four eigenvalues are greater than one, and the rest of the factors are not significant. Table 6.11 shows that the first factor explains 60% of the variation in the system. The second, third and fourth factors account for 14.4 %, 7.4% and 5.4% of the variations of the system respectively. The four factors together account for 88% of the total variance. Table 6.12 shows factor loading for each factor. One variable from each factor will be selected to represent that factor in the model. Variable selection is based on the following three criteria: highest factor loading, maximum predictor-criterion correlation and minimum intercorrelation with variables already in the model.

From the first factor, T1 through T5 have the highest factor loadings (0.96 to .99). T5 is selected because, it has the highest criterion- predictor correlation (0.47 from Table 1). From the second factor, GM2 has the highest factor loading. In the third factor, GM6 is the variable with highest loading (0.92). In the fourth factor, T_GRAD is selected. In conclusion, PCA suggests that T5, GM2, GM6 and T_GRAD are the best predictors of E3.

SITE 48SF

Tables 6.13 and 6.14 present a summary of the outputs of PCA, for Site 48SF. Table 6.13 shows that five principal components (or factors) are significant (eigenvalues are greater than 1.0. The fifth factor has an eigenvalue of 0.96, and may be significant). Figure 6.6 shows that the

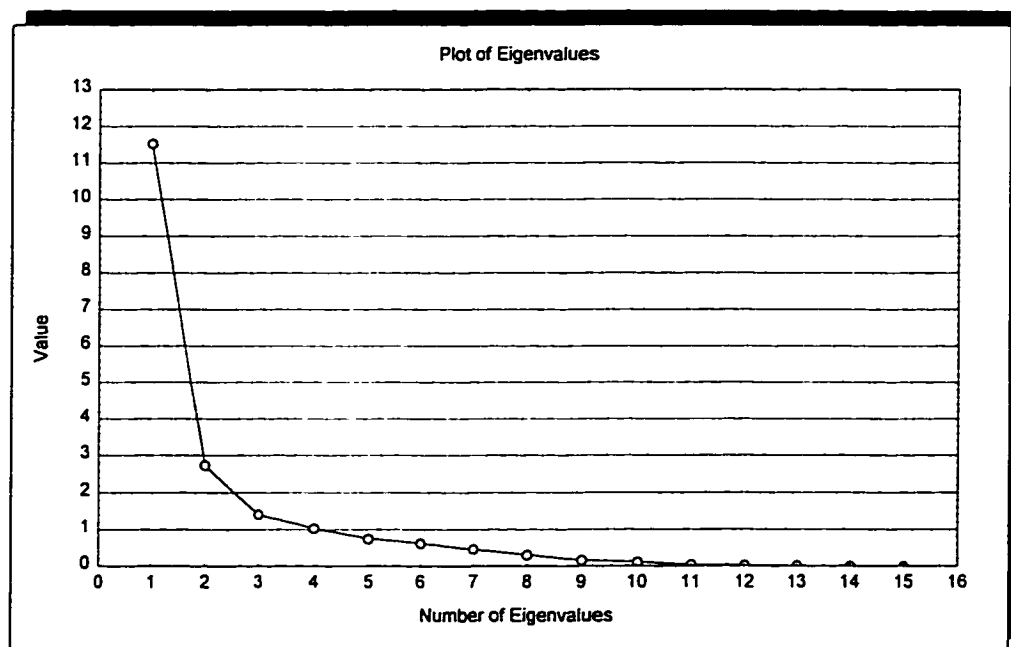


FIGURE 6.5: EIGENVALUES (SITE 48SA)

eigenvalues of the first five factors are greater than one, and the rest of the factors are not significant. Table 6.13 shows that the first factor explains 49% of the variation in the system. The second, third, fourth and fifth factors account for 20 %, 7.6%, 6.3% and 4.6% of the variations of the system respectively. The five factors together account for 88% of the total variance. Table 6.14 shows factor loading for each factor. One variable from each factor will be selected to represent that factor in the model.

TABLE 6.11: EIGENVALUES
Extraction: Principal components

	Eigenval	% total Variance	Cumul. Eigenval	Cumul. %
1	11.52707	60.66880	11.52707	60.66880
2	2.74467	14.44563	14.27174	75.11443
3	1.41105	7.42658	15.68279	82.54102
4	1.03350	5.43946	16.71629	87.98047

TABLE 6.12: FACTOR LOADINGS (UNROTATED)
Extraction: Principal components

	<u>Factor 1</u>	<u>Factor 2</u>	<u>Factor 3</u>	<u>Factor 4</u>
E3_MPA	.51822	-.060733	.022006	.396794
GM1	-.35090	-.829998	.203405	.052474
GM2	.00739	-.892297	.234738	.301981
GM3	-.66889	.219264	-.476975	-.159009
GM4	-.71014	-.518058	.115901	-.032660
GM5	-.84661	-.015808	.130970	-.162281
GM6	-.08265	-.286384	-.918928	.126912
GM7	.60362	-.593954	-.437468	.129205
GM8	.94804	-.138087	.012070	.117487
GM9	.87964	.129107	-.049143	.152780
GM10	.86790	.147182	.023700	.269313
AGM	-.83662	-.468714	-.024275	-.141270
T1	.95797	-.125627	-.020132	-.263369
T2	.93767	-.153576	-.003745	-.268726
T3	.99185	-.034538	-.031294	-.093059
T4	.98665	.015540	.077177	.011288
T5	.97861	.031294	.090066	.072276
T_AV	.93847	.170282	.012662	-.264058
T_GRAD	-.61429	.395618	.029225	.584528
Expl.Var	11.52707	2.744670	1.411051	1.033497
Prp.Totl	.60669	.144456	.074266	.054395

TABLE 6.13: EIGENVALUES

Extraction: Principal components

		% total	Cumul.	Cumul.
	Eigenval	Variance	Eigenval	%
1	10.38859	49.46949	10.38859	49.46949
2	4.20057	20.00273	14.58917	69.47222
3	1.59219	7.58184	16.18135	77.05406
4	1.33099	6.33806	17.51234	83.39212
5	.95865	4.56501	18.47100	87.95713

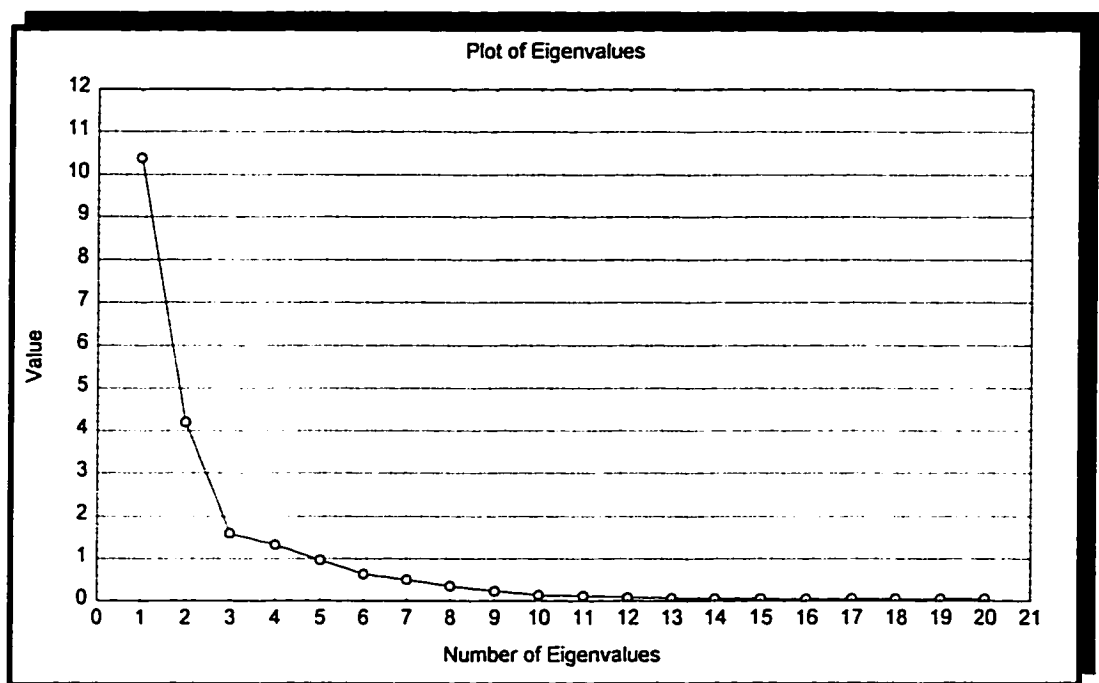


FIGURE 6.6: EIGENVALUES (SITE 48SF)

From the first factor, T4, T5 and GM3 have the highest factor loadings (0.95, 0.95, and 0.94 respectively). T4 is selected because, it has the highest loading factor and the highest criterion- predictor correlation (0.28 from Table 6.8). From the second factor, GM6 has

the highest factor loading (0.80). In the third factor, GM8 is the variable with highest loading (0.80). In the fourth factor, E3 is selected; it is the dependent variable. In the fifth factor, GM4 is selected since it is the variable with the highest factor (0.38) with a predictor-criterion correlation of 0.18. In conclusion, PCA suggests that T4, GM6, GM8 and GM4 are the best predictors of E3.

MULTIPLE REGRESSION ANALYSIS (MULT R)

SITE 48SA

After identifying the key predictor variables using PCA, a linear model is calibrated using Multiple Regression analysis. The result of (Mult R) is the following model:

$$E3 = 101.12 + 2.418(GM2) + 2.26(GM6) + 1.94(T5) + 0.035(T\_GRAD).....(6.1)$$

In which E3 is in MPa, GM in % and T in °C. Table 6.15 shows the fitted regression coefficient at the 4th column (labeled B). The last two columns show the results of a statistical test that evaluates the significance of each regression coefficient. The test results indicate that at significance level of 95%, only the intercept and the coefficient of T5 are significant (p-level is less than 0.05). The above model has an irrational regression coefficient with GM2 (the correlation coefficient between the dependent variable (E3) and GM2 is negative, while the regression coefficient between the two variables is positive.) The standardized regression coefficients (under the second column, labeled BETA) indicate that the T5 is the most important predictor variable since it has the largest standardized coefficient. The goodness of fit statistics indicate that the model is poor (the explained variance, R^2 , is 23.3 %). However, the standard error of estimate (Se)

is 34.4 MPa. The standard deviation of the dependent variable (S_y) is 86.3 MPa, therefore, $Se/S_y = 34.4/86.3 = 0.4$. This means that the error resulting from this model is 40% of that of using the average value.

TABLE 6.14: FACTOR LOADINGS (UNROTATED)
Extraction: Principal components

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STATION	.01075	.081670	-.442601	.757679	-.241355
MONTH	.93114	-.229968	.029953	.052236	.026484
E3	-.31255	.296435	-.151383	.747749	.116013
GM1	-.62912	.636679	.071324	-.025902	.103254
GM2	.90256	.235891	.035486	.047654	.181270
GM3	.94414	.035354	-.042605	.023391	.142197
GM4	.13207	.757936	.181709	.070342	.379599
GM5	-.75701	.224004	-.479787	-.156788	.133373
GM6	.03598	.799917	.426503	.051931	-.316402
GM7	-.31781	.623828	-.282783	-.157616	-.331272
GM8	.42316	.423575	.674591	.154487	-.350916
GM9	-.64959	.593799	-.080482	-.064696	.242230
GM10	.88090	.216046	-.030675	.042202	.320008
A_GM	.74425	.581326	.108026	.047386	.217870
T1	.60627	.600809	-.344301	-.189371	-.132124
T2	.88271	.076831	-.270101	-.114266	-.219173
T3	.93355	.021655	-.207600	-.064167	-.121024
T4	.95570	-.061665	-.054926	.027860	.055810
T5	.95146	-.073012	-.020991	.043683	.076022
T_AV	.86400	.251239	-.295272	-.132704	-.171311
T_GRAD	-.33889	.762227	-.199577	-.170558	-.026321
Expl.Var	10.38859	4.200573	1.592186	1.330993	.958652
Prp.Totl	.49469	.200027	.075818	.063381	.045650

STEPWISE REGRESSION ANALYSIS (STEP. R)

Forward stepwise regression is an alternative to PCA and Multiple Regression. In Forward Stepwise Regression, all moisture content and temperature variables are entered as potential predictor variables and based on statistical criteria [46], the model is calibrated using significant predictor variables. The following model is obtained:

$$E3 = 70.48 + 4.64(T5) + 9.67(GM4) + 12.48(GM7) - 18(GM8) - 3.77(GM2) \dots \dots \dots (6.2)$$

The goodness of fit statistics are: coefficient of determination ($R^2 = 30\%$), $Se = 36.0$ MPa and $Se/Sy = 0.42$. Although R^2 is higher than that of the first model, the standard error of estimate is greater. This is because the number of predictor variables is greater in this model, and hence, the number of degrees of freedom is less.

This model is slightly less accurate than the one before. It also has irrational coefficients for variables GM2, GM4 and GM8, since the sign of their regression coefficients are opposite to that of their correlation coefficients with $E3$. The standardized regression coefficients of the variables T5, GM4, GM7, GM8 and GM2 are 1.33, -0.31, 0.23., -0.73 and -0.098, respectively. Therefore, the order of importance of the variables is T5, GM8, GM4, GM7 then GM2.

Based on the above analysis, the linear association between climatic factors (temperature and moisture conditions) and the subgrade resilient modulus explains only about 30% of the modulus variation. It suggests the need for further study to investigate other key variables that might affect the resilient modulus. It is also suggested that other seasonal

sites where the range of variation of the moisture levels is larger should be analyzed. Note that at this site the variation range of GM content averaged 4%. In order to increase the reliability of the results of statistical analyses, in general, and multivariate analysis in particular, it is important to use variables with a large range of variation.

MULTIPLE REGRESSION ANALYSIS (SITE 48SF)

The result of the Multiple Regression Analysis for Site 48SF is the following model:

$$E3 = -2308.3 + 13.28 (GM4) + 83.68 (GM6) - 19.83 (GM8) - 1.08(T4)..(6.3)$$

In which E3 is in MPa, GM in % and T in °C. Table 6.16 shows the fitted regression coefficients at the 4th column (labeled B). The last two columns show the results of a statistical test that evaluates the significance of each regression coefficient. The test results indicate that at significance level of 95%, all predictor variables, including the intercept, are significant (p-level is less than 0.05). The above model does not have irrational regression coefficients (the sign of the correlation coefficient between the dependent variable (E3) and all variables is the same as that of regression coefficient between the two variables). The standardized regression coefficients (under the second column, labeled BETA) indicate that the GM6 is the most important predictor variable since it has the largest standardized coefficient. The second important predictor variable is GM8, with beta of -.23. This is surprising since the correlation coefficient between E3 and GM8 is very insignificant (-0.04). It is expected that the substitution effect (removing some variables from the analysis causes the existing ones to account for the missing ones) is the reason for this discrepancy. The order of importance for the other two variables is

GM4 then T4. The intercept is negative, which will lead to irrational values of E3, when the value of the predictor variables is zero.

The goodness of fit statistics indicate that the model is poor (the explained variance, R^2 , is 16.6 %). The standard error of estimate (Se) is 56.3 MPa. The standard deviation of the dependent variable (Sy) is 61.32 MPa, therefore, $Se/Sy = 56.3/61.32 = 0.92$. This means that the error resulting from this model is 92% of that of using the average value.

TABLE 6:15 MULTIPLE REGRESSION SUMMARY (SITE 48SA)

DEPENDENT VARIABLE: E3

$R = .48295354$ $R^2 = .23324412$ Adjusted $R^2 = .22635193$
 $F(4,445) = 33.842$ $p < .00000$ Std.Error of estimate: 38.446

	<u>BETA</u>	<u>St. Err. of BETA</u>	<u>B</u>	<u>St. Err. of B</u>	<u>t(445)¹</u>	<u>p-level²</u>
Interc.			101.12	40.64054	2.48818	.013205
GM2	.074123	.042346	2.418	1.38151	1.75041	.080737
GM6	.025047	.042209	2.263	3.81490	.59341	.553208
T5	.501723	.050161	1.944	.19440	10.00230	.000000
T_GRA	.045390	.050374	.0347	.03852	.90107	.368041

¹ *Adjusted R^2 is multiple coefficient of determination adjusted for number of predictor variables*

² *$F(a,b)$ is statistical F test for degrees of freedom a and b . It is used to test the significance of the model. The test results are reported in the significance level (p).*

' & " $t(a)$ is a statistical t -test for a degrees of freedom. It is used to test the significance of individual variables in the model. The test results reported in the p -level column (significance level).

STEPWISE REGRESSION ANALYSIS (SITE 48SF)

The results of the Stepwise Regression Analysis for Site 48SF is following model:

$$E3 = -2222.74 + 11.47(GM1) + 10.24(GM4) - 6.91(T2) + 7.45(T3) + 27.57(GM5) + 31.69(GM6) + 8.75(T\_GRAD) \dots\dots\dots(6.4)$$

Table 6.17 shows the Stepwise Regression summary. The right column (p -level) indicates that for a 95% significance level, variables GM1, GM6 and T_GRAD are not significant (p -level is greater than .05) although they pass the partial F test for significance. The regression coefficients of T1 and T2 are irrational, since the standardized coefficients (bita) are greater than one. In fact both models have too large errors.

The goodness of fit statistics are: coefficient of determination ($R^2 = 24\%$), $Se = 54.0$ MPa and $Se/Sy = 0.88$. This model is slightly more accurate than the one before. It also has irrational coefficients for variables GM1, GM5 and T3, since the sign of their regression coefficients are opposite to that of their correlation coefficients with E3. The standardized regression coefficients of the variables GM1, GM4, GM5, GM6, T2, T3 and T_GRAD are .1238, .139, 0.174., 0.125 -1.247, 1.155 and 0.076, respectively. Therefore, the order of importance of the variables is T2, T3, GM5, GM4, GM6, GM1 then T_GRAD. Although the Multiple regression model is slightly less accurate than this one,

it is more rational and it has less predictor variables. Therefore it is probably more practical to use.

Implications of the Regression Analyses

Based on the above analysis, the linear association between climatic factors (temperature and moisture conditions) and the subgrade resilient modulus explains, at most, only 30% of the modulus variation. The effect of moisture content on the back-calculated modulus is more complicated than one expected. The moisture content at different depths influence the modulus in opposite ways (some moisture measures had negative correlation coefficient with the modulus, while others had positive ones). The average moisture content is not of a great use, since it is not well correlated to the layer modulus.

One factor that is not accounted for in laboratory testing, is the subsurface moisture migration. This factor is invisible and difficult to measure, predict or control. Moreover, It has a measurable impact on the on the relationship between the subgrade modulus and the measured moisture levels.

The above results suggest the need for further study to investigate other key variables that might affect the resilient modulus. It is also suggested that other seasonal sites where the range of variation of the moisture levels is larger, should be analyzed. Note that at these two sites the variation range of GM content averaged 4%. In order to increase the

reliability of the results of statistical analyses, in general, and multivariate analysis in particular, it is important to use variables with a large range of variation.

One of the assumptions made in this analysis, which should be revisited, is that the moisture levels measured in the instrumentation hole represents those of all FWD testing points. The poor correlation between moisture levels and the subgrade modulus may be caused by the fact that the measured moisture levels are local and greatly vary from one point to the next. Unless we have another instrumentation area at the other end of the site, we will have no way of comparing and assessing the spatial variation of the moisture content. It would be helpful to install a second instrumentation hole in one of the seasonal sites.

TABLE 6.16: MULTIPLE REGRESSION SUMMARY
DEPENDENT VARIABLE: E3

R= .40775227 R²= .16626191 Adjusted R²= .15896442
F(4,457)=22.783 p<.00000 Std.Error of estimate: 56.229

	BETA	St. Err. of BETA	B	St. Err. of B	t(457)	p-level
Intercpt			-2308.31	477.5868	-4.83328	.000002
GM4	.180909	.052829	13.28	3.8793	3.42445	.000672
GM6	.334840	.082885	83.68	20.7149	4.03979	.000063
GM8	-.233197	.077775	-19.83	6.6150	-2.99837	.002862
T4	-.141973	.051889	-1.08	.3965	-2.73610	.006459

TABLE 6.17: STEPWISE REGRESSION SUMMARY

R= .48957625 R²= .23968490 Adjusted R²= .22791011
F(7,452)=20.356 p<.00000 Std.Error of estimate: 53.982

	BETA	St. Err. of BETA	B	St. Err. of B	t(452)	p-level
Intercpt			-2222.74	828.4879	-2.68288	.007567
GM1	.12380	.107204	11.47	9.9332	1.15482	.248775
GM4	.13907	.052687	10.24	3.8799	2.63954	.008589
T2	-1.24798	.276881	-6.91	1.5337	-4.50727	.000008
T3	1.15562	.283447	7.45	1.8269	4.07701	.000054
GM5	.17440	.081896	27.57	12.9482	2.12949	.033754
GM6	.12491	.078156	31.69	19.8297	1.59826	.110683
T_GRA.	.07672	.067105	8.75	7.6520	1.14330	.253518

CHAPTER 7: NONLINEAR MODELS

As was outlined in Chapter 5, the multivariate correlation analysis, the principal components analysis and multiple regression analyses implicitly assume a linear relationship between the variables. Theoretical considerations or model formulation may suggest otherwise. For example, bivariate plots between the dependent variable and each predictor variable may imply an exponential relationship rather than a linear one. Bivariate plots indicate an exponential relationship between the AC layer elastic modulus and the pavement temperature. This relationship is used to develop a temperature correction algorithm of the back-calculated AC layer elastic modulus.

In theory, a sinusoidal relationship is expected between the average air temperature and the month of the year and between the AC layer elastic modulus and the month of the year. In this chapter, numerical optimization techniques are used to calibrate such nonlinear models.

TEMPERATURE CORRECTION ALGORITHM OF THE BACK-CALCULATED AC LAYER MODULUS *SITE 48SA*

Based on the seasonal data obtained at Site 48SA, numerical optimization technique was used to calibrate an exponential model that correlates the back-calculated elastic modulus of the AC layer to pavement temperature. Pavement temperature, in this model, is the

temperature at a point 25 mm below pavement surface (T1). The following is the calibrated model:

$$E1 = e^{(9.37196-0.03608145 \cdot T1)} \dots\dots\dots(7.1)$$

Figure 7.1 shows the fitted model and its goodness of fit statistics. The explained variance is 72%, and Se/Sy = 0.44. The scatter may be caused by the fact that 20 testing points are included in the data set, while it is assumed that all points have the same layer thickness, there might be slight differences in layer thickness from one point to another (construction variability). Figure 7.2 compares observed and predicted E1 values based on Equation 7.1. Approximately a 45° line resulted from the plot, which indicates the agreement between the two values.

Other temperature measures were used as predictor variables (i.e., T2, T3, T_AV and pavement surface temperature as measured by a sensor mounted on FWD). Table 7.1 compares the accuracy of each model (presented by the coefficient of determination R²). Table 7.1 shows that T1 is the best predictor variable since it produces the highest coefficient of determination. Another model was fitted using T_GRAD as a second predictor variable. This resulted in the following model:

$$E1 = e^{(9.36-0.0345 \cdot T1-0.00005 \cdot T\_GRAD)} \dots\dots\dots(7.2)$$

The coefficient of T_GRAD is very small and insignificant. The goodness of fit statistics are: explained variance = 64%, Se/Sy = 0.48. Comparing the above two models suggests that including temperature gradient in the model does not do any good. It leads to a poorer model. It also indicates that the information gained from temperature gradient is totally redundant to that of the layer temperature. Therefore, the first model (Equation 7.1) is used in developing a temperature correction algorithm of the back-calculated AC layer modulus. While other variables may influence the relationship between the AC layer elastic modulus and the layer's temperature (such as binder grade, layer thickness, aggregate gradation, porosity etc.), Equation 7.1 is a simple model, with a single predictor variable, the AC layer temperature, that is readily available and automatically measured along with deflection data.

The correction factor (C) is defined as:

$$\frac{EI @ \text{Reference Temperature (21 } ^\circ\text{C)}}{EI @ \text{The Measured Temperature}} \dots\dots\dots(7.3)$$

Substituting from Equation 7.1 in Equation 7.3 gives:

$$C = \frac{e^{(9.37196 - 0.03608145 \cdot 21)}}{e^{(9.37196 - 0.03608145 \cdot T)}} \dots\dots\dots(7.4)$$

$$C = e^{(0.03608145 \cdot T - 0.75771)} \dots\dots\dots(7.5),$$

where T is the AC temperature at a point located 25 mm (1 in.) below pavement surface, in Celsius, the asphalt layer elastic modulus is in MPa and $e = 2.7183$.

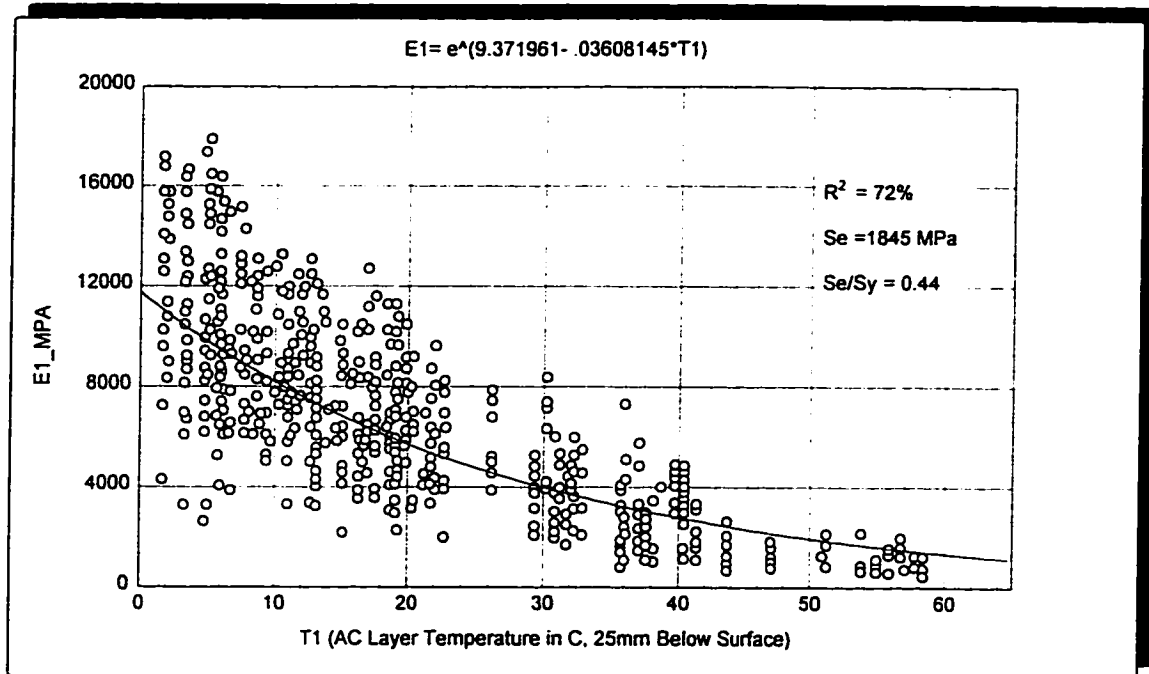


FIGURE 7.1: EXPONENTIAL MODEL OF THE AC MODULUS AND PAVEMENT TEMPERATURE

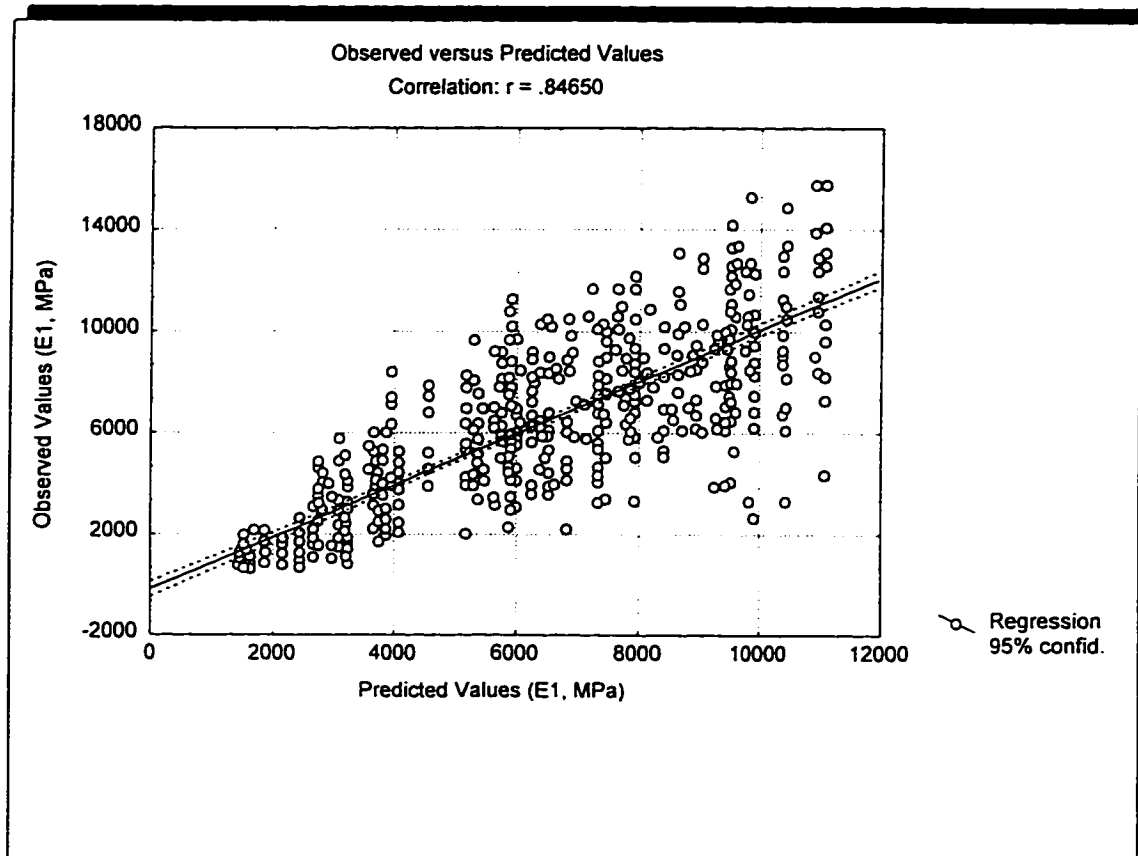


FIGURE 7.2: OBSERVED VS. PREDICTED E1 VALUES BASED ON EQ. 7.1

TABLE 7.1: COMPARISON OF E1 PREDICTOR VARIABLES

<u>Predictor Variable</u>	<u>Coefficient of Determination (R^2)</u>
T1	72 %
T2	63 %
T3	66.6 %
T_AV	63 %
Surface temp. from FWD	63 %

Note that the model form and hence the number of degrees of freedom is the same for all of the above models, therefore R^2 could be used to compare the goodness of fit of the models.

SITE 48SF

Based on the seasonal data obtained at Site 48SF, pavement temperature (in this model, is the temperature at the middle of the AC layer (T2)) is correlated with the AC layer's modulus by the following exponential model:

$$E1 = e^{(10.424 - 0.04566 \cdot T2)} \dots\dots\dots(7.6)$$

Figure 7.3 shows the fitted model and its goodness of fit statistics. The explained variance is 85%, and $Se/Sy = 0.34$. Figure 7.4 compares observed and predicted E1 values based on Equation 7.6. Approximately a 45° line resulted from the plot, which

indicates the agreement between the two values, with less scatter than that observed in Site 48SA.

Other temperature measures were used as predictor variables (i.e., T1, T3, T_AV and pavement surface temperature as measured by a sensor mounted on the FWD vehicle). Table 7.2 compares the accuracy of each model (presented by coefficient of determination R^2). Table 7.2 shows that T2 is the best predictor variable since it produces the highest coefficient of determination.

Another model was fitted using T_GRAD as a second predictor variable. This resulted in the following model:

$$E1 = e^{(10.4327 - 0.046 \cdot T2 - 0.10448 \cdot T\_GRAD)} \dots\dots\dots(7.7)$$

The goodness of fit statistics are: explained variance = 85%, Se/Sy = 0.338. Comparing the above two models suggests that including temperature gradient in the model does very little to improve the model accuracy. As it was observed in Site 48SA, the information gained from the temperature gradient is totally redundant to that of the layer temperature. Therefore, the first model (Equation 7.6) is used in developing temperature correction algorithm of back-calculated AC layer modulus. Figure 7.5 is a graphical presentation of the relationship between the three variables.

The correction factor (C) is defined as:

$$\frac{EI @ \text{Reference Temperature } (21^{\circ}C)}{EI @ \text{The Measured Temperature}} \dots\dots\dots(7.3)$$

Substituting from Equation 7.6 in Equation 7.3 gives:

$$C = \frac{e^{(10.424 - 0.04566 \cdot 21)}}{e^{(10.424 - 0.04566 \cdot T)}} \dots\dots\dots(7.8)$$

$$C = e^{(0.04566 \cdot T - 0.95886)} \dots\dots\dots(7.9),$$

where T is the AC temperature at the middepth of the AC layer, in Celsius, the asphalt layer elastic modulus is in MPa and $e = 2.7183$. This algorithm may be used for thick pavements (greater than 5-inch deep), whereas the algorithm given by Equation 7.5 may be used for a thinner AC layer (less than 5-inch deep.)

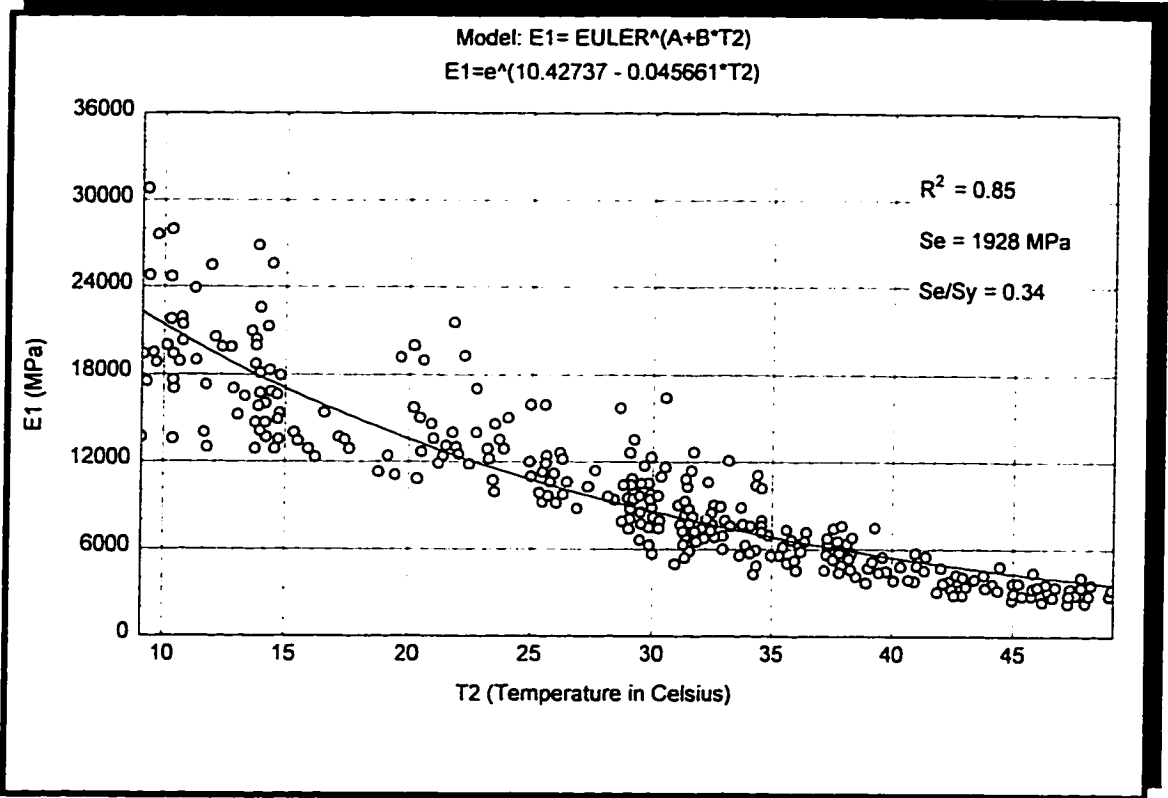


FIGURE 7.3: EXPONENTIAL MODEL FOR E1 VS. T2 (SITE 48SF)

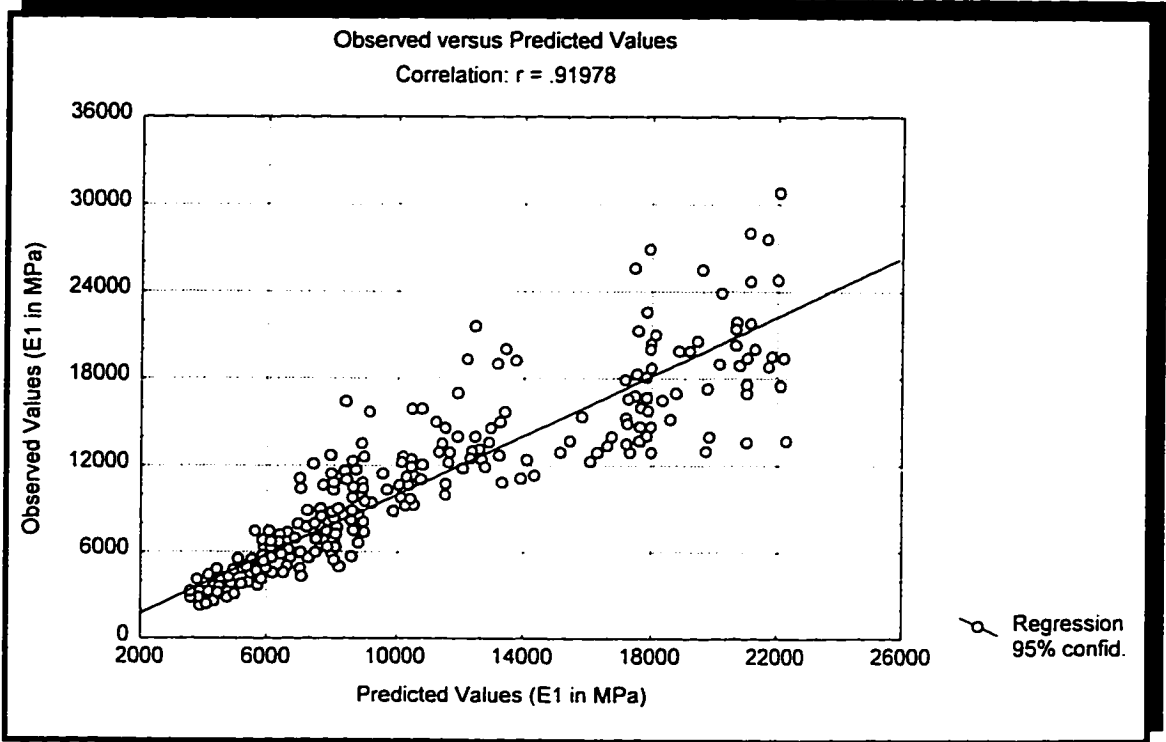
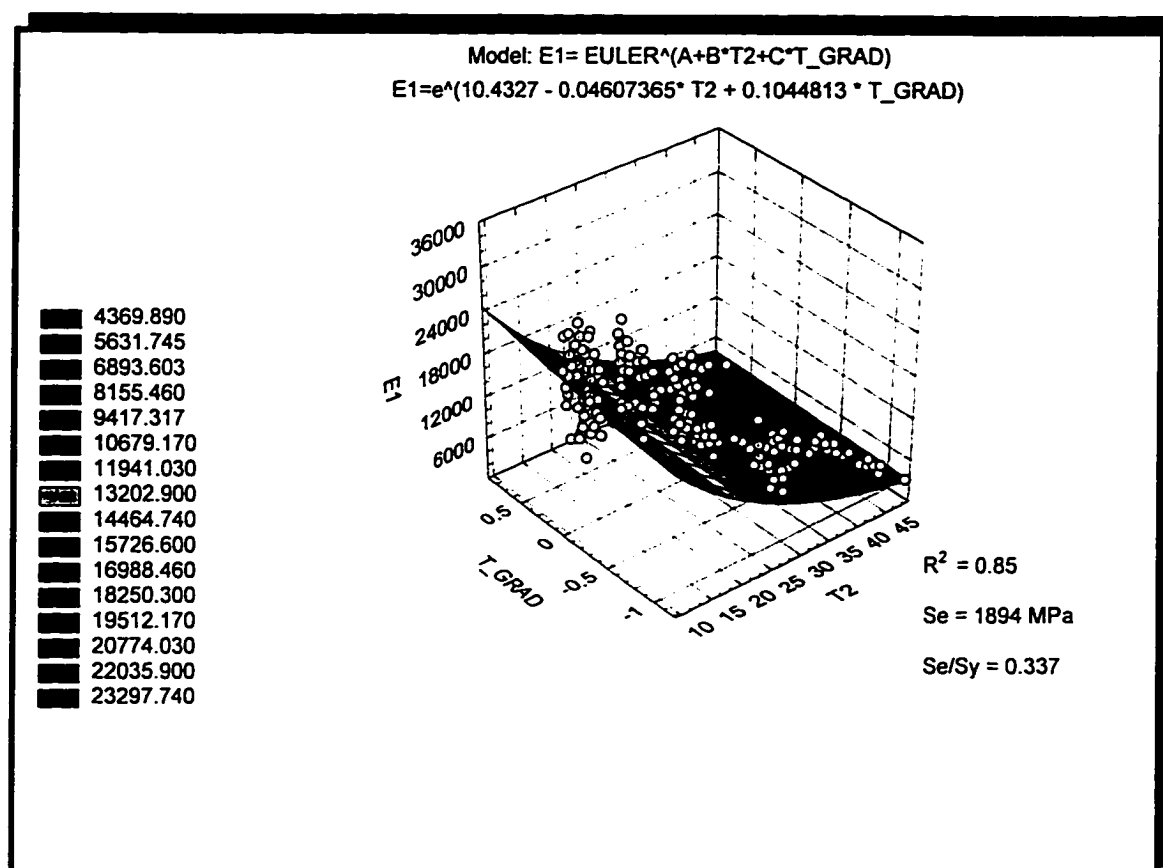


FIGURE 7.4: PREDICTED VERSUS OBSERVED VALUES (SITE 48SF)

TABLE 7.2: COMPARISON OF E1 PREDICTOR VARIABLES, SITE 48SF

<u>Predictor Variable</u>	<u>Coefficient of Determination (R²)</u>
T1	58 %
T2	85 %
T3	83 %
T_AV	80 %
Surface temp. from FWD	66 %

Note that the model form and hence the number of degrees of freedom is the same for all of the above models, therefore R² could be used to compare the goodness of fit of the models.

**FIGURE 7.5: EXPONENTIAL MODEL FOR E1 VS. T2 AND T_GRAD (SITE 48SF)**

AVERAGE PAVEMENT TEMPERATURE PERIODIC MODEL

As shown in the previous section, pavement temperature is a good predictor of the AC layer modulus. One might use the seasonal variation in pavement temperature, assuming that such variation is systematic, to predict the AC layer modulus values. First, we will examine the time dependency of pavement temperature, to see if it follows a sinusoidal pattern, as theory suggests.

Characteristics of Sinusoidal Curves

Theoretically, the Earth rotation around the Sun is the major cause of the seasonal climatic variations. Since this rotation is systematic, average air temperature in a given location is expected to follow a sinusoidal pattern. In the remainder of this chapter, periodic functions are constructed to represent the seasonal variation of the average air temperature, the average pavement temperature, the AC layer elastic modulus and the subgrade resilient modulus.

A sinusoidal model takes the following general form:

$$Y = A + B \sin(2\pi f * T + C).....(7.10)$$

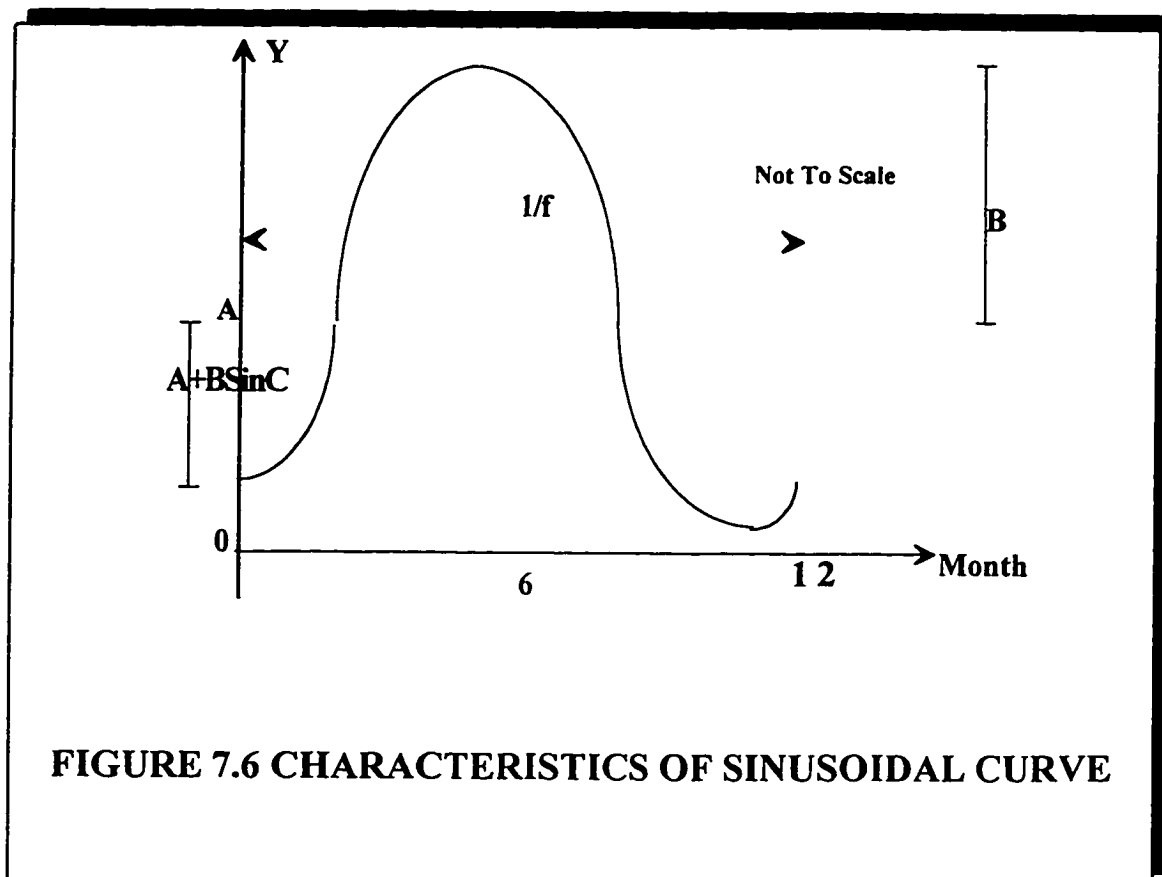
Where

- Y: is the dependent variable
- A: is the average value of Y
- B: is the amplitude of the wave
- T: is time of observation (e.g.. month of the year 1 to 12)

f : is the frequency (reciprocal of the number of increments per cycle = $1/12$ in case of using monthly increments)

C : is the phase angle; it controls the starting point on the curve and the peak month(s).

Equation 7.10 indicates that the values of variable Y average A , have a minimum value of $(A-B)$ and a maximum value of $(A+B)$. Depending on the site location (i.e. southern or northern hemisphere and latitude) the values of A , B and C will change to reflect the average value, the magnitude of change and the phase angle respectively, as shown in Figure 7.6.



Figures 7.7 and 7.8 show periodic sinusoidal models for average air temperature, based on the data collected at the FWD testing day, for sites 48SA and 48SF, respectively. It is assumed that the testing day is representative of the month in which the measurements are taken. It is understood that if the testing day was atypically hot or cold, for the given month, deviations from the sinusoidal pattern will take place.

The model shown in Figure 7.7, for Site 48SA, indicates that the average air temperature has an average value of 19.66 °C. The seasonal variation of the average temperature is characterized by the amplitude of the model (13.6 °C), and the shift angle (23.033). The explained variance for this model is 87 %, and the standard error of estimate (Se) is 4.7 °C. These goodness of fit criteria indicate a good fit between the model and the data. Figure 7.8 shows a similar model for Site 48SF, with an explained variance of 93.5% and a standard error of estimate of 2.7 °C.

Pavement surface temperature, as measured by the FWD vehicle, is expected to follow the air temperature pattern, with a lag and a smaller amplitude. The maximum pavement temperature is higher than the maximum air temperature. Figures 7.9 and 7.10 show periodic sinusoidal models for the average pavement surface temperature. As expected, the amplitude of the pavement temperature is less than that of the air temperature. For Site 48SA, the amplitude of the pavement surface temperature is about 12 °C, compared to 13.6 °C for the air temperature. For Site 48SF, the amplitude of the pavement surface temperature is 9.2 °C, compared to 10 °C for the air temperature. The explained variance

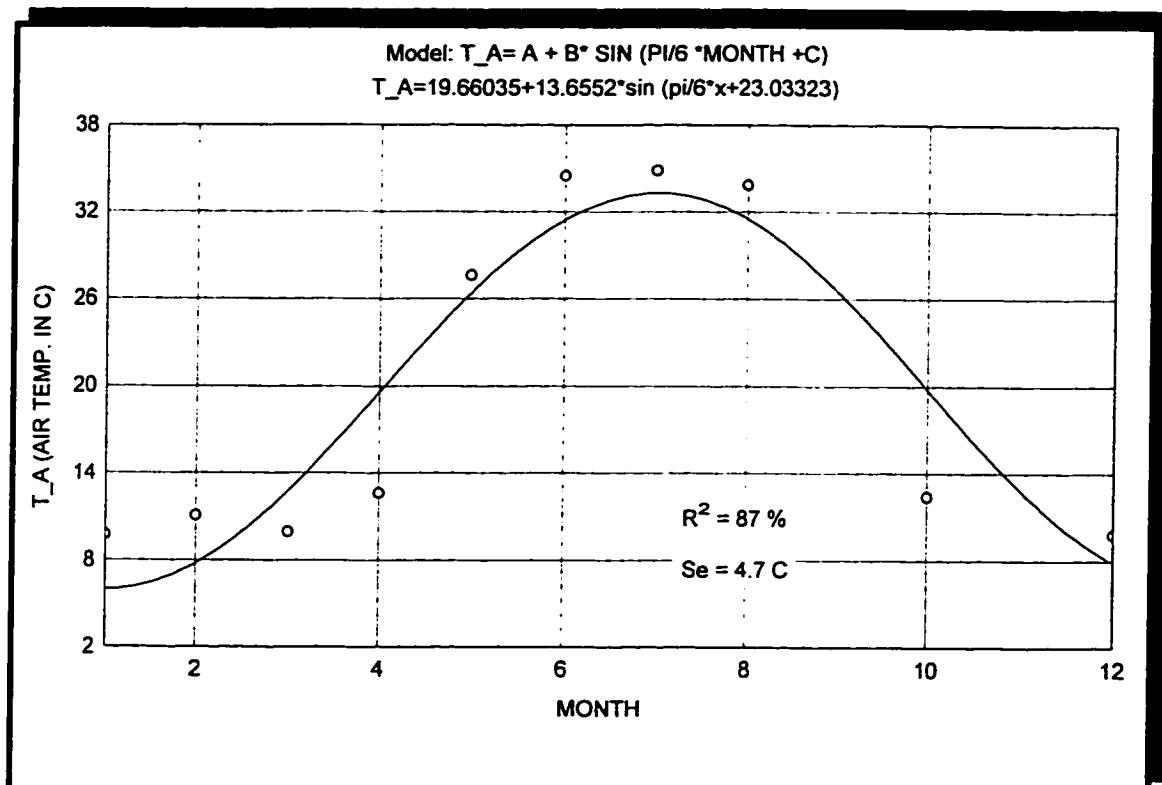


FIGURE 7.7: AVERAGE AIR TEMPERATURE SINUSOIDAL MODEL (SITE 48SA)

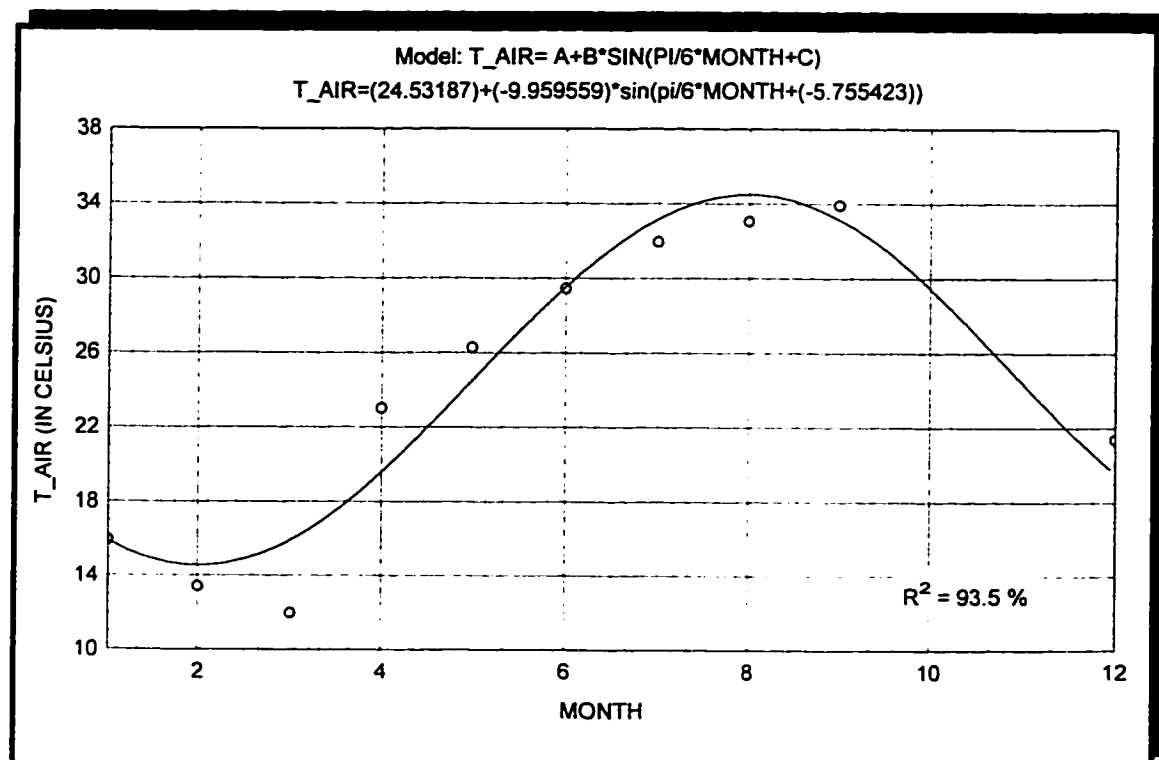


FIGURE 7.8: AVERAGE AIR TEMPERATURE SINUSOIDAL MODEL (SITE 48SF)

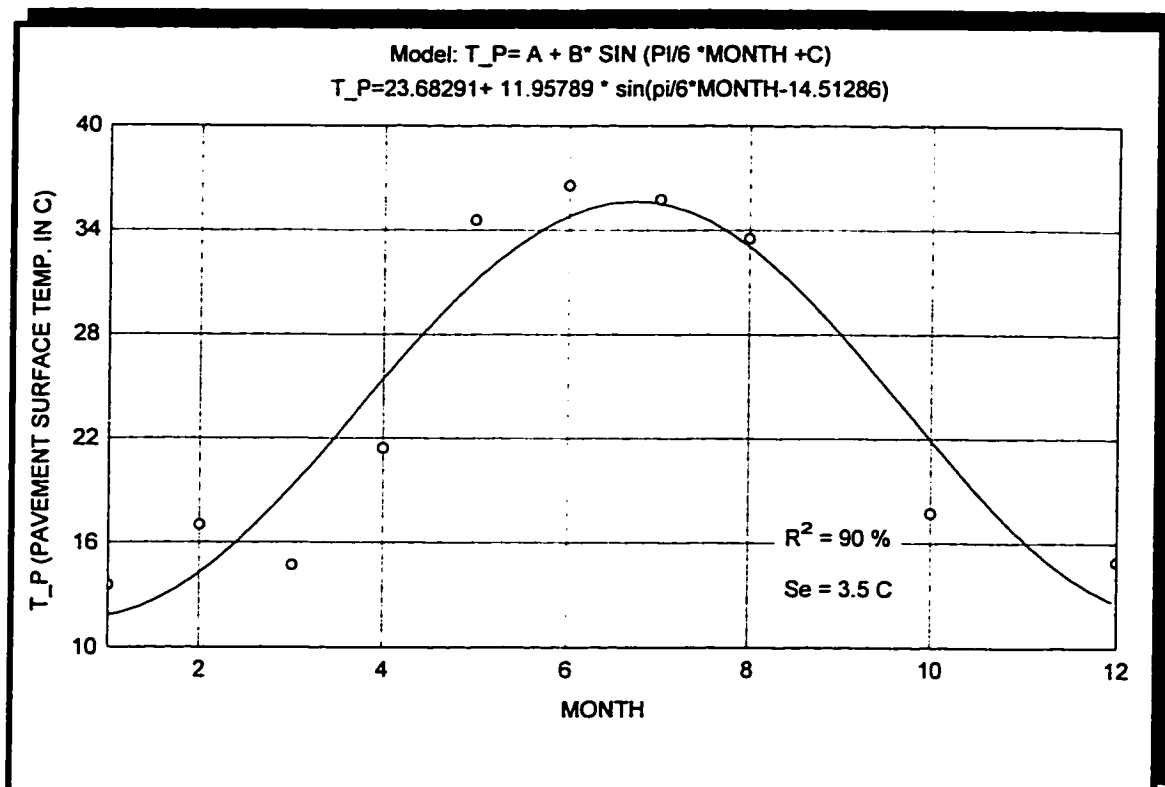


FIGURE 7.9: AVERAGE PAVEMENT TEMPERATURE SINUSOIDAL MODEL (SITE 48SF)

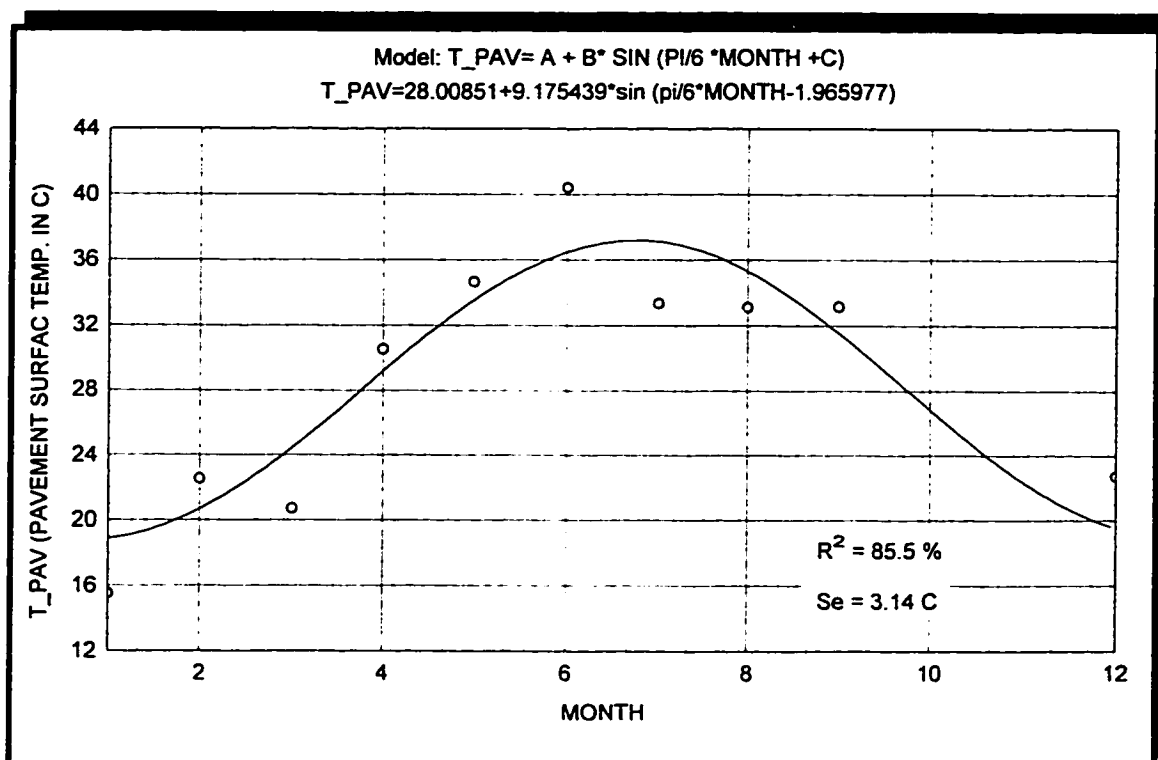


FIGURE 7.10: AVERAGE PAVEMENT TEMPERATURE SINUSOIDAL MODEL (SITE 48SF)

for the model of Site 48SA is 90% and the standard error of estimate is 3.5 °C. The explained variance of the model of Site 48SF is 85.5 %, and the standard error of estimate is 3.14 °C. Again these are indications of a good fit between the model and the data.

AVERAGE AC LAYER MODULUS PERIODIC MODELS

The elastic modulus of the AC layer was shown to be exponentially influenced by pavement temperature as shown earlier in this chapter. The cause- effect mechanism between pavement temperature and the AC layer elastic modulus is explained by Newton's law:

$$\tau = \mu * \frac{\delta \epsilon}{\delta t} \dots\dots\dots(7.11),$$

where:

τ is the shearing resistance between the microscopic layers;
 μ is the Viscosity (a function of pavement temperature); and
 $\frac{\delta \epsilon}{\delta t}$ is the rate of shear strain corresponding to the relative speed at which one microscopic layer slides by the other.

As temperature changes, the viscosity of the binder material changes (the higher the temperature, the lower is the viscosity) thus changing the shear resistance of the material.

The elastic modulus of a material (E) is related to the shear modulus (G) and Poisson's ration (ν) by the following equation:

$$E = 2(1 + \nu)G \dots\dots\dots (7.12)$$

This mechanism explains why the elastic modulus of asphalt concrete decreases as temperature increases. However, since pavement temperature is related to the ambient air

temperature, and the latter often follows a sinusoidal pattern throughout the year, it is expected that the elastic modulus of the AC layer follows the temperature cycle.

Figures 7.11 and 7.12 show sinusoidal models for AC layer modulus at Sites 48SA and 48SF respectively. The average AC layer modulus at site 48SA is 5657 MPa, and the amplitude is 3530 MPa. The minimum value takes place in July, concurrent with the maximum pavement temperature. The explained variance is 94 %. The average AC layer modulus at site 48SF is 10976 MPa, and the amplitude is 6325 MPa. The minimum value takes place in July, corresponding to the maximum pavement temperature. The explained variance is 98 % (an indication of a perfect fit) and the standard error of estimate is 757 MPa. It is interesting to note that although the amplitude of pavement temperature at Site 48SF is less than that of Site 48SA, the amplitude of the E_1 at Site 48SF is twice as much of that of Site 48SA. This may be attributed to the difference in the AC layer thermal properties, the layer thickness, and the mechanical characteristics of the pavement at the two sites.

The resilient modulus of the subgrade material is one of pavement properties that is known to undergo seasonal variations. Although the exact mechanisms that cause the subgrade resilient modulus to change is not as simple as that of the AC elastic modulus, the subgrade resilient modulus often follows a seasonal cycle. The subgrade modulus' seasonal cycles are influenced by moisture content, matrix suction, precipitation, water table, drainability of soil mass, temperature and freezing and thawing cycles. Freezing

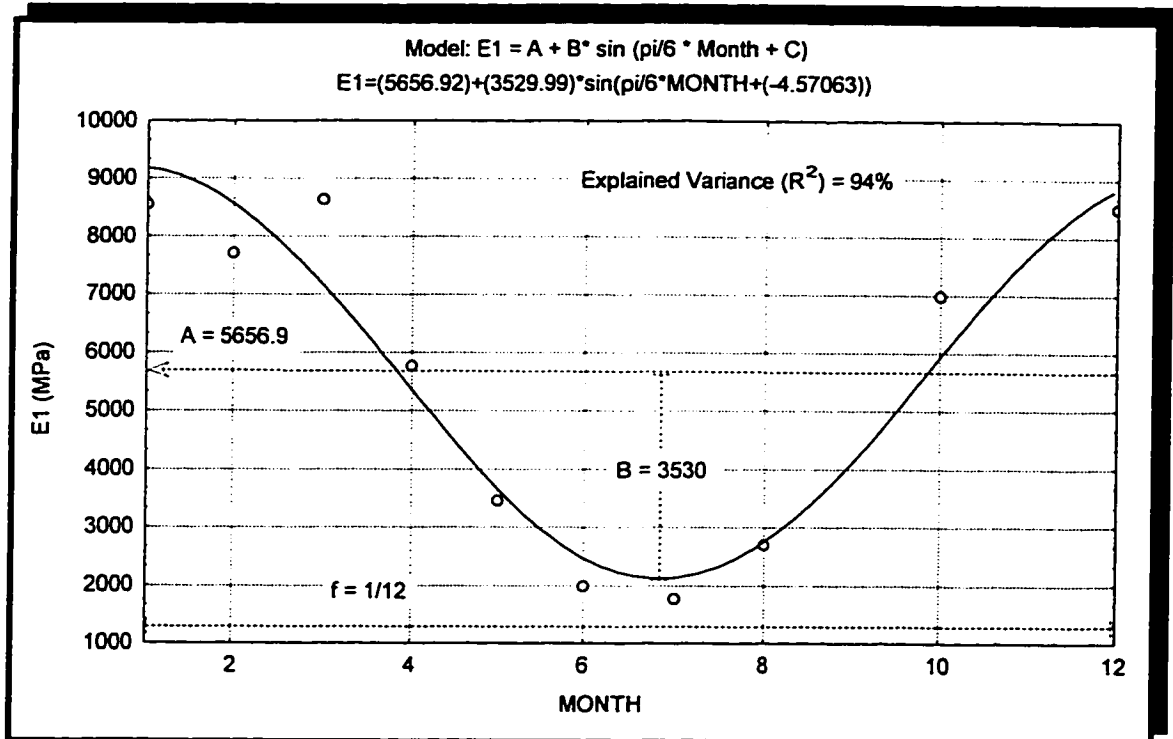


FIGURE 7.11: AVERAGE AC LAYER MODULUS SINUSOIDAL MODEL (SITE 48SA)

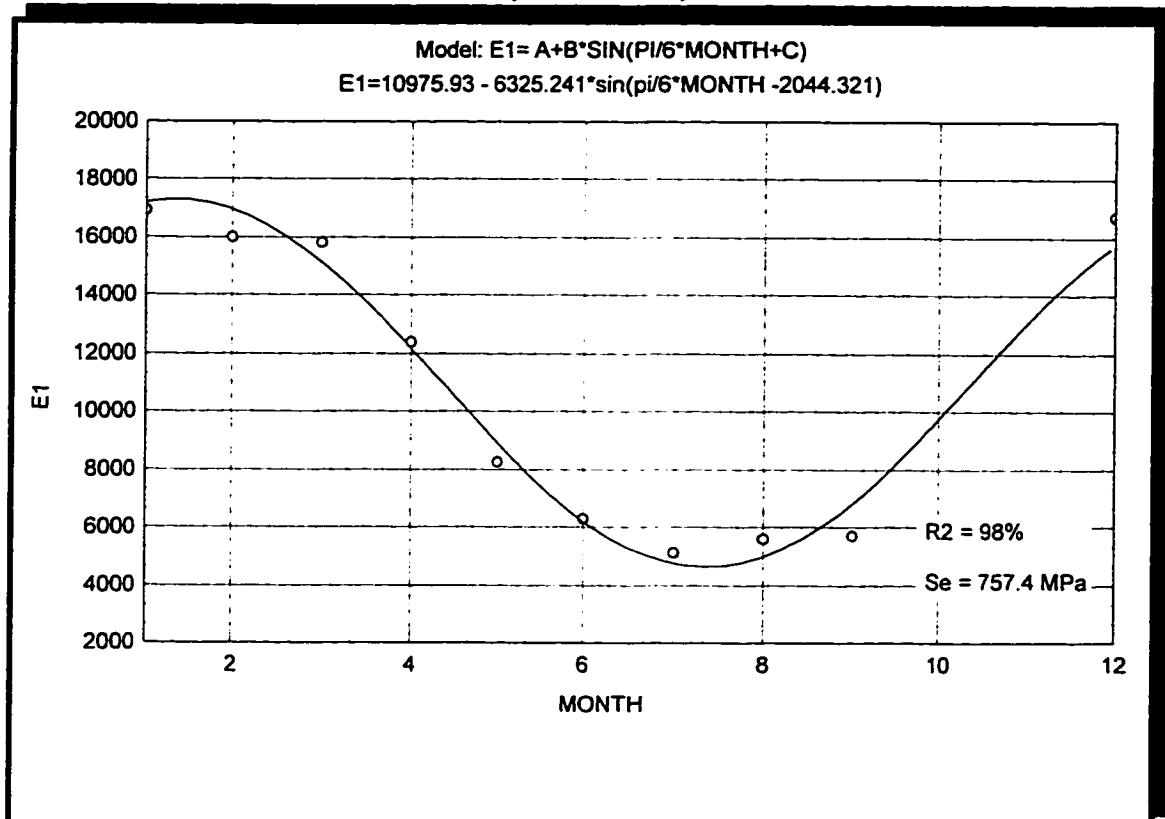


FIGURE 7.12: AVERAGE AC LAYER MODULUS SINUSOIDAL MODEL (SITE 48SF)

and thawing could introduce acute changes in the subgrade modulus. However, since the seasonal sites analyzed in this report are located in a no-freeze zone, sinusoidal functions similar to AC layer modulus functions are fitted with reasonable accuracy to correlate the resilient modulus of the subgrade to the month of the year.

Figures 7.13 and 7.14 show a sinusoidal model for the subgrade modulus at Sites 48SA and 48SF respectively. Figure 7.13 shows that the subgrade resilient modulus at Site 48SA has an average value of 184.5 MPa and an amplitude of about 27 MPa. The sinusoidal curve fits the data points perfectly (the explained variance = 94%.) The peak value of the modulus is in July, concurrent with the minimum value of the AC modulus. Figure 7.14 shows a periodic model for the subgrade modulus at Site 48SF. The average value of the modulus is 147 MPa, and the amplitude is 28.6 MPa. The maximum modulus value occurs in February, concurrent with the maximum AC layer modulus. The explained variance for this model is 57% and the standard error of estimate is 22.4 MPa, which indicates a poorer fit than that of the model of Site 48SA.

The subgrade resilient modulus may be represented by other functions such as polynomial functions (see Figure 7.15), exponential functions (during thaw periods), linear functions or composite models with more than one function (as presented in Figure 7.16). The subgrade resilient modulus may be analyzed using time series technique, to predict the future values of the modulus. This is presented in Chapter 8.

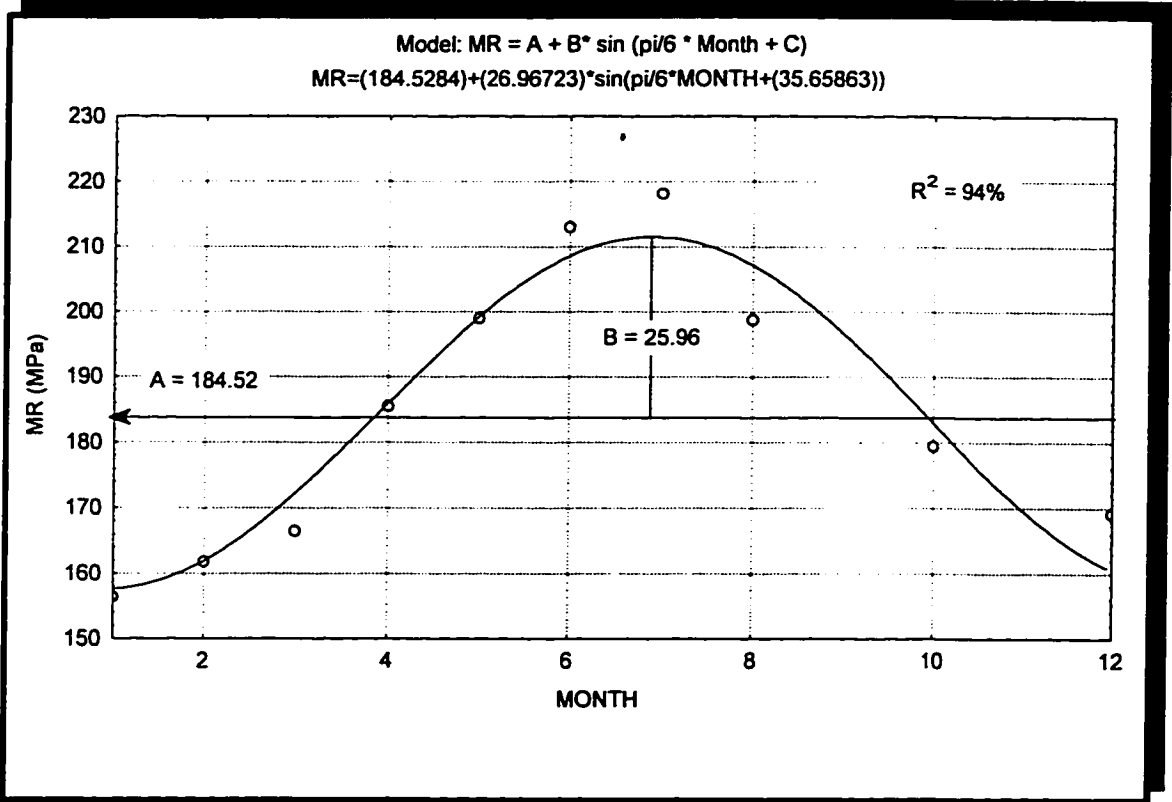


FIGURE 7.13: AVERAGE SUBGRADE MODULUS SINUSOIDAL MODEL (SITE 48SA)

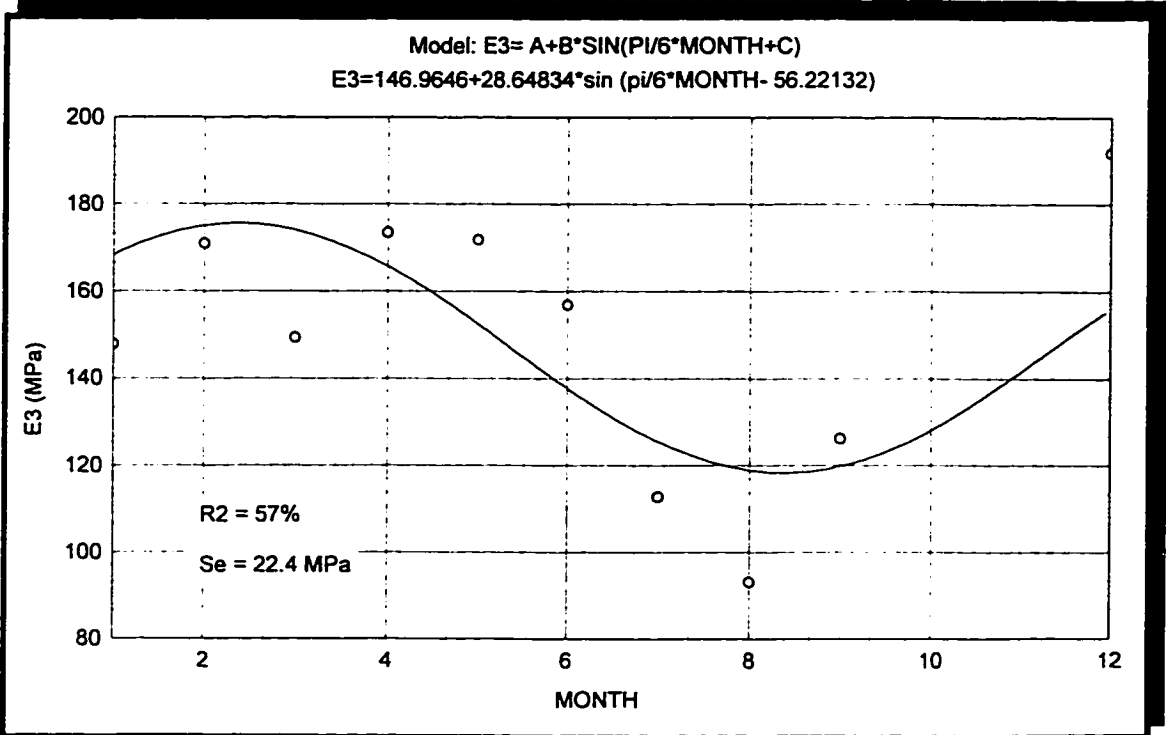


FIGURE 7.14: AVERAGE SUBGRADE MODULUS SINUSOIDAL MODEL (SITE 48SF)

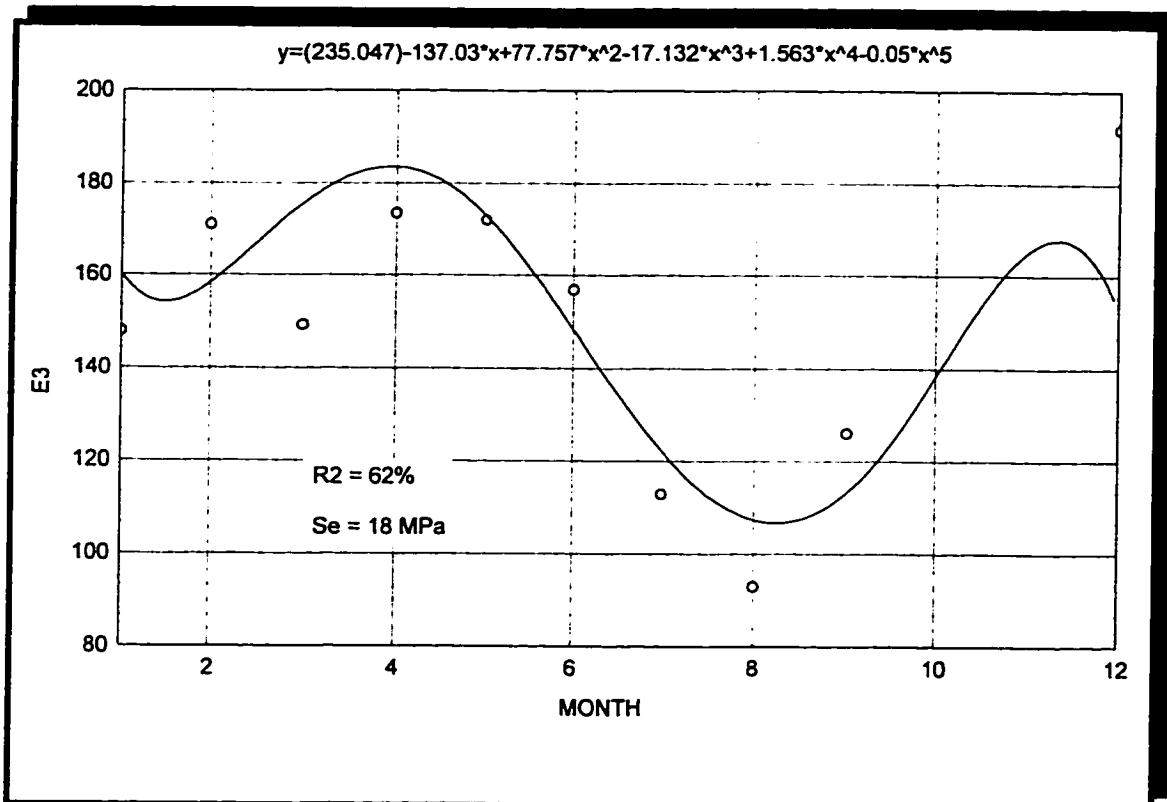


FIGURE 7.15: AVERAGE SUBGRADE MODULUS POLYNOMIAL MODEL (SITE 48SF)

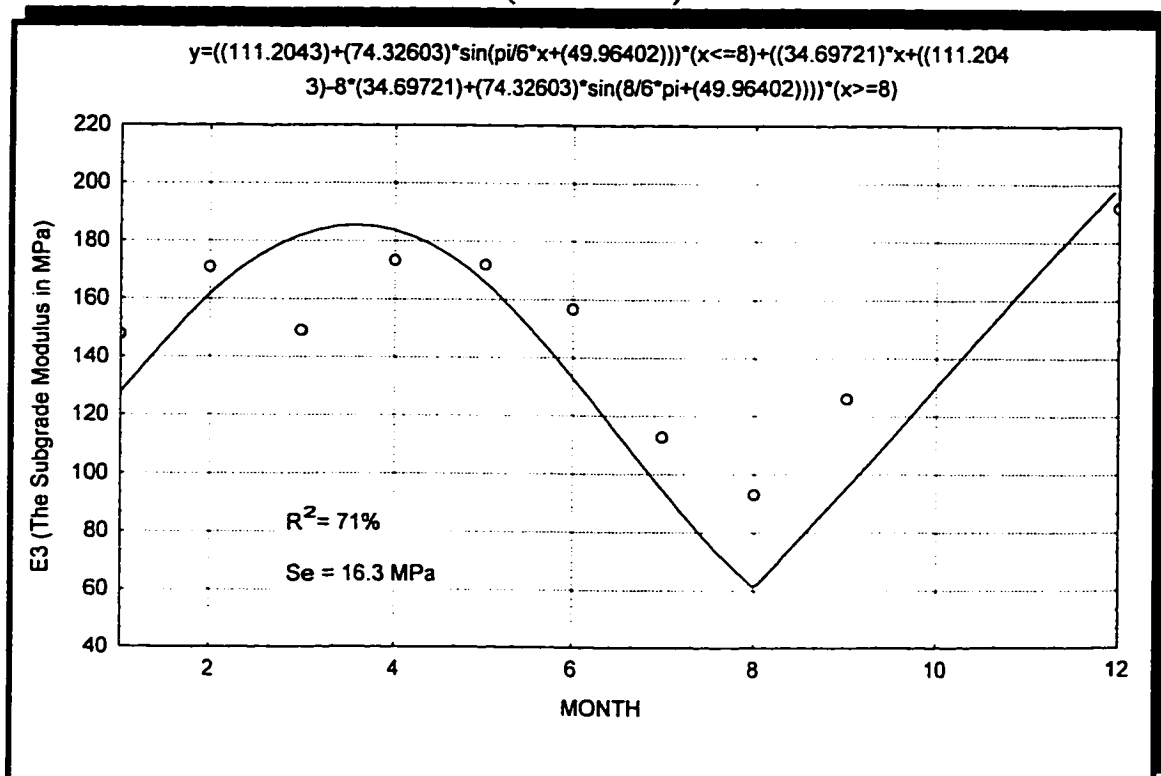


FIGURE 7.16: AVERAGE SUBGRADE MODULUS COMPOSITE MODEL (SITE 48SF)

CHAPTER 8: TIME SERIES ANALYSIS

Overview of Time Series Analysis

Time series analysis is the analysis of data in which time is an independent variable. The objective of time series analysis is to decompose (analyze) a recorded data sequence into its underlying components so that a model can be formulated to represent the underlying system and to forecast future occurrences of the system.

Unlike the analyses of random samples of observations, the analysis of time series is based on the assumption that successive values in the data file represent consecutive measurements taken at equally spaced time intervals. Methods used to analyze time series can also be used to analyze spatial data, such as moisture content along a highway segment.

Time and space are not causal properties. They will be regarded as convenient parameters by which we bring true cause and effect into proper relationship [46]. As an example, pavement deflection is normally highest in July. This maximum is not caused by July, but since pavement temperature is highest in July, the seasonal time of July is a parameter relating pavement deflection to pavement temperature.

Components of A Time Series

A time series may consist of a systematic component, that which varies regularly (signal), and a nonsystematic component, that which does not vary regularly (noise.) The systematic component may be presented by some or all of the following shapes: secular, periodic and/ or cyclical. The secular trend is a systematic long -term trend occurring for the duration of the measured series, usually a continuous increase or decrease in magnitude. The secular trend may be detected using the moving average filtering or by fitting an assumed functional form. The periodic variation is a movement that recurs with a degree of regularity with a specified period, such as annual and seasonal variations. It may be identified using the moving average analysis, correlogram analysis, spectral frequency analysis, and/ or by fitting a periodic model. The cyclical variation is a systematically increasing - decreasing trend that occurs with an irregular period. It may be identified using the moving average filtering and/ or spectral analysis.

The nonsystematic component consists of episodic events (if any) and random variation. The episodic event is that which causes a noticeable variation in a time series, but occurs on a "one-shot" basis. For example, a sudden drop in the value of the subgrade resilient modulus due to a sharp increase in temperature, which causes the frost to melt and the moisture content of the subgrade to increase. The random variation is a nonsystematic, short- duration variation caused by events that are not measurable. It may be identified by decomposing both the systematic and the episodic components and identifying its

probability density function and its parameters. These parameters may be used later, to simulate the random variation.

Once the components of a series are identified and modeled, they could be reassembled (additively, or multiplicatively) to generate future forecasts of the series. In this chapter, time series analysis is performed on the monthly records of the layer moduli values to forecast future occurrences. Such forecasts are then used in the next chapter (Chapter 9), to incorporate the seasonal variations of the layers' stiffnesses in the design of flexible pavements.

Spectral Analysis

The purpose of the spectral analysis is to decompose the original series into underlying sine and cosine functions of different frequencies, in order to determine those that are important. In essence, the spectral analysis will calibrate the following model:

$$X_t = a + \sum [a_k * \cos(\lambda * t) + b_k * \sin(\lambda * t)] \dots \dots \dots (8.1),$$

where X_t is the value of variable X at time t , a is the mean value of the variable, a_k and b_k are the cosine and sine regression coefficients and λ is the frequency in radians per unit time. There will be $n/2+1$ cosine terms and $n/2-1$ sine terms, where n is the number of data points. In other words, there will be as many different sinusoidal waves as there are data points, and we will be able to completely reproduce the series from the underlying functions. If a large sine or cosine coefficient is identified, one can conclude that there is a strong periodicity of the respective frequency (or period) in the data.

SITE 48SA

For this Site, the spectral analysis was performed on three variables: pavement surface temperature T_P , the AC layer back-calculated modulus, $E1$ and the subgrade back-calculated resilient modulus, $E3$. Figure 8.1.A is a plot of the monthly average values. Figure 8.1.B is the periodogram, which shows that the 12th period is, by far, the most significant period. Therefore, the corresponding frequency ($1/12 = 0.08$) is the most significant frequency. The periodogram value is a measure of the resultant of the cosine coefficient and the sine coefficient. Since the two waves are orthogonal, the resultant is the square root of the sum of the squares of the two waves. The periodogram value = $[(\text{the cosine coefficient})^2 + (\text{the sine coefficient})^2] * n/2$. Table 8.1.A shows for each frequency (from 0 to 0.5) the cosine coefficient, the sine coefficient, the periodogram value, the spectral density, and Hamming weights. The spectral density is the smoothed moving average values of the periodogram values. The moving average is obtained using 5 consecutive values with the Hamming weights (the five weights add up to 1.0.) The spectral density is used to identify the general frequencies "regions" that significantly contribute to the seasonal behavior of the series.

Table 8.1.A shows that period 12 (i.e. frequency 0.08) has a periodogram value of 823.79. Therefore the wave with this frequency is the most important wave of the six waves in the table. This indicates that every 12 periods (months) constitute one cycle. These results support the conclusion of the ANOVA analysis (Chapter 6), that the season of the year makes a significant difference in temperature, $E1$, and $E3$ values. In addition

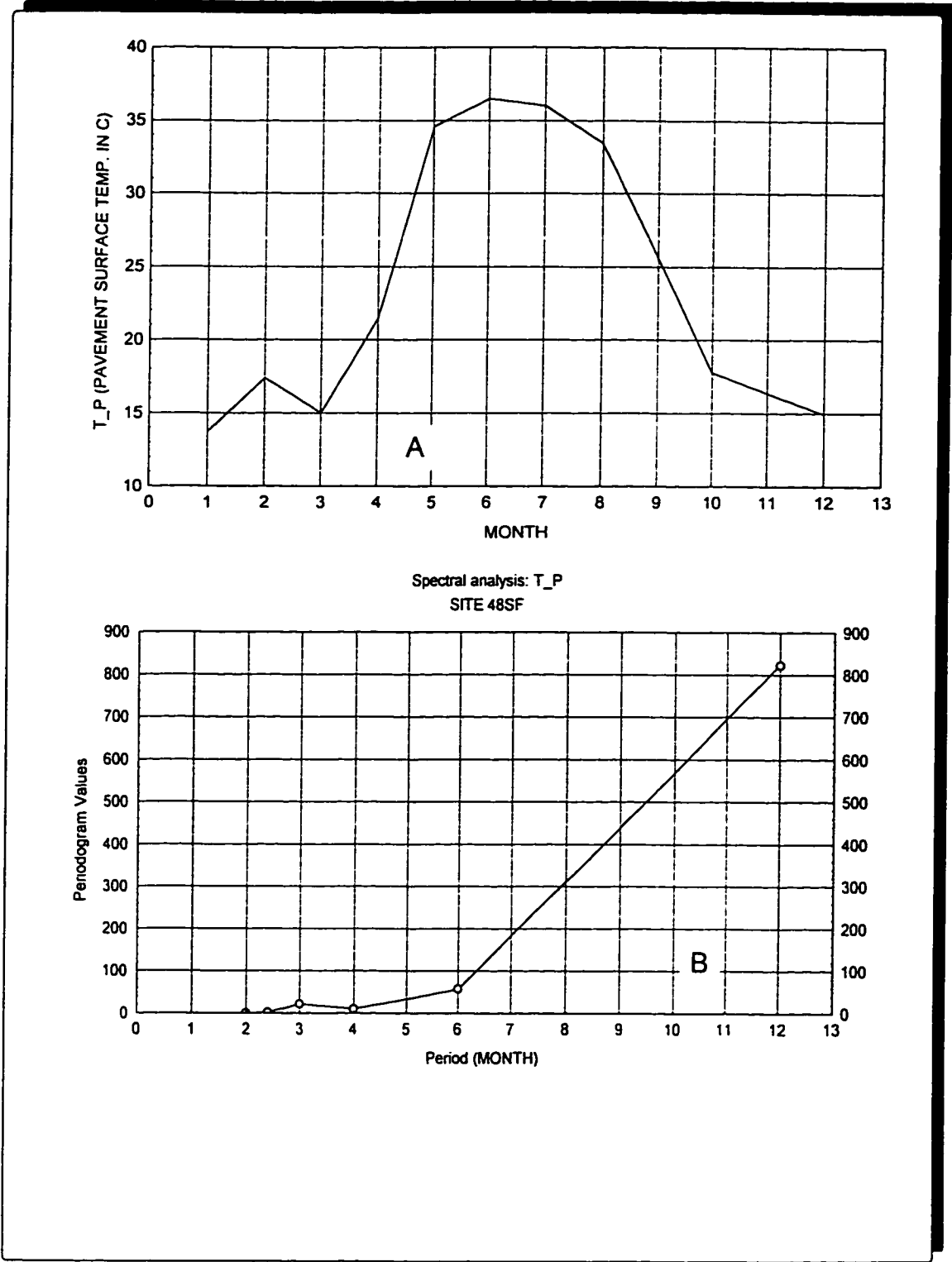


FIGURE 8.1: A) PLOT OF MONTHLY VALUES OF PAVEMENT SURFACE TEMPERATURE; B) PERIODOGRAM

TABLE 8.1A: SPECTRAL ANALYSIS SUMMARY (VARIABLE T_P, SITE 48SA)
MEAN VALUE = 23.56 °C

	Frequency	Period	Cosine Coeff.	Sine Coeff.	Periodog	Density	Hamming Weights
0	0		0	0	0	401.25	0.04
1	0.08	12	-11.4	2.69	823.79	411.29	0.24
2	0.17	6	2.78	-1.33	56.95	227.3	0.45
3	0.25	4	1.24	0.44	10.38	53.09	0.24
4	0.33	3	-1.18	1.49	21.72	14.67	0.04
5	0.42	2.4	-0.54	0	1.77	6.48	
6	0.5	2	0.11	0	0.08	2.44	

TABLE 8.1B: SPECTRAL ANALYSIS SUMMARY (VARIABLE E1, SITE 48SA)
MEAN VALUE = 5939.5 MPa

	Frequency	Period	Cosine Coeff.	Sine Coeff.	Periodog	Density	Hamming Weights
0	0		0	0	0	41,586,148	0.04
1	0.08	12	3,714.6	-708.62	85,802,566	42,125,476	0.24
2	0.17	6	-692.27	164.98	3,038,745	22,239,468	0.45
3	0.25	4	-298.57	-148.49	667,161	4,367,777	0.24
4	0.33	3	-55.88	-414.61	1,050,145	879,267	0.04
5	0.42	2.4	67.13	-296.83	555,671	593,066	
6	0.5	2	182.48	0	199,799	432,119	

TABLE 8.1C: SPECTRAL ANALYSIS SUMMARY (VARIABLE E3, SITE 48SA)
MEAN VALUE = 194.63 MPa

	Frequency	Period	Cosine Coeff.	Sine Coeff.	Periodog	Density	Hamming Weights
0	0		0	0	0	306.82	0.04
1	0.08	12	-8.93	3.3	543.47	415.43	0.24
2	0.17	6	9.31	-4.23	627.09	426.48	0.45
3	0.25	4	-2.44	2.1	62.27	204.74	0.24
4	0.33	3	-1.51	-0.27	14.15	63.66	0.04
5	0.42	2.4	-3.56	1.06	82.7	45.53	
6	0.5	2	-0.13	0	0.1	40.93	

TABLE 8.2A: SPECTRAL ANALYSIS SUMMARY (VARIABLE E1, SITE 48SF)**MEAN VALUE = 10945 MPa**

	Frequency	Period	Cosine Coeff.	Sine Coeff.	Periodog	Density	Hamming Weights
0	0		0	0	0	98,014,141	0.04
1	0.08	12	5,804.84	-254.21	202,564,456	99,202,805	0.24
2	0.17	6	-212.42	-877.23	4,887,888	53,519,990	0.45
3	0.25	4	-916.54	-915.14	10,065,138	13,477,958	0.24
4	0.33	3	-389.65	-465.55	2,211,358	3,943,583	0.04
5	0.42	2.4	-202.94	-373.53	1,084,245	2,049,853	
6	0.5	2	-662.33	0	2,632,112	1,855,765	

TABLE 8.2B: SPECTRAL ANALYSIS SUMMARY (VARIABLE E3, SITE 48SF)**MEAN VALUE = 151 MPa**

	Frequency	Period	Cosine Coeff.	Sine Coeff.	Periodog	Density	Hamming Weights
0	0		0	0	0	2,226.21	0.04
1	0.08	12	23.75	10.77	4,079.59	2,844.55	0.24
2	0.17	6	-10.67	-22.16	3,629.78	2,629.66	0.45
3	0.25	4	2.14	2.72	71.98	1,130.11	0.24
4	0.33	3	-5.64	-2.73	235.22	410.17	0.04
5	0.42	2.4	-8.88	4.13	575.16	468.36	
6	0.5	2	-9.54	0	546.62	538.14	

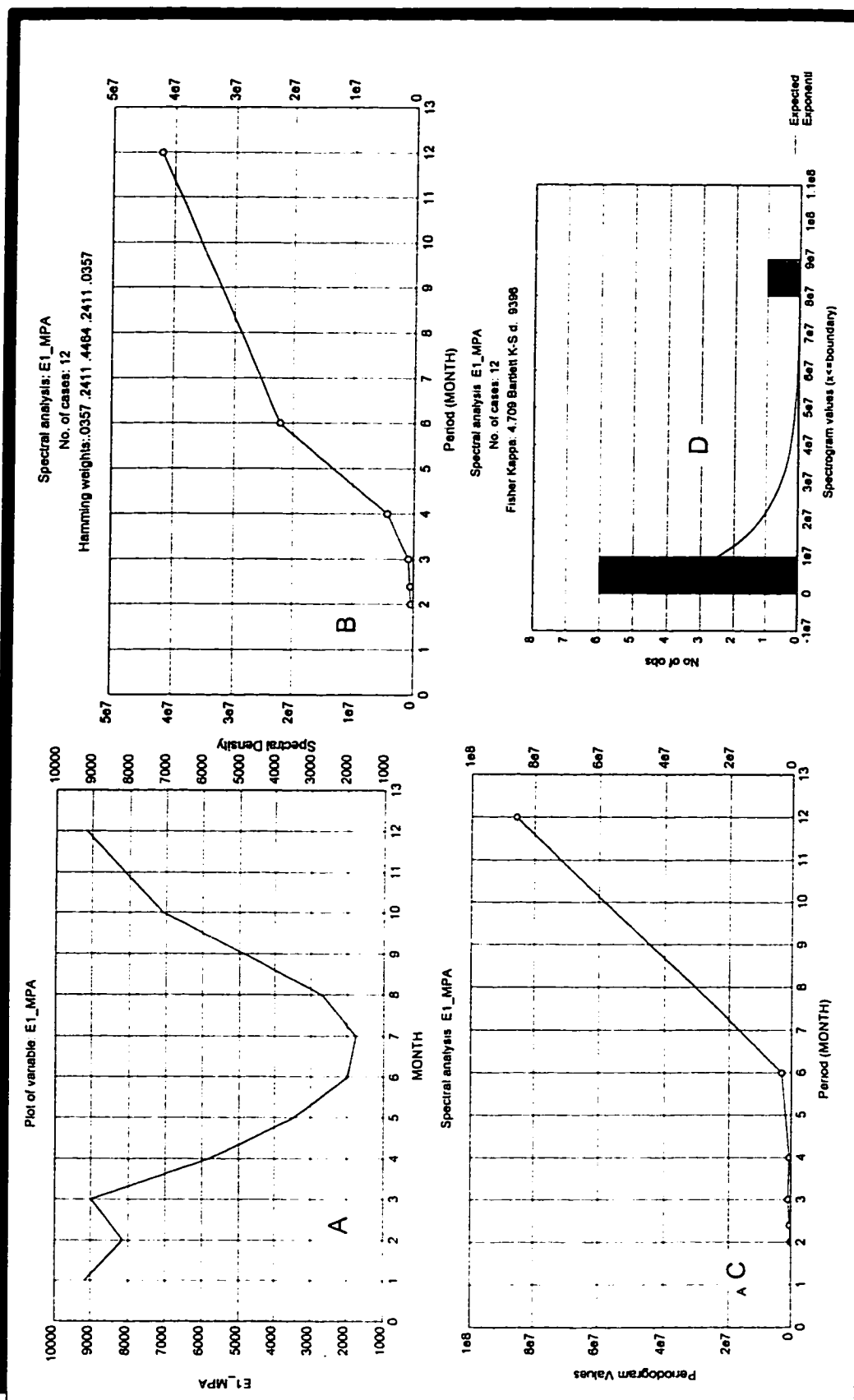


FIGURE 8.2: A) PLOT OF THE AC LAYER MODULUS MONTHLY VALUES; B) SPECTRAL DENSITY;
C) PERIODOGRAM; D) HISTOGRAM VS. EXPECTED WHITE NOISE

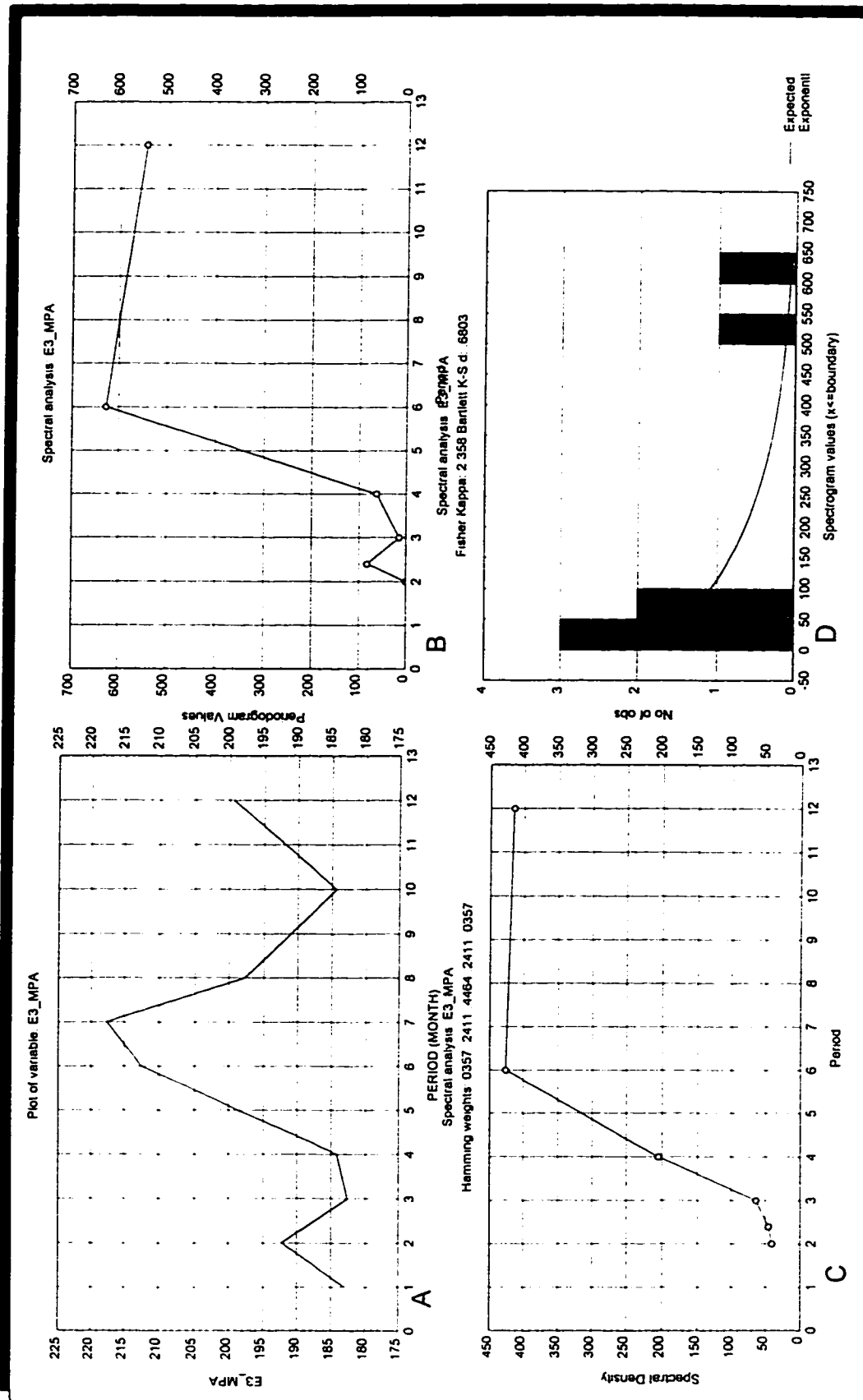


FIGURE 8.3: A) PLOT OF THE SUBGRADE RESILIENT MODULUS MONTHLY VALUES; B) PERIODOGRAM; C) SPECTRAL DENSITY; D) HISTOGRAM VS. EXPECTED WHITE NOISE

to this conclusion, the spectral analysis has produced a mathematical model that may be used to accurately reproduce the series. The model, as shown in the fourth and fifth columns:

$$T-P_t = 23.56 - 11.4 \cos(2 \pi \cdot 0.08 \cdot t) + 2.69 \sin(2 \pi \cdot 0.08 \cdot t) + 2.78 \cos(2 \pi \cdot 0.17 \cdot t) - 1.33 \sin(2 \pi \cdot 0.17 \cdot t) + 1.24 \cos(2 \pi \cdot 0.25 \cdot t) + 0.44 \sin(2 \pi \cdot 0.25 \cdot t) - 1.18 \cos(2 \pi \cdot 0.33 \cdot t) + 1.49 \sin(2 \pi \cdot 0.33 \cdot t) - 0.54 \cos(2 \pi \cdot 0.42 \cdot t) + 0.11 \cos(2 \pi \cdot 0.5 \cdot t)$$

where T_P is the pavement surface temperature at month t . Since the first term is the most significant one, then the above model may be approximated to:

$$T-P_t = 23.56 - 11.4 \cos(2 \pi \cdot 0.08 \cdot t) + 2.69 \sin(2 \pi \cdot 0.08 \cdot t):$$

The results of the spectral analysis for variable E1 are shown in Table 8.1.B and Figure 8.2. Again, the periodogram values for the 12th period is, by far, the most significant one. The coefficients of the sine and cosine waves may be used to construct a model similar to the one shown above, for pavement temperature. Figure 8.2.A is a plot of the average monthly AC layer modulus, Figure 8.2.B shows the spectral density plot, Figure 8.2.C is a plot of the periodogram values, and Figure 8.2.D is a histogram comparing the frequency of the spectrogram values to the expected exponential curve which will result if the series has a totally random variation and follows a normal distribution, which may be referred to as "white noise", i.e., when there are no significant frequencies and the series has no periodicity. Clearly, the pattern observed for this series deviates from the expected

normal distribution, especially at the tail of the exponential curve, where it is expected that no data points would have a periodogram value between 8×10^7 and 9×10^7 . The 12th period has a spectrogram (periodogram) value of 85,802,566. This is an indication of the presence of a strong periodicity at a frequency of 0.08.

The results of the spectral analysis for variable E3 are shown in Table 8.1.C and Figure 8.3. The periodogram values of Table 8.1.C reveal that two significant frequencies exist, corresponding to the 6th and the 12th periods, which indicates that there appears to be two cycles, one is every six months and the other is every twelve months. Figure 8.3.A is a plot of the average monthly values of the subgrade modulus. Figure 8.3.B is the periodogram, which shows the significance of the two frequencies (corresponding to periods 6 and 12), Figure 8.3.C is the spectral density graph and Figure 8.3.D is a histogram comparing the frequency of the spectrogram values to the expected exponential curve. Again, the pattern observed for this series deviates from the expected normal distribution, especially at the tail of the exponential curve, which indicates the presence of a strong periodicity at a frequencies of 0.17 and 0.08.

SITE 48SF

For this Site, the spectral analysis was performed on two variables; the AC layer back-calculated modulus, E1, and the subgrade back-calculated resilient modulus, E3. Table 8.2. shows the results of the analysis. As in Site 48SA, for E1, the 12th period is

the most significant one, indicating a strong seasonal cycle every 12 months. The subgrade modulus series has two significant frequencies, at the sixth and the twelfth periods. The coefficients of the sine and cosine waves, shown at the fourth and the fifth columns, may be used to construct a model similar to the one shown above, for pavement temperature.

In conclusion, the spectral analysis shows a strong periodicity in the layers' moduli values. In addition, the spectral analysis has produced mathematical models that may be used to accurately reproduce the moduli series.

SEASONAL DECOMPOSITION (CENSUS METHOD I)

As stated in the introduction to this chapter, the objective of time series analysis is to decompose the series into its underlying components, so that a model may be formulated to forecast future occurrences of the series. There are several methods to perform the analysis, such as the Auto Regressive Integrated Moving Average (ARIMA), the Exponential Smoothing method, the Seasonal Decomposition Methods (Census I and II) and the Distributed Lag analysis. The remainder of this chapter will demonstrate the use of the Seasonal Decomposition method to decompose the systematic and nonsystematic variations of the elastic layer moduli time series. Exponential Smoothing technique is used to generate future forecasts.

The layer moduli time series consists of (12) monthly values (one year's worth of data is available at this time.) Most time series techniques require a larger amount of data (a few hundred data points.) Therefore, the data points are organized as follows: the first twelve data points represent the values of the dependent variable for January through December, respectively, at the first testing point (station); the next twelve data points represent the values of the dependent variable for January through December, respectively, at the following station; and so forth. Based on this arrangement of the series, the within station variability represents the seasonal (temporal) variation, whereas the variation from one station to the other represents the spatial variation.

Since only testing data for one year is available, there is not enough data to examine the secular trend (the long-term year to year variation.) The AC layer elastic modulus value is expected to have a decreasing trend, as cracks and distresses develop in the pavement. The subgrade resilient modulus, however, is not expected to have a trend, unless a nonlinear behavior of the subgrade causes changes in the subgrade modulus value due to the changes of the stress state of the soil in response to the decline of AC layer modulus. The secular trend component of the layer moduli remains to be examined when few more years' worth of data have been collected. For the purpose of this analysis the trend/cyclical component of the series represents the spatial variation at the given site.

Analysis at Site 48SA

The seasonal decomposition was performed two times; one for the AC layer elastic modulus and the other for the subgrade resilient modulus. First, the AC layer modulus (E1) series is plotted in Figure 8.4. As explained above, the first station is 300F3, represented by 12 seasonal values; one for each month, starting in January. Note that the months are not shown in the x axis for clarity. The next station is 325F3, which is 25 ft. apart, and so forth, until the last station at the wheel path (530F3.) Then come stations 300F1 through 530F1 at the mid-lane. This convention is followed throughout this chapter. Figure 8.4 shows that there is a seasonal cycle at each station, but its magnitude is variable from one station to the other (caused by the differences in the physical characteristics from one testing point to the other.)

Autocorrelogram is used to correlate the average monthly value of the AC layer elastic modulus in a month to its value after 1, 2, ..., 36 months (lag of 1 through 36). Figure 8.5 shows the autocorrelation function and the correlation values. The correlation corresponding to a lag of 1.0 is high (0.8), implying that E1 values at any two consecutive months are highly correlated. The correlations corresponding to a lag of 12, 24, 36 are also high (0.76, 0.74 and 0.7 respectively), indicating that readings separated by 12 time units (months) are highly correlated. These high correlations suggest that the annual cycle is significant and the time of the year is a significant predictor of the AC layer elastic modulus.

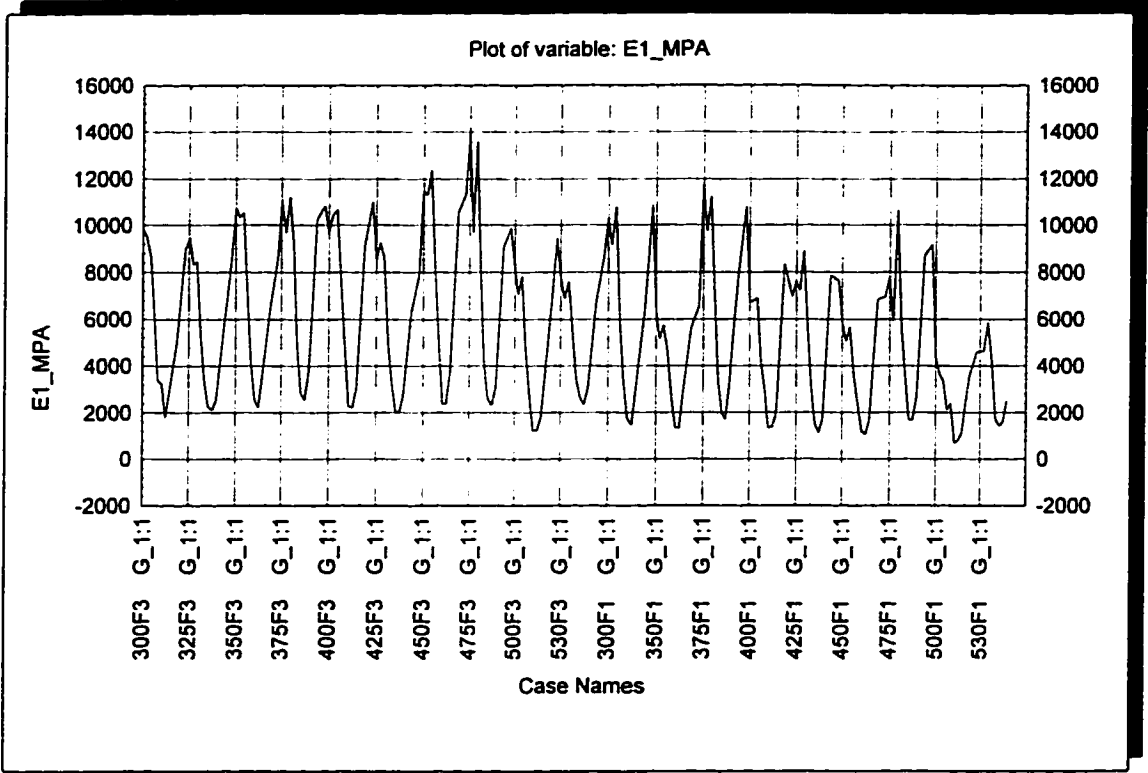


FIGURE 8.4: THE AC LAYER MODULUS TIME - SPACE SERIES (SITE 48SA)

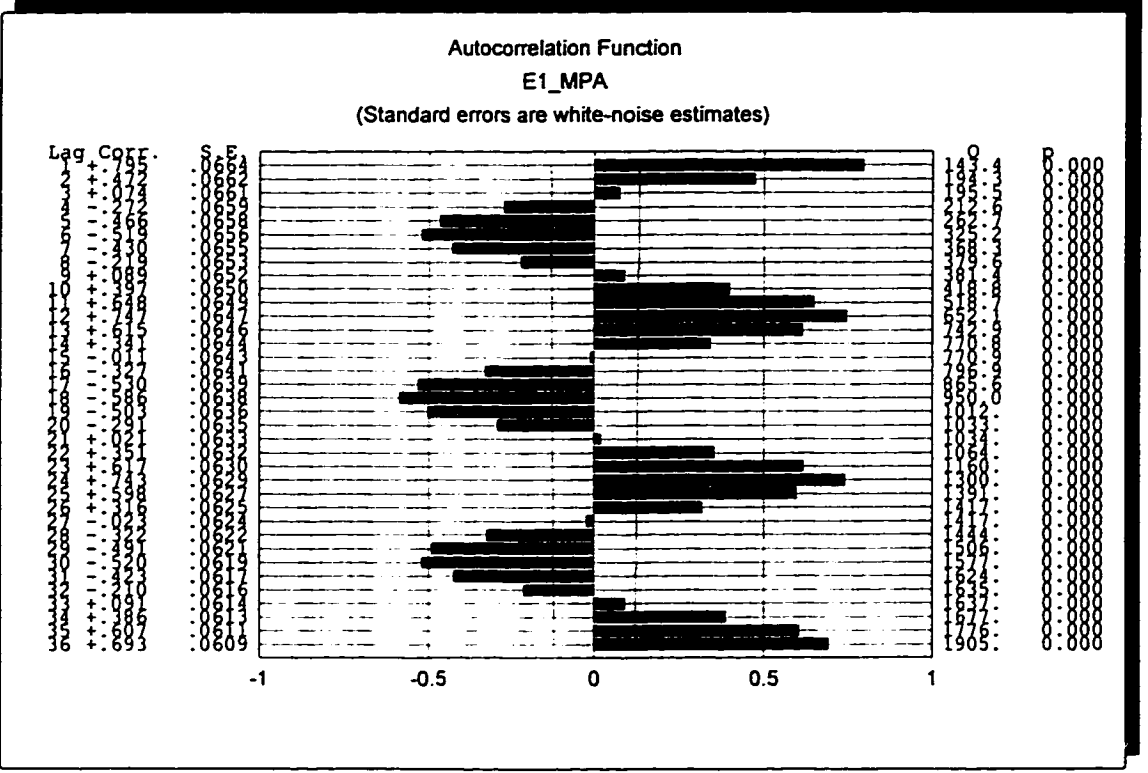


FIGURE 8.5: AUTOCORRELOGRAM ANALYSIS (VARIABLE E1, SITE 48SA)

The first three columns of the correlogram show the lag, the correlation coefficient of the lag, and the standard error corresponding to each lag (representing the threshold value between significant and insignificant correlations, "white noise"). The standard error ranges between plus and minus 0.06, and is represented by the vertical inner dotted lines. The correlations corresponding to lags 6, 18 and 30 are also significant and negative (because the values of readings 6 months apart are at the opposite side of the mean value with respect to one another.)

Table 8.3 shows a sample of the outputs of the seasonal decomposition analysis, for station 325F3. The full output for all stations, along with the original series (about 200 records), is given in Appendix B. The first column is the station name and the month of the year. The second column is the average value of the dependent variable corresponding to the station - month combination (the original series). The third column is the moving average with a window width equal to the length of one season (12 months). The objective of the moving average is to cancel out both the seasonal and the random components, so that the trend/ cycle component will be separated. The fourth column is the difference between the original series and the moving average (represent both the seasonal and the random components) The fifth column represents the average seasonal component for all points. The sixth column shows the seasonally adjusted series (the original series minus the seasonal factor.) The seventh column shows the trend component, which is the smoothed seasonally adjusted series. The last column is the

TABLE 8.3: SAMPLE OF THE SEASONAL DECOMPOSITION OUTPUT
VARIABLE E1, SITE 48SA

	E1_MP A	Moving Averages	Diffnecs	Seasonal Factors	Adjusted Series	Smoother Trend-c.	Irreg. Compo n.
325F3 JAN	9,460	5,578.15	3,881.85	2,893.43	6,566.57	6,064.61	501.97
325F3 FEB	8,326	5,605.4	2,720.6	1,988.5	6,337.5	6,033.85	303.64
325F3 MAR	8,456.6	5,583.32	2,873.35	3,096.9	5,359.77	5,771.06	-411.29
325F3 APR	5,373.3	5,597.44	-224.11	-60.45	5,433.78	5,682.84	-249.05
325F3 MAY	3,363.3	5,647.78	-2,284.44	-2,387.74	5,751.07	5,809.94	-58.87
325F3 JUN	2,288	5,653.36	-3,365.36	-3,997	6,285	5,997.15	287.85
325F3 JULY	2,122	5,614.19	-3,492.19	-4,116.91	6,238.91	5,936.92	301.99
325F3 AUG	2,560	5,722.19	-3,162.19	-3,145.61	5,705.61	5,568.54	137.08
325F3 SEP	4,106	5,889.19	-1,783.19	-877.28	4,983.28	5,115.97	-132.69
325F3 OCT	5,652	6,062.25	-410.25	1,381.4	4,270.6	4,869.41	-598.82
325F3 NOV	7,105	6,207.25	897.75	2,202.48	4,902.52	5,240.67	-338.15
325F3 DEC	8,558	6,274.19	2,283.81	3,022.28	5,535.72	6,083.27	-547.55

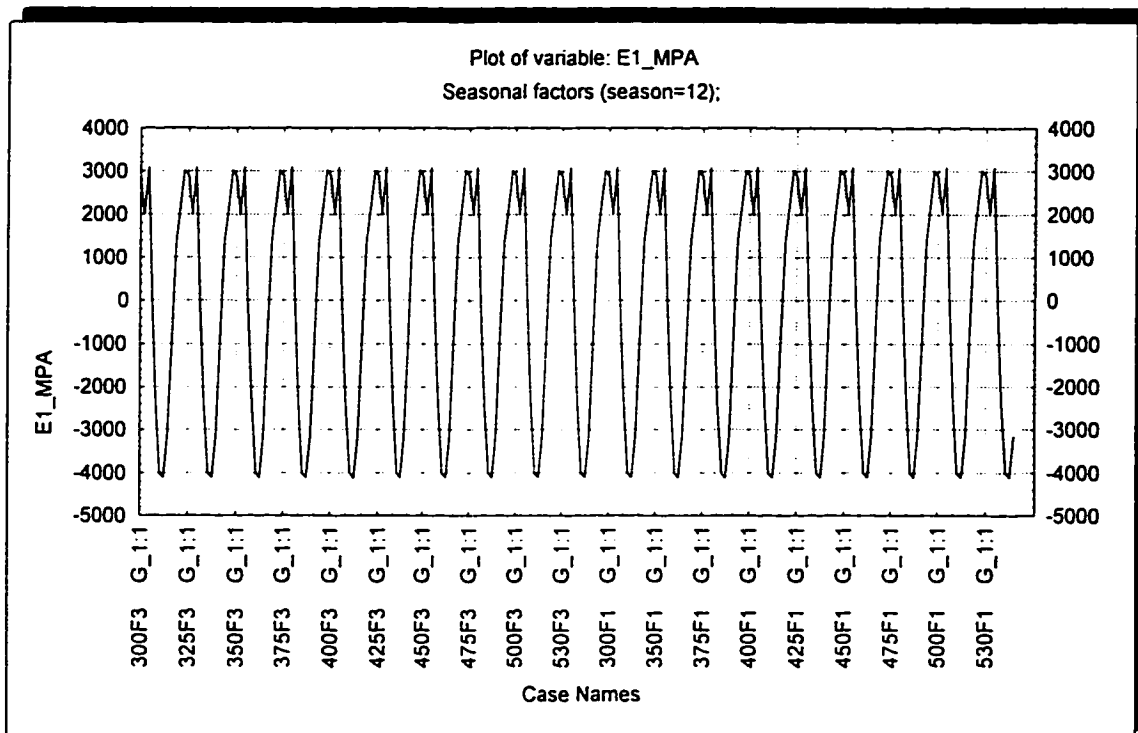


FIGURE 8.6: THE SEASONAL (TEMPORAL) COMPONENT OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

random (irregular) component. The original series is the sum of the seasonal factors, the smoothed trend and the irregular component.

Figures 8.6 through 8.8 represent the three major components of the series. Figure 8.6 shows the seasonal component, which ranges between 3000 MPa and -4000 MPa. The average difference between the maximum and the minimum values of the AC layer modulus is 7000 MPa. This is caused by environmental (climatic) variation. The spatial variation is superimposed on the temporal variation to produce the total systematic variation. Figure 8.7 shows the trend component, which represents the spatial variation. The Figure indicates that the modulus values at the wheel path are higher than that of the mid-lane. It is evident that the spatial variation is random and does not follow a structure. This result supports the conclusion reached by applying the Semivariogram analysis (Chapter 6). Figure 8.8 shows the random component of the series. The histogram of the random component (Figure 8.9) shows that the residuals may be simulated using a normal distribution with a mean value of -0.5 MPa and a standard deviation of 587 MPa.

To model the system, the seasonal component may be modeled by a periodic sinusoidal model. The trend component may be modeled by a linear model and the random component may be simulated using the random number generators to resemble the above distribution (Figure 8.9). Alternatively, capitalizing on the strong autocorrelations for lags 1, 6, 12, 18, 24, 30, and 36, serial models may be developed to correlate the expected "future" values with the previous values.

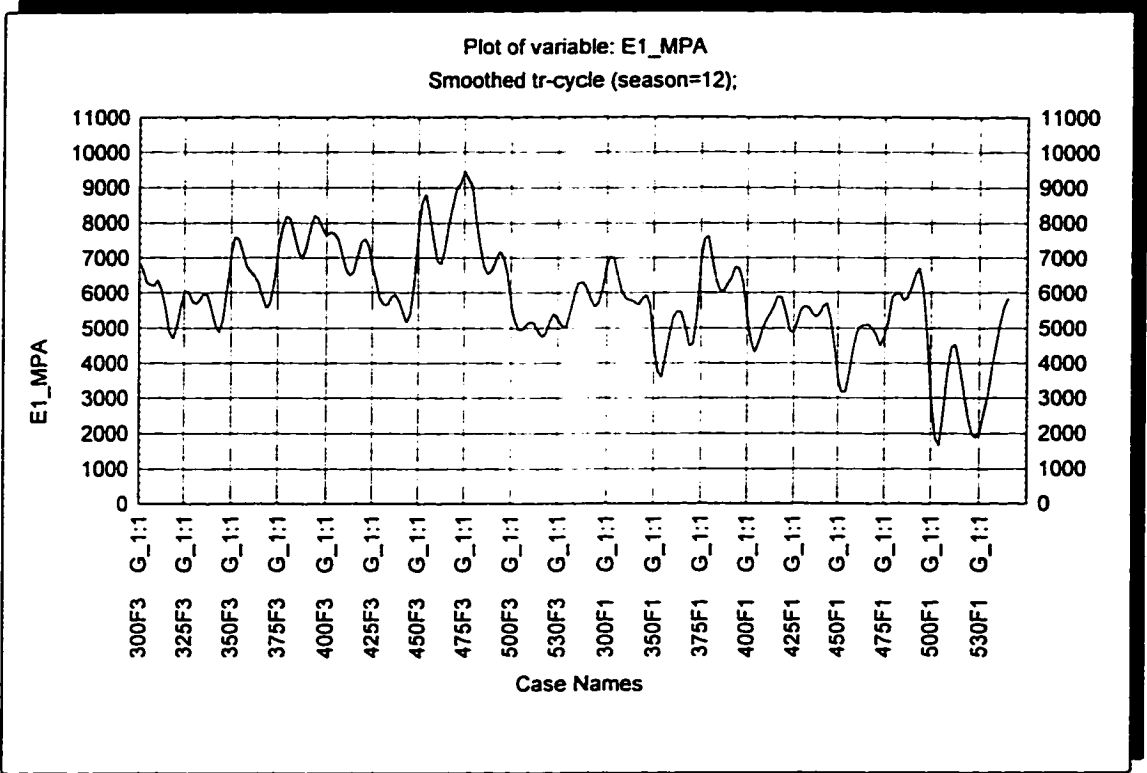


FIGURE 8.7: TREND/ CYCLE (SPATIAL) COMPONENT OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

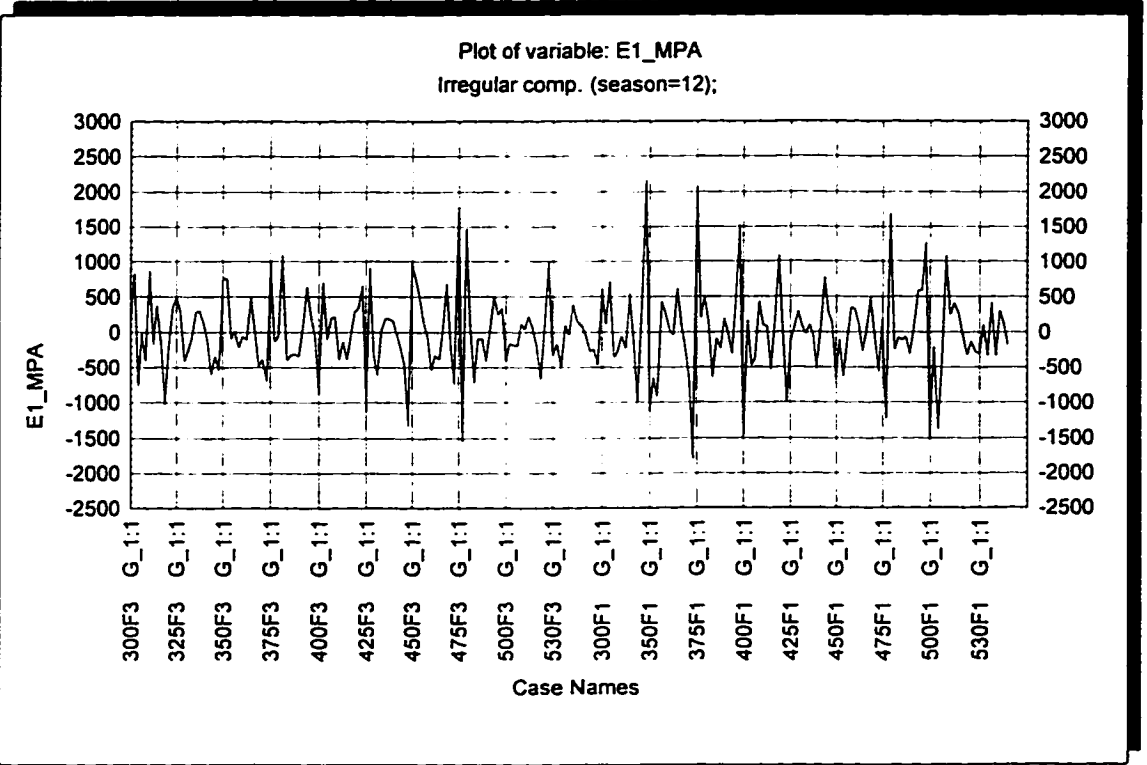


FIGURE 8.8: THE RANDOM (IRREGULAR) COMPONENT OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

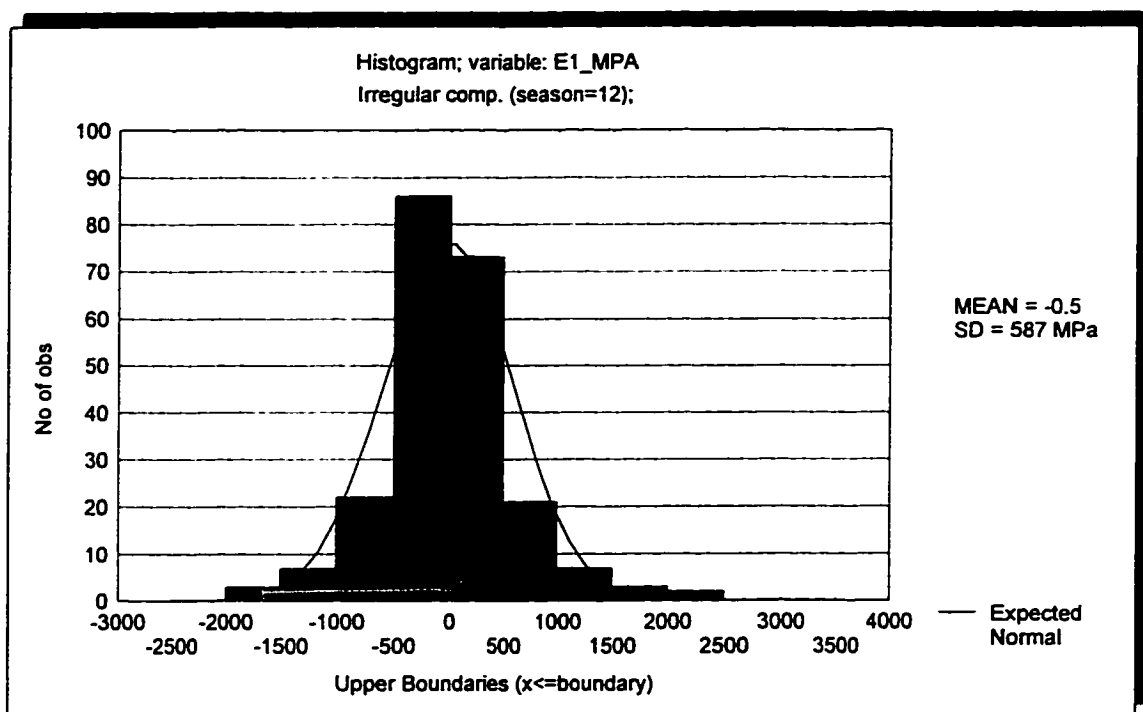


FIGURE 8.9: HISTOGRAM OF THE RANDOM (IRREGULAR) COMPONENT OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

The subgrade modulus time series is shown in Figure 8.10. There is a seasonal cycle at each station, but its magnitude is variable from one station to the other (more variation is observed at points located at the mid-lane.) In contrast to the AC layer modulus series, the peak takes place in the middle of the year. The autocorrelogram function, shown in Figure 8.11 shows a pattern similar to that of the AC layer modulus series (i.e., strong positive correlations for lags 1, 12, etc. and negative correlation for lags 6, 18, etc.). However, the magnitude of the correlations is less than that of the AC layer series. This indicates that the periodicity of the subgrade modulus is less than that of the AC layer modulus. The strong correlation of lag 1 (0.77) may be used to construct a serial model to predict the value of the subgrade modulus, given its value in the previous month.

Table 8.4 shows a sample of the outputs of the seasonal decomposition analysis, for station 325F3. The full output for all stations, along with the original series (about 200 records), is given in Appendix B. Figures 8.12 through 8.14 represent the three additive components of the series. Figure 8.12 shows the seasonal component, which ranges between 30 MPa and -25 MPa. The average difference between the maximum and the minimum values of the subgrade modulus is about 55 MPa. This is caused by environmental (climatic) variation. The spatial variation is superimposed on the temporal variation to produce the total systematic variation. Figure 8.13 shows the trend component, which represents the spatial variation. It is evident that the spatial variation is random and does not follow a structure. This result supports the conclusion reached in the Semivariogram analysis (Chapter 6). Figure 8.14 shows the random component of the series. The histogram of the random component (Figure 8.15) shows that the residuals may be simulated using a normal distribution with a mean value of 0.08 MPa and a standard deviation of 10.8 MPa.

Analysis at Site 48SF

The AC layer modulus (E_1) series is plotted in Figure 8.16. The first station is 25F1 (mid-lane). The Figure shows that there is a seasonal cycle at each station, but its magnitude is variable from one station to the other (caused by the differences in the physical characteristics from one testing point to the other.) Figure 8.17 shows the autocorrelation function and the correlation values, which follow a similar pattern to that observed at Site 48SA .

**TABLE 8.4: SAMPLE OF THE SEASONAL DECOMPOSITION OUTPUT
VARIABLE E3, SITE 48SA**

	E3_M PA	Moving Averages	Diffnrcs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
325F3 JAN	134.6	172.58	-37.98	12.29	122.31	135.43	-13.13
325F3 FEB	133.6	169.31	-35.71	28.92	104.68	120.6	-15.92
325F3 MAR	135.33	164.87	-29.53	31.52	103.81	123.19	-19.37
325F3 APR	159	161.16	-2.16	13.39	145.61	141.05	4.56
325F3 MAY	183.33	158.17	25.16	8.98	174.35	160.77	13.58
325F3 JUN	173.6	155.46	18.14	2.04	171.56	174.17	-2.61
325F3 JULY	181	153.03	27.97	-4.74	185.74	180.8	4.94
325F3 AUG	169.2	152.58	16.62	-17.83	187.03	180.03	7
325F3 SEP	153.9	152.28	1.62	-24.57	178.47	174.77	3.7
325F3 OCT	138.6	151.53	-12.93	-20.61	159.21	164.94	-5.73
325F3 NOV	137.6	149.73	-12.13	-21.69	159.29	153.36	5.92
325F3 DEC	136.6	148.11	-11.51	-7.7	144.3	138.4	5.91

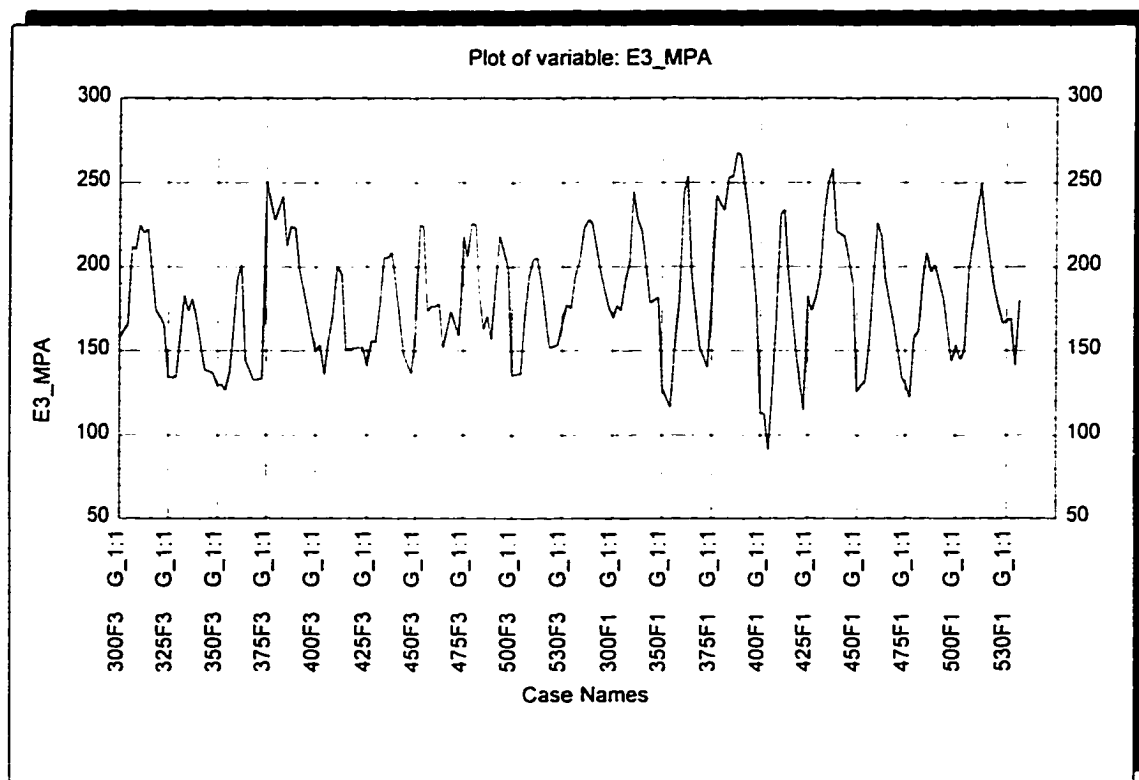


**FIGURE 8.10: THE SUBGRADE MODULUS TIME - SPACE SERIES
(SITE 48SA)**

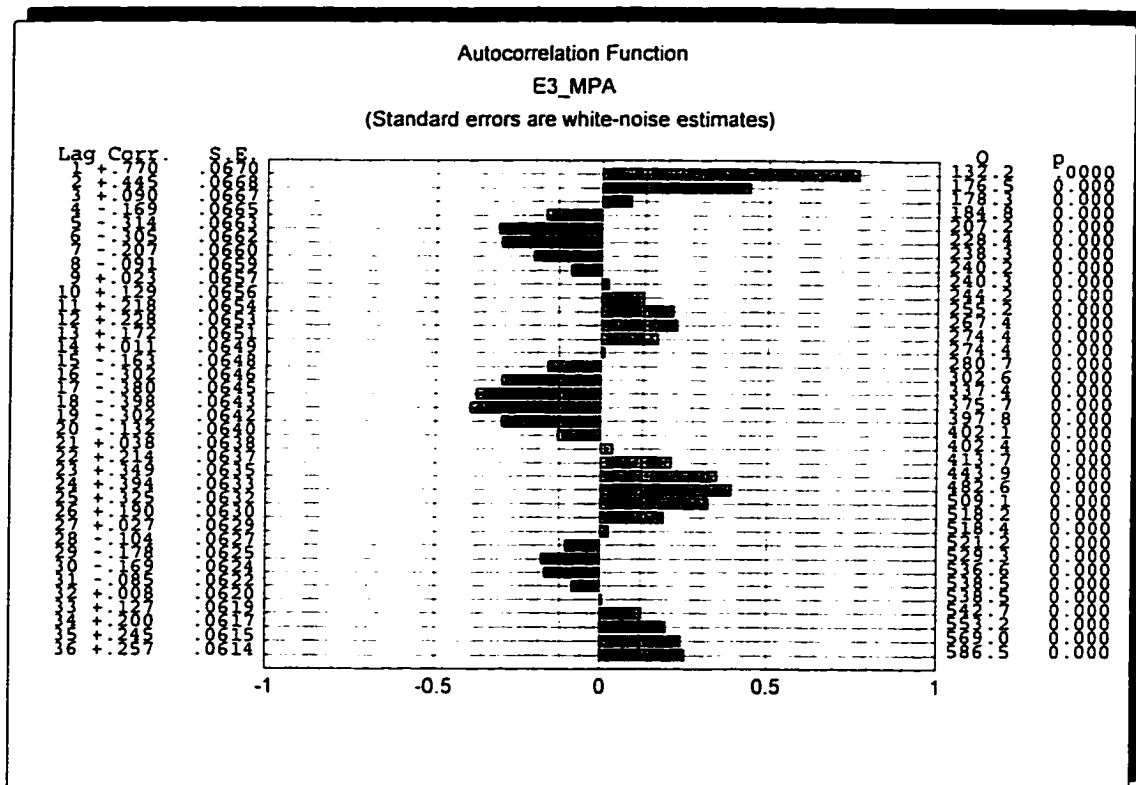


FIGURE 8.11: AUTOCORRELOGRAM ANALYSIS (VARIABLE E3, SITE 48SA)

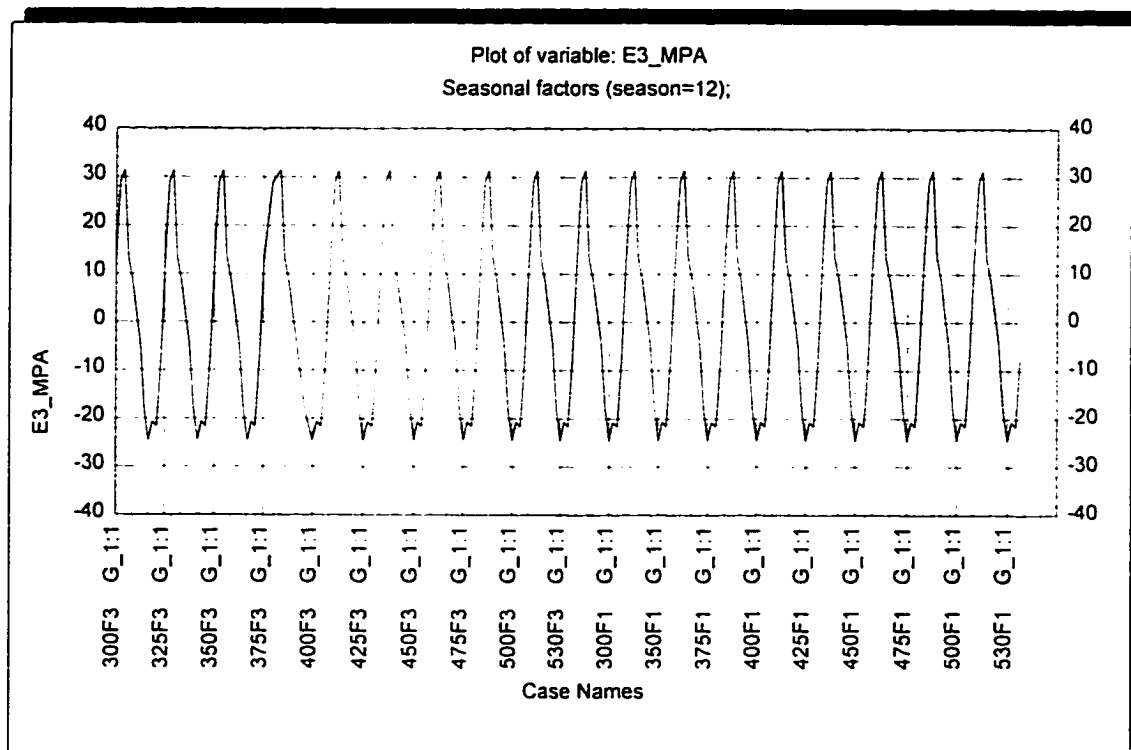


FIGURE 8.12: THE SEASONAL (TEMPORAL) COMPONENT OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SA)

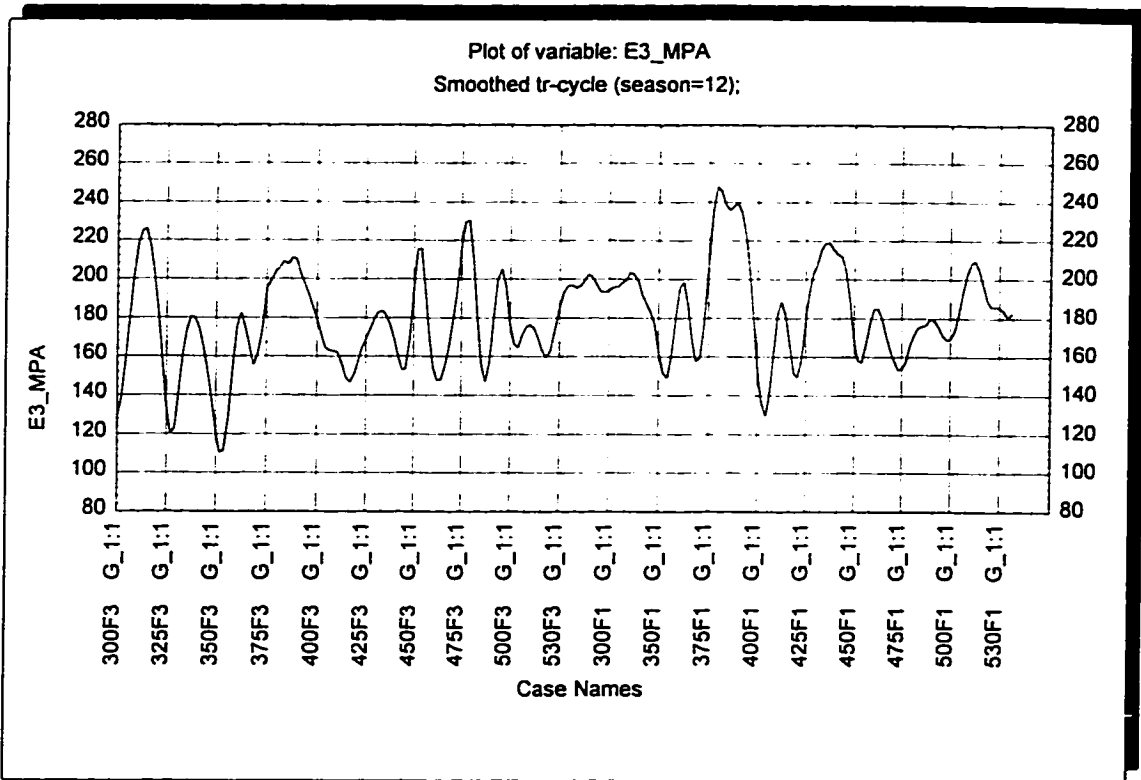


**FIGURE 8.13: TREND/ CYCLE (SPATIAL) COMPONENT
OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SA)**

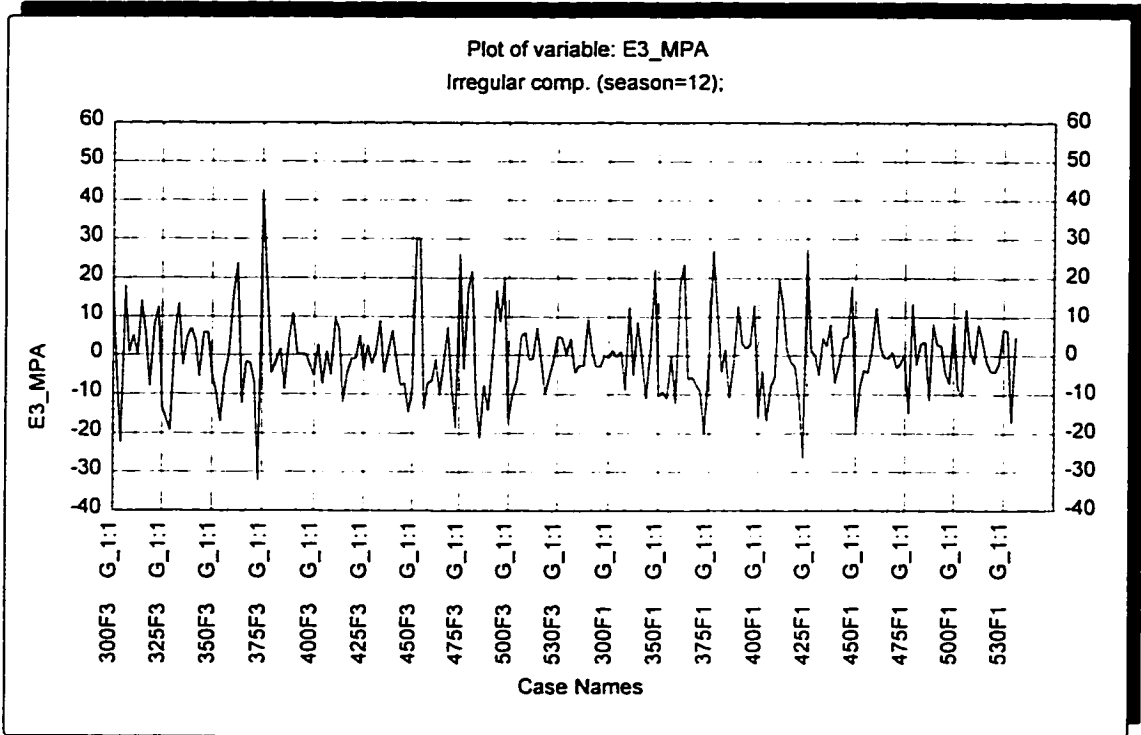


**FIGURE 8.14: THE RANDOM (IRREGULAR) COMPONENT
OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SA)**

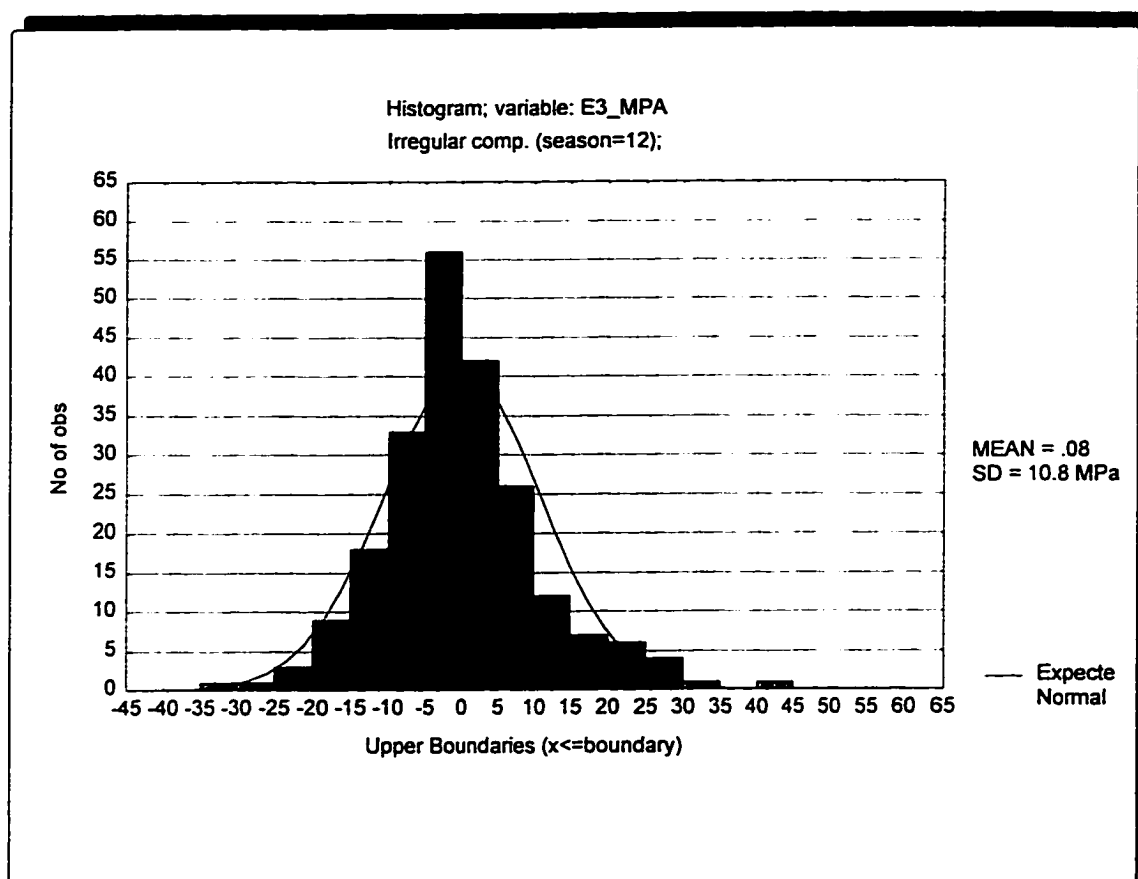


FIGURE 8.15: HISTOGRAM OF THE RANDOM (IRREGULAR) COMPONENT OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SA)

The correlation corresponding to a lag of 1.0 is high (0.8), implying that E_1 values at any two consecutive months are highly correlated. The correlations corresponding to a lag of 12, 24, 36 are also high, indicating that readings separated by 12 time units (months) are highly correlated. These high correlations suggest that the annual cycle is significant and the time of the year is a significant predictor of the AC layer elastic modulus. The standard error ranges between plus and minus 0.06, and is represented by the vertical inner dotted lines. The correlations corresponding to lags 6, 18 and 30 are also significant and negative (the values of readings 6 months apart are at the opposite side of the mean value with respect to one another.)

Table 8.5 shows a sample of the outputs of the seasonal decomposition analysis, for station 25F1. The full output for all stations, along with the original series (about 200 records), is given in Appendix B. Figures 8.18 through 8.20 represent the three additive components of the series. Figure 8.18 shows the seasonal component, which has a sinusoidal shape that ranges between 5000 MPa and -5000 MPa. The average difference between the maximum and the minimum values of the AC layer modulus is 10,000 MPa. Figure 8.19 shows the trend component, which represents the spatial variation. Figure 8.20 shows the random component of the series. The histogram of the random component (Figure 8.21) shows that the residuals may be simulated using a normal distribution with a mean value of 6.7 MPa and a standard deviation of 1205 MPa.

The subgrade modulus time series is shown in Figure 8.22. There is a seasonal cycle at each station, but its magnitude is variable from one station to the other. There appears to be a structure in the data. The modulus values start at low values at Station 25F1, then the values increase gradually as the testing proceeds towards the end of the site (Station 200F1). The pattern is repeated again as testing progresses through the wheel path points (0F3 through 200F3). The autocorrelogram function, shown in Figure 8.23 shows declining correlations as the lag increases, with higher correlations with lags of multiples of 12. After a lag of 24, all the correlations are insignificant (within the white noise). A lag of 24 indicates a separation of more than 50 ft between stations. This indicates that the spatial variation is so significant that it masks the effect of seasonality. In other words, the pattern observed above (the modulus value increases with distance) makes the

modulus seasonal values, at two testing points, uncorrelated, if they are separated by a distance greater than 50 ft.

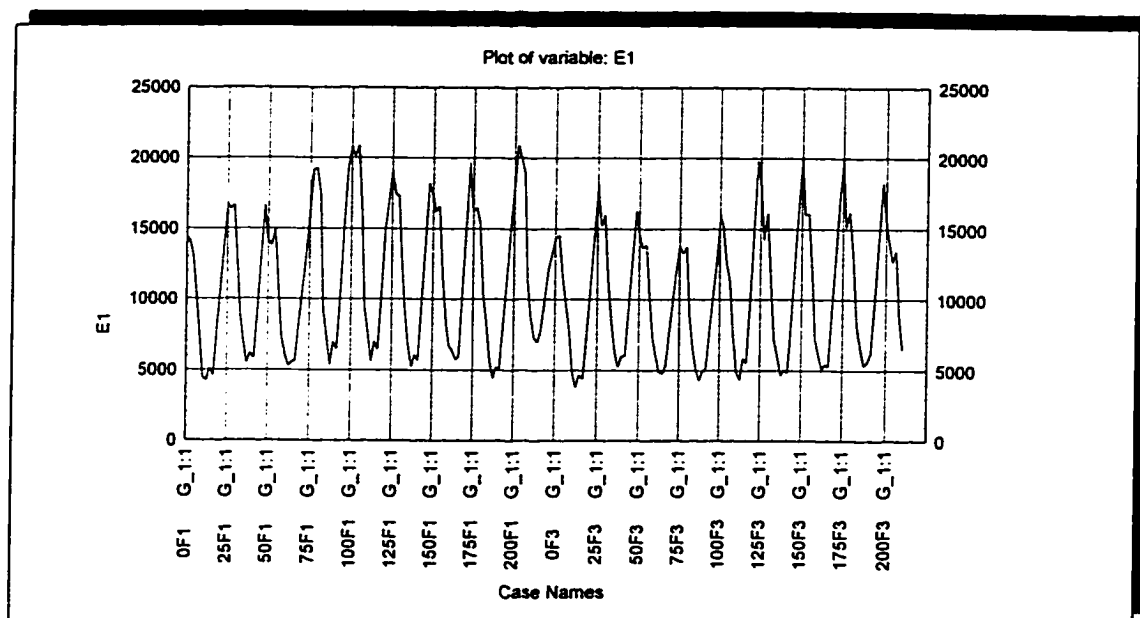


FIGURE 8.16: THE AC LAYER MODULUS TIME - SPACE SERIES (SITE 48SA)

Table 8.6 shows a sample of the outputs of the seasonal decomposition analysis, for station 25F1. The full output for all stations is given in Appendix B. Figures 8.24 through 8.26 represent the three additive components of the series. Figure 8.24 shows the seasonal component, which ranges between 35 MPa and -20 MPa. The average difference between the maximum and the minimum values of the subgrade modulus is about 55 MPa. Figure 8.25 shows the trend component, which represents the spatial variation. It is evident that the spatial variation is not random and does follow a structure, i.e., the modulus increases as we move towards the end of the site. Figure 8.26 shows the random component of the series. The histogram of the random component (Figure 8.27) shows that the residuals may be simulated using a normal distribution with a mean value of 0.23 MPa and a standard deviation of 16.8 MPa.

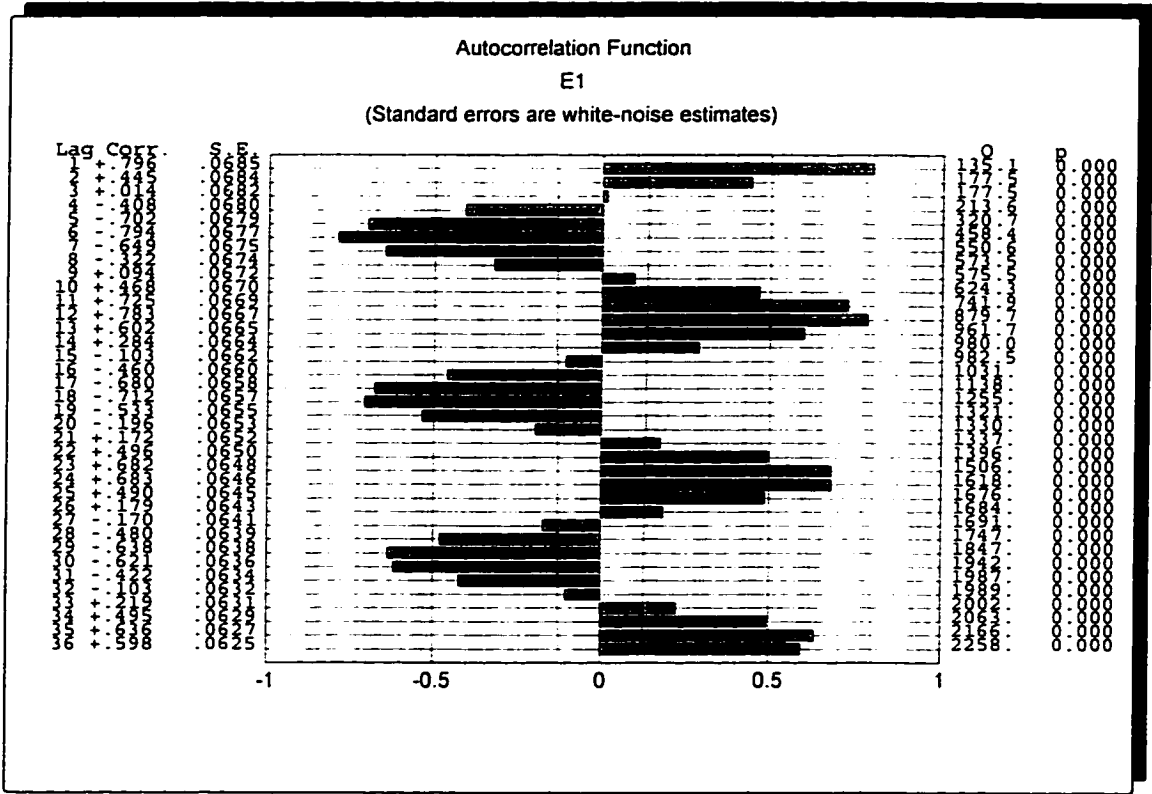


FIGURE 8.17: AUTOCORRELOGRAM ANALYSIS
(VARIABLE E1, SITE 48SA)

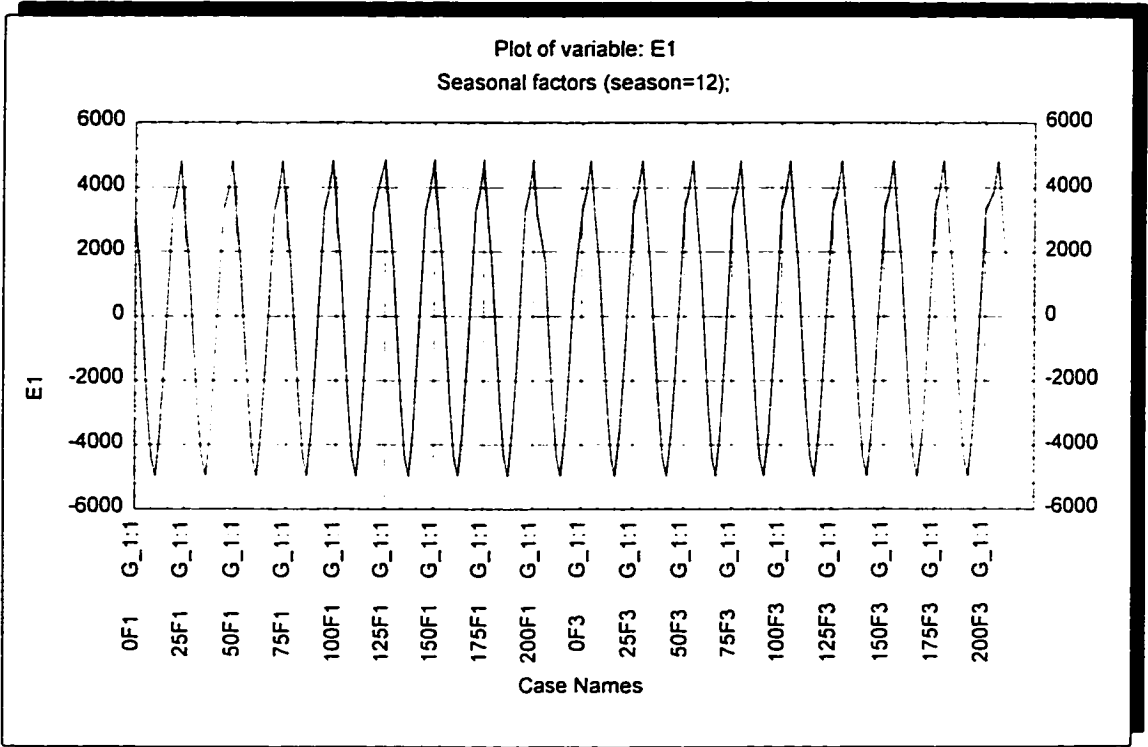


FIGURE 8.18: THE SEASONAL (TEMPORAL) COMPONENT
OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

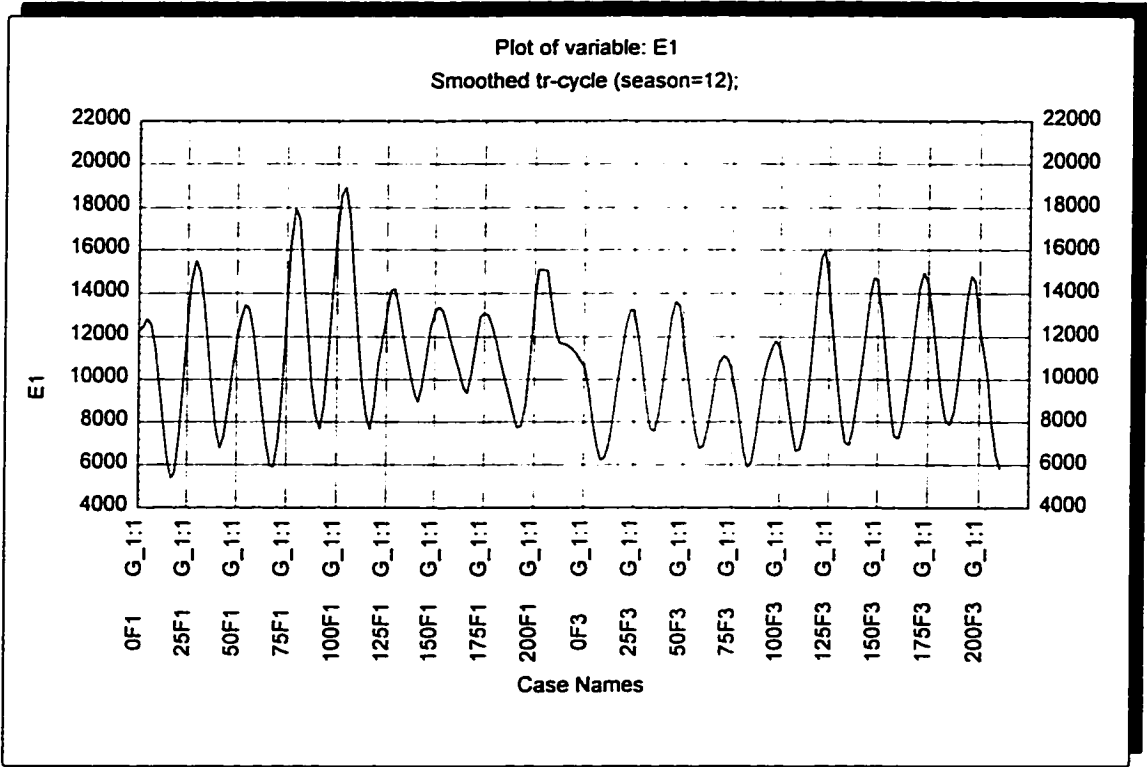


FIGURE 8.19: TREND/ CYCLE (SPATIAL) COMPONENT OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

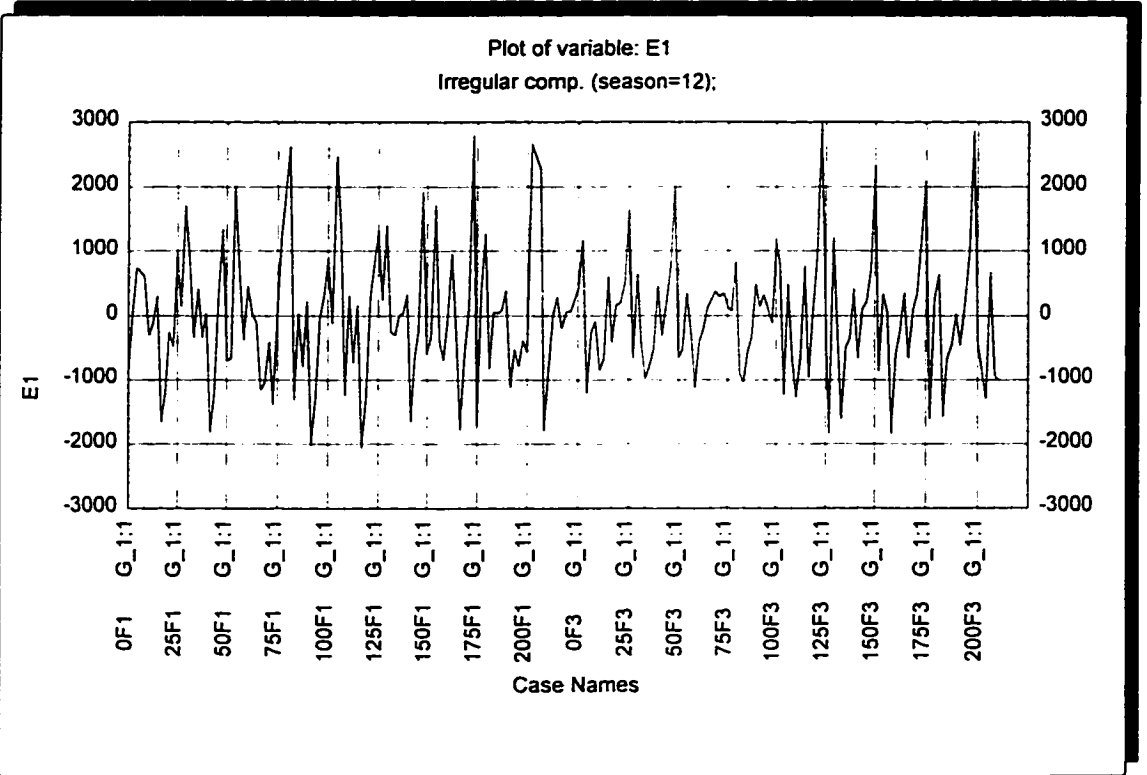


FIGURE 8.20: TREND/ CYCLE (SPATIAL) COMPONENT OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

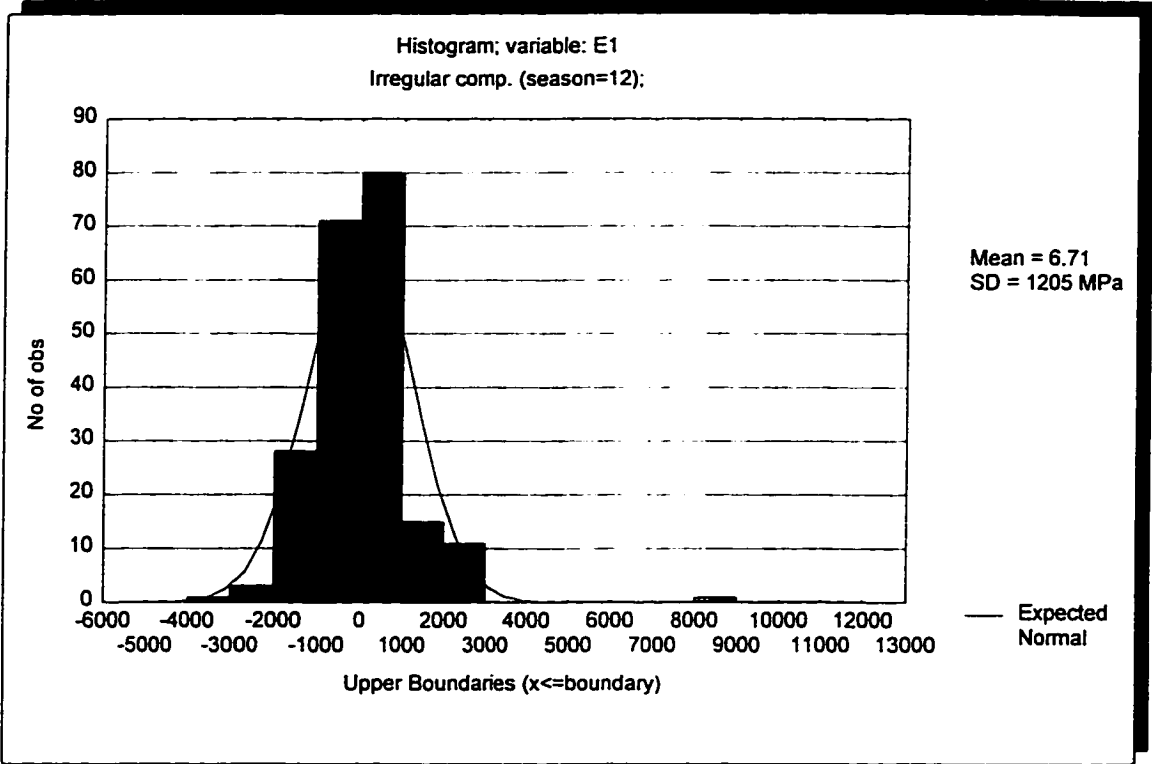


FIGURE 8.21: HISTOGRAM OF THE RANDOM (IRREGULAR) COMPONENT OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

**TABLE 8.5: SAMPLE OF THE SEASONAL DECOMPOSITION OUTPUT
VARIABLE E1, SITE 48SF**

	E1_MPA	Moving Averages	Diffnrcs	Seasonal Factors	Adjuste d Series	Smoothed Trend-c.	Irreg. Comp.
25F1 JAN	16,700	10,490.93	6,209.07	3,122.07	13,577.9	12,584.39	993.54
25F1 FEB	16,366.6	10,594.1	5,772.57	1,668.1	14,698.5	14,551.86	146.71
25F1 MAR	16,700	10,686.01	6,013.99	-525.13	17,225.1	15,511.16	1,713.97
25F1 APR	13,200	10,786.85	2,413.15	-2,685.41	15,885.4	15,020.09	865.33
25F1 MAY	8,807.5	10,922.13	-2,114.63	-4,371.61	13,179.1	13,518.92	-339.81
25F1 JUN	7,025	11,091.85	-4,066.85	-4,992.48	12,017.5	11,587.09	430.39
25F1 JULY	5,480	11,296.01	-5,816.01	-3,622.06	9,102.1	9,448.21	-346.15
25F1 AUG	6,245	11,087.68	-4,842.68	-1,538.61	7,783.6	7,732.35	51.26
25F1 SEP	5,814	10,876.57	-5,062.57	867.58	4,946.4	6,771.26	-1,824.84
25F1 OCT	9,442.67	10,734.9	-1,292.24	3,316.79	6,125.9	7,360.63	-1,234.76
25F1 NOV	13,071.3	10,564.9	2,506.43	3,890.29	9,181	8,830.92	350.12
25F1 DEC	16,700	10,451.15	6,248.85	4,870.48	11,829.5	10,477.51	1,352.01

**TABLE 8.6: SAMPLE OF THE SEASONAL DECOMPOSITION OUTPUT
VARIABLE E3, SITE 48SF**

	E3_MP A	Moving Averages	Diffnecs	Seasonal Factors	Adjusted Series	Smoothe d Trend-c.	Irreg. Comp.
25F1 JAN	144	129.09	14.91	23.68	120.32	129.42	-9.1
25F1 FEB	161.67	133.23	28.44	14.99	146.67	149.23	-2.56
25F1 MAR	151	137.05	13.95	-10.62	161.62	168.02	-6.4
25F1 APR	202.5	140.81	61.69	-20.44	222.94	182.37	40.56
25F1 MAY	163.5	145.14	18.36	-4.28	167.78	174.87	-7.09
25F1 JUN	162.5	150.03	12.47	-4.6	167.1	159.16	7.94
25F1 JULY	112.3	155.49	-43.19	-16.52	128.82	138.56	-9.73
25F1 AUG	102.85	149.38	-46.53	-12.18	115.03	130.79	-15.76
25F1 SEP	127.8	143.41	-15.61	-0.69	128.49	135.56	-7.07
25F1 OCT	153.53	137.95	15.58	3.26	150.27	150.54	-0.27
25F1 NOV	179.27	129.96	49.31	4.14	175.13	151.65	23.48
25F1 DEC	205	124.89	80.11	23.26	181.74	134.97	46.77

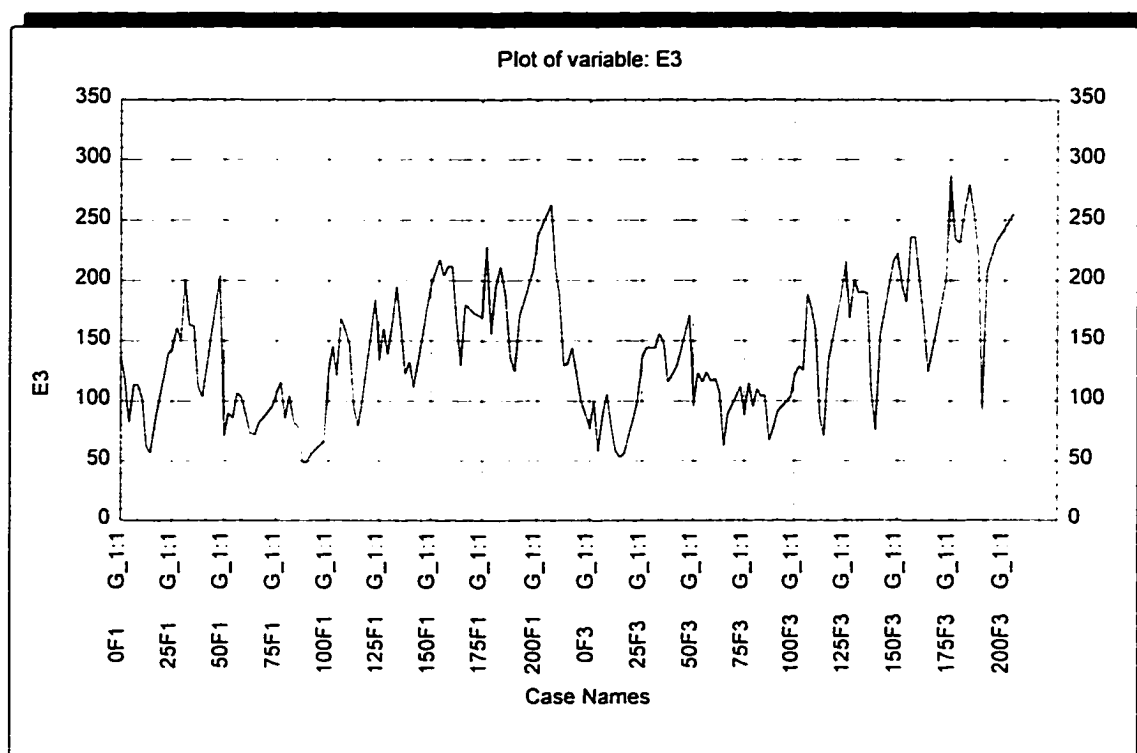


FIGURE 8.22: THE SUBGRADE MODULUS TIME - SPACE SERIES (SITE 48SF)

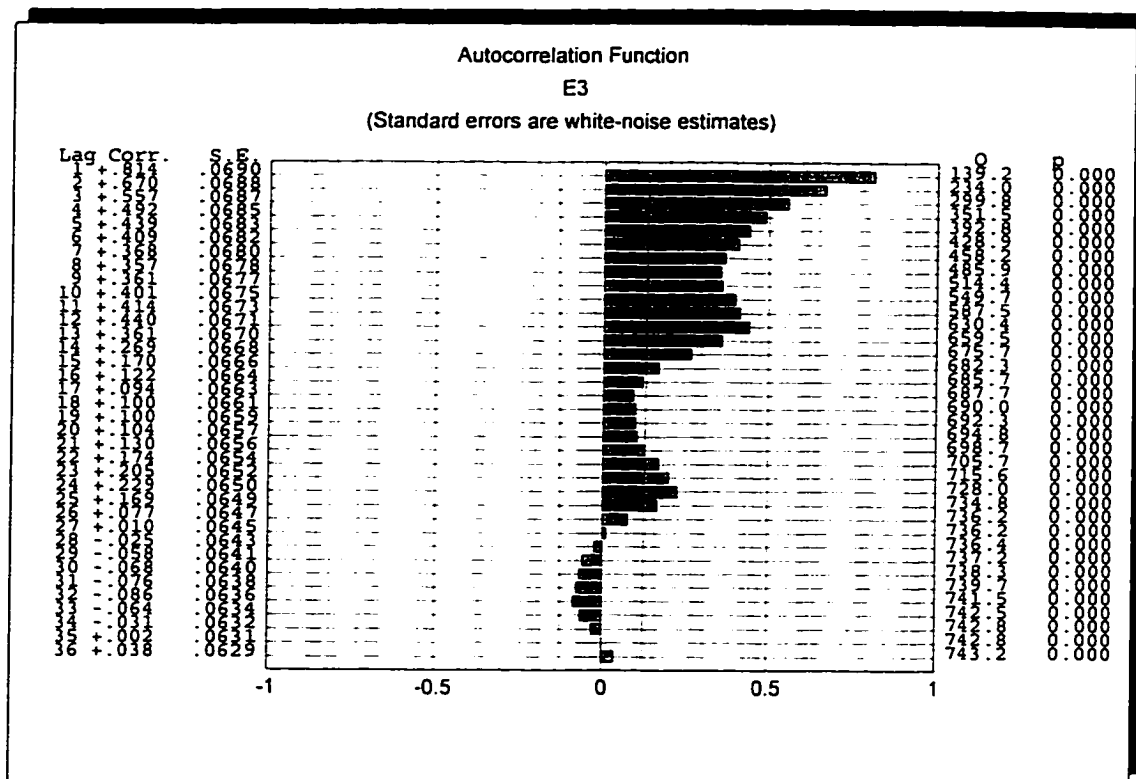


FIGURE 8.23: AUTOCORRELOGRAM ANALYSIS (VARIABLE E3, SITE 48SF)

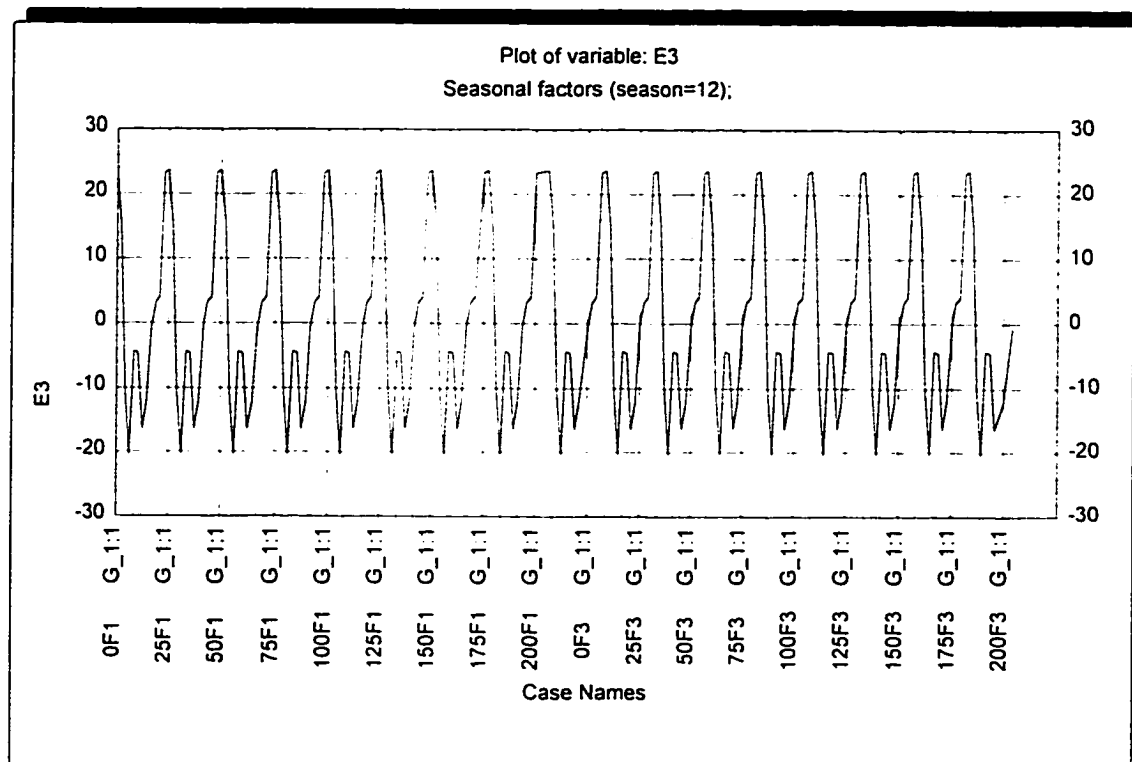


FIGURE 8.24: THE SEASONAL (TEMPORAL) COMPONENT OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SF)

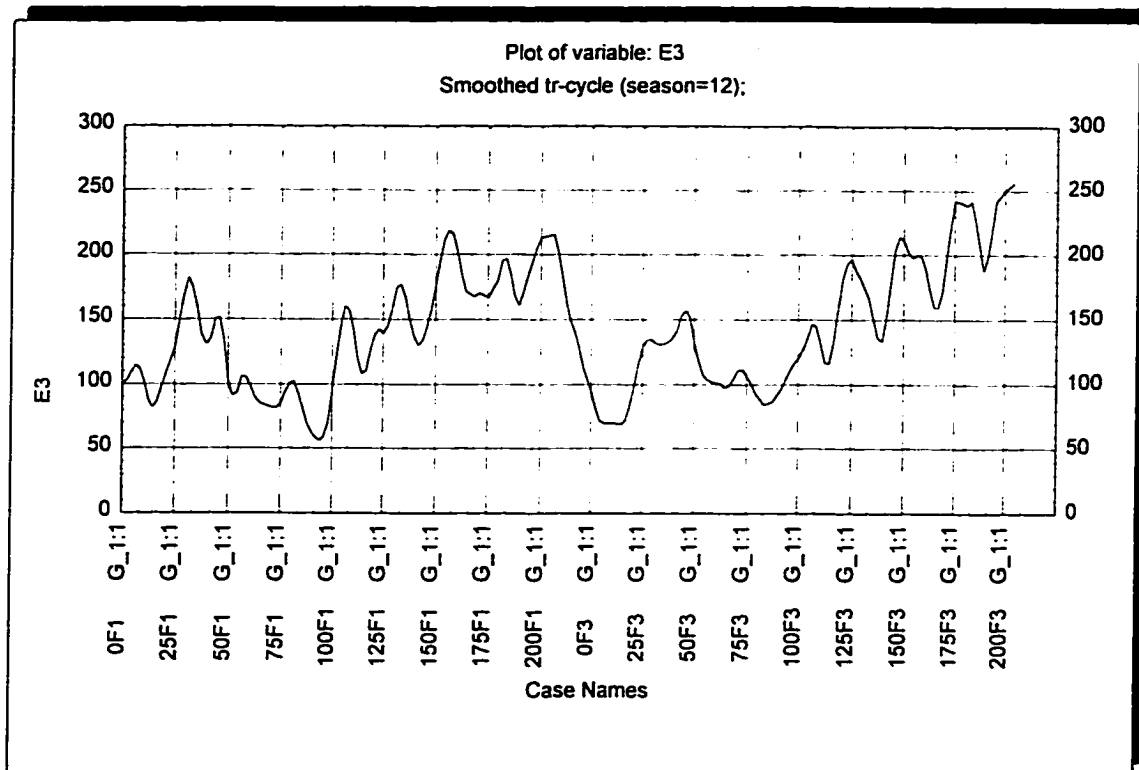


FIGURE 8.25: TREND/ CYCLE (SPATIAL) COMPONENT OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SF)

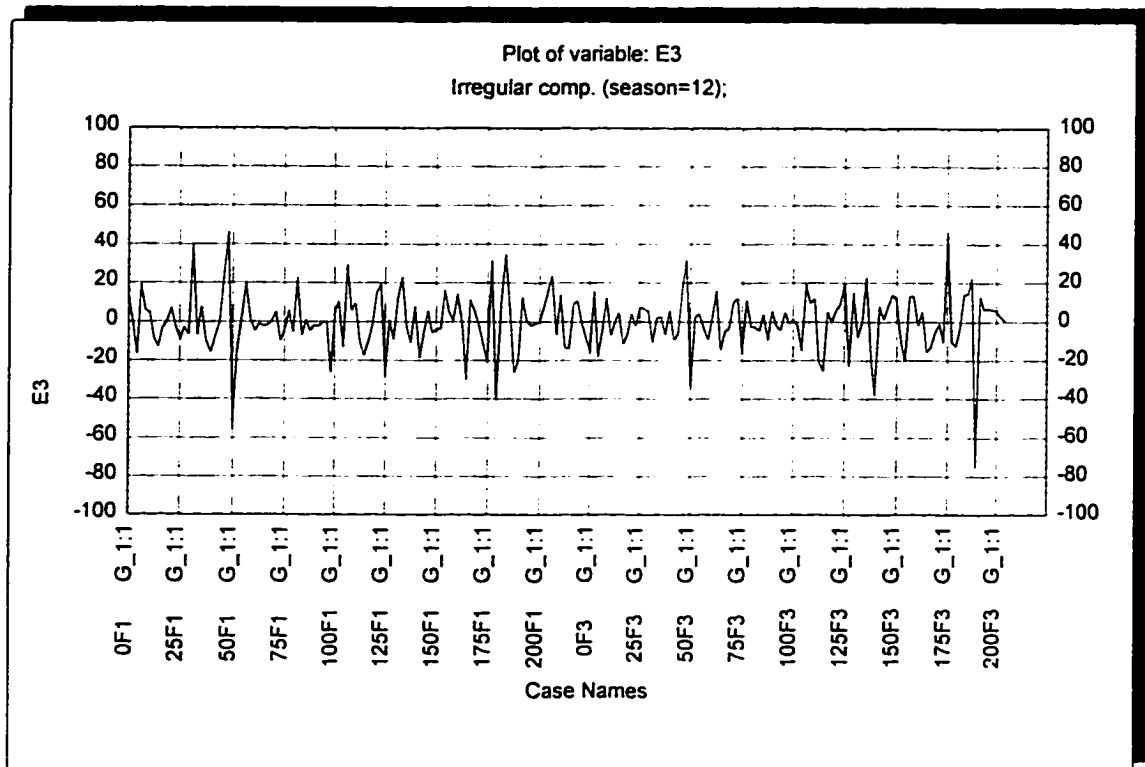


FIGURE 8.26: THE RANDOM (IRREGULAR) COMPONENT OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SF)

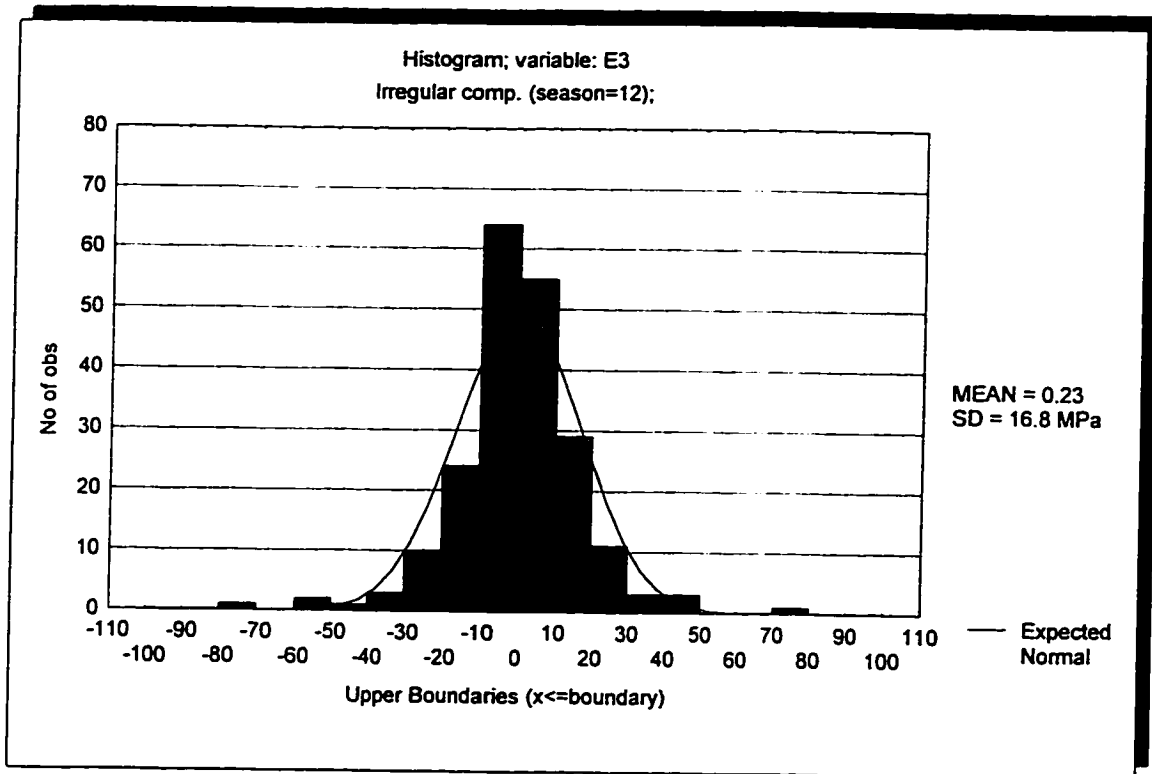


FIGURE 8.27: HISTOGRAM OF THE RANDOM (IRREGULAR) COMPONENT OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SF)

Exponential Smoothing & Forecasts

To forecast the future values of a series, the exponential smoothing method is used. The new smoothed value (forecast) is computed as the weighted average of the current observation and the previous smoothed value. Which is expressed as:

$$S_t = \alpha * X_t + (1 - \alpha)S_{t-1}$$

where S_t is the current smoothed value of the series, α is a stiffness parameter, X_t is the current observation and S_{t-1} is the previous smoothed value. Figure 8.28 shows the smoothed AC layer modulus series followed by the next year's forecast (shown in a dotted line at the right side of the graph). The left side of the figure shows the original series, the smoothed series and the residuals (the difference between the two series, with values given by the right side vertical scale.)

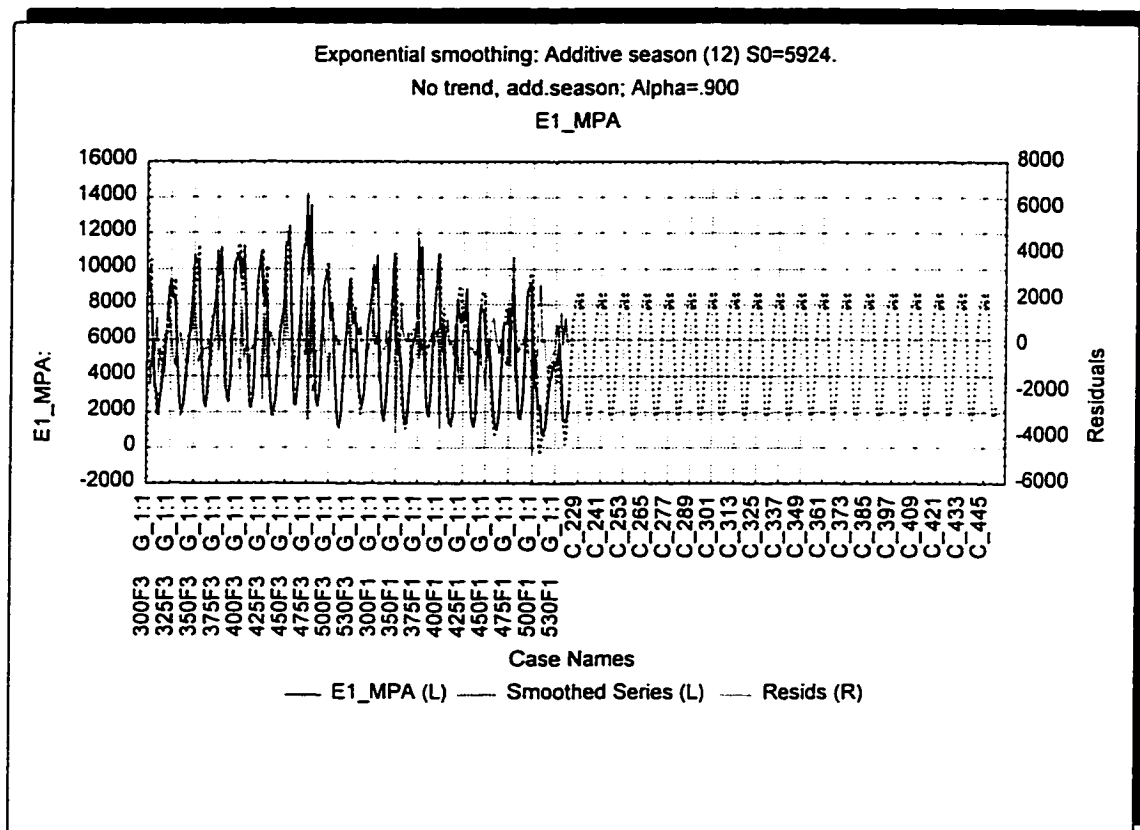


FIGURE 8.28: EXPONENTIAL SMOOTHING FORECASTS OF THE AC LAYER MODULUS TIME SERIES (SITE 48SA)

Figure 8.29 shows the exponential smoothing forecast for the subgrade resilient modulus at site 48SA. As indicated earlier, it is assumed that secular trend component of the variation is absent, since the data is not enough to examine the long term variation. Therefore, the forecast above shows only the seasonal variation.

In conclusion, the time series analysis, performed in this chapter, is a powerful technique that enables pavement engineers to separate the various sources of variation, so that a model may be formulated to represent the system and predict future values of the criterion variable. In this analysis, two systematic variations are investigated: the temporal variation that is caused by the environment, and the spatial variation that is

caused by the physical characteristics of the pavement. In addition to the systematic variation, a nonsystematic (random) variation exists, which represents the unexplained portion of the variation. These three components are added together to reconstruct the original series.

With respect to the AC layer modulus, the temporal (seasonal) variation is very significant as compared to the spatial variation. The latter variation did not represent a specific structure (i.e., random.) The subgrade modulus at Site 48SA, exhibited a strong seasonality and a random spatial variation. However, in Site 48SF, it exhibited a strong seasonality and a strong spatial variation, with an increasing trend, which, to a large degree, masked the effect of seasonality. Spectral analysis was performed to examine the periodicity of the series and to mathematically model the series. The exponential smoothing was used to forecast future values of the series.

It is recommended that time series analysis be performed on the pavement layer moduli values when a few more years' worth of data have been collected, to examine the secular trend (long term variation) component. The next chapter (Chapter 9), presents a methodology to incorporate both the long-term variation as well as the seasonal variation of a pavement's layer moduli in the design of the pavement. Such methodology is built on the assumption that the seasonal and the secular components of the pavement layer moduli are accurately modeled.

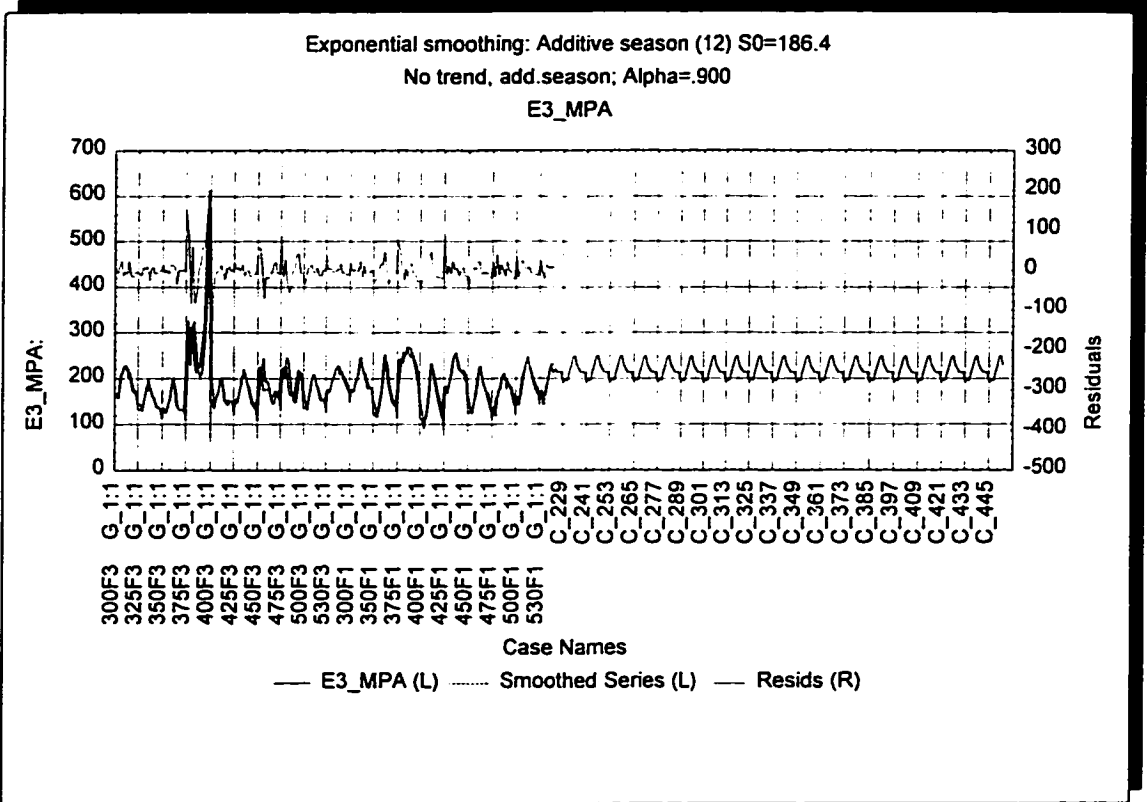


FIGURE 8.29: EXPONENTIAL SMOOTHING FORECASTS OF THE SUBGRADE MODULUS TIME SERIES (SITE 48SA)

CHAPTER 9: SEASONAL VARIATION IN PAVEMENT DESIGN

It has been shown in previous chapters, by applying time series techniques, autocorrelations, spectral analysis and nonlinear modeling, that some pavement structural properties are time dependent. However, time is not a causal property of pavements, that is, time does not cause pavement properties to change, but other explanatory variables do change with time, some changes occurring in a systematic manner, thus causing those properties to change.

For example, pavement aging (hardening due to age) is not caused by time. It is actually caused by load compaction and by pavement oxidization. However, since these two independent variables increase with the passage of time, and since measuring time is easier than measuring pavement oxidization or load repetitions, it might be easier to develop a regression equation to predict pavement aging as a function of time (or age) especially if the exact mechanisms are not fully understood.

In this chapter pavement structural properties are characterized using periodic functions. Such functions are then substituted in selected flexible pavement design equations to evaluate the impact of such variations in pavement performance.

CHARACTERIZATION OF THE SEASONAL VARIATION

Seasonal variations in climatic factors (temperature, moisture and frost) impose seasonal variations in pavement layers' stiffnesses (elastic moduli). Meanwhile, demographic, social and economic activities impose variation in travel demand (load magnitude and frequency in the context of pavement design). It is imperative to accommodate variations from both sides in pavement design and analysis. The following paragraphs discuss such variations and the use of periodic functions to characterize such variations.

Seasonal Variations in the AC Layer Elastic Modulus

The elastic modulus of the AC layer was shown to be exponentially influenced by pavement temperature. As was outlined in Chapter 7, a sinusoidal model was fitted to the average monthly AC layer elastic modulus values, to characterize its seasonal variation. The model takes the following general form, which was described in Equation 7.10 and Figure 7.6:

$$E_{AC} = A + B \sin(2\pi fT + C) \dots \dots \dots (9.1),$$

Where

E_{AC} : is the AC layer elastic modulus at time T

A: is the average value of E_{AC}

B: is the amplitude of the wave

T: is the time of observation (e.g.. month of the year 1 to 12)

f: is the frequency (number of increments per cycle = 1/12 in case of using month increments)

C: is a phase angle; it controls the starting point on the curve and the peak month(s).

Equation 9.1 indicates that the values of E average A , have a minimum value of $(A-B)$ and a maximum value of $(A+B)$. Depending on the site location (i.e. southern or northern hemisphere and latitude) the values of A , B and C will change to reflect the average values of E , the magnitude of change and the phase angle, respectively.

Although a sinusoidal model is used throughout this chapter to characterize the AC layer modulus seasonal variation (refer to Chapter 7), other models may be used. For example, the above model describes only the seasonal variation, indicating that the same wave is precisely repeated every year. Long- term variations (secular- trend, as described in Chapter 8) may suggest an exponential (or linear) component to be multiplied by the above model, to express the long- term decline in the AC layer modulus due to pavement deterioration.

$$E_{AC} = e^{(-D * M/12)} * (A + B * \sin(2\pi * f * M - C)) \dots\dots\dots(9.2)$$

where D is a decaying factor, which controls the rate by which the pavement deteriorates and M is the month of the year. A stochastic component may be added to the model to express the random component. Such component is characterized by the probability density function and its parameters (mean and standard deviation.) For instance, the random (irregular) component of the AC layer modulus was normally distribution with a mean of 0.23 MPa and a standard deviation of 16.8 MPa (Figure 8.27.)

Seasonal Variation in the Elastic Moduli of the Base and Subbase Layers

According to Unsaturated Soil Mechanics (USM) theory [39], the elastic moduli of the base and subbase layers are influenced by matric suction; the latter is a function of moisture content and material type. However, if a proper drainage system is provided such that the moisture levels are held constant within the base and subbase layers, then a constant modulus value corresponding to the optimum moisture content may be assumed, for each layer [47]. In cases where a drainage system is not provided (i.e., modulus values vary), periodic functions similar to Equation 9.1 may be used to quantify seasonal variation in the elastic moduli of the base and subbase layers.

Seasonal Variation in the Subgrade Resilient Modulus

The resilient modulus of the subgrade material is one pavement property that is known to undergo seasonal variations. Although the exact mechanisms that cause the subgrade resilient modulus to change is not as simple as that of the AC elastic modulus, the subgrade resilient modulus often follows a seasonal cycle. The subgrade modulus' seasonal cycles are influenced by moisture content, matric suction, precipitation, water table, drainability of the soil mass, temperature, and freezing and thawing cycles. Freezing and thawing could introduce acute changes in the subgrade modulus. However, since the seasonal sites analyzed in this report are located in a no-freeze zone, sinusoidal functions similar to Equation 9.1 are fitted with reasonable accuracy to correlate the resilient modulus of subgrade to the month of the year (see Chapter 7.)

The subgrade resilient modulus may be represented by other functions such as polynomial functions, exponential functions (during thaw periods), linear functions or composite models with more than one function. The trend and the irregular components of the variation may be modeled in a fashion similar to that outlined above for the AC layer elastic modulus.

The combined effect of the changes in both the AC modulus of elasticity and the subgrade resilient modulus results in seasonal variation in pavement stiffness and hence, strength.

Seasonal Variation in Traffic Volume

Not only is there variation from the supply side, but also from the demand side. In other words, pavement is a transportation facility provided by the highway agency (the supplier) and used by road users (traffic or demand). As the supplied facility undergoes seasonal weakening and strengthening, the demand on the facility undergoes seasonal fluctuations. It is well known that traffic patterns change with seasons, following economic, social and demographic activities. For example, in the summer time, as well as at Christmas time, there is a higher demand on transportation than that of other times of the year. Access roads that serve recreational centers are expected to have more traffic during the summer time than in the winter time. Functions that represent traffic variation might have a sinusoidal shape similar to that of Equation 9.1, a sinusoidal shape with dual or multiple peaks, a saw tooth shape, or any other shape.

INCORPORATING THE SEASONAL VARIATIONS IN PAVEMENT DESIGN

With the increasing computing capabilities and significant improvements in data collection techniques, such as Weigh in Motion (WIM) and FWD, it is becoming increasingly possible to accommodate variations from both supply and demand sides in pavement design. The following paragraphs demonstrate how such variations may be incorporated in existing pavement design algorithms, given that all sources of temporal variations have been quantified. In this context, quantification means that each source of variation is expressed as a function of time. Alternatively, typical values at specified periods of the year may be used. A computer program, Seasonal Variation in Pavement Design (SVPD), was written to carry out the required calculations, and facilitate the comparison between the following design methods:

A: Empirical Design Methods (based on serviceability loss)

1. Existing Effective Roadbed Resilient Modulus (AASHTO)
2. Integral Method w/ Constant Structural Number (AASHTO)
3. Integral Method w/ Variable Structural Number (AASHTO)

B: Mechanistic -Empirical Methods (based on specified failure criteria)

1. Design based on Fatigue Failure
2. Design based on Permanent Deformation Failure

Design Algorithms Based on Serviceability Loss.

1. Effective Roadbed Resilient Modulus (AASHTO)

The AASHTO flexible pavement design method of 1993 [1] uses the following equation:

$$\log_{10} W_{18} = z_R S_o + 9.36 \log(SN + 1) - 0.20 + \frac{\log_{10} \left[\frac{\Delta PSI}{4.2 - 1.5} \right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \log_{10} M_R - 8.07 \dots (9.3),$$

where:

W_{18} is the estimated future traffic for the performance period;

Z_R is the number of standard deviations (from the standard normal distribution curve) corresponding to reliability level R;

S_o is the overall standard deviation;

SN is the required structural number to sustain traffic applications in performance period;

ΔPSI is the design serviceability loss; and

M_R is the effective resilient modulus of roadbed material.

In this method, the subgrade resilient modulus M_R is taken as the weighted average of the seasonal values. The weights are based on the amount of "damage" that occurs in each season. The effective roadbed resilient modulus is calculated as follows:

$$U_i = 1.18 * 10^8 * M_{Ri}^{-2.32} \dots \dots \dots (9.4)$$

$$U_{average} = \frac{1}{n} \sum U_i \dots \dots \dots (9.5)$$

$$M_r(eff) = \left(\frac{1.18 * 10^8}{U_{average}} \right)^{1/2.32} \dots \dots \dots (9.6),$$

where:

U_i is the damage in season i ; there are n seasons in the year; and

M_{Ri} is the resilient modulus in season i

It is assumed that there are no fluctuations in traffic volume, i.e., traffic is constant throughout the year.

2. Integral Method w/ Constant Structural Number (AASHTO)

Using the AASHTO design equation (9.3), the effect of seasonal variation in the resilient modulus of the subgrade and the seasonal variation in traffic volume may be accounted for as follows:

The total damage (D) to a pavement during its life is given by

$$D = \frac{\text{Demand (ESAL's)}}{\text{Supply (ESAL's)}} = \frac{\text{the predicted total traffic (number of load applications)}}{\text{the allowable number of load applications}} \dots\dots(9.7)$$

Assuming that Miner's linear damage hypothesis [48] is valid and applicable, that is the total damage is the sum of seasonal damages,

$$D = N * \int_a^b \left[\frac{f(t) dt}{10^{[z_R S_o + 9.36 \log(SN+1) - 0.20 + \frac{\log_{10} \left[\frac{\Delta PSI}{4.2-1.5} \right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \log_{10} M_R - 8.07]}} \right] \dots\dots(9.8),$$

where

N is the performance life in years assuming that annual traffic is constant;

a and b are constants that represent the beginning and the end of the year (1 and 12 if seasons are represented by months, or 1 and 365 if seasons are represented by days, etc.);

f(t) is the traffic distribution time function;

t represents time of the year; and

The term in the denominator represents the allowable load repetitions at time t for a duration of Δt .

Now let's assume that X = the term in the denominator that does not include M_R , and Y is the term that includes M_R , that is:

$$X = 10^{[z_R S_o + 9.36 \log(SN+1) - 0.20 + \frac{\log_{10} \left[\frac{\Delta PSI}{4.2-1.5} \right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} - 8.07]} \dots\dots\dots(9.9)$$

$$Y = 10^{[2.32 \log_{10} M_R]} \dots\dots\dots(9.10)$$

Substituting in equation 9.8, and factoring out the constant term X , result in:

$$\frac{N}{X_a} \int_a^b \left[\frac{f(t) dt}{(Y)_t} \right] = D \dots\dots\dots(9.11)$$

At the end of pavement performance life, the total damage equals unity. Hence,

$$\frac{N}{X_a} \int_{10}^b \left[\frac{f(t) dt}{(2.32 \log MR)} \right] = 1.0 \dots\dots\dots(9.12)$$

Substituting Y and X in Equation 9.12, and replacing M_R by its time function results in:

$$N = \frac{X}{\int_a^b \left[\frac{f(t) dt}{(\Phi(t))^{2.32}} \right]} \dots\dots\dots(9.13),$$

where $\Phi(t)$ is a time function of the subgrade resilient modulus. Solving for SN gives:

$$SN = -1 + \left(\frac{K}{(\Delta PSI/2.7)^{(1/B)}} \right)^{(1/9.36)} \dots\dots\dots(9.14)$$

where $B = 0.4 + \frac{1094}{(SN+1)^{5.19}}$ and $K = N(1+r)^{(N-1)} * \int \frac{f(t)}{\Phi(t)^{2.32}} dt / 10^{(ZS-8.27)}$

Equation 9.14 is to be used to find the required structural number SN such that the pavement will survive N years, given $f(t)$, $\Phi(t)$ and the traffic annual growth rate (r). Alternatively, given an existing pavement structure (SN), the number of years (N) that will elapse before the serviceability index declines to a given terminal level, may be calculated using Equation 9.13. It is important to realize that this method will account for:

1. seasonal variations in the subgrade M_R ; and
2. seasonal variation in traffic volume

It assumes that pavement structural number is constant throughout the year. Therefore the variation in the AC elastic modulus is not accounted for.

Equation 9.14 is solved by evaluating the integral part analytically or numerically, by dividing the year into small finite segments and evaluating the above damage function in each segment and adding the values using Simpson's rule, for example. Since the unknown (SN) appears on both sides, the equation may be solved iteratively using Newton's method, for instance. SVPD calculates the required structural number based on this method and other methods outlined later in this paper. SVPD is written in Visual BASIC, the program listing is given in Appendix C.

3. Integral Method w/ Variable Structural Number (AASHTO)

The Structural Number, the output of AASHTO design method, is a function of pavement layer thicknesses and stiffnesses. It is expressed as:

$$SN = \sum a_i m_i d_i \dots\dots\dots(9.15),$$

where

(a_i) is the structural (strength) coefficient of layer i ;

(m_i) is the drainage coefficient of layer i ; and

(d_i) is the thickness in inches of layer i .

The structural coefficient is correlated to the modulus of elasticity of each layer, therefore, it is expected that the structural number will be variable depending on the elastic moduli of the layers. However, if a proper drainage system is provided such that

the moisture levels are held constant within the base and subbase layers, then a constant modulus value corresponding to the optimum moisture content may be assumed, for the base and subbase layers [47]. It is then assumed that the major source of variation in the structural number is caused by seasonal changes in the AC layer elastic modulus. As mentioned earlier, the AC elastic modulus follows a sinusoidal form after the ambient temperature, consequently, the structural number, in theory, should follow the same pattern (with different amplitude and shift angle.) For example, the structural number may follow the following expression:

$$SN = SN_{av} + \frac{SN_{av}}{3} * \sin(2\pi * M/12 + C) \dots \dots \dots (9.16),$$

meaning that the structural number is variable, having an average value of SN_{av} and deviates from the average value by plus or minus one third of that value. To incorporate these variation in the design algorithm, a gradient search method is used to calculate the required structural number such that the cumulative damage at the end of performance life equals unity. In this case, the unknown is variable and is inside the integral function. Therefore, numerical optimization techniques have to be used to find the solution.

Using the AASHTO design equation (Equation 9.3) and keeping all time variables inside the integration, the objective function in this case is to minimize the quantity:

$$F = \left(\frac{N^*(1+r)^{(N-1)}}{10^{(2.5-8.27)}} \int_a^b \frac{f(t)}{\Phi(t)^{2.32} * (SN(t)+1)^{9.36} * \left(\frac{\Delta PSI}{2.7}\right)^{\frac{1}{B}}} dt - 1 \right)^2 \dots \dots \dots (9.17),$$

where:

$f(t)$ is traffic volume time function in ESAL's;

$\Phi(t)$ is the subgrade resilient modulus time function;

SN(t) is the Structural Number time function; and

$$B = 0.4 + \frac{1094}{(SN(t)+1)^{5.19}}$$

F is the objective function to be minimized. The first term in the function represents the cumulative damage to the pavement; the second term is 1.0. Since the cumulative damage should equal unity at the end of performance life, the solution is the Structural Number that satisfies the condition $F = 0.0$.

The solution is achieved using two numerical optimization methods. The first method is Exhaustive Enumeration, in which the practical range of SN values is divided into small segments (SN from 1 to 10 with increments of 0.1) and the objective function is calculated at each value. The solution is the SN value that minimizes the objective function. The second method uses the Gradient Search technique in which the objective function is evaluated at a starting point and the gradient (the slope or derivative of the objective function with respect to the unknown) is evaluated at each step to calculate the movement to the next value until convergence is reached. SVPD carries out these calculations, plots the objective function and finds the required structural number.

Example 1

A new expressway is to be constructed. Travel demand forecasting and traffic analysis predicted that the monthly traffic volume per design lane is given by the following time function $ESAL = 27,777 + 20000 \sin(3.14 * M/6 + A)$. FWD testing on existing roads in

the area shows that the resilient modulus of the subgrade, in psi (1 psi = 6.9 kPa), is given by:

MR = 5000+1000 SIN(3.14*M/6 +B). Also given:

M is the month of the year

A = 3, B = -2

Serviceability loss = 1.9

Reliability level = 95%

Overall standard deviation = 0.35

Traffic growth rate = 0.0

Calculate the required SN to sustain 5×10^6 cumulative standard ESAL applications using:

1. Effective Roadbed Resilient Modulus (i.e., neglect traffic volume and SN variations)
2. Integral Method w/ Constant SN (i.e., neglect variations in SN)
3. Integral Method w/ Variable SN assuming that minimum average air temperature is in February and that SN follows the temperature sinusoidal pattern. The summer (minimum) value of the AC layer modulus is 333,000 psi (2300 MPa) and the winter (maximum) value is 1,000,000 psi (6900 MPa).

Solution

1. Using SVPD, the resilient modulus function is used to generate 24 values for different times of the year (e.g., for January, substituting M by 0.5 and 1.0 yields 4969 psi and 4974 psi for the first and second halves of January respectively). These

values are then used to calculate the effective M_R according to the AASHTO Effective Roadbed Resilient Modulus procedure. For reliability level of 95%, the corresponding Z value from the standard normal distribution curve is -1.645. Substituting these values in the design equation, the required $SN = 5.03$

2. In order to compare the different methods, the cumulative traffic (ESAL's) must be the same in all methods. Therefore, with an annual traffic growth rate of 0.0 and average monthly ESAL's of 27,777 the cumulative ESAL's will be $5 * 10^6$ in 15 years. In the Integral Method w/ Constant SN, SVPD divides the year into 360 segments. In each segment, ESAL and M_R values are calculated and the damage values are summed. To evaluate the sensitivity of the solution to the shift angles A and B, the required SN is calculated for all possible combinations of the two variables A and B. The SN values were between 4.90 and 5.14. Obviously, these values will change if the amplitude (one half the variation range) of either or both the traffic volume and the resilient modulus functions change.

3. In order to construct the SN time function, we need to assume average values for SN and AC layer thickness. The SN is assumed to follow the following function $SN = SN_{av} + X * SN_{av} * \sin(3.14 * M/6 + C)$, where X is a fraction that represents the magnitude of change in SN value (amplitude). C is shift angle to be calculated as follows:

The maximum SN will occur in February, therefore,

$$\sin(3.14 * M/6 + C) = +1$$

$$3.14 * M/6 + C = \frac{\pi}{2} ; M = 2 \text{ (February)}$$

$$C = \frac{\pi}{6}$$

$$C = 0.524$$

From correlation charts (after Van Til et al [49]), at $E_{AC} = 1,000,000$ psi (6900 MPa), the structural layer coefficient = 0.59; for $E_{AC} = 333,000$ psi (2300 MPa), the structural layer coefficient = 0.38. It should be noted that since the variation in the AC layer modulus values are explicitly characterized in this approach, it is not necessary to adhere to the 70 °F temperature label on the correlation chart. The correlations between the AC elastic modulus and the layer coefficient are based on the Elastic Layer theory, in which temperature has no bearing on the results. Therefore, for the purpose of this example, these correlations may be used for temperatures other than 70 °F, as long as the temperature effect on the modulus values is accounted for explicitly. Also, see Appendix GG of the AASHTO Guide.

For a 6-inch AC layer, the difference in SN between the maximum and the minimum values = $6 * (0.59 - 0.38) = 1.26$. The amplitude of the sine function, as expressed in Equation 9.16, equals $(1.26/SN_{av})/2 = \frac{0.63}{SN_{av}}$. Therefore, the SN time function is:

$$SN = SN_{av} + 0.63 * \sin(3.14 * M/6 + 0.524).$$

SVPD divides the year into 360 increments, calculates the ESAL, M_R and SN at each increment and evaluates the objective function. The solution is found when the cumulative damage at the end of 15-year performance life equals unity. Using the Exhaustive Enumeration method, the required $SN_{av} = 5.2$. Using the Gradient Search Algorithm yields $SN_{av} = 5.2$.

To evaluate the degree to which the required SN is sensitive to changes in the amplitude and the shift factor of the SN time function, the following values were calculated:

<u>SN Time Function</u>	<u>Required SN</u>
$SN = SN_{av} + 0.63 * \sin(3.14 * M/6 + 0.524)$	5.2
$SN = SN_{av} + 1.50 * \sin(3.14 * M/6 + 0.524)$	5.7
$SN = SN_{av} + 2.0 * \sin(3.14 * M/6 + 0.524)$	6.1
$SN = SN_{av} + 0.63 * \sin(3.14 * M/6 + \pi)$	5.0
$SN = SN_{av} + 0.63 * \sin(3.14 * M/6 - \frac{\pi}{2})$	5.3

This example illustrates how each variation component affects the outcome of the design algorithm. Further sensitivity analysis is required to evaluate the importance of each variation parameter. Another possible application is to adjust the SN calculated by traditional methods by a correction factor. Such factor could be evaluated and tabulated for all practical combinations of seasonal variation sources. Initial results indicate that the SN calculated by SVPD ranged from 0.84 to 1.21 of that calculated by the current method. Subsequent research is to follow to address this issue.

Mechanistic - Empirical Design Methods

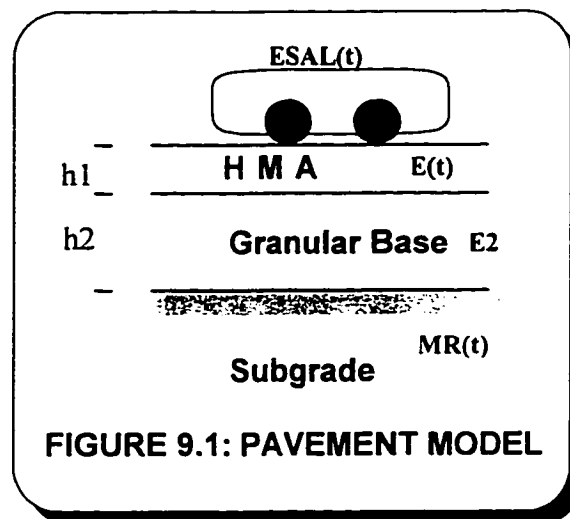
In mechanistic- empirical design methods, pavement performance life is predicted by the following framework:

1. Assume a layered structure (i.e., layer thicknesses, elastic moduli, Poisson's ratios, etc.). Or if the analysis is to be conducted on an existing pavement, then these information are already available.
2. For the expected (or existing) loading and environmental conditions, calculate pavement response due to a given single axle load, using mechanistic models. Pavement response, here, refers to stresses, strains and/or any specified failure criterion. Two failure criteria widely used in the analysis of flexible pavements are: 1) horizontal tensile strain at the bottom of the asphalt layer that ultimately causes fatigue cracking; 2) vertical compressive strain on the surface of the subgrade that causes permanent deformation.
3. The number of load applications that the pavement could sustain prior to failure is calculated based on pavement response (from step 2) using "repetition to failure" equations or charts. These equations (or charts) are based on extensive laboratory (or in-situ) pavement testing and are given for each type of failure.
4. Knowing the number of load applications to failure and knowing (or predicting) the rate at which loads are applied to actual pavement, performance life is then calculated.

The following paragraphs illustrate how seasonal variations in pavement layers' elastic moduli and traffic volume are incorporated in design methods that are based on fatigue and permanent deformation.

Damage Function based on Fatigue

Let us assume that the pavement structure shown in Figure 9.1 is the subject of our analysis. The Hot Mix Asphalt layer (HMA) has a thickness of h_1 and elastic modulus that is time dependent (influenced by air temperature.) The subgrade resilient modulus is also time dependent (influenced by moisture and other environmental conditions). The base course has a thickness of h_2 inches and a constant elastic modulus of E_2 (assuming that a proper drainage system is provided). In the analysis, the base course elastic modulus may also assume time- dependent values if testing confirms that behavior. Traffic volume represented by ESAL's is time dependent.



To calculate the horizontal tensile strain at the bottom of the HMA layer, a variety of mechanistic tools exist to accomplish this task. For instance, Burmister's elastic layered theory may be used to calculate internal forces and displacements in pavement layers. Alternatively, based on finite element analysis, internal forces and displacements at specified vertical and horizontal locations in the pavement may be calculated. ELSYM5

[50], ILLI-PAVE [51], MICH-PAVE [52], KENLAYER [53] and CHEVRON [54] are software programs (some based on elastic layer theory and some based on finite element analysis) that may be used to serve this purpose. The theoretical background, the assumptions on which these programs are based, and the differences between such programs are presented elsewhere [53]. In this analysis, the CHEVRON code is used to calculate the horizontal tensile strain at the bottom of the HMA layer and the vertical compressive strain on the top of the subgrade.

Assumptions of the CHEVRON Code

The following are the assumptions on which the algorithm is based:

- each layer is characterized by thickness, Poisson's ratio and elastic modulus,
- pavement layers are linear elastic with constant modulus at every point in the layer,
- the load is applied uniformly over a single, flexible circular area of specified radius,
- layers extend infinitely in all horizontal directions,
- there is 100% horizontal strain and vertical stress continuity across layer interfaces,
- the bottom layer is semi-infinite in depth.

Fatigue Life Equation The Asphalt Institute (AI) equation [55] relates horizontal tensile strain at the bottom of the AC layer to number of load repetitions to failure (N_f) as follows:

$$N_f = \frac{0.0796}{\epsilon_t^{3.291} * E^{0.854}} \dots\dots\dots (9.18),$$

where E is the elastic modulus of HMA in psi. ϵ_t is in strain units.

The damage to the pavement due to a single load application is given by:

$$D_i = \frac{1}{N_f} \dots\dots\dots(9.19)$$

Substituting from 9.18 in 9.19 yields:

$$D_i = 12.563(\epsilon_t)^{3.291} * E^{0.854} \dots\dots\dots(9.20)$$

If traffic volume in ESAL's is given by a time function $f(t)$, then the cumulative damage

(D) in N years is given by

$$D = N(1 + r)^{(N-1)} \int_a^b f(t) \bullet D(t) dt = 1.0 \dots\dots\dots(9.21),$$

where

$D(t)$ is the damage time function in Equation 9.20 when E is replaced by its time functions, and ϵ_t is calculated in each increment using mechanistic models (e.g., CHEVRON code),

(a) and (b) are the boundary conditions (the beginning and the end of the year, e.g., 1 and 12 if monthly increments are used), and

(r) is the annual traffic growth rate in percent.

Damage Function based on Permanent Deformation

Theoretically, permanent deformation is mainly caused by vertical compressive strain at the top of subgrade. SVPD uses the CHEVRON code to calculate this strain.

Permanent Deformation Life Equation The Asphalt Institute (AI) equation relates vertical compressive strain on the subgrade surface to number of load repetitions to failure (N_d) as follows:

$$N_d = \frac{1.365 \cdot 10^{-9}}{(\epsilon_c)^{4.477}} \dots\dots\dots(9.22),$$

where ϵ_c is vertical compressive strain at the top of subgrade.

The damage to the pavement due to a single load application is given by:

$$D_i = \frac{1}{N_d} \dots\dots\dots (9.23)$$

Substituting from 9.22 in 9.23 yields:

$$D_i = \frac{10^9}{1.365} * (\epsilon_c)^{4.477} \dots\dots\dots(9.24)$$

If traffic volume in ESAL's is given by a time function $f(t)$, then the cumulative damage in N years is given by:

$$D = N(1 + r)^{(N-1)} \int_a^b f(t) \bullet D(t) dt \dots\dots\dots(9.25),$$

where

$D(t)$ is the damage time function in Equation 9.24 when E is replaced by its time

function, and ϵ_c is calculated at time t using the CHEVRON code, for instance,

(a) and (b) are the beginning and the end of the year (1 and 12 if monthly increments are used), and

(r) is the annual traffic growth rate.

Pavement performance life is defined as the number of years that will elapse before the cumulative damage equals unity, hence:

$$D = N(1 + r)^{(N-1)} \int_a^b f(t) \bullet D(t) dt = 1.0 \dots\dots\dots(9.21)$$

Given a pavement structure, SVPD subdivides the year into small increments, calculates the expected ESAL's, E and M_R values in each increment, calculates critical stresses (or strains) using the CHEVRON code, evaluates the integral function and solves for (N) performance life of the pavement due to fatigue and due to permanent deformation.

Example 2

Given the pavement section that is shown in Figure 9.2 and the following data:

HMA:

thickness = 5 inches

$$E = 10^6 + 4 \cdot 10^5 \cdot \sin(3.14 \cdot M/6 - 0.5) \text{ psi}$$

(1 psi = 6.9 kPa)

Poisson's ratio = 0.35

Base layer

thickness = 12 inches

$$E_2 = 100,000 \text{ psi (690 MPa)}$$

Poisson's ratio = 0.35

Subgrade

$$M_R = 5000 + 2000 \cdot \sin(3.14 \cdot M/6 - 5) \text{ psi (1}$$

psi = 6.9 kPa)

Poisson's ratio = 0.4

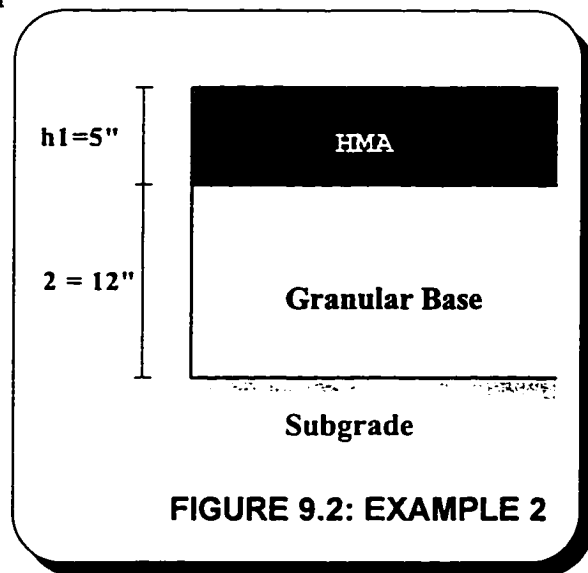
Traffic Data

$$\text{monthly ESAL} = 18,000 + 10,000 \cdot \sin(3.14 \cdot M/6 + 5.6)$$

annual traffic growth rate = 2%

Note: All of the above time functions are monthly values (M is the month of the year 1....12).

1. Plot the subgrade resilient modulus, the HMA elastic modulus and Traffic time functions.



2. Plot the damage per ESAL as a function of the time of the year a) based on fatigue, and b) based on permanent deformation
3. Based on a) fatigue, b) permanent deformation, calculate pavement performance life in years

Solution

Figure 9.3 shows plot of E , ESAL and M_R time functions (only for illustration purpose, not part of the solution). The horizontal axis represents segments of the year; the year is divided into 24 segments where segments 1 and 2 are the first and the second halves of January respectively, 3 and 4 are first and second halves of February and so forth. The HMA elastic modulus has an annual cycle that peaks in April and reaches its minimum value in October. ESAL is expressed by an annual cycle that peaks in April and reaches its minimum value in October. M_R also follows an annual pattern with minimum value in July.

Figure 9.4 shows the fatigue damage function and the permanent deformation damage function associated with one ESAL application, therefore, both damage functions are independent of ESAL function. The fatigue function is expressed by Equation 9.20 and permanent deformation function is expressed by Equation 9.24. From a fatigue stand point, an ESAL would cause damage of 1.32×10^{-7} in August, while it would cause damage of 1.02×10^{-7} in March. That is to say it would take 7,575,757 standard load

applications in August or 9,803,921 standard load applications in March to fail the pavement.

From permanent deformation stand point, an ESAL would cause a damage of 6×10^{-7} in August while it would cause a damage of 1.8×10^{-7} in February. That is to say it would take 1,666,666 standard load applications in August or 5,555,555 standard load applications in February to fail the pavement. This indicates that the damage caused in August is about three and one half times the damage caused in February. The output of SVPD indicates that for 2% annual traffic growth, performance life in fatigue is 24.9 years and in permanent deformation is 11.04 years. Obviously, permanent deformation is the governing criterion.

The above example demonstrates how the seasonal variations in pavement layers' properties influences the pavement performance and life expectancy. Based on this example, in which very reasonable values are assumed for seasonal variations (based on actual SMP data), seasonal variations play an important role in damage analysis. It was shown that a single standard load application in one season causes a damage that is equivalent to 3.5 standard load applications in a different season.

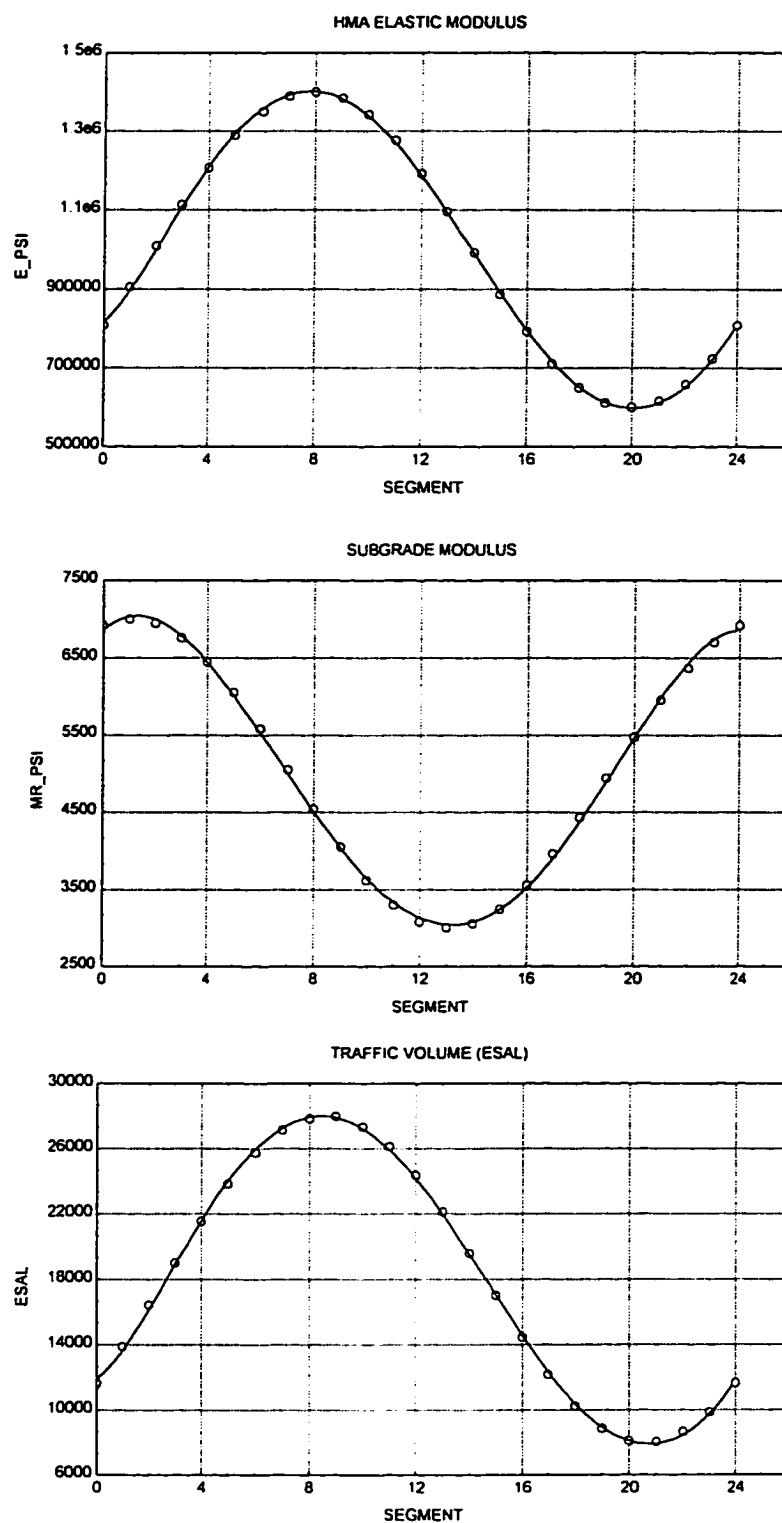


FIGURE 9.3: ESAL AND PAVEMENT MODULI TIME FUNCTIONS ($\text{psi} = 6.9$ kPa)

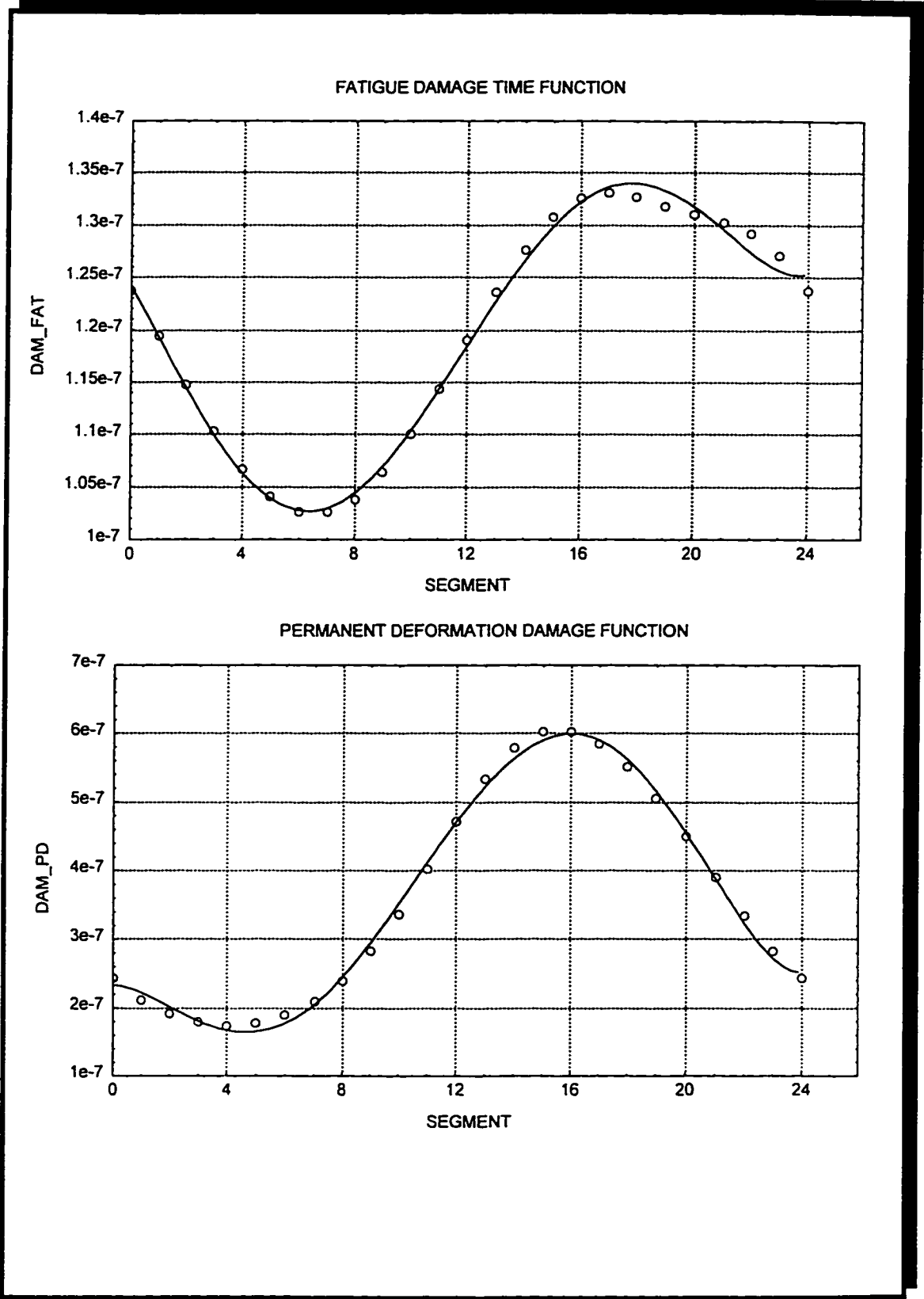


FIGURE 9.4: DAMAGE FUNCTIONS (Example 2)

The Concept of Equivalent Constant Moduli

Based on SVPD analysis a new concept is proposed which states that for every pavement structure with a set of layers that exhibit seasonal variations of the elastic moduli, there is an equivalent structure with the same layer thickness but with "equivalent constant elastic layer moduli" that will last the same performance life (withstand the same number of load repetitions.) The latter set of layers (with constant values) is easier to deal with in terms of design and for planning purposes, and because it is based on the remaining performance life, the equivalent constant AC elastic modulus should reflect the deterioration in the AC layer. The cumulative damage to a pavement with a set of elastic layer moduli that exhibit seasonal variations is given by Equation 9.21. This cumulative damage will be equated to the cumulative damage when the pavement layer moduli are constant. hence,

$$D = N(1 + r)^{(N-1)} \int_a^b f(t) \bullet D(t) dt = N(1 + r)^{(N-1)} * D(i) * \int_a^b f(t) dt \dots (9.26),$$

In the right side of the equation, since $D(i)$, the damage caused by unit load, is dependent on the moduli values of the layers, which are assumed to be constant, $D(i)$ is constant and is taken out of the integral.

Now, if the governing failure criterion is fatigue of the AC layer, then substituting $D(i)$ and $D(t)$ from Equation 9.20, and factoring out the constant (12.563) and the term

$N(1+r)^{(N-1)}$ (so that the equivalent structure will have the same performance life as the actual structure), yields:

$$\int_a^b \varepsilon_t(t)^{3.291} * E(t)^{0.854} * f(t) dt = (\bar{\varepsilon}_t)^{3.291} * (\bar{E})^{0.854} * \int_a^b f(t) dt \dots (9.27)$$

Where $\bar{E}$ is the equivalent constant AC layer elastic modulus and $\bar{\varepsilon}_t$ is the tensile strain at the bottom of the AC layer resulting from a standard axle load and corresponding to $\bar{E}$.

Rearranging the equation yields:

$$(\bar{\varepsilon}_t)^{3.291} * (\bar{E})^{0.854} = \frac{\int_a^b (\varepsilon_t(t))^{3.291} * E(t)^{0.854} * f(t) dt}{\int_a^b f(t) dt} \dots (9.28)$$

The equivalent constant AC modulus may be calculated using the CHEVRON code with some assumptions about the equivalent constant subgrade resilient modulus and the base course elastic modulus. For example, the equivalent constant base layer elastic modulus (E_2) and the subgrade resilient modulus may be assumed to equal the weighted average value, where the weights are based on the expected traffic volume of the season.

$$\bar{E}_2 = \frac{\int_a^b f(t) * E_2(t) dt}{\int_a^b f(t) dt} \dots (9.29)$$

and

$$\bar{M}_r = \frac{\int_a^b f(t) * M_r(t) dt}{\int_a^b f(t) dt} \dots (9.30)$$

Following the same derivation method of Equation 9.28, if permanent deformation is the governing failure criterion, then the equivalent constant AC layer elastic modulus may be calculated such that:

$$\bar{\epsilon}_c^{4.477} = \frac{\int_a^b \epsilon_c^{4.477}(t) * f(t) dt}{\int_a^b f(t) dt} \dots\dots\dots(9.31)$$

where, $\bar{\epsilon}_c$ is the equivalent constant vertical compressive strain at the bottom of the subgrade, resulting from one standard axle load and associated with the equivalent constant AC layer elastic modulus, and the equivalent layer moduli of the base course and subgrade. Again, the calculations of this set of equivalent moduli take into account both the changes in the moduli values within the year (seasonal variations) and the long-term variations resulting from pavement deterioration.

This concept may be applied differently. For example, for a given structure, after determining its life expectancy and the failure criterion, an equivalent set of layer moduli may be calculated for each year of service, to account for the seasonal variations of the layers' moduli and for the deterioration of the pavement. In this case,

$$(\bar{\epsilon}_t)_i^{3.291} * (\bar{E})_i^{0.854} = \frac{\int_a^\beta (\epsilon_t(t))^{3.291} * E(t)^{0.854} * f(t) dt}{\int_a^\beta f(t) dt} \dots\dots\dots(9.32),$$

where, $\bar{E}_i$ and $(\bar{\epsilon}_t)_i$ are the equivalent AC modulus for the i th year of service and the associated horizontal tensile strain at the top of the AC layer, respectively. α and β are the integration limits; they represent the initial and the terminal number of time segments (Δt) over which the integration is performed. For example, if time segments (Δt) are one

month long, then the equivalent AC modulus of the first year is calculated based on α and β values of 0 and 12 respectively. The equivalent AC modulus for the second year is calculated based on α and β values of 12 and 24, respectively, and so on.

Back-Calculation of the Equivalent Elastic Layers' Moduli Due to Fatigue

The following steps outline the method used to back-calculate the equivalent constant elastic layers' moduli (Equivalent Moduli for short) of a pavement, due to fatigue:

1- Calculate the expected fatigue damage of each time increment (month, day, etc.), as outlined earlier in the mechanistic- empirical analysis

2- Sum the damages until the cumulative relative damage equals 100%. Stop the iterations and determine the number of increments that will take the pavement to fail (the expected performance life)

3- Calculate the quantity $\frac{\int_a^b (\epsilon_r(t))^{3.291} * E(t)^{0.854} * f(t) dt}{\int_a^b f(t) dt}$, the right side of Equation 9.28.

4- Calculate the equivalent base layer modulus using Equation 9.29 and the equivalent subgrade modulus using Equation 9.30.

5- Using the CHEVRON code, and the equivalent moduli of the base layer and the subgrade, calculate the quantity $\epsilon_r(t)^{3.291} * E(t)^{0.854}$ corresponding to a standard axle load application and to the minimum, average and maximum values of the AC layer elastic modulus (3 runs).

6- Interpolate using log-log transformation to find the value of the AC layer modulus, which corresponds to the quantity calculated in step 3 above (Equation 9.28). The set of layer moduli calculated in steps 4 and 6 are the pavement Equivalent Moduli.

Back-Calculation of the Equivalent Elastic Layers' Moduli Due to Permanent Deformation

The following steps outline the method used to back-calculate the equivalent elastic layers' moduli of a pavement, due to permanent deformation:

1- Calculate the expected permanent deformation damage of each time increment (month, day, etc.), as outlined earlier in the mechanistic- empirical analysis

2- Sum the damages until the cumulative relative damage equals 100%. Stop the iterations and determine the number of increments for the pavement to fail (the expected performance life)

3- Calculate the quantity $\frac{\int_a^b \epsilon_c^{4.477}(t) * f(t) dt}{\int_a^b f(t) dt}$, the right side of Equation 9.31.

4- Calculate the equivalent base layer modulus using Equation 9.29 and the equivalent subgrade modulus using Equation 9.30.

5- Using the CHEVRON code, and the equivalent moduli of the base layer and the subgrade, calculate the quantity $\epsilon_c^{4.477}$ corresponding to a standard axle load application

and to the minimum, average and maximum values of the AC layer elastic modulus (3 runs).

6- Interpolate using log-log transformation to find the value of the AC layer modulus, which corresponds to the quantity calculated in step 3 above (Equation 9.31).

The set of layer moduli calculated in steps 4 and 6 are the pavement Equivalent Moduli.

SVPD is devised to back-calculate the equivalent constant moduli for a given set of layers, based on fatigue life and/or permanent deformation life. First the program calculates the magnitude of each failure criterion (horizontal tensile strain at the bottom of the AC layer, for fatigue, and vertical compressive strain at the top of subgrade, for permanent deformation) in every segment of the year (12 segments per year) and integrates the values until the cumulative damage equals unity. Then, the program calculates the equivalent layer moduli for the whole service life. Finally, if the user elects, SVPD calculates the equivalent layer moduli for every year. The results of this analysis will be used to compare the equivalent moduli to the actual moduli.

It should be noted that in the above paragraphs, for simplicity, traffic loading is expressed in standard 18-kips load applications. Moreover, the CHEVRON program used in the calculation assumes that pavement layers are linearly elastic. However, the assumptions on which the calculations are based may be modified to reflect different traffic loading (i.e., different loading groups), and as the load magnitude changes the stress-strain

relationship changes according to a predefined constitutive relationship for each respective layer. But the concept of equivalent moduli is still the same.

Example 9.3:

For the pavement structure given below:

- A) Calculate the pavement's life expectancy;
- B) Calculate the equivalent constant elastic layer moduli;
- C) Calculate the equivalent constant elastic layer moduli for every year of the service life.

The Surface layer (HMA)

thickness = 8 inches

Poisson's ratio = 0.35

elastic modulus, in psi, is variable based on temperature. It is expressed as a sinusoidal function with a wave length of 12 month, multiplied by a negative exponential term, to reflect the reduction of the modulus due to pavement distresses, according to:

$$E = e^{(-.008 * M/12)} * (600000 + 300000 * \sin(\frac{2\pi}{12}M - \pi))$$

M is the cumulative number of months since construction. For example months 1, 13, 25,... represent January, months 2, 14, 26, ... represent February, and so forth. This function and the other time functions are presented graphically in Figure 9.5.

The Base course

thickness = 12 inches

Poisson's ratio = .35

the elastic modulus, in psi, is variable within the year, according to

$$E_{base} = 40000 + 10000 * \sin\left(\frac{2\pi}{12}M + \frac{\pi}{2}\right)$$

The Subgrade:

semi-infinite

Poisson's ration = .4

the resilient modulus, in psi, is variable within the year, according to:

$$M_r = 5000 + 2000 * \sin\left(\frac{2\pi}{12}M + \frac{\pi}{2}\right)$$

The traffic, in standard 18-kips ESAL, expressed as a sinusoidal function multiplied by an annual growth rate of 2 percent, is given by

$$ESAL = (1.02)^{(M/12-1)} * (17000 + 14000 * \sin\left(\frac{2\pi}{12}M - \frac{\pi}{2}\right)), M > 12$$

$$ESAL = (17000 + 14000 * \sin\left(\frac{2\pi}{12}M - \frac{\pi}{2}\right)), M \leq 12$$

Solution

A) SVPD is used to do the required calculation. In this example, the pavement will sustain 1,389,004 standard load applications before it fails due to permanent deformation after 6.5 years.

B) The equivalent subgrade resilient modulus, calculated by Equation 9.30, equals 4,198.168 psi. The equivalent base course modulus, calculated by Equation 9.29, equals 36,128.58 psi. The equivalent AC layer modulus, is calculated using Equation 9.31, equals 503,536.8 psi. This indicates that if we assume that the pavement in question was to have the above equivalent layer elastic moduli, it would sustain the same number of load repetitions.

To verify the calculations, the CHEVRON program is used to calculate the compressive strain at the top of the subgrade for the equivalent structure and calculate N_f (number of load repetitions to failure) based on the Asphalt Institute equation (Equation 9.22) and compare the results with the number of load repetitions to failure, for the original structure, as calculated above. The number of load repetitions based on the AI equation is $1.46 * 10^6$, which is close enough to the calculated number of load repetitions to failure ($1.38 * 10^6$). The difference between the two values may be caused by the error of estimate associated with the log- log regression model used in the calculation.

C) Now, that we know that the pavement is expected to fail after 6.5 years due to permanent deformation, let us calculate the equivalent moduli of the pavement layers for every year. The following table shows the output results.

<u>Year</u>	<u>M_r</u>	<u>E_2</u>	<u>E_{AC}</u>
1	4176.196	35880.98	516697.7
2	4177.214	35888.26	512609.8
3	4177.210	35888.25	508495.0
4	4177.204	35888.21	504412.9
5	4177.206	35888.20	500351.6
6	4177.205	35888.27	496329.4
OVERALL	4177.168	35888.58	503536.8

The equivalent AC moduli decrease as the pavement ages, due to the development of distresses. Each value reflects the seasonal variations of the AC modulus. The subgrade resilient modulus and the base layer modulus are assumed not to vary from one year to another (although they exhibit seasonal variations), therefore, their equivalent (yearly) moduli are constant.

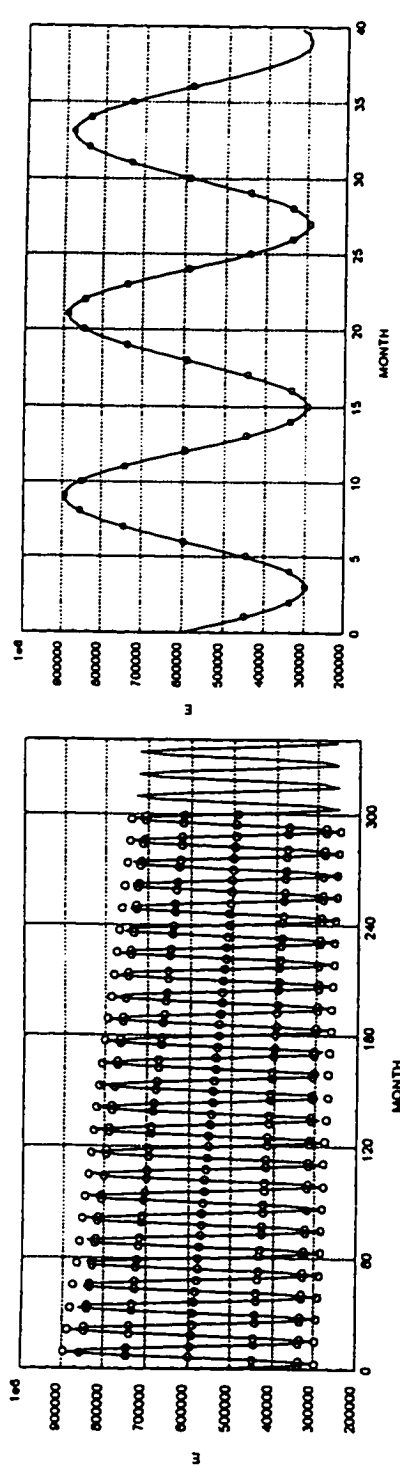
The above example shows the equivalent moduli for the above structure, given the above seasonal variations in traffic and in pavement material properties. In other words, each of the models given above in the example, that reflect seasonal and annual changes in pavement properties, has been reduced to a single number that will lead to the same design life. Hence, if the design engineer was to be given only the equivalent moduli, then he would have been able to evaluate the design life of the structure in a very simple process (i.e. Equations 18 and 22) without having to know the seasonal variations of the properties of the layers (either expressed by a periodic function or by a typical values).

The above analysis may be used to answer the following questions: what if the designer used the average values of the layer moduli, rather than using equivalent moduli? How far off would he be? And what are the consequences in terms of whether or not a premature failure or an overdesign will occur.

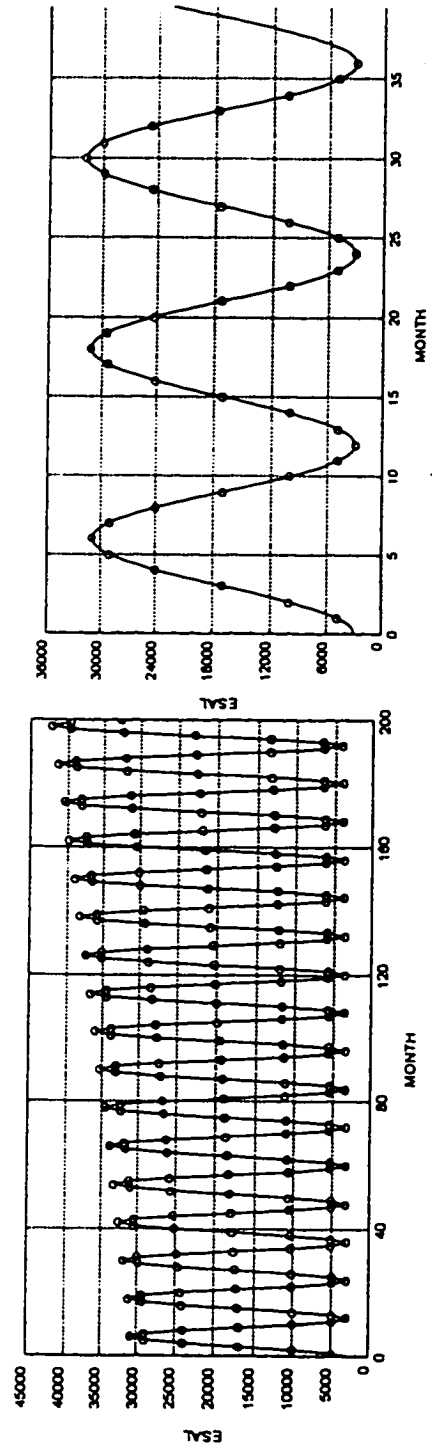
Another potential application for this analysis is to develop correlations or at least recommendations as to how sensitive the equivalent moduli are to the input factors. For example, in the above example, outputs will change according to the following scenarios:

SCENARIO	Equivalent M_r in PSI	Equivalent E_2 in PSI	Equivalent E_{AC} in PSI	Performance Life in Years
1) No change (the above scenario)	4,198	36,128	503,537	6.5
2) Thickness of AC layer is 6"	4,254	36,812	494,630	1.5
3) Traffic amplitude is 1000 ESAL	4,925	39,512	495,421	8.33
4) Rapid AC layer deterioration (i.e. E_{AC} deterioration rate is .08 rather than .008)	4,155	35,842	486,778	4.75

In the above table, for example, in scenario 3, the equivalent moduli are the closest to the average moduli. Conversely, scenario 4 has the least moduli values (the furthest from the average moduli). Similarly, the sensitivity of other input variables may be investigated (e.g., the shape of the growth functions, if linear rather than exponential, the effect of nonlinearity of the moduli, and so forth).



A: PERIODIC FUNCTION OF THE ELASTIC MODULUS OF THE AC LAYER



B: PERIODIC FUNCTION OF THE TRAFFIC MAGNITUDE IN ESAL

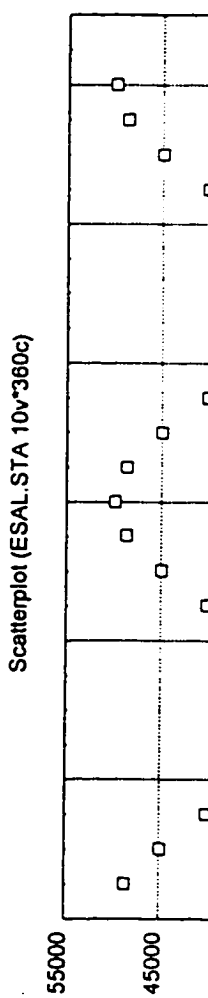
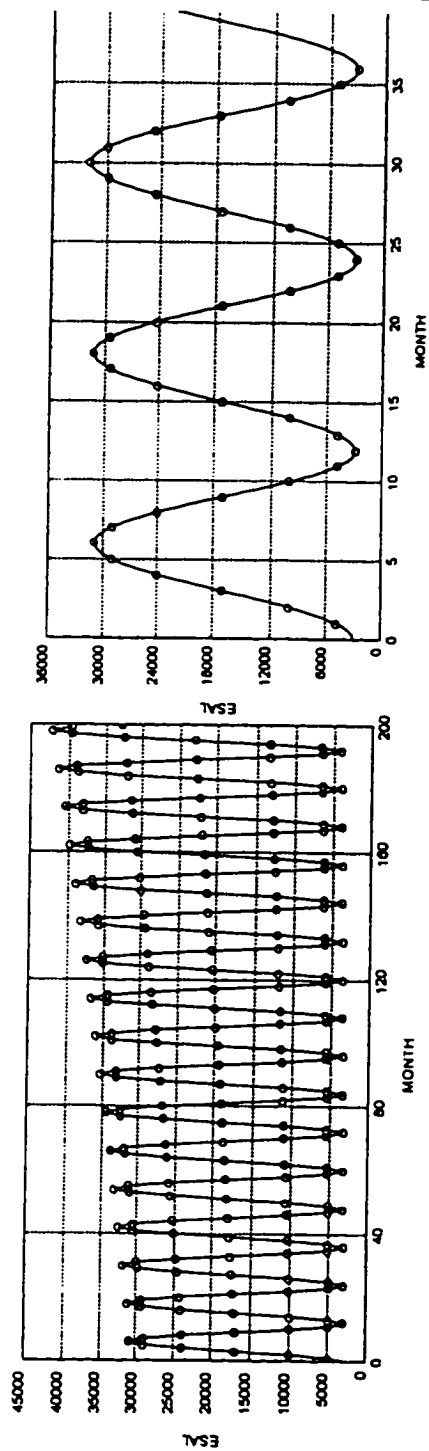
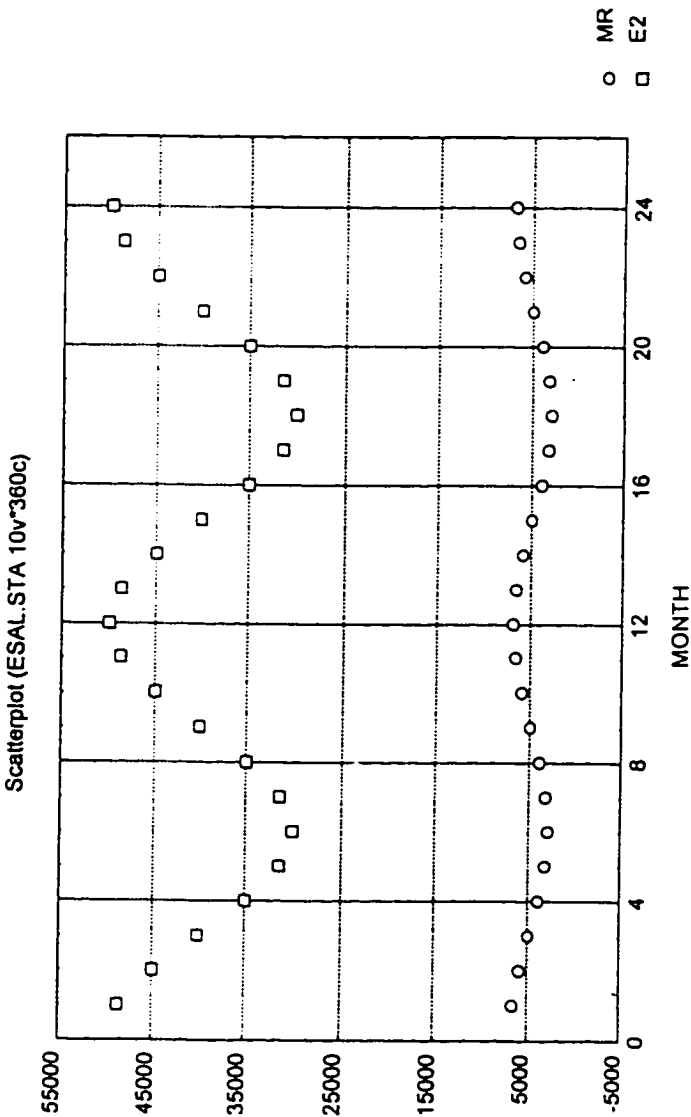


FIGURE 9.5: PERIODIC FUNCTIONS (EXAMPLE 9.3)



B: PERIODIC FUNCTION OF THE TRAFFIC MAGNITUDE IN ESAL



C: PERIODIC FUNCTIONS OF THE ELASTIC MODULUS OF THE BASE LAYER AND THE SUBGRADE

CHAPTER 10: SENSITIVITY ANALYSIS OF SVPD DESIGN PARAMETERS

In Chapter 9, SVPD was introduced as a software to design flexible pavements, considering the seasonal and long term variations in the structural properties of the pavement. In empirical design procedure, the AASHTO method, SVPD requires additional parameters to express the seasonal variation in the AC layer modulus, the subgrade modulus and traffic volume. It is the intent of this Chapter to examine the sensitivity of SVPD output (the required Structural Number (SN)), to each of the input parameters and to compare (and correlate) the required structural number based on the AASHTO method, to that based on SVPD.

SVPD Runs

Several thousand runs were necessary to obtain SVPD outputs for a mesh that covers the practical range of each input parameter. The following table shows the input parameters and their range of variation. Appendix D contains the data base developed for this purpose. The data base contains about 14,000 records (iterations).

In Table 10.1, the values of the shift angles range between 0 and 2π ($\sin X = \sin (X+2\pi)$). Each value characterizes a wave. The values given in the Table express four characteristic waves that span the range of variation. Figure 10.1 shows the four values of the shift angle used in the analysis.

TABLE 10.1: EXPERIMENTAL MESH

Variable Name	Meaning	Values
TOT_ESAL	Total ESAL over the design life	[0.5, 4.5, 8.5, 12.5, 16.5] Million ESAL
TRAF_AMP	Annual traffic amplitude in ESAL	[0, 25, 50] in thousands
TRAF_SHF	The shift angle of the traffic function **	$-\frac{\pi}{2}$, 0, $+\frac{\pi}{2}$, π
MR_AV	Average value of the subgrade modulus in psi	1000, 6000, 11000
MR_AMP	Amplitude of the subgrade modulus in psi	0, 700, 1400
MR_SHFT	shift angle of the subgrade modulus **	$-\frac{\pi}{2}$, 0, $+\frac{\pi}{2}$, π
E1_AV	The average value of the AC layer modulus psi	[100, 400, 700, 1000] in 1000
E1_AMP	The amplitude of the AC layer modulus in psi	[0, 300, 600] in 1000 psi
E1_SHFT	The shift angle of the AC layer modulus in psi	$-\frac{\pi}{2}$, 0, $+\frac{\pi}{2}$, π
OVER_SHF	A measure of the shift between the traffic function and E1 and MR. Is defined as: $2 \cdot \text{abs}(\text{TRAF\_SHFT} - (\text{E1\_SHF} + \text{MR\_SHF})/2)$	[0, .5, 1.0, 1.5, 2.0, 2.5, 3.0] in $\text{Pi}/2$. Calculated based on the shift angles
SN_ASHTO	Required SN based on AASHTO method	Calculated
SN_SVPD	Required SN based on SVPD, Integral Method with Variable SN	Calculated
FACTOR	$= \text{SN\_SVPD} / \text{SN\_ASHTO}$	Calculated
OBJ_FUN	Objective Function	Calculated

Sensitivity Analysis

It is of interest to see which parameters of those listed in Table 10.1 significantly affect the deviation between SN_ASHTO and SN_SVPD. This deviation is measured by the ratio between the two variables: Factor = SN_SVPD / SN_ASHTO. Plots of means are used to show the sensitivity of each parameter

The Variable $OVER\_SHF$ is the overall shift between the periodic functions. It is envisioned that what could really influence the deviation between SN_ASHTO and SN_SVPD is whether traffic peaks on the time of weak subgrade or soft surface layer (i.e., the traffic peak is concurrent with the minimum value of EI and/ or MR). This is measured by the $OVER\_SHF$. The maximum damage (per unite load) will take place when the $OVER\_SHF = \pi$. The AASHTO method considers only the cumulative traffic over the design life, without considering the time dependency, whereas SVPD uses time series approach. It is then expected that the deviation between SN_ASHTO and SN_SVPD is maximum when the $OVER\_SHF = \pi$. As shown in Figure 10.1, any two sinusoidal functions one's peak will face the other's bottom, if the difference of their shift $= \pi$.

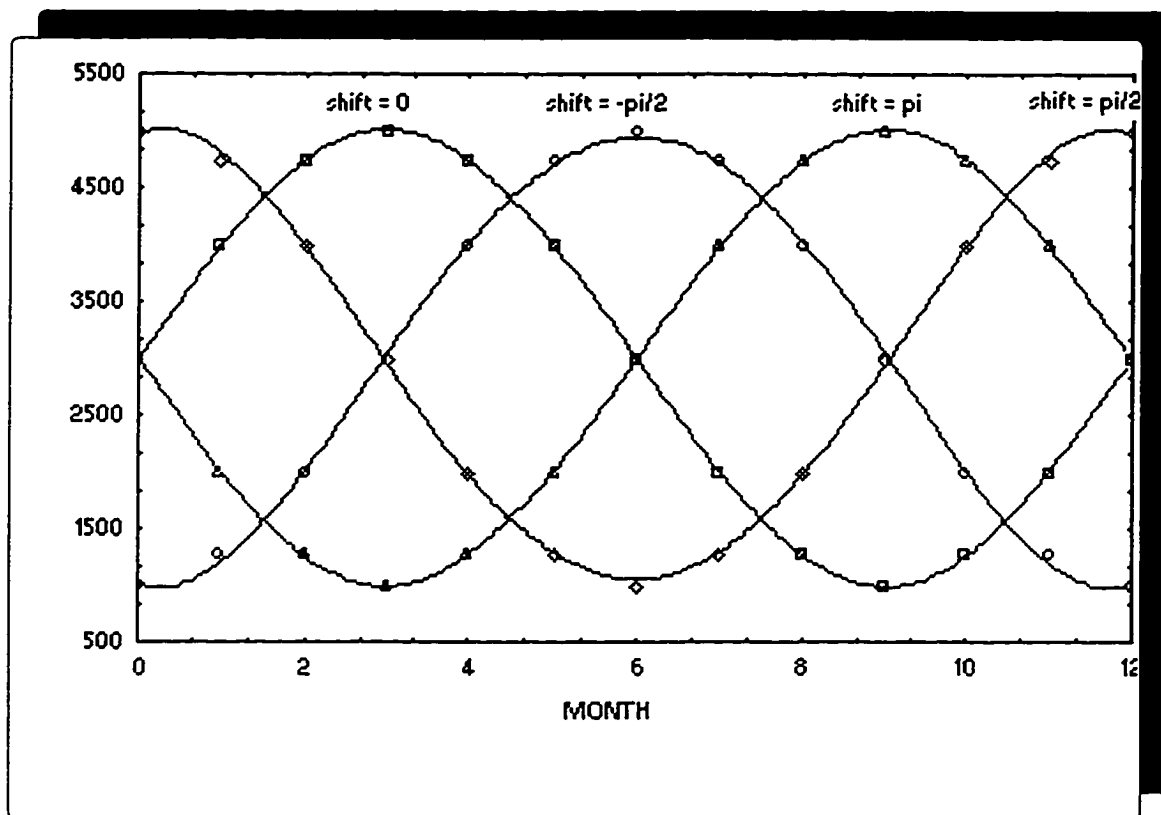


FIGURE 10.1: FOUR CHARACTERISTIC SINUSOIDAL WAVES

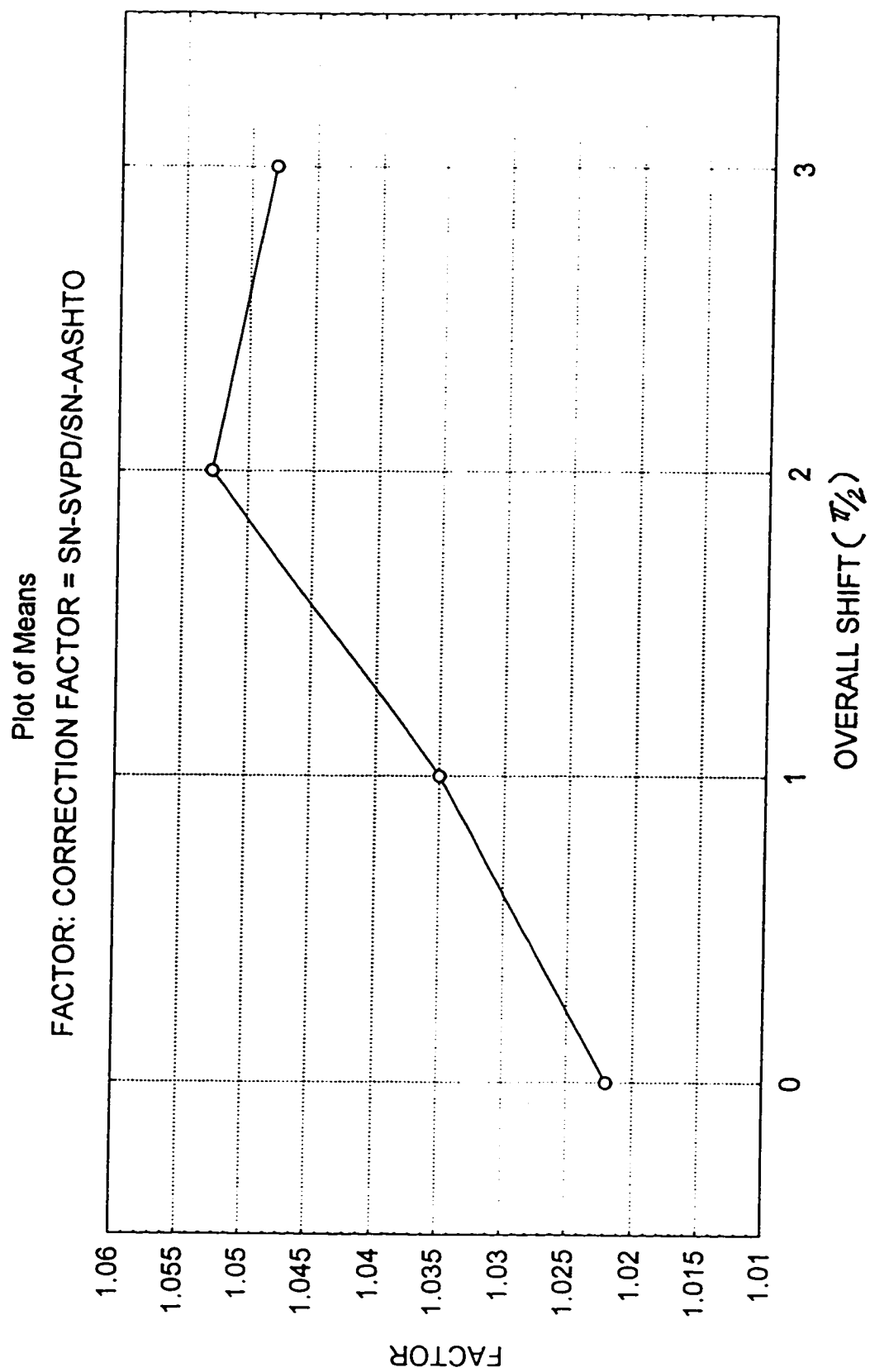


FIGURE 10.2: SENSITIVITY OF OVER_SHF

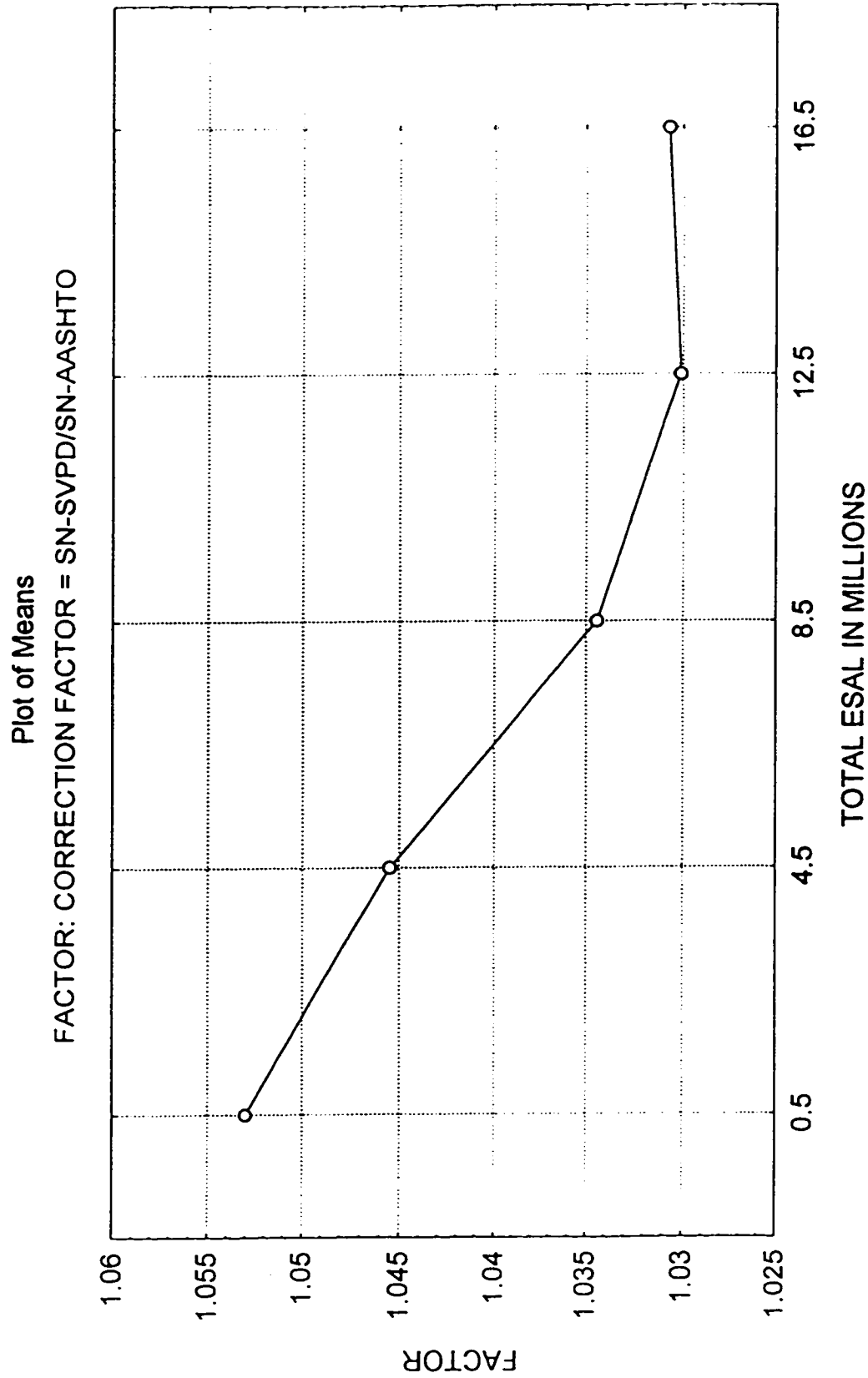


FIGURE 10.3: SENSITIVITY OF TOTAL ESAL

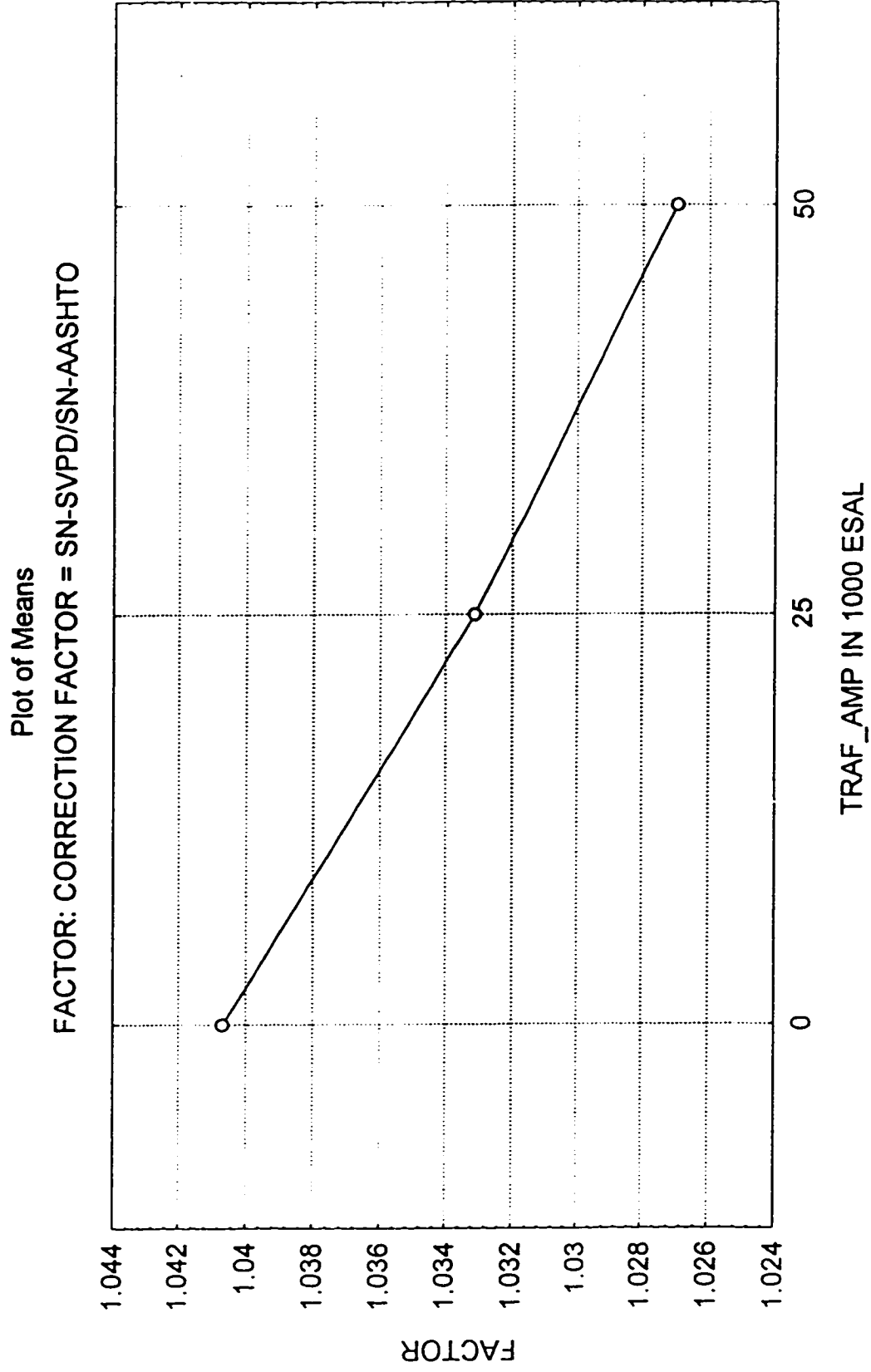


FIGURE 10.4: SENSITIVITY OF TRAF_AMP

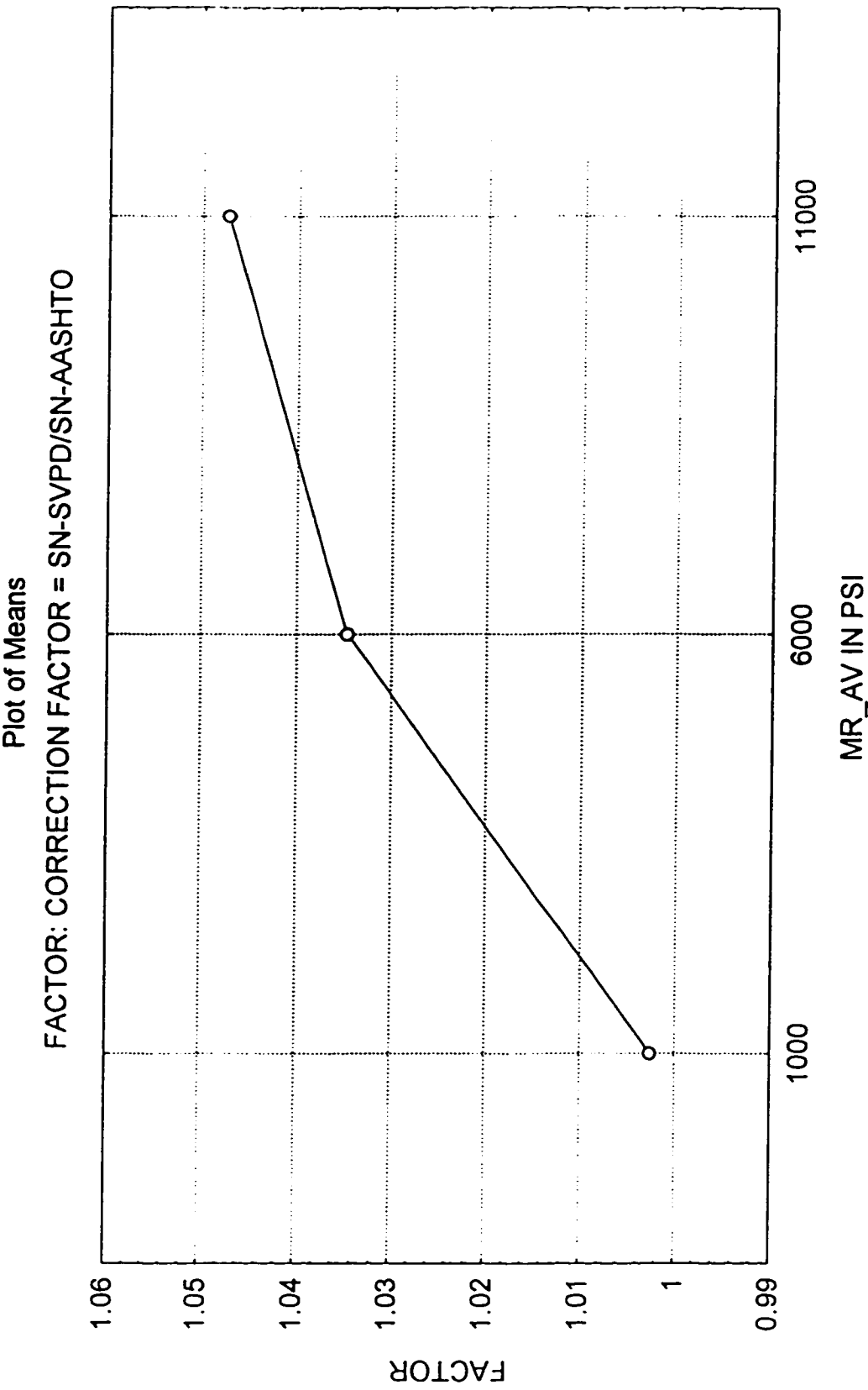


FIGURE 10.5: SENSITIVITY OF MR_AV

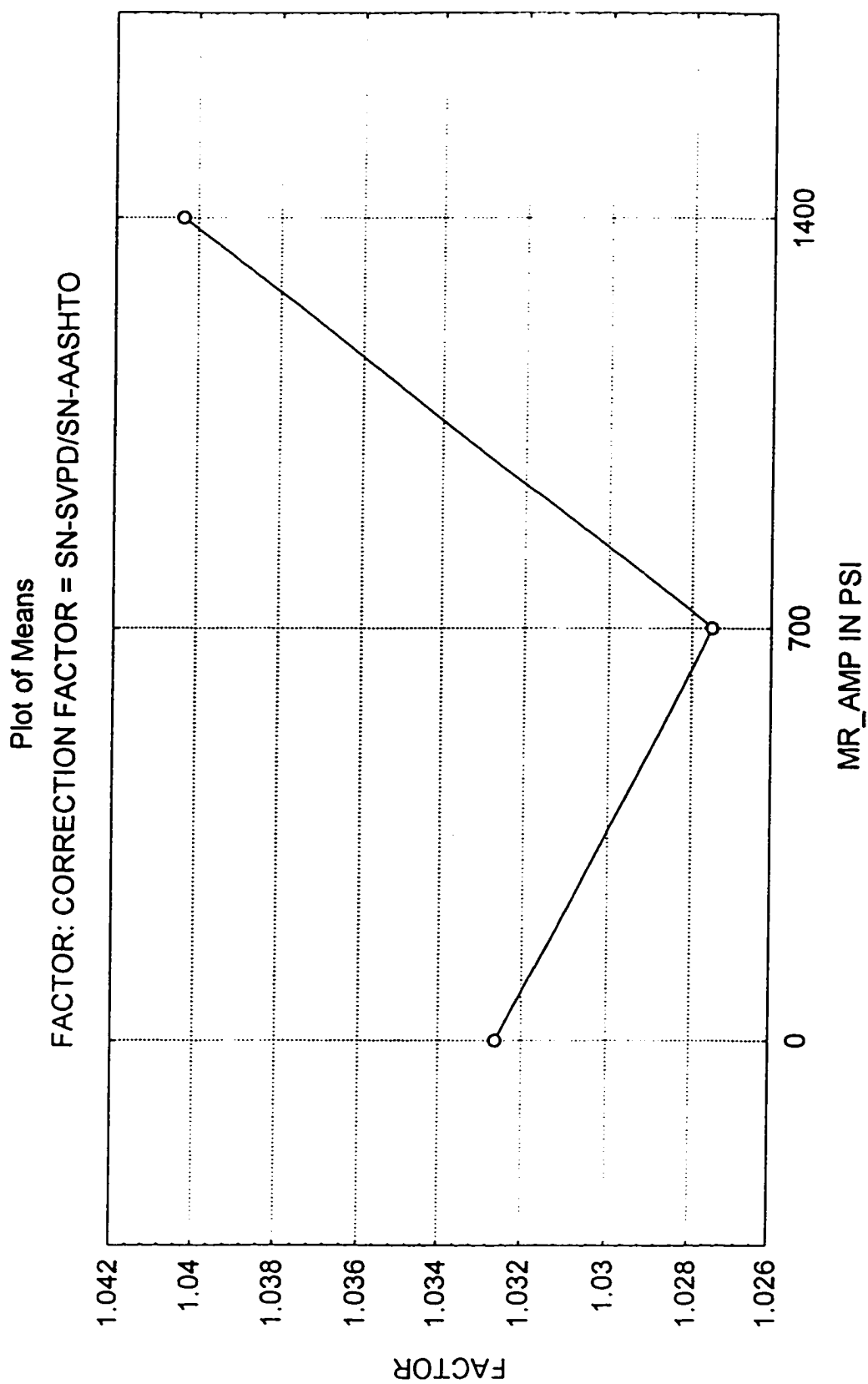


FIGURE 10.6: SENSITIVITY OF MR_AMP

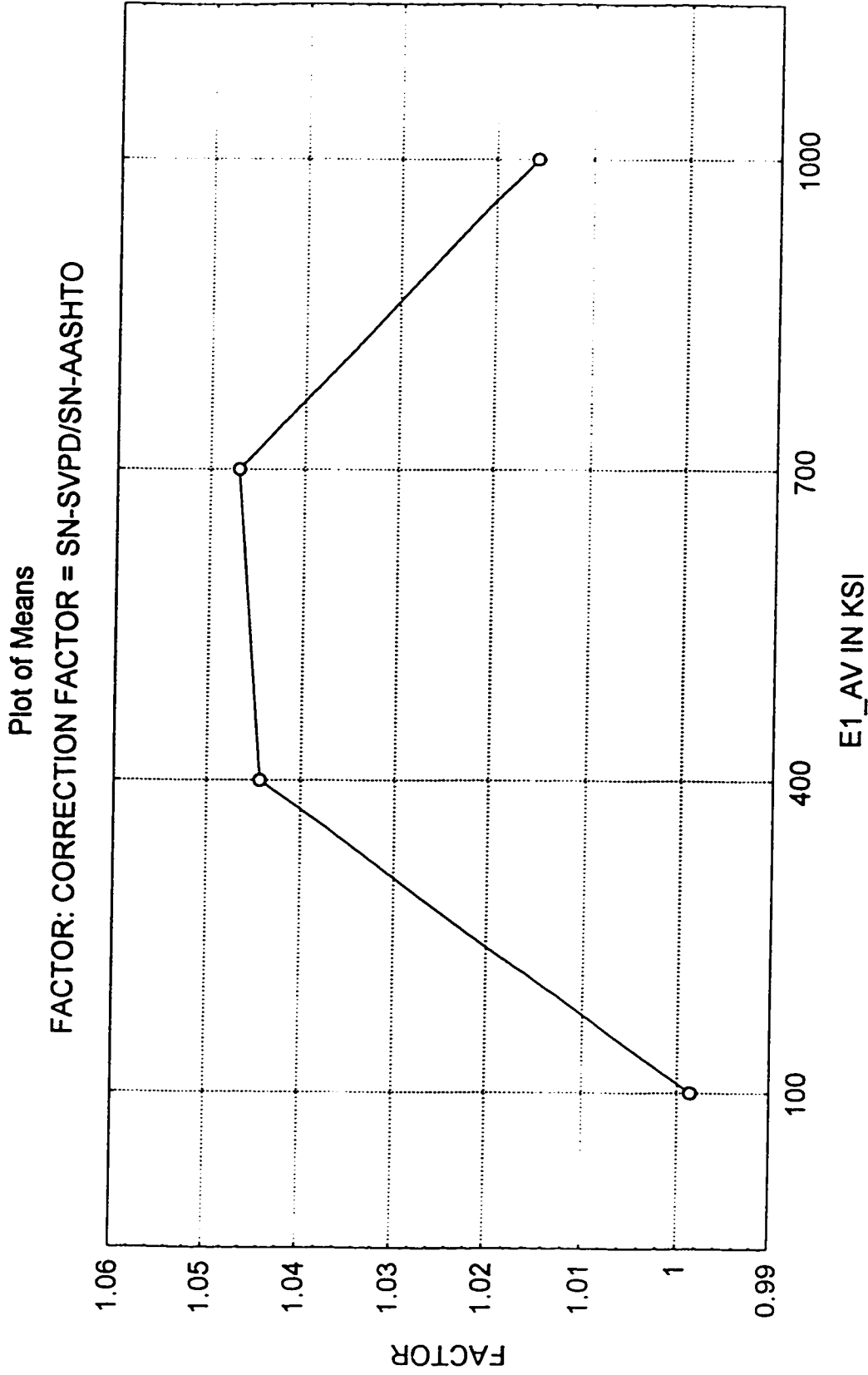


FIGURE 10.7: SENSITIVITY OF E1_AV

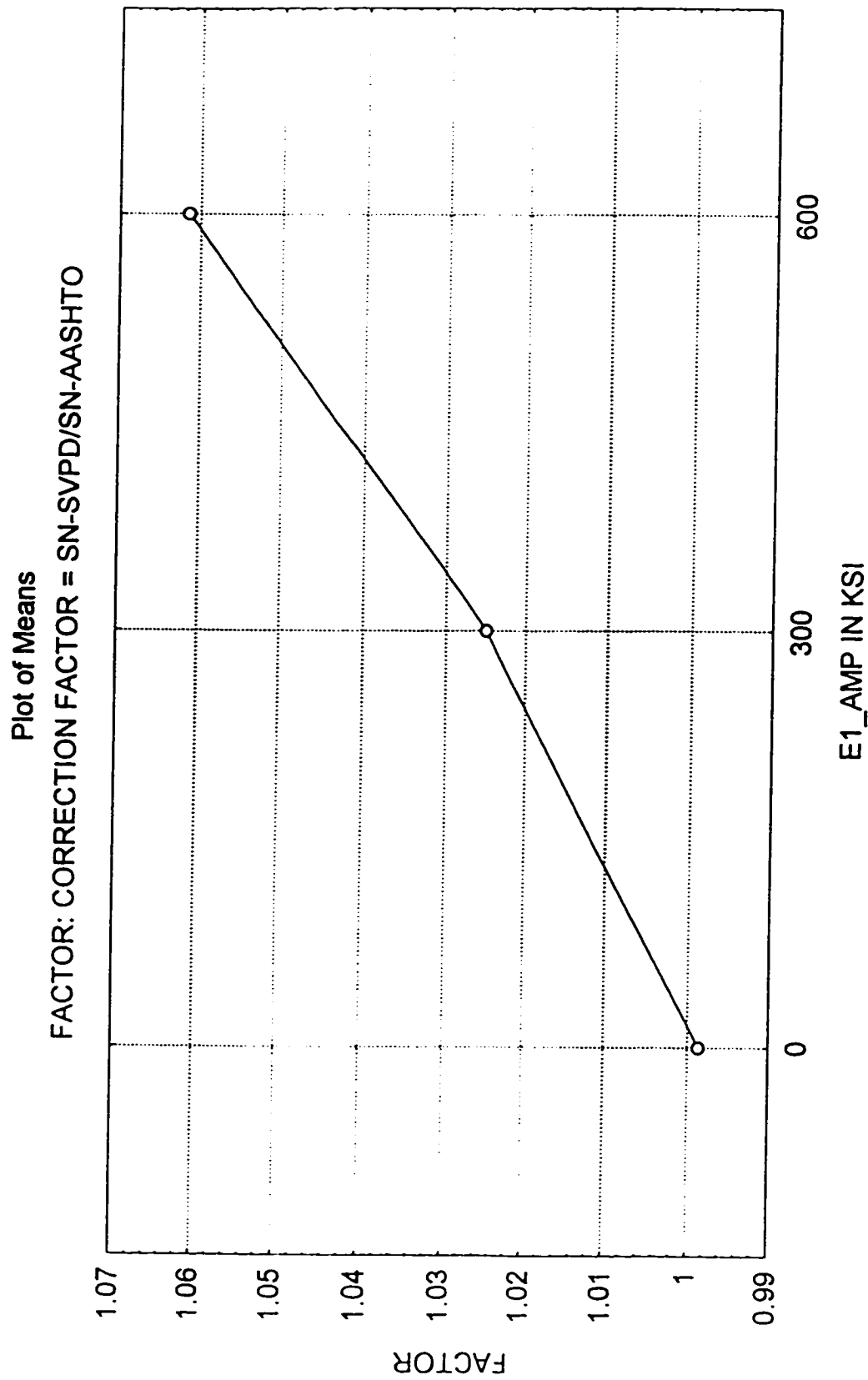


FIGURE 10.8: SENSITIVITY OF E1_AMP

Figure 10.2 is a plot of means for FACTOR versus OVER_SHF. The horizontal axis shows the overall shift in $\pi/2$ units. As expected, the maximum deviation between SN_ASHTO and SN_SVPD is when the overall shift = π .

Figure 10.3 is a plot of means for FACTOR versus TOT_ESAL, in millions. The Figure indicates a general trend of decrease of the FACTOR in response to increase in the total number of ESAL. Figure 10.4 is a plot of means for FACTOR versus TRAF_AMP. The Figure shows a trend of decrease in FACTOR in response to the increase in traffic amplitude. These Figures might be biased by the fact that the program canceled all iterations in which traffic volume is less than 0.0, which will take place when the traffic amplitude (in negative sign) is greater than the annual average traffic volume. As a result, there are much fewer iterations with total ESAL of 500,000 than with total ESAL of 16,500,000, and much fewer cases with traffic amplitude of 50,000 ESAL than with traffic amplitude of 25,000 ESAL.

Figure 10.5 is a plot of means for FACTOR versus MR_AV in psi. The Figure shows a positive relationship, as FACTOR increases with the MR_AV increase. Figures 10.6 and 10.7 show the relationship between FACTOR and MR_AMP and EI_AV respectively. The Figures indicate that there is not a significant pattern between the variables. This is not surprising since the AASHTO design method partially accounts for the variation in the subgrade resilient modulus. It also accounts for the average value of the AC layer elastic modulus.

Figure 10.8 is a plot of means for FACTOR versus El_AMP. The Figure indicates that the higher the amplitude of the AC layer modulus function (seasonal variation) the higher is the deviation between SN_ASHTO and SN_SVPD. This is expected, since the AASHTO method does not consider the seasonal variation in the AC layer elastic modulus in the design. This variable is very significant as will be shown in subsequent analysis. Practically, and as shown earlier in Chapters 5 and 7, the minimum AC layer modulus in Site 48SA was 2 GPa and the maximum was 10 GPa, which indicates a significant seasonal variation.

Comparison Between SN_ASHTO and SN_SVPD – t-Test

The Student t- test is used to test the significance of the difference between SN_ASHTO and SN_SVPD. Table 10.2 shows the mean, standard deviation of each variable and of the difference between the variables. It indicates that at significance level of .05 (confidence of 95%), the two variables are significantly different.

TABLE 10.2: T- SIGNIFICANCE TEST

Variable	Mean	St. Dv.	N	Diff.	St. Dv. Diff.	t	df	p-level
SN_ASHTO	5.94415*	2.27015*	13,727	-.154129	.345832*	-52.22	13,726	0.00*
SN_SVPD	6.09828*	2.22130*		*				

* Marked Differences are Significant at p-level < 0.050

Correlation Tables

The data base, shown in Appendix D, was used to develop correlation (or correction) tables to correlate the Structural Number obtained using SVPD to that obtained by the

AASHTO method, through a multiplier (or FACTOR). The value of the FACTOR is dependent on the values of six variables, as shown in Table 10.3. These variables are: TOT_ESAL, TRAF AMP, E1_AV, E1_AMP, MR_AV and MR_AMP. The values of the FACTOR listed in Table 10.3 correspond to an overall shift of π (i.e., the worst case scenario). The Table was developed for the case that:

- Reliability level $R = 95\%$
- Performance life $N = 20$ years
- Overall Standard Deviation $= 0.35$
- Serviceability loss $\Delta PSI = 1.9$

These limitations are displayed on the Table. For other values SVPD should be used. The correction Table may be useful to pavement engineers; they may use the AASHTO method to calculate the required Structural Number, then multiply the Structural Number by the Correction Factor found in the Table, to adjust for the seasonal variations of traffic and the pavement structural properties.

Notes on Table 10.3

- There are five tables one for each traffic level. The traffic levels are: 0.5, 4.5, 8.5, 12.5 and 16.5 million ESAL's.

- The shaded cells are not feasible. For Example, the subgrade resilient modulus amplitude may not be greater than the average value of the modulus, since this will lead to negative subgrade modulus values.
- It is noted that higher values of the Correction Factor (for up to 1.25, i.e., up to 25% increase in SN value) are associated with higher values of $E1\_AMP$, MR_AV and MR_AMP . This is explained earlier by the fact that the seasonal variation of the AC layer modulus is not accounted for, in the AASHTO method. In addition, it appears that the interaction between the three variables is significant.

TABLE 10.3: CORRECTION FACTORS

TRAF AMP *1000 ESAL	EI_A V KSI	EI_A MP KSI	MR_AV= 1000 (PSI)			6,000			11,000		
			MR_AMP= 0 (PSI)	700	1,400	0.0	700	1,400	0	700	1,400
0	100	0	1.000	1.000		0.995	0.991	1.000	0.990	1.010	1.007
		300									
		600									
	400	0	1.000	1.000		0.995	0.991	1.000	0.990	1.01	1.007
		300	1.022	1.073		1.067	1.081	1.088	1.078	1.098	1.095
		600									
	700	0	1.000	1.000		0.995	0.991	1.000	0.990	1.010	1.007
		300	1.011	1.036		1.013	1.027	1.034	1.012	1.032	1.029
		600	1.043	1.017		1.103	1.118	1.141	1.122	1.142	1.160
	1,000	0	1.000	1.000		0.995	0.991	1.000	0.990	1.010	1.007
		300	1.000	1.027		1.013	1.009	1.016	1.012	1.010	1.029
		600	1.011	1.054		1.031	1.045	1.052	1.034	1.054	1.073
25	100	0	1.000	1.027		0.995	1.009	1.016	0.990	1.010	1.007
		300									
		600									
	400	0	1.000	1.027		.995	1.009	1.016	0.990	1.010	1.007
		300	1.043	1.110		1.085	1.100	1.123	1.100	1.120	1.138
		600									
	700	0	1.000	1.027		0.995	1.009	1.016	0.990	1.010	1.007
		300	1.011	1.063		1.031	1.045	1.052	1.034	1.054	1.051
		600	1.065	1.138		1.121	1.154	1.177	1.166	1.164	1.182
	1,000	0	1.000	1.027		0.995	1.009	1.016	0.990	1.010	1.007
		300	1.011	1.054		1.013	1.027	1.034	1.012	1.032	1.029
		600	1.022	1.082		1.049	1.063	1.088	1.078	1.076	1.095
50	100	0	1.000	1.054		0.995	1.009	1.016	0.990	1.010	1.007
		300									
		600									
	400	0	1.000	1.054		0.995	1.009	1.016	0.990	1.010	1.007
		300	1.054	1.138		1.103	1.136	1.141	1.122	1.142	1.160
		600									
	700	0	1.000	1.054		0.995	1.009	1.016	0.990	1.010	1.007
		300	1.022	1.091		1.049	1.063	1.070	1.056	1.054	1.073
		600	1.076	1.156		1.140	1.172	1.195	1.188	1.208	1.226
	1,000	0	1.000	1.054		0.995	1.009	1.016	0.990	1.010	1.007
		300	1.011	1.082		1.031	1.045	1.052	1.034	1.032	1.051
		600	1.033	1.110		1.067	1.082	1.106	1.078	1.098	1.117

CORRECTION FACTORS (TOTAL ESALS = 16.5 MILLION, $\Delta PSI = 1.9$, $R = 95\%$, $N = 20$ YEARS, $S_o = 0.3$)

TABLE 10.3- CONTINUED: CORRECTION FACTORS

TRAFFIC AMP *1000 ESAL	E1_A V KSI	E1_A MP KSI	MR_AV= 1000 (PSI)			6,000			11,000		
			MR_AV= 0 (PSI)	700	1,400	0.0	700	1,400	0	700	1,400
0	100	0	1.001	1.003		0.995	0.992	0.999	1.007	1.006	1.003
		300									
		600									
	400	0	1.001	1.003		0.995	0.992	0.999	1.007	1.006	1.003
		300	1.023	1.080		1.070	1.085	1.092	1.076	1.098	1.117
		600									
	700	0	1.001	1.003		0.995	0.992	0.999	1.007	1.006	1.003
		300	1.012	1.032		1.014	1.03	1.036	1.030	1.029	1.026
		600	1.045	1.109		1.108	1.123	1.147	1.145	1.144	1.162
	1,000	0	1.001	1.003		0.995	0.992	0.999	1.007	1.006	1.003
		300	1.001	1.023		1.014	1.010	1.018	1.007	1.006	1.026
		600	1.012	1.051		1.033	1.048	1.055	1.053	1.052	1.071
25	100	0	1.001	1.042		0.995	1.010	1.018	1.007	1.006	1.003
		300									
		600									
	400	0	1.001	1.042		0.995	1.010	1.018	1.007	1.006	1.003
		300	1.045	1.118		1.089	1.123	1.129	1.122	1.144	1.140
		600									
	700	0	1.001	1.042		0.995	1.010	1.018	1.007	1.006	1.003
		300	1.023	1.080		1.033	1.048	1.073	1.053	1.052	1.071
		600	1.067	1.147		1.145	1.160	1.184	1.168	1.189	1.208
	1,000	0	1.001	1.042		0.995	1.010	1.018	1.007	1.006	1.003
		300	1.012	1.061		1.014	1.029	1.055	1.030	1.029	1.048
		600	1.034	1.099		1.052	1.085	1.092	1.076	1.098	1.094
50	100	0	1.001	1.070		0.995	1.010	1.036	1.007	1.006	1.026
		300									
		600									
	400	0	1.001	1.070		0.995	1.010	1.036	1.007	1.006	1.026
		300	1.067	1.147		1.127	1.141	1.166	1.145	1.166	1.185
		600									
	700	0	1.001	1.070		0.995	1.010	1.036	1.007	1.006	1.03
		300	1.034	1.109		1.052	1.067	1.092	1.053	1.075	1.094
		600	1.090	1.175		1.164	1.198	1.221	1.214	1.235	1.231
	1,000	0	1.001	1.070		0.995	1.010	1.036	1.007	1.006	1.026
		300	1.023	1.089		1.033	1.048	1.073	1.030	1.052	1.071
		600	1.045	1.128		1.089	1.104	1.129	1.099	1.121	1.140

CORRECTION FACTORS (TOTAL ESALS = 12.5 MILLION, $\Delta PSI = 1.9$, $R = 95\%$, $N = 20$ YEARS, $S_o = 0.3$)

TABLE 10.3- CONTINUED: CORRECTION FACTORS

TRAFFIC AMP *1000 ESAL	E1_A V KSI	E1_AM P KSI	MR_AV = 1000 (PSI)			6,000			11,000		
			MR_AM = 0 (PSI)	700	1,400	0.0	700	1,400	0	700	1,400
0	100	0	1.002	1.000		1.010	1.006	0.995	0.994	0.993	0.989
		300									
		600									
	400	0	1.002	1.000		1.010	1.006	0.995	0.994	0.993	0.989
		300	1.025	1.080		1.069	1.085	1.112	1.091	1.114	1.110
		600									
	700	0	1.002	1.000		1.010	1.006	0.995	0.994	0.993	0.989
		300	1.002	1.040		1.010	1.026	1.034	1.018	1.041	1.038
		600	1.048	1.110		1.109	1.124	1.151	1.139	1.162	1.182
	1,000	0	1.002	1.000		1.010	1.006	0.995	0.994	0.993	0.989
		300	1.002	1.030		1.010	1.026	1.014	1.018	1.017	1.013
		600	1.013	1.060		1.029	1.045	1.073	1.042	1.065	1.062
25	100	0	1.022	1.050		1.010	1.006	1.034	0.994	1.017	1.013
		300									
		600									
	400	0	1.002	1.050		1.010	1.006	1.034	0.994	1.017	1.013
		300	1.060	1.14		1.109	1.144	1.151	1.139	1.162	1.182
		600									
	700	0	1.002	1.050		1.010	1.006	1.034	0.994	1.017	1.013
		300	1.025	1.090		1.049	1.065	1.073	1.067	1.065	1.086
		600	1.083	1.170		1.168	1.184	1.209	1.212	1.235	1.231
	1,000	0	1.002	1.050		1.010	1.006	1.034	0.994	1.017	1.013
		300	1.013	1.080		1.029	1.045	1.053	1.042	1.041	1.062
		600	1.036	1.11		1.069	1.105	1.112	1.091	1.114	1.13

CORRECTION FACTORS (TOTAL ESALS = 8.5 MILLION, $\Delta PSI = 1.9$, $R = 95\%$, $N = 20$ YEARS, $S_o = 0.35$)

TABLE 10.3- CONTINUED: CORRECTION FACTORS

TRAF AMP *1000 ESAL	EI_A V KSI	EI_A MP KSI	MR_AV= 1000 (PSI)			6,000			11,000		
			MR_AMP= 0 (PSI)	700	1,400	0.0	700	1,400	0	700	1,400
0	100	0	1.006	1.003		0.996	0.992	1.002	0.988	1.013	1.010
		300									
		600									
	400	0	1.006	1.003		0.996	0.992	1.002	0.988	1.013	1.010
		300	1.032	1.089		1.083	1.100	1.109	1.121	1.120	1.14
		600									
	700	0	1.006	1.003		0.996	0.992	1.002	0.988	1.013	1.010
		300	1.006	1.046		1.018	1.036	1.045	1.041	1.040	1.036
		600	1.057	1.122		1.126	1.143	1.173	1.175	1.200	1.196
	1,000	0	1.006	1.003		0.996	0.992	1.002	0.988	1.013	1.010
		300	1.006	1.025		1.018	1.014	1.024	1.015	1.013	1.036
		600	1.019	1.068		1.039	1.057	1.066	1.068	1.067	1.089

CORRECTION FACTORS (TOTAL ESAL = 4.5 MILLION, N= 20 YEARS, $\Delta PSI = 1.9$, $R = 95\%$, $S_o = 0.35$)

TRAF AMP *1000 ESAL	EI_A V KSI	EI_A MP KSI	MR_AV= 1000 (PSI)			6,000			11,000		
			MR_AMP= 0 (PSI)	700	1,400	0.0	700	1,400	0	700	1,400
0	100	0	0.995	1.000		0.997	0.993	1.010	0.983	1.020	1.016
		300									
		600									
	400	0	0.995	1.000		0.997	0.993	1.010	0.983	1.020	1.016
		300	1.061	1.113		1.148	1.173	1.188			
		600									
	700	0	0.995	1.000		0.997	0.993	1.010	0.983	1.020	1.016
		300	1.011	1.057		1.027	1.053	1.069	1.059	1.057	1.091
		600	1.094	1.155		1.208	1.233	1.247			
	1,000	0	0.995	1.000		0.997	0.993	1.010	0.983	1.020	1.016
		300	1.011	1.043		1.027	1.023	1.039	1.021	1.020	1.053
		600	1.028	1.085		1.087	1.083	1.129	1.097	1.133	1.13

CORRECTION FACTORS (TOTAL ESAL = 0.5 MILLION, N= 20 YEARS, $\Delta PSI = 1.9$, $R = 95\%$, $S_o = 0.35$)

CHAPTER 11: CONCLUSIONS AND RECOMMENDATIONS

The first main objective of the work reported here is to investigate and quantify the relationship between climatic variables and pavements' structural properties, in light of the data collected under the Seasonal Monitoring Program. A series of bivariate and multivariate graphs are plotted to visually explore the spatial and temporal distribution of the pavement structural properties, and to graphically express the relationships between pairs of variables. Semivariogram analysis and ANOVA are used to analyze the spatial variation of the pavement layer moduli. Multivariate correlation analysis is used to correlate changes in pavement structural properties to climatic factors. Principal components and regression analyses are used to formulate and calibrate linear models that correlate climatic factors to the pavement's layer moduli. Nonlinear exponential models are developed to correlate the AC layer modulus to pavement temperature. Sinusoidal models are developed to correlate the layer moduli to the month of the year. Time series analysis is used to quantify the temporal and the spatial variations in pavement layers' moduli.

The second main objective is to develop a methodology to account for the seasonal changes in pavements' structural properties in the design of flexible pavements. Time series approach is used to incorporate the seasonal variations of pavement layers' stiffnesses in both empirical and mechanistic - empirical pavement design methods. A

computer program was written to carry out the required calculations based on the proposed methods, and to compare the outputs to those of existing design methods.

The concept of The Equivalent Constant Moduli is proposed to back-calculate the moduli of a set of layers that: have constant moduli with time, have the same set of thicknesses as the original pavement and will last the same performance life as the original pavement. The concept has the potential of simplifying the design method and evaluating the consequences of the design assumptions in relation to the stiffnesses of the pavement layers.

The following bullets report some of the important conclusions reached in these analyses.

- The base layer elastic modulus, E_2 , and the subgrade resilient modulus, E_3 , exhibited much less variation throughout the year than that of the AC layer modulus. This is expected since the sites under investigation are located at a no-freeze zone. While the peak values of E_3 are concurrent with minimum moisture levels at the upper part of the subgrade, the minimum values of the resilient modulus of the subgrade are concurrent with maximum moisture levels at the upper part of the subgrade. This observation supports Unsaturated Soil Mechanics (USM) theory that, within specified saturation levels, the value of E_3 increases as moisture levels go down and vice versa. When the moisture content is

plotted against the resilient modulus of the subgrade, for one testing point at a time, a significant linear association between the two variables is observed.

- In analyzing the spatial variations of pavement properties, Semivariogram (geostatistical) analysis showed that the moduli variations are not dependent on the separation distance, therefore data do not have a local structure. ANOVA is used to test the significance of the spacing between testing points. The results show that the moduli values that would have been obtained using less testing points (spacing between testing points of up to 100 ft (30.5 m)) are not significantly different from those obtained using a 25 ft (7.6 m) spacing between testing points. These results are specific to Site 48SA.
- In Site 48SA, the results of ANOVA indicate that for a significance level of 5% (reliability of 95%), the difference between AC elastic modulus values at the wheel path and that at the mid-lane is significant. The difference between the resilient modulus of the subgrade values at the wheel path and that at the mid-lane is not significant. This may be explained by the fact that the wheel path is subject to load applications that eventually cause compaction and hardening of the AC layer (the mean value of E1 at the wheel path is larger than that of the mid-lane). Since the pressure acting on the subgrade is much less than that of the surface layer, loading impact does not affect the subgrade resilient modulus significantly. In Site 48SF ANOVA indicates a significant difference in both variables (E1 and E3).

- There exists a strong linear negative association between the AC layer temperature and its elastic modulus. That is to say, the hotter the AC layer the less its resistance to deflection. This strong correlation is used to derive a temperature correction algorithm of back-calculated AC layer modulus.
- The AC layer elastic modulus is well correlated to the temperature gradient of the layer. Therefore, it has the potential of being used to predict the AC elastic modulus. However, the information gained from the temperature gradient is totally redundant to the layer temperature. Since it is easier to measure, the AC layer temperature is used in developing temperature correction algorithm of the back-calculated AC layer modulus.
- The intercorrelations between temperature at various depths are very high. This suggests that in constructing a model to predict the value of E_1 , only one measure of temperature should be included in the model. There is no need to include more than one temperature measure since there exists a large degree of redundancy between temperature measures.
- As far as the correlation between E_3 and moisture levels at the subgrade, the correlation coefficients ranged between -0.37 and 0.48. The upper TDR's have negative correlation coefficients, whereas the lower TDR's have positive coefficients. Theoretically, moisture levels in the soil are expected to be inversely

related to the subgrade resilient modulus (i.e., negative correlations are expected). The positive correlation coefficients for the lower TDR's may be explained by the hypothesis that vertical moisture movement within the soil, caused by temperature gradient within the soil mass, gravity and other forces, draws water from the upper part of the subgrade to lower parts and vice versa. This hypothesis is supported by negative intercorrelations between the upper TDR's and the lower TDR's. The upper part of the subgrade is where volumetric changes due to effective stresses take place, it is therefore the place where moisture levels mostly influence the resilient modulus of the soil. Simply put, when the moisture migrates from the lower part of the subgrade up, it causes an increase in moisture content at the upper part and consequently a lower soil resilient modulus. However, because the drying of the lower subgrade is concurrent with a decrease in the resilient modulus, a positive correlation coefficient is obtained.

- In an attempt to develop a linear model to predict the resilient modulus of subgrade, given the climatic conditions, Principal Components, Multiple Regression and Stepwise Regression analyses were performed. Based on these analyses, and based on the assumption that the moisture conditions measured in the instrumentation hole is representative of those of all FWD testing points, the linear association between climatic factors (temperature and moisture conditions) and the subgrade resilient modulus explain only about 30% of the modulus variation. This suggests further study to investigate other key variables that might affect the resilient

modulus. It is also suggested that other seasonal sites where the range of variation of the moisture levels is larger should be analyzed, since the wider the variation of the moisture levels the more reliable are the correlation coefficients in particular, and the statistical analyses in general.

- ♦ Time series analysis is a powerful technique that enables pavement engineers to separate the various sources of variation, so that a model may be formulated to represent the system and predict future values of the criterion variable. In this analysis, two systematic variations are investigated: the temporal variation that is caused by the environment, and the spatial variation that is caused by the physical characteristics of the pavement. In addition to the systematic variation, a nonsystematic (random) variation exists, which represent the unexplained portion of the variation. These three components are added together to reconstruct the original series. With respect to the AC layer modulus, the temporal (seasonal) variation is very significant as compared to the spatial variation. The latter variation did not represent a specific structure (i.e., was random.) The subgrade modulus at Site 48SA, exhibited a strong seasonality and a random spatial variation. However, in Site 48SF, it exhibited a strong seasonality and a strong spatial variation, with an increasing trend, which, to a large degree, masked the effect of seasonality. Spectral analysis was performed to examine the periodicity of the series and to mathematically model the series. The exponential smoothing was used to forecast future values of the series.

- A two- step process is proposed to consider seasonal variations in the design of flexible pavements. The first step is to characterize the seasonal changes of pavement layers' moduli using periodic functions. The second step is to use such periodic functions in pavement design equations.

- A computer program, Seasonal Variation in Pavement Design (SVPD), was written to carry out the required calculations, and facilitate the comparison between the following design methods:

A: Empirical Design Methods (based on serviceability loss) these include

- Existing Effective Roadbed Resilient Modulus (AASHTO)
- Integral Method w/ Constant Structural Number (AASHTO)
- Integral Method w/ Variable Structural Number (AASHTO)

B: Mechanistic -Empirical Methods (based on specified failure criteria) these include

- Design based on Fatigue Failure
- Design based on Permanent Deformation Failure

- In empirical design methods, AASHTO equation, material and traffic variables are substituted by time functions. The equation is then solved for the required Structural Number. The solution is achieved using numerical optimization techniques. The required SN value is the value that minimizes the objective function (in this case is the squared deviation between the cumulative damage and

unity). SVPD carries out these calculations, plots the objective function and finds the required structural number.

- In mechanistic- empirical design methods, given a pavement structure, SVPD subdivides the year into small increments, calculates the expected equivalent standard axle loads, the AC layer elastic modulus and the subgrade resilient modulus values in each increment, calculates critical stresses (or strains), uses superposition to calculate the cumulative damage and solves for (N) performance life of the pavement due to fatigue and due to permanent deformation. Two examples are presented to illustrate how each variation component affects the outcome of the design algorithm.
- The essence of the effective modulus concept in the AASHTO design procedure [1] is the recognition of the sensitivity of the M_R to seasonal variations. However, the underlying assumption in its present application is that traffic is uniformly distributed throughout the year. Mechanistic damage analysis procedures [53 and 55] opened up the prospects of matching traffic variations to seasonal variations, to yield conceptually more accurate pavement performance predictions. SVPD advances the state of the art of pavement design and performance one step further, by suggesting a methodology for simulating the joint impact of seasonal variations in pavement layer properties and traffic loading. By extension also, SVPD could

become a valuable decision support tool for pavement management, as well as for traffic restriction in environmentally sensitive areas.

- Time series analysis was used to characterize the seasonal variations of interest. It should be noted, however, that deployed in simulation mode, the SVPD methodology would be capable of accommodating any periodic function, continuous or piecewise, linear or nonlinear, time variant or time invariant.
- A sensitivity analysis was performed, to examine SVPD parameters. The analysis indicates that the higher the amplitude of the AC layer modulus function (seasonal variation), the higher is the deviation between SN_ASHTO and SN_SVPD. This is expected, since the AASHTO method does not consider the seasonal variation in the AC layer elastic modulus in the design. Practically, the AC layer modulus exhibits large seasonal variation. It was shown that the minimum AC layer modulus at Site 48SA was 2 GPa and the maximum was 10 GPa-- a significant seasonal variation.
- The data base developed for the sensitivity analysis, shown in Appendix D, was used to develop correlation (or correction) tables to correlate the Structural Number obtained using SVPD to that obtained by the AASHTO method, through a multiplier (or FACTOR). The value of the FACTOR is dependent on the values of six variables. It is noted that higher values of the Correction Factor (for up to 1.25,

i.e., up to 25% increase in SN value) are associated with higher values of El_AMP , MR_AV and MR_AMP . This is explained by the fact that the seasonal variation of the AC layer modulus is not accounted for, in the AASHTO method. In addition, it appears that the interaction between the three variables is significant.

- The Student t- test is used to test the significance of the difference between SN_ASHTO and SN_SVPD . The Test indicates that at significance level of .05 (confidence of 95%), the two variables are significantly different.

RECOMMENDATIONS

- Since the linear association between climatic factors (temperature and moisture conditions) and the subgrade resilient modulus explains only about 30% of the modulus variation, a further study is recommended to investigate other key variables that might affect the resilient modulus. It is also suggested that other seasonal sites where the range of variation of the moisture levels is larger should be analyzed, since the wider the variation of the moisture levels the more reliable are the correlation coefficients in particular, and the statistical analyses in general.
- One of the assumptions made in this analysis, which should be revisited, is that the moisture levels measured in the instrumentation hole represents those of all FWD testing points. The poor correlation between moisture levels and the subgrade modulus may be caused by the fact that the measured moisture levels are local and

greatly vary from one point to the next. Unless we have another instrumentation area at the other end of the site, we will have no way of comparing or assessing the spatial variation of the moisture content. It would be helpful to install a second instrumentation hole in one of the seasonal sites.

- It is recommended that time series analysis be performed on the pavement layer moduli values when a few more years' worth of data become available, to examine the secular trend (long term variation) component. The proposed methodology (to incorporate both the long-term variation as well as the seasonal variation of a pavement's layer moduli in the pavement design) is built on the assumption that the seasonal and the secular components of the pavement layer moduli are accurately modeled.
- In this report, many hypotheses were formulated to explain the observed pavement behavior. At the time of writing this report, we are missing some of the data that may help in accepting or rejecting such hypotheses. As more data become available (e.g., material testing data, etc.,), and more sites are tested, it is recommended that these hypotheses be revisited for a closer scrutiny.
- Further analysis is required to achieve the potential of the Equivalent Constant Moduli analysis. It is expected that useful recommendations, as to how to assume the values of the layer moduli, would result from such analysis.

APPENDICES:

Appendix A: Data Sets for Sites 48SA and 48SF

Appendix B: Complete Monthly Values of E1 and E3 & the Outputs of the Seasonal Decomposition

Appendix C: SVPD Program Listing

Appendix D: Data Base for SVPD Sensitivity Analysis

VARIABLE SPECIFICATIONS:

No	Name	Format	MD Code	Long Label
1	STATION	5.0	-0399	STATION
2	DATE	6.0	-9999	DATE
3	MONTH	3.0	-9999	MONTH OF THE YEAR (1-12)
4	TIME	4.0	-9999	TIME
5	COD	4.0	-9999	CODE FOR TESTING TIME (1 FROM 6 TO 9) ..ETC.
6	T_P	4.1	-9999	PAVEMENT TEMPERATURE IN C (BY FWD DEVICE)
7	T_A	4.1	-9999	AIR TEMPERATURE IN C (BY FWD)
8	D0_H1	5.2	-9999	NORMALIZED CENTRAL DEFLECTION FOR DROP HIGHT 1
9	D0_H2	5.2	-9999	NORMALIZED CENTRAL DEFLECTION FOR DROP HIGHT 2
10	D0_H3	5.2	-9999	NORMALIZED CENTRAL DEFLECTION FOR DROP HIGHT 3
11	D0_H4	5.2	-9999	NORMALIZED CENTRAL DEFLECTION FOR DROP HIGHT 4
12	T_AREA	5.1	-9999	TOTAL BASIN AREA IN MM
13	OUT3_A	5.1	-9999	BASIN AREA OF THE OUTER 3 SENSORS
14	T_U_A	5.1	-9999	UNIT BASIN AREA = TOTAL AREA /D0
15	U_AREA	5.1	-9999	APPROXIMATE UNIT BASIN AREA
16	E1_MPA	6.0	-9999	E1 IN MPa FOR THE AC LAYER"BACK-CALCULATED BY MODCOMP3"
17	E2_MPA	6.0	-9999	E2 IN MPa FOR THE BASE COURSE
18	E3_MPA	6.0	-9999	E3 IN MPa FOR THE UPPER 1.0 METER OF THE SUBGRADE
19	E4_MPA	6.0	-9999	E4 IN MPa FOR THE SUBGRADE BELOW 1.0 METER; unsaturated s
20	RMS	5.2	-9999	ROOT MEAN SQUARE ERROR ASSOCIATED WITH BACK-CALCULATION
21	ITR	4.1	-9999	NUMBER OF ITERATIONS TO FINAL SOLUTION
33	GM1	4.1	-9999	= VM1 * 0.467 ;GRAVIMETRIC MOISTURE CONTENT % AT 305 MM F
34	GM2	4.1	-9999	= VM2 * 0.581
35	GM3	4.1	-9999	= VM3 * 0.581
36	GM4	4.1	-9999	= VM4 * 0.581
37	GM5	4.1	-9999	= VM5 * 0.581
38	GM6	4.1	-9999	= VM6 * 0.581
39	GM7	4.1	-9999	= VM7 * 0.581
40	GM8	4.1	-9999	= VM8 * 0.581
41	GM9	4.1	-9999	= VM9 * 0.581
42	GM10	4.1	-9999	= VM10 * 0.581
43	AGM	4.1	-9999	=(GM1+GM2+GM3+GM4+GM5+GM6)/6 ;AVERAGE GRAVIMETRIC MOISTUR
44	T1	5.2	-9999	TEMPERATURE IN C AT 25 MM FROM THE SURFACE (IN AC)
45	T2	5.2	-9999	TEMPERATURE IN C AT 69 MM FROM THE SURFACE (IN AC)
46	T3	5.2	-9999	TEMPERATURE IN C AT 112 MM FROM THE SURFACE (IN AC)
47	T4	5.2	-9999	TEMPERATURE IN C AT 182 MM (IN THE BASE OR SUBGRADE)
48	T5	5.2	-9999	TEMPERATURE IN C AT 257 MM (IN THE BASE OR SUBGRADE)
49	A_PT	5.2	-9999	=(T1+T2+T3)/3
50	T_GRAD	5.2	-9999	= ((T2-T1)/0.044 + (T3-T2)/0.043)/2 ;TEMP.GRAD. IN AC (C/

data file: 48SA.STA [910 cases with 50 variables]

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
1	300F1	931026	10	932	2	13.0	10.0	.33	.19	.33	.33	280.7
2	300F1	931026	10	1103	3	15.0	12.0	.36	.20	.36	.35	291.9
3	300F1	931026	10	1419	4	22.0	15.0	.39	.23	.39	.39	296.3
4	300F1	931026	10	1548	4	23.0	15.0	.42	.24	.42	.41	294.1
5	300F1	931214	12	740	1	2.0	2.0	.31	.19	.32	.31	277.2
6	300F1	931214	12	926	2	10.0	6.0	.34	.20	.34	.33	288.7
7	300F1	931214	12	1120	3	16.0	10.0	.37	.22	.37	.36	296.1
8	300F1	931214	12	1321	4	22.0	13.0	.39	.24	.39	.39	300.0
9	300F1	931214	12	1527	4	23.0	14.0	.41	.24	.40	.40	300.8
10	300F1	940110	1	746	1	-1.0	-3.0	.33	.19	.33	.32	289.7
11	300F1	940110	1	936	2	6.0	3.0	.33	.20	.34	.34	293.4
12	300F1	940110	1	1132	3	15.0	11.0	.37	.22	.37	.37	300.1
13	300F1	940110	1	1331	4	20.0	14.0	.39	.24	.39	.39	302.6
14	300F1	940110	1	1457	4	21.0	16.0	.41	.25	.42	.41	301.5
15	300F1	940207	2	738	1	2.0	1.0	.37	.22	.36	.35	298.3
16	300F1	940207	2	925	2	7.0	5.0	.37	.22	.37	.36	301.1
17	300F1	940207	2	1130	3	15.0	12.0	.39	.23	.39	.38	306.4
18	300F1	940207	2	1326	4	24.0	18.0	.42	.25	.42	.41	314.3
19	300F1	940207	2	1532	4	19.0	15.0	.42	.26	.42	.41	314.1
20	300F1	940302	3	704	1	2.0	1.0	.35	.20	.35	.34	289.7
21	300F1	940302	3	906	2	10.0	7.0	.37	.21	.37	.36	301.4
22	300F1	940302	3	1100	3	22.0	15.0	.40	.23	.40	.39	309.1
23	300F1	940411	4	956	2	15.0	11.0	.37	.21	.37	.36	287.2
24	300F1	940411	4	1157	3	17.0	10.0	.37	.22	.38	.38	291.3
25	300F1	940411	4	1400	4	23.0	14.0	.42	.25	.42	.41	299.0
26	300F1	940509	5	1336	4	26.0	23.0	.38	.22	.38	.38	279.2
27	300F1	940509	5	1525	4	35.0	26.0	.40	.24	.40	.41	284.7
28	300F1	940509	5	1708	5	35.0	27.0	.48	.27	.47	.46	295.8
29	300F1	940624	6	630	1	24.0	24.0	.37	.21	.40	.38	267.0
30	300F1	940624	6	939	2	31.0	33.0	.34	.21	.37	.38	260.4
31	300F1	940624	6	1147	3	35.0	39.0	.42	.25	.45	.45	278.5
32	300F1	940624	6	1404	4	41.0	39.0	.49	.29	.50	.50	285.4
33	300F1	940624	6	1629	5	43.0	43.0	.52	.28	.52	.49	289.3
34	300F1	940718	7	639	1	24.0	23.0	.35	.22	.38	.39	257.1
35	300F1	940718	7	906	2	29.0	29.0	.35	.22	.38	.40	258.9
36	300F1	940718	7	1217	3	38.0	37.0	.42	.26	.45	.45	274.1
37	300F1	940718	7	1436	4	39.0	40.0	.49	.29	.50	.50	281.4
38	300F1	940718	7	1631	5	41.0	42.0	.44	.28	.50	.51	280.1
39	300F1	940817	8	654	1	21.0	21.0	.33	.21	.36	.36	256.0
40	300F1	940817	8	901	2	25.0	27.0	.37	.22	.39	.40	271.4
41	300F1	940817	8	945	2	28.0	27.0	.42	.25	.43	.42	285.2
42	300F1	940817	8	1105	3	33.0	33.0	.41	.25	.43	.44	278.1
43	300F1	940817	8	1303	4	39.0	39.0	.47	.28	.48	.49	292.2
44	300F1	940817	8	1501	4	42.0	43.0	.53	.30	.52	.52	292.5
45	300F3	931026	10	810	1	11.0	9.0	.39	.22	.39	.39	307.9
46	300F3	931026	10	917	2	14.0	8.0	.39	.22	.39	.38	309.1
47	300F3	931026	10	1148	3	21.0	13.0	.44	.25	.44	.42	315.5
48	300F3	931026	10	1505	4	24.0	16.0	.47	.26	.45	.45	319.1
49	300F3	931026	10	1634	5	19.0	14.0	.46	.26	.45	.44	311.6
50	300F3	931214	12	815	1	4.0	3.0	.35	.20	.36	.35	297.0

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
51	300F3	931214	12	1006	2	11.0	8.0	.37	.22	.38	.37	309.6
52	300F3	931214	12	1205	3	19.0	11.0	.39	.24	.40	.40	312.4
53	300F3	931214	12	1401	4	21.0	13.0	.43	.25	.42	.42	318.1
54	300F3	931214	12	1623	5	18.0	14.0	.42	.25	.42	.42	314.7
55	300F3	940110	1	822	1	1.0	-1.0	.33	.20	.34	.34	296.5
56	300F3	940110	1	1023	2	11.0	6.0	.36	.22	.37	.36	310.5
57	300F3	940110	1	1221	3	17.0	12.0	.39	.24	.39	.40	313.7
58	300F3	940110	1	1411	4	21.0	14.0	.42	.25	.42	.42	315.9
59	300F3	940110	1	1547	4	19.0	15.0	.44	.26	.44	.43	318.3
60	300F3	940207	2	820	1	17.0	1.0	.37	.22	.37	.36	314.8
61	300F3	940207	2	1006	2	10.0	7.0	.38	.23	.37	.37	315.5
62	300F3	940207	2	1210	3	19.0	15.0	.40	.25	.40	.40	320.9
63	300F3	940207	2	1411	4	25.0	20.0	.44	.27	.43	.43	329.9
64	300F3	940207	2	1656	5	14.0	11.0	.41	.25	.41	.41	320.2
65	300F3	940302	3	752	1	5.0	2.0	.35	.21	.35	.35	306.1
66	300F3	940302	3	951	2	15.0	11.0	.40	.23	.40	.39	321.8
67	300F3	940302	3	1150	3	24.0	17.0	.43	.26	.43	.43	324.4
68	300F3	940411	4	1038	2	16.0	11.0	.39	.23	.39	.39	296.9
69	300F3	940411	4	1240	3	22.0	12.0	.41	.24	.40	.40	301.3
70	300F3	940411	4	1449	4	27.0	15.0	.47	.27	.45	.45	309.4
71	300F3	940509	5	1417	4	34.0	27.0	.45	.26	.43	.43	294.3
72	300F3	940509	5	1612	5	35.0	28.0	.45	.26	.43	.43	292.8
73	300F3	940509	5	1751	5	34.0	27.0	.46	.27	.45	.44	295.4
74	300F3	940624	6	746	1	25.0	26.0	.35	.21	.37	.36	266.3
75	300F3	940624	6	1027	2	34.0	35.0	.38	.23	.39	.39	273.1
76	300F3	940624	6	1236	3	39.0	41.0	.43	.25	.43	.43	288.8
77	300F3	940624	6	1514	4	44.0	43.0	.48	.27	.48	.47	294.1
78	300F3	940718	7	754	1	25.0	24.0	.34	.21	.36	.35	260.4
79	300F3	940718	7	946	2	30.0	31.0	.40	.24	.41	.41	273.4
80	300F3	940718	7	1307	4	39.0	38.0	.44	.26	.45	.44	284.0
81	300F3	940718	7	1507	4	43.0	41.0	.46	.27	.47	.46	289.2
82	300F3	940718	7	1714	5	42.0	41.0	.45	.26	.46	.45	285.9
83	300F3	940817	8	744	1	22.0	22.0	.38	.23	.40	.39	273.4
84	300F3	940817	8	945	2	28.0	27.0	.42	.25	.43	.42	285.2
85	300F3	940817	8	1156	3	34.0	36.0	.46	.27	.46	.45	292.1
86	300F3	940817	8	1343	4	41.0	40.0	.48	.28	.47	.47	296.1
87	300F3	940817	8	1547	4	43.0	44.0	.51	.29	.49	.48	301.4
88	325F1	931026	10	939	2	14.0	10.0	.39	.22	.39	.39	330.9
89	325F1	931026	10	1107	3	16.0	12.0	.40	.24	.42	.41	337.2
90	325F1	931026	10	1423	4	22.0	15.0	.43	.25	.43	.43	335.1
91	325F1	931026	10	1553	4	22.0	15.0	.48	.26	.47	.46	339.2
92	325F1	931214	12	743	1	2.0	2.0	.41	.24	.41	.40	349.3
93	325F1	931214	12	932	2	10.0	7.0	.43	.25	.42	.41	352.0
94	325F1	931214	12	1125	3	16.0	10.0	.46	.27	.45	.44	359.9
95	325F1	931214	12	1327	4	21.0	13.0	.48	.28	.47	.46	357.0
96	325F1	931214	12	1534	4	22.0	14.0	.50	.30	.50	.48	362.3
97	325F1	940110	1	749	1	-1.0	-2.0	.41	.24	.41	.40	352.2
98	325F1	940110	1	941	2	6.0	3.0	.42	.25	.42	.41	361.1
99	325F1	940110	1	1135	3	15.0	12.0	.44	.27	.45	.44	359.9
100	325F1	940110	1	1334	4	20.0	15.0	.49	.29	.49	.48	361.3
101	325F1	940110	1	1501	4	21.0	16.0	.49	.29	.50	.48	358.5
102	325F1	940207	2	742	1	2.0	1.0	.46	.27	.45	.44	373.2
103	325F1	940207	2	929	2	7.0	4.0	.47	.28	.46	.44	372.2
104	325F1	940207	2	1136	3	16.0	13.0	.49	.29	.48	.47	371.3
105	325F1	940207	2	1329	4	24.0	19.0	.52	.31	.51	.50	375.5

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
106	325F1	940207	2	1539	4	19.0	14.0	.54	.31	.52	.51	378.2
107	325F1	940302	3	709	1	2.0	1.0	.44	.25	.43	.42	364.7
108	325F1	940302	3	912	2	11.0	8.0	.46	.26	.45	.44	373.6
109	325F1	940302	3	1103	3	22.0	15.0	.51	.29	.50	.48	374.6
110	325F1	940411	4	1000	2	15.0	11.0	.46	.26	.46	.45	346.0
111	325F1	940411	4	1203	3	17.0	10.0	.46	.27	.46	.45	348.1
112	325F1	940411	4	1403	4	26.0	14.0	.52	.30	.51	.50	354.8
113	325F1	940509	5	1340	4	26.0	23.0	.50	.29	.49	.49	335.4
114	325F1	940509	5	1529	4	36.0	28.0	.46	.28	.46	.46	325.1
115	325F1	940509	5	1711	5	32.0	27.0	.60	.34	.57	.56	342.5
116	325F1	940624	6	638	1	24.0	24.0	.50	.29	.51	.51	312.1
117	325F1	940624	6	945	2	32.0	34.0	.42	.25	.44	.44	301.6
118	325F1	940624	6	1153	3	37.0	40.0	.60	.33	.59	.57	328.6
119	325F1	940624	6	1409	4	41.0	39.0	.65	.37	.63	.61	329.7
120	325F1	940624	6	1633	5	42.0	43.0	.69	.38	.65	.64	332.0
121	325F1	940718	7	646	1	24.0	23.0	.50	.30	.52	.52	304.0
122	325F1	940718	7	909	2	30.0	29.0	.42	.26	.45	.45	293.2
123	325F1	940718	7	1231	3	35.0	37.0	.48	.28	.51	.50	308.0
124	325F1	940718	7	1439	4	41.0	40.0	.57	.34	.58	.58	325.1
125	325F1	940718	7	1635	5	42.0	41.0	.63	.36	.61	.60	319.8
126	325F1	940817	8	700	1	22.0	20.0	.40	.24	.41	.41	296.5
127	325F1	940817	8	904	2	26.0	27.0	.44	.27	.46	.47	311.3
128	325F1	940817	8	948	2	30.0	28.0	.47	.28	.47	.46	315.8
129	325F1	940817	8	1113	3	33.0	33.0	.53	.30	.52	.53	325.8
130	325F1	940817	8	1308	4	38.0	40.0	.58	.33	.56	.56	330.2
131	325F1	940817	8	1504	4	42.0	43.0	.64	.36	.61	.60	334.4
132	325F3	931026	10	815	1	11.0	9.0	.45	.25	.44	.43	348.2
133	325F3	931026	10	920	2	13.0	8.0	.42	.24	.42	.41	340.5
134	325F3	931026	10	1151	3	20.0	13.0	.45	.26	.44	.44	344.3
135	325F3	931026	10	1508	4	23.0	15.0	.48	.27	.47	.47	344.2
136	325F3	931026	10	1637	5	19.0	14.0	.49	.28	.48	.47	346.6
137	325F3	931214	12	818	1	4.0	3.0	.38	.22	.39	.38	325.2
138	325F3	931214	12	1009	2	11.0	8.0	.41	.24	.41	.40	337.4
139	325F3	931214	12	1210	3	19.0	11.0	.44	.26	.44	.43	343.1
140	325F3	931214	12	1406	4	21.0	13.0	.47	.28	.46	.46	350.2
141	325F3	931214	12	1629	5	17.0	14.0	.46	.27	.45	.45	341.4
142	325F3	940110	1	829	1	1.0	-1.0	.36	.21	.37	.37	322.6
143	325F3	940110	1	1027	2	11.0	6.0	.39	.23	.39	.39	332.3
144	325F3	940110	1	1224	3	17.0	13.0	.43	.25	.42	.42	336.2
145	325F3	940110	1	1414	4	21.0	14.0	.46	.27	.46	.45	345.0
146	325F3	940110	1	1551	4	20.0	16.0	.49	.28	.48	.47	348.5
147	325F3	940207	2	826	1	19.0	1.0	.40	.24	.40	.40	342.8
148	325F3	940207	2	1011	2	10.0	8.0	.41	.24	.41	.40	343.8
149	325F3	940207	2	1214	3	19.0	15.0	.44	.26	.43	.43	344.3
150	325F3	940207	2	1415	4	25.0	20.0	.47	.29	.47	.47	357.3
151	325F3	940207	2	1615	5	16.0	12.0	.45	.28	.45	.45	346.7
152	325F3	940302	3	758	1	5.0	2.0	.39	.23	.39	.38	336.9
153	325F3	940302	3	954	2	15.0	12.0	.42	.25	.42	.41	340.4
154	325F3	940302	3	1159	3	26.0	18.0	.47	.29	.47	.46	353.0
155	325F3	940411	4	1042	2	17.0	11.0	.41	.24	.41	.41	317.2
156	325F3	940411	4	1246	3	21.0	13.0	.44	.26	.44	.43	326.5
157	325F3	940411	4	1452	4	26.0	15.0	.49	.28	.48	.47	331.0
158	325F3	940509	5	1425	4	34.0	27.0	.49	.28	.47	.47	321.2
159	325F3	940509	5	1619	5	39.0	28.0	.49	.28	.47	.46	317.5
160	325F3	940509	5	1754	5	32.0	27.0	.51	.29	.48	.47	320.5

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
161	325F3	940624	6	754	1	27.0	28.0	.42	.24	.43	.42	301.5
162	325F3	940624	6	1033	2	36.0	36.0	.46	.27	.46	.46	312.4
163	325F3	940624	6	1240	3	41.0	42.0	.49	.28	.48	.48	315.0
164	325F3	940624	6	1518	4	44.0	43.0	.53	.30	.52	.52	325.9
165	325F3	940624	6	1715	5	43.0	44.0	.52	.29	.51	.50	318.0
166	325F3	940718	7	759	1	28.0	25.0	.39	.24	.42	.42	293.1
167	325F3	940718	7	950	2	33.0	31.0	.45	.27	.46	.45	304.4
168	325F3	940718	7	1309	4	39.0	38.0	.50	.29	.50	.50	312.2
169	325F3	940718	7	1510	4	42.0	40.0	.52	.31	.52	.51	318.8
170	325F3	940718	7	1717	5	42.0	41.0	.53	.31	.52	.51	318.1
171	325F3	940817	8	747	1	23.0	22.0	.44	.26	.44	.44	310.5
172	325F3	940817	8	948	2	30.0	28.0	.47	.28	.47	.46	315.8
173	325F3	940817	8	1206	3	34.0	36.0	.52	.30	.51	.50	330.1
174	325F3	940817	8	1346	4	41.0	41.0	.53	.30	.52	.51	327.6
175	325F3	940817	8	1550	4	42.0	44.0	.56	.32	.53	.52	327.8
176	350F1	931026	10	943	2	14.0	10.0	.33	.19	.33	.33	278.6
177	350F1	931026	10	1111	3	12.0	12.0	.35	.20	.34	.34	283.3
178	350F1	931026	10	1426	4	22.0	15.0	.36	.21	.36	.36	288.3
179	350F1	931026	10	1559	4	23.0	14.0	.38	.21	.38	.37	285.7
180	350F1	931214	12	746	1	2.0	2.0	.32	.19	.33	.32	274.7
181	350F1	931214	12	936	2	10.0	7.0	.35	.20	.34	.33	284.1
182	350F1	931214	12	1128	3	17.0	10.0	.37	.22	.36	.36	291.3
183	350F1	931214	12	1330	4	22.0	13.0	.39	.23	.38	.38	291.6
184	350F1	931214	12	1537	4	21.0	14.0	.40	.24	.40	.39	291.6
185	350F1	940110	1	752	1	-1.0	-2.0	.32	.19	.33	.32	281.8
186	350F1	940110	1	948	2	7.0	4.0	.35	.20	.35	.34	289.7
187	350F1	940110	1	1142	3	15.0	11.0	.36	.22	.36	.36	291.0
188	350F1	940110	1	1339	4	20.0	14.0	.39	.23	.39	.39	296.2
189	350F1	940110	1	1504	4	21.0	15.0	.40	.24	.41	.39	295.5
190	350F1	940207	2	748	1		1.0	.36	.21	.36	.35	297.1
191	350F1	940207	2	932	2	8.0	5.0	.36	.22	.36	.36	297.6
192	350F1	940207	2	1139	3	17.0	13.0	.38	.23	.38	.37	301.0
193	350F1	940207	2	1332	4	24.0	19.0	.41	.25	.41	.41	310.8
194	350F1	940207	2	1542	4	18.0	14.0	.42	.25	.42	.41	310.8
195	350F1	940302	3	714	1	2.0	1.0	.35	.20	.35	.34	288.8
196	350F1	940302	3	915	2	11.0	8.0	.37	.21	.36	.35	295.6
197	350F1	940302	3	1107	3	22.0	16.0	.41	.24	.40	.40	305.5
198	350F1	940411	4	1004	2	15.0	11.0	.36	.21	.37	.36	286.0
199	350F1	940411	4	1207	3	17.0	10.0	.36	.21	.36	.36	286.7
200	350F1	940411	4	1410	4	28.0	14.0	.39	.23	.40	.39	293.3
201	350F1	940509	5	1343	4	27.0	24.0	.38	.22	.38	.38	283.9
202	350F1	940509	5	1534	4	40.0	28.0	.43	.25	.43	.42	297.4
203	350F1	940509	5	1716	5	32.0	27.0	.45	.26	.44	.43	288.8
204	350F1	940624	6	649	1	24.0	24.0	.38	.22	.40	.40	265.1
205	350F1	940624	6	955	2	32.0	34.0	.36	.21	.38	.38	263.7
206	350F1	940624	6	1156	3	39.0	40.0	.47	.27	.47	.47	276.8
207	350F1	940624	6	1413	4	42.0	39.0	.53	.30	.52	.51	282.8
208	350F1	940624	6	1636	5	44.0	43.0	.62	.33	.56	.54	283.3
209	350F1	940718	7	648	1	24.0	23.0	.38	.23	.40	.41	259.8
210	350F1	940718	7	912	2	29.0	29.0	.33	.21	.36	.37	258.8
211	350F1	940718	7	1234	3	39.0	37.0	.38	.24	.42	.44	270.5
212	350F1	940718	7	1442	4	42.0	39.0	.49	.28	.48	.48	276.0
213	350F1	940718	7	1641	5	40.0	41.0	.50	.28	.48	.48	276.5
214	350F1	940817	8	703	1	22.0	20.0	.33	.20	.36	.36	263.4
215	350F1	940817	8	907	2	26.0	27.0	.37	.22	.39	.39	271.2

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	D0_H1	D0_H2	D0_H3	D0_H4	T_ARE
216	350F1	940817	8	950	2	30.0	28.0	.40	.23	.40	.39	296.5
217	350F1	940817	8	1116	3	35.0	33.0	.41	.24	.43	.43	279.8
218	350F1	940817	8	1314	4	40.0	40.0	.46	.27	.47	.47	286.5
219	350F1	940817	8	1511	4	42.0	42.0	.50	.28	.49	.48	287.7
220	350F3	931026	10	826	1	11.0	9.0	.38	.22	.39	.38	312.8
221	350F3	931026	10	926	2	14.0	8.0	.38	.21	.39	.37	306.7
222	350F3	931026	10	1155	3	20.0	13.0	.43	.24	.42	.41	314.4
223	350F3	931026	10	1513	4	23.0	16.0	.42	.24	.42	.42	315.5
224	350F3	931026	10	1642	5	19.0	14.0	.42	.24	.41	.41	311.9
225	350F3	931214	12	821	1	4.0	3.0	.35	.21	.36	.35	298.4
226	350F3	931214	12	1015	2	11.0	8.0	.37	.22	.37	.37	309.2
227	350F3	931214	12	1213	3	19.0	11.0	.41	.24	.41	.40	314.2
228	350F3	931214	12	1413	4	21.0	13.0	.42	.25	.42	.42	318.1
229	350F3	931214	12	1635	5	17.0	14.0	.42	.24	.40	.41	312.6
230	350F3	940110	1	834	1	1.0	-1.0	.34	.20	.35	.34	301.6
231	350F3	940110	1	1031	2	11.0	7.0	.37	.21	.36	.36	308.7
232	350F3	940110	1	1227	3	17.0	14.0	.39	.23	.40	.39	314.6
233	350F3	940110	1	1417	4	21.0	15.0	.42	.25	.42	.42	319.7
234	350F3	940110	1	1556	4	20.0	16.0	.44	.25	.43	.42	319.2
235	350F3	940207	2	830	1	17.0	2.0	.37	.22	.37	.36	318.7
236	350F3	940207	2	1014	2	10.0	8.0	.38	.23	.38	.37	322.5
237	350F3	940207	2	1217	3	19.0	16.0	.41	.25	.40	.41	329.5
238	350F3	940207	2	1417	4	25.0	20.0	.44	.27	.43	.43	335.8
239	350F3	940207	2	1619	5	15.0	12.0	.42	.26	.42	.42	329.9
240	350F3	940302	3	802	1	5.0	2.0	.35	.21	.36	.35	312.1
241	350F3	940302	3	959	2	15.0	12.0	.38	.23	.38	.38	320.1
242	350F3	940302	3	1205	3	27.0	18.0	.43	.26	.43	.43	330.4
243	350F3	940411	4	1045	2	16.0	12.0	.38	.22	.38	.38	304.3
244	350F3	940411	4	1249	3	22.0	13.0	.41	.24	.41	.40	310.5
245	350F3	940411	4	1455	4	26.0	15.0	.44	.26	.43	.43	314.7
246	350F3	940509	5	1428	4	36.0	28.0	.45	.26	.43	.43	304.5
247	350F3	940509	5	1622	5	36.0	28.0	.43	.25	.42	.42	302.1
248	350F3	940509	5	1800	5	32.0	29.0	.45	.25	.43	.42	302.2
249	350F3	940624	6	802	1	26.0	27.0	.36	.20	.37	.35	272.8
250	350F3	940624	6	1039	2	36.0	37.0	.38	.23	.39	.39	280.2
251	350F3	940624	6	1242	3	41.0	41.0	.42	.24	.43	.42	289.1
252	350F3	940624	6	1521	4	44.0	42.0	.45	.26	.46	.46	292.4
253	350F3	940624	6	1720	5	43.0	44.0	.47	.27	.47	.47	293.2
254	350F3	940718	7	802	1	27.0	25.0	.37	.22	.38	.38	270.4
255	350F3	940718	7	953	2	32.0	31.0	.40	.23	.40	.40	275.6
256	350F3	940718	7	1315	4	40.0	39.0	.41	.25	.42	.42	287.0
257	350F3	940718	7	1512	4	43.0	41.0	.46	.27	.45	.45	289.8
258	350F3	940718	7	1721	5	41.0	41.0	.43	.26	.44	.44	286.7
259	350F3	940817	8	750	1	23.0	22.0	.40	.24	.41	.41	288.4
260	350F3	940817	8	950	2	30.0	28.0	.40	.23	.40	.39	296.5
261	350F3	940817	8	1209	3	38.0	36.0	.47	.27	.45	.45	304.9
262	350F3	940817	8	1352	4	41.0	41.0	.46	.27	.45	.45	308.0
263	350F3	940817	8	1558	4	41.0	43.0	.49	.28	.47	.47	307.6
264	374F1	940110	1	951	2	8.0	4.0	.35	.20	.35	.34	293.0
265	375F1	931026	10	946	2	14.0	11.0	.34	.19	.34	.34	279.9
266	375F1	931026	10	1118	3	16.0	12.0	.35	.20	.35	.34	283.6
267	375F1	931026	10	1429	4	22.0	15.0	.39	.22	.38	.38	291.6
268	375F1	931026	10	1602	5	21.0	15.0	.39	.22	.39	.38	287.7
269	375F1	931214	12	749	1	3.0	1.0	.32	.19	.33	.32	276.5
270	375F1	931214	12	939	2	10.0	7.0	.34	.20	.34	.34	287.2

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
271	375F1	931214	12	1134	3	17.0	10.0	.37	.22	.37	.36	294.9
272	375F1	931214	12	1334	4	22.0	14.0	.39	.23	.38	.38	296.9
273	375F1	931214	12	1544	4	21.0	14.0	.41	.23	.40	.39	298.1
274	375F1	940110	1	755	1	-1.0	-2.0	.33	.19	.33	.32	281.5
275	375F1	940110	1	1145	3	16.0	11.0	.36	.21	.37	.36	297.7
276	375F1	940110	1	1342	4		15.0	.40	.23	.40	.39	301.3
277	375F1	940110	1	1508	4	20.0	15.0	.41	.24	.41	.40	301.1
278	375F1	940207	2	751	1	20.0	1.0	.36	.21	.36	.35	295.2
279	375F1	940207	2	935	2	9.0	5.0	.37	.22	.37	.36	301.8
280	375F1	940207	2	1142	3	17.0	13.0	.39	.23	.39	.38	305.5
281	375F1	940207	2	1335	4	25.0	20.0	.41	.25	.41	.40	310.1
282	375F1	940207	2	1544	4	17.0	14.0	.43	.25	.42	.41	309.8
283	375F1	940302	3	718	1	2.0	1.0	.34	.19	.34	.33	288.0
284	375F1	940302	3	918	2	11.0	8.0	.36	.21	.36	.36	298.8
285	375F1	940302	3	1113	3	22.0	16.0	.40	.23	.40	.39	306.0
286	375F1	940411	4	1008	2	15.0	11.0	.36	.21	.36	.36	283.0
287	375F1	940411	4	1210	3	17.0	10.0	.38	.22	.37	.36	284.6
288	375F1	940411	4	1414	4	28.0	14.0	.41	.24	.40	.40	289.9
289	375F1	940509	5	1346	4	29.0	24.0	.39	.23	.39	.39	274.2
290	375F1	940509	5	1539	4	38.0	29.0	.43	.25	.42	.42	283.2
291	375F1	940509	5	1719	5	33.0	28.0	.44	.25	.42	.42	284.6
292	375F1	940624	6	656	1	24.0	23.0	.35	.20	.37	.36	258.2
293	375F1	940624	6	958	2	34.0	34.0	.38	.23	.39	.40	262.6
294	375F1	940624	6	1159	3	38.0	40.0	.43	.25	.43	.43	273.6
295	375F1	940624	6	1416	4	42.0	40.0	.48	.27	.47	.46	277.6
296	375F1	940718	7	655	1	24.0	23.0	.33	.21	.36	.37	248.7
297	375F1	940718	7	915	2	30.0	29.0	.36	.22	.38	.38	254.1
298	375F1	940718	7	1237	3	38.0	37.0	.42	.25	.44	.43	268.6
299	375F1	940718	7	1445	4	42.0	40.0	.48	.28	.47	.46	272.7
300	375F1	940718	7	1644	5	42.0	41.0	.50	.29	.48	.48	273.2
301	375F1	940817	8	708	1	21.0	21.0	.36	.22	.38	.38	265.6
302	375F1	940817	8	910	2	27.0	27.0	.38	.23	.39	.39	269.0
303	375F1	940817	8	1000	2	30.0	29.0	.40	.24	.42	.40	288.9
304	375F1	940817	8	1119	3	33.0	33.0	.42	.25	.43	.43	279.8
305	375F1	940817	8	1317	4	39.0	40.0	.47	.27	.47	.47	288.5
306	375F1	940817	8	1514	4	42.0	43.0	.51	.29	.49	.49	289.6
307	375F3	931026	10	832	1	11.0	10.0	.39	.22	.38	.37	303.1
308	375F3	931026	10	931	2	15.0	8.0	.38	.21	.38	.37	302.8
309	375F3	931026	10	1206	3	20.0	13.0	.42	.23	.41	.40	310.5
310	375F3	931026	10	1516	4	24.0	16.0	.45	.25	.43	.43	314.3
311	375F3	931026	10	1647	5	17.0	14.0	.43	.24	.42	.41	308.2
312	375F3	931214	12	824	1	5.0	4.0	.35	.21	.36	.35	295.7
313	375F3	931214	12	1019	2	12.0	8.0	.39	.22	.38	.37	309.4
314	375F3	931214	12	1218	3	19.0	11.0	.42	.24	.41	.40	312.5
315	375F3	931214	12	1423	4	21.0	13.0	.43	.25	.42	.42	316.8
316	375F3	931214	12	1642	5	17.0	14.0	.43	.25	.42	.41	312.3
317	375F3	940110	1	838	1	1.0	0.0	.35	.20	.35	.34	296.6
318	375F3	940110	1	1035	2	12.0	8.0	.38	.22	.38	.37	305.5
319	375F3	940110	1	1230	3	17.0	12.0	.41	.24	.40	.40	312.8
320	375F3	940110	1	1422	4	20.0	14.0	.43	.25	.42	.41	312.8
321	375F3	940110	1	1558	4	20.0	16.0	.44	.25	.43	.42	314.5
322	375F3	940207	2	833	1	18.0	2.0	.38	.22	.37	.36	313.3
323	375F3	940207	2	1017	2	11.0	8.0	.39	.23	.39	.38	315.8
324	375F3	940207	2	1221	3	20.0	16.0	.41	.25	.41	.41	321.5
325	375F3	940207	2	1421	4	24.0	20.0	.46	.27	.44	.44	329.5

	1 STATI	2 DATE	3 MON	4 TIME	5 COD	6 T_P	7 T_A	8 DO_H1	9 DO_H2	10 DO_H3	11 DO_H4	12 T_ARE
326	375F3	940207	2	1625	5	15.0	12.0	.43	.26	.42	.42	319.9
327	375F3	940302	3	805	1	5.0	3.0	.37	.21	.36	.35	307.6
328	375F3	940302	3	1003	2	17.0	12.0	.40	.23	.39	.39	314.7
329	375F3	940302	3	1210	3	26.0	18.0	.45	.26	.43	.43	321.8
330	375F3	940411	4	1049	2	17.0	11.0	.38	.22	.37	.38	294.1
331	375F3	940411	4	1256	3	25.0	13.0	.41	.23	.40	.39	297.3
332	375F3	940411	4	1501	4	27.0	15.0	.43	.25	.41	.41	301.1
333	375F3	940509	5	1432	4	35.0	27.0	.43	.25	.42	.41	291.4
334	375F3	940509	5	1626	5	36.0	27.0	.45	.25	.42	.42	290.8
335	375F3	940509	5	1802	5	32.0	29.0	.44	.25	.42	.42	289.7
336	375F3	940624	6	805	1	26.0	27.0	.36	.21	.37	.37	267.3
337	375F3	940624	6	1042	2	38.0	36.0	.38	.22	.39	.38	276.2
338	375F3	940624	6	1249	3	39.0	42.0	.40	.23	.41	.41	287.4
339	375F3	940624	6	1524	4	45.0	42.0	.45	.26	.45	.44	291.6
340	375F3	940624	6	1725	5	44.0	46.0	.46	.26	.46	.45	288.3
341	375F3	940718	7	805	1	27.0	25.0	.36	.21	.37	.37	264.5
342	375F3	940718	7	1001	2	32.0	32.0	.37	.22	.38	.38	269.7
343	375F3	940718	7	1317	4	40.0	38.0	.42	.25	.42	.42	276.0
344	375F3	940718	7	1518	4	41.0	40.0	.44	.26	.44	.43	283.5
345	375F3	940718	7	1724	5	42.0	42.0	.43	.26	.45	.44	284.1
346	375F3	940817	8	754	1	23.0	22.0	.41	.24	.41	.40	285.2
347	375F3	940817	8	1000	2	30.0	29.0	.40	.24	.42	.40	288.9
348	375F3	940817	8	1212	3	36.0	36.0	.47	.27	.46	.44	301.4
349	375F3	940817	8	1358	4	40.0	41.0	.49	.28	.48	.47	308.4
350	375F3	940817	8	1605	5	40.0	44.0	.49	.28	.48	.47	303.2
351	400F1	931026	10	950	2	15.0	11.0	.35	.19	.35	.34	289.9
352	400F1	931026	10	1122	3	16.0	12.0	.35	.20	.35	.35	291.8
353	400F1	931026	10	1433	4	22.0	15.0	.38	.22	.37	.38	297.5
354	400F1	931026	10	1605	5	21.0	15.0	.39	.22	.40	.39	297.1
355	400F1	931214	12	752	1	3.0	2.0	.34	.20	.34	.33	285.7
356	400F1	931214	12	942	2	10.0	7.0	.37	.22	.37	.36	298.2
357	400F1	931214	12	1143	3	16.0	11.0	.40	.24	.40	.39	307.9
358	400F1	931214	12	1336	4	22.0	13.0	.42	.25	.42	.41	308.9
359	400F1	931214	12	1551	4	21.0	14.0	.43	.25	.43	.42	311.2
360	400F1	940110	1	759	1	-1.0	-2.0	.35	.21	.36	.35	300.6
361	400F1	940110	1	957	2	9.0	4.0	.38	.22	.38	.36	306.6
362	400F1	940110	1	1153	3	16.0	12.0	.40	.24	.41	.39	310.7
363	400F1	940110	1	1345	4	20.0	15.0	.43	.25	.43	.42	313.0
364	400F1	940110	1	1511	4	20.0	16.0	.45	.26	.44	.43	315.6
365	400F1	940207	2	755	1	20.0	1.0	.39	.23	.38	.37	314.6
366	400F1	940207	2	938	2	9.0	5.0	.39	.23	.39	.38	317.3
367	400F1	940207	2	1147	3	17.0	14.0	.41	.25	.41	.40	321.8
368	400F1	940207	2	1338	4	25.0	19.0	.44	.27	.44	.43	327.9
369	400F1	940207	2	1554	4	17.0	14.0	.44	.27	.44	.43	325.7
370	400F1	940302	3	722	1	2.0	1.0	.36	.21	.36	.36	304.6
371	400F1	940302	3	922	2	12.0	9.0	.39	.23	.39	.39	318.4
372	400F1	940302	3	1116	3	23.0	15.0	.44	.26	.43	.42	323.5
373	400F1	940411	4	1012	2	15.0	11.0	.39	.23	.39	.38	296.4
374	400F1	940411	4	1215	3	19.0	11.0	.40	.23	.40	.39	298.0
375	400F1	940411	4	1417	4	27.0	14.0	.45	.26	.44	.43	307.1
376	400F1	940509	5	1349	4	30.0	24.0	.38	.22	.38	.38	283.2
377	400F1	940509	5	1543	4	40.0	30.0	.42	.24	.41	.41	289.7
378	400F1	940509	5	1722	5	35.0	29.0	.47	.27	.46	.45	294.0
379	400F1	940624	6	701	1	24.0	23.0	.39	.23	.41	.41	269.1
380	400F1	940624	6	1000	2	33.0	34.0	.41	.24	.43	.42	274.0

1	2	3	4	5	6	7	8	9	10	11	12	
STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE	
381	400F1	940624	6	1203	3	38.0	41.0	.48	.27	.48	.47	283.7
382	400F1	940624	6	1427	4	41.0	40.0	.50	.28	.49	.48	284.3
383	400F1	940718	7	658	1	25.0	23.0	.38	.23	.40	.40	262.0
384	400F1	940718	7	919	2	30.0	29.0	.36	.22	.39	.39	264.0
385	400F1	940718	7	1240	3	39.0	37.0	.43	.26	.45	.45	275.1
386	400F1	940718	7	1447	4	42.0	39.0	.49	.28	.49	.48	278.3
387	400F1	940718	7	1647	5	42.0	41.0	.52	.29	.50	.50	278.5
388	400F1	940817	8	714	1	22.0	22.0	.37	.22	.38	.39	274.0
389	400F1	940817	8	913	2	27.0	27.0	.41	.24	.42	.42	283.4
390	400F1	940817	8	1124	3	33.0	34.0	.42	.25	.44	.44	291.5
391	400F1	940817	8	1320	4	40.0	40.0	.49	.28	.49	.48	298.2
392	400F1	940817	8	1520	4	41.0	44.0	.53	.29	.51	.49	301.8
393	400F3	931026	10	839	1	12.0	10.0	.39	.22	.39	.39	312.7
394	400F3	931026	10	936	2	16.0	8.0	.40	.22	.40	.39	316.2
395	400F3	931026	10	1215	3	20.0	13.0	.43	.24	.42	.41	319.8
396	400F3	931026	10	1521	4	23.0	15.0	.45	.26	.44	.44	319.9
397	400F3	931026	10	1650	5	17.0	14.0	.44	.25	.43	.43	318.7
398	400F3	931214	12	828	1	5.0	4.0	.37	.21	.37	.37	308.5
399	400F3	931214	12	1022	2	14.0	9.0	.41	.24	.40	.39	321.0
400	400F3	931214	12	1223	3	20.0	12.0	.43	.25	.42	.42	324.0
401	400F3	931214	12	1426	4	21.0	13.0	.44	.26	.43	.43	325.4
402	400F3	931214	12	1651	5	17.0	14.0	.44	.26	.43	.43	324.2
403	400F3	940110	1	842	1	2.0	0.0	.36	.21	.36	.36	306.7
404	400F3	940110	1	1037	2	12.0	8.0	.39	.23	.39	.38	316.6
405	400F3	940110	1	1235	3	17.0	13.0	.43	.25	.43	.42	322.2
406	400F3	940110	1	1425	4	21.0	15.0	.45	.26	.44	.44	325.5
407	400F3	940110	1	1601	5	19.0	16.0	.45	.26	.45	.44	326.1
408	400F3	940207	2	835	1	19.0	2.0	.40	.23	.39	.38	324.6
409	400F3	940207	2	1021	2	11.0	9.0	.41	.24	.41	.40	328.0
410	400F3	940207	2	1225	3	21.0	16.0	.43	.27	.43	.43	333.7
411	400F3	940207	2	1427	4	25.0	20.0	.47	.28	.45	.45	338.9
412	400F3	940207	2	1633	5	15.0	11.0	.44	.27	.43	.43	327.8
413	400F3	940302	3	809	1	5.0	3.0	.38	.22	.38	.37	320.9
414	400F3	940302	3	1006	2	17.0	12.0	.41	.25	.41	.40	324.3
415	400F3	940302	3	1215	3	27.0	18.0	.46	.28	.45	.45	330.6
416	400F3	940411	4	1051	2	17.0	11.0	.39	.23	.39	.38	301.4
417	400F3	940411	4	1259	3	25.0	13.0	.41	.24	.40	.40	305.2
418	400F3	940411	4	1505	4	26.0	15.0	.44	.26	.43	.42	306.3
419	400F3	940509	5	1435	4	36.0	27.0	.43	.25	.41	.41	293.9
420	400F3	940509	5	1630	5	37.0	29.0	.45	.26	.44	.43	294.6
421	400F3	940509	5	1806	5	34.0	29.0	.44	.25	.42	.41	294.6
422	400F3	940624	6	812	1	25.0	27.0	.36	.20	.37	.35	270.0
423	400F3	940624	6	1045	2	36.0	36.0	.39	.22	.39	.39	278.2
424	400F3	940624	6	1253	3	40.0	42.0	.41	.24	.42	.42	285.2
425	400F3	940624	6	1527	4	45.0	42.0	.46	.26	.45	.45	288.3
426	400F3	940624	6	1728	5	44.0	47.0	.48	.27	.48	.48	288.8
427	400F3	940718	7	808	1	27.0	25.0	.36	.22	.37	.37	263.3
428	400F3	940718	7	1003	2	34.0	32.0	.36	.22	.38	.38	267.9
429	400F3	940718	7	1322	4	40.0	38.0	.42	.25	.43	.43	284.1
430	400F3	940718	7	1522	4	42.0	40.0	.45	.27	.46	.45	284.1
431	400F3	940718	7	1728	5	41.0	42.0	.46	.26	.45	.44	283.9
432	400F3	940817	8	800	1	23.0	23.0	.39	.24	.41	.41	292.9
433	400F3	940817	8	1010	2	31.0	30.0	.40	.24	.42	.41	297.9
434	400F3	940817	8	1215	3	37.0	37.0	.44	.26	.45	.45	303.5
435	400F3	940817	8	1407	4	39.0	42.0	.48	.28	.48	.48	312.1

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
436	400F3	940817	8	1608	5	42.0	43.0	.46	.28	.47	.47	308.9
437	425F1	931026	10	955	2	15.0	11.0	.35	.20	.35	.34	283.2
438	425F1	931026	10	1126	3	17.0	12.0	.36	.21	.36	.35	285.3
439	425F1	931026	10	1436	4	22.0	15.0	.39	.22	.37	.38	288.6
440	425F1	931026	10	1608	5	19.0	15.0	.39	.22	.39	.39	287.9
441	425F1	931214	12	755	1	3.0	2.0	.35	.20	.35	.34	282.0
442	425F1	931214	12	945	2	10.0	7.0	.36	.21	.36	.35	288.8
443	425F1	931214	12	1146	3	17.0	11.0	.39	.23	.39	.38	296.4
444	425F1	931214	12	1340	4	21.0	13.0	.42	.24	.40	.40	297.8
445	425F1	931214	12	1554	4	21.0	14.0	.43	.25	.42	.41	301.9
446	425F1	940110	1	802	1	0.0	-1.0	.35	.20	.35	.34	286.6
447	425F1	940110	1	1002	2	9.0	5.0	.38	.22	.38	.36	298.6
448	425F1	940110	1	1156	3	16.0	12.0	.40	.24	.40	.39	302.5
449	425F1	940110	1	1348	4	20.0	16.0	.41	.24	.41	.40	301.2
450	425F1	940110	1	1517	4	20.0	16.0	.43	.24	.43	.41	298.0
451	425F1	940207	2	758	1	19.0	1.0	.39	.23	.38	.37	305.8
452	425F1	940207	2	942	2	9.0	5.0	.39	.23	.38	.37	304.3
453	425F1	940207	2	1150	3	18.0	14.0	.41	.24	.41	.40	310.2
454	425F1	940207	2	1341	4	25.0	19.0	.45	.26	.43	.42	316.3
455	425F1	940302	3	726	1	2.0	1.0	.36	.21	.36	.35	296.1
456	425F1	940302	3	926	2	12.0	9.0	.41	.23	.39	.38	307.9
457	425F1	940302	3	1119	3	24.0	16.0	.43	.24	.41	.40	309.2
458	425F1	940411	4	1015	2	15.0	11.0	.38	.22	.38	.37	285.3
459	425F1	940411	4	1219	3	18.0	11.0	.38	.22	.38	.37	289.0
460	425F1	940411	4	1420	4	28.0	14.0	.42	.24	.42	.41	295.0
461	425F1	940509	5	1353	4	30.0	25.0	.38	.22	.37	.38	274.6
462	425F1	940509	5	1546	4	39.0	28.0	.45	.26	.43	.43	286.2
463	425F1	940509	5	1726	5	35.0	28.0	.48	.27	.46	.45	289.1
464	425F1	940624	6	706	1	23.0	23.0	.39	.22	.40	.40	261.9
465	425F1	940624	6	1003	2	33.0	34.0	.41	.24	.42	.42	266.9
466	425F1	940624	6	1206	3	39.0	41.0	.47	.27	.47	.46	276.9
467	425F1	940624	6	1430	4	41.0	40.0	.53	.30	.52	.51	279.4
468	425F1	940718	7	701	1	23.0	23.0	.37	.23	.39	.40	255.5
469	425F1	940718	7	924	2	31.0	30.0	.37	.23	.40	.40	251.9
470	425F1	940718	7	1243	3	38.0	37.0	.47	.28	.47	.47	271.4
471	425F1	940718	7	1450	4	41.0	39.0	.48	.29	.50	.50	273.7
472	425F1	940718	7	1654	5	41.0	43.0	.50	.29	.50	.50	273.2
473	425F1	940817	8	721	1	21.0	22.0	.37	.22	.39	.39	267.5
474	425F1	940817	8	916	2	27.0	27.0	.39	.24	.40	.41	273.3
475	425F1	940817	8	1128	3	35.0	34.0	.44	.26	.44	.44	279.4
476	425F1	940817	8	1322	4	40.0	41.0	.49	.28	.48	.48	285.2
477	425F1	940817	8	1523	4	41.0	44.0	.53	.30	.51	.51	286.7
478	425F3	931026	10	846	1	12.0	10.0	.41	.23	.41	.39	319.6
479	425F3	931026	10	942	2	16.0	9.0	.42	.23	.41	.40	322.3
480	425F3	931026	10	1218	3	19.0	13.0	.44	.25	.43	.42	324.5
481	425F3	931026	10	1524	4	24.0	15.0	.48	.27	.47	.45	328.8
482	425F3	931026	10	1658	5	17.0	14.0	.46	.25	.45	.44	326.2
483	425F3	931214	12	831	1	5.0	4.0	.39	.23	.39	.38	314.7
484	425F3	931214	12	1028	2	14.0	9.0	.42	.24	.41	.40	326.1
485	425F3	931214	12	1227	3	20.0	11.0	.45	.26	.45	.43	330.7
486	425F3	931214	12	1431	4	22.0	13.0	.47	.27	.46	.45	331.1
487	425F3	931214	12	1655	5	17.0	14.0	.47	.27	.46	.45	330.1
488	425F3	940110	1	849	1	2.0	0.0	.37	.22	.37	.36	313.7
489	425F3	940110	1	1040	2	11.0	8.0	.41	.24	.41	.40	326.4
490	425F3	940110	1	1238	3	18.0	13.0	.45	.26	.44	.43	332.8

	1 STATI	2 DATE	3 MON	4 TIME	5 COD	6 T_P	7 T_A	8 DO_H1	9 DO_H2	10 DO_H3	11 DO_H4	12 T_ARE
491	425F3	940110	1	1428	4	21.0	16.0	.47	.28	.46	.45	333.7
492	425F3	940110	1	1604	5	20.0	16.0	.47	.27	.46	.45	336.2
493	425F3	940207	2	838	1	17.0	2.0	.41	.24	.40	.39	332.8
494	425F3	940207	2	1024	2	11.0	9.0	.42	.25	.41	.40	336.8
495	425F3	940207	2	1230	3	21.0	16.0	.45	.27	.44	.43	341.6
496	425F3	940207	2	1433	4	24.0	19.0	.48	.29	.46	.46	349.0
497	425F3	940207	2	1636	5	15.0	12.0	.46	.27	.45	.44	338.5
498	425F3	940302	3	813	1	6.0	3.0	.39	.23	.39	.38	324.6
499	425F3	940302	3	1010	2	17.0	12.0	.43	.25	.43	.42	334.2
500	425F3	940302	3	1218	3	27.0	18.0	.48	.28	.46	.46	340.9
501	425F3	940411	4	1054	2	17.0	12.0	.42	.24	.41	.40	304.0
502	425F3	940411	4	1305	4	25.0	13.0	.45	.25	.43	.42	309.3
503	425F3	940411	4	1508	4	27.0	16.0	.47	.27	.45	.44	310.2
504	425F3	940509	5	1442	4	35.0	27.0	.46	.26	.44	.43	293.9
505	425F3	940509	5	1633	5	39.0	30.0	.45	.26	.42	.42	295.7
506	425F3	940509	5	1810	5	34.0	29.0	.47	.26	.44	.43	295.7
507	425F3	940624	6	817	1	26.0	28.0	.39	.21	.40	.38	274.6
508	425F3	940624	6	1048	2	36.0	36.0	.41	.24	.41	.41	283.8
509	425F3	940624	6	1259	3	39.0	0.0	.46	.26	.45	.45	291.5
510	425F3	940624	6	1529	4	46.0	42.0	.47	.27	.48	.48	298.5
511	425F3	940624	6	1731	5	44.0	45.0	.47	.27	.48	.47	292.7
512	425F3	940718	7	811	1	27.0	25.0	.38	.23	.39	.40	269.7
513	425F3	940718	7	1007	2	34.0	32.0	.40	.24	.40	.41	271.7
514	425F3	940718	7	1325	4	40.0	39.0	.45	.26	.45	.45	288.0
515	425F3	940718	7	1529	4	41.0	40.0	.47	.27	.47	.45	287.8
516	425F3	940718	7	1732	5	41.0	42.0	.46	.27	.46	.45	288.4
517	425F3	940817	8	803	1	23.0	23.0	.42	.25	.42	.42	287.9
518	425F3	940817	8	1019	2	33.0	30.0	.42	.25	.43	.42	297.6
519	425F3	940817	8	1220	3	36.0	37.0	.47	.28	.47	.46	310.5
520	425F3	940817	8	1410	4	41.0	41.0	.48	.28	.48	.47	306.3
521	425F3	940817	8	1612	5	42.0	44.0	.50	.29	.49	.48	307.7
522	426F1	940207	2	1557	4	17.0	14.0	.45	.26	.43	.42	312.4
523	450F1	931026	10	958	2	15.0	10.0	.39	.22	.39	.38	316.0
524	450F1	931026	10	1130	3	17.0	13.0	.39	.22	.39	.38	318.4
525	450F1	931026	10	1443	4	22.0	16.0	.42	.24	.42	.42	322.7
526	450F1	931026	10	1611	5	18.0	14.0	.44	.24	.43	.42	322.2
527	450F1	931214	12	758	1	3.0	2.0	.38	.22	.38	.37	310.0
528	450F1	931214	12	950	2	10.0	7.0	.38	.23	.38	.37	318.3
529	450F1	931214	12	1149	3	17.0	11.0	.42	.25	.42	.41	326.5
530	450F1	931214	12	1342	4	21.0	14.0	.45	.26	.44	.43	329.3
531	450F1	931214	12	1602	5	21.0	14.0	.46	.28	.48	.46	334.6
532	450F1	940110	1	806	1	0.0	-1.0	.38	.22	.38	.38	315.5
533	450F1	940110	1	1006	2	10.0	5.0	.41	.24	.41	.40	328.7
534	450F1	940110	1	1159	3	16.0	12.0	.45	.26	.44	.43	334.2
535	450F1	940110	1	1351	4	20.0	15.0	.47	.28	.47	.45	337.7
536	450F1	940110	1	1523	4	20.0	17.0	.48	.28	.47	.46	339.3
537	450F1	940207	2	804	1	20.0	1.0	.42	.25	.42	.41	334.6
538	450F1	940207	2	945	2	9.0	6.0	.43	.25	.42	.41	334.0
539	450F1	940207	2	1153	3	18.0	14.0	.46	.27	.45	.44	342.2
540	450F1	940207	2	1347	4	25.0	19.0	.51	.29	.49	.47	349.7
541	450F1	940207	2	1600	5	17.0	13.0	.51	.30	.49	.48	347.5
542	450F1	940302	3	730	1	3.0	1.0	.40	.23	.40	.39	322.8
543	450F1	940302	3	929	2	12.0	9.0	.44	.25	.43	.42	335.6
544	450F1	940302	3	1122	3	24.0	16.0	.48	.28	.47	.46	344.2
545	450F1	940411	4	1021	2	15.0	11.0	.42	.24	.42	.41	313.7

	1 STATI	2 DATE	3 MON	4 TIME	5 COD	6 T_P	7 T_A	8 DO_H1	9 DO_H2	10 DO_H3	11 DO_H4	12 T_ARE
546	450F1	940411	4	1222	3	20.0	11.0	.44	.25	.43	.42	317.6
547	450F1	940411	4	1425	4	26.0	14.0	.48	.28	.48	.47	325.3
548	450F1	940509	5	1400	4	30.0	25.0	.42	.24	.41	.41	304.3
549	450F1	940509	5	1553	4	38.0	29.0	.50	.29	.50	.48	316.8
550	450F1	940509	5	1729	5	34.0	30.0	.49	.27	.47	.46	309.4
551	450F1	940624	6	715	1	24.0	23.0	.39	.22	.42	.40	282.1
552	450F1	940624	6	1006	2	34.0	34.0	.43	.25	.45	.45	289.7
553	450F1	940624	6	1209	3	39.0	41.0	.50	.29	.51	.50	299.0
554	450F1	940624	6	1433	4	44.0	41.0	.56	.31	.54	.53	300.8
555	450F1	940718	7	704	1	24.0	23.0	.38	.23	.40	.42	277.1
556	450F1	940718	7	929	2	31.0	30.0	.39	.24	.42	.43	281.7
557	450F1	940718	7	1246	3	39.0	37.0	.46	.28	.49	.50	295.5
558	450F1	940718	7	1453	4	42.0	40.0	.53	.31	.53	.52	294.8
559	450F1	940718	7	1658	5	41.0	42.0	.53	.31	.53	.52	295.2
560	450F1	940817	8	723	1	22.0	22.0	.40	.24	.41	.42	295.4
561	450F1	940817	8	920	2	28.0	27.0	.42	.25	.43	.44	302.0
562	450F1	940817	8	1133	3	33.0	34.0	.48	.28	.49	.49	312.9
563	450F1	940817	8	1325	4	40.0	41.0	.52	.30	.52	.51	311.7
564	450F1	940817	8	1529	4	42.0	44.0	.54	.30	.53	.52	315.0
565	450F3	931026	10	855	1	13.0	10.0	.42	.23	.41	.40	333.7
566	450F3	931026	10	948	2	17.0	10.0	.42	.24	.42	.41	341.6
567	450F3	931026	10	1222	3	19.0	14.0	.44	.25	.43	.43	339.7
568	450F3	931026	10	1527	4	23.0	15.0	.48	.27	.46	.45	347.8
569	450F3	931026	10	1701	5	17.0	14.0	.46	.26	.45	.44	341.0
570	450F3	931214	12	834	1	6.0	4.0	.38	.22	.39	.38	323.3
571	450F3	931214	12	1031	2	14.0	9.0	.42	.24	.42	.40	338.0
572	450F3	931214	12	1232	3	20.0	12.0	.46	.26	.45	.43	346.4
573	450F3	931214	12	1437	4	22.0	13.0	.47	.28	.46	.44	350.2
574	450F3	931214	12	1701	5	17.0	14.0	.46	.27	.46	.44	345.8
575	450F3	940110	1	852	1	3.0	0.0	.38	.22	.38	.37	327.7
576	450F3	940110	1	1048	2	11.0	8.0	.42	.24	.41	.40	339.8
577	450F3	940110	1	1241	3	18.0	14.0	.45	.27	.45	.44	346.7
578	450F3	940110	1	1433	4	21.0	15.0	.48	.28	.47	.46	347.1
579	450F3	940110	1	1607	5	19.0	16.0	.47	.28	.47	.45	348.2
580	450F3	940207	2	841	1	17.0	3.0	.42	.25	.41	.40	341.8
581	450F3	940207	2	1028	2	11.0	9.0	.43	.25	.42	.41	348.7
582	450F3	940207	2	1233	3	22.0	15.0	.46	.27	.45	.44	354.2
583	450F3	940207	2	1435	4	23.0	19.0	.49	.29	.48	.47	364.8
584	450F3	940207	2	1639	5	15.0	11.0	.47	.28	.46	.45	355.6
585	450F3	940302	3	817	1	6.0	3.0	.40	.23	.39	.38	333.9
586	450F3	940302	3	1013	2	18.0	13.0	.44	.26	.43	.42	347.4
587	450F3	940302	3	1221	3	27.0	18.0	.49	.29	.48	.47	359.6
588	450F3	940411	4	1058	2	17.0	12.0	.41	.24	.41	.40	320.7
589	450F3	940411	4	1308	4	24.0	13.0	.45	.26	.43	.43	328.6
590	450F3	940411	4	1511	4	29.0	16.0	.46	.27	.45	.44	331.0
591	450F3	940509	5	1447	4	36.0	27.0	.45	.26	.44	.44	321.4
592	450F3	940509	5	1636	5	39.0	29.0	.45	.26	.44	.44	313.3
593	450F3	940509	5	1813	5	33.0	29.0	.47	.27	.45	.44	318.8
594	450F3	940624	6	827	1	25.0	27.0	.39	.22	.40	.39	293.4
595	450F3	940624	6	1052	2	37.0	37.0	.41	.24	.42	.42	302.0
596	450F3	940624	6	1305	4	39.0	0.0	.46	.27	.47	.46	313.1
597	450F3	940624	6	1535	4	44.0	41.0	.49	.28	.49	.48	317.5
598	450F3	940624	6	1734	5	44.0	44.0	.45	.26	.47	.47	311.1
599	450F3	940718	7	816	1	27.0	26.0	.37	.23	.40	.40	287.1
600	450F3	940718	7	1010	2	33.0	32.0	.40	.24	.41	.41	292.6

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
601	450F3	940718	7	1328	4	41.0	39.0	.45	.27	.47	.46	308.9
602	450F3	940718	7	1532	4	42.0	40.0	.47	.28	.47	.47	308.3
603	450F3	940718	7	1735	5	42.0	42.0	.45	.26	.46	.46	307.7
604	450F3	940817	8	810	1	23.0	23.0	.42	.25	.42	.42	309.9
605	450F3	940817	8	1022	2	32.0	30.0	.43	.26	.44	.43	316.6
606	450F3	940817	8	1225	3	37.0	37.0	.48	.28	.47	.47	330.0
607	450F3	940817	8	1418	4	39.0	42.0	.50	.29	.49	.48	335.9
608	450F3	940817	8	1615	5	43.0	44.0	.52	.30	.51	.50	331.0
609	475F1	931026	10	1001	2	15.0	10.0	.37	.21	.37	.37	305.7
610	475F1	931026	10	1135	3	19.0	13.0	.38	.22	.37	.38	307.9
611	475F1	931026	10	1448	4	22.0	15.0	.41	.23	.40	.41	308.4
612	475F1	931026	10	1615	5	18.0	15.0	.41	.23	.41	.41	308.5
613	475F1	931214	12	801	1	4.0	2.0	.36	.21	.36	.36	299.3
614	475F1	931214	12	954	2	11.0	7.0	.38	.22	.37	.36	309.6
615	475F1	931214	12	1152	3	18.0	11.0	.40	.24	.40	.39	316.2
616	475F1	931214	12	1345	4	21.0	14.0	.41	.24	.41	.40	316.8
617	475F1	931214	12	1608	5	21.0	14.0	.44	.26	.44	.43	322.6
618	475F1	940110	1	809	1	0.0	-2.0	.36	.21	.36	.36	306.3
619	475F1	940110	1	1011	2	10.0	6.0	.38	.22	.39	.38	311.3
620	475F1	940110	1	1202	3	17.0	12.0	.42	.24	.41	.40	321.4
621	475F1	940110	1	1358	4	20.0	15.0	.44	.25	.44	.42	324.6
622	475F1	940110	1	1530	4	20.0	16.0	.44	.26	.44	.43	324.4
623	475F1	940207	2	808	1	18.0	1.0	.40	.24	.40	.39	323.1
624	475F1	940207	2	950	2	9.0	6.0	.41	.24	.40	.40	324.6
625	475F1	940207	2	1158	3	19.0	14.0	.44	.26	.43	.42	331.0
626	475F1	940207	2	1353	4	25.0	19.0	.46	.27	.46	.45	336.6
627	475F1	940207	2	1603	5	17.0	13.0	.47	.27	.46	.45	335.4
628	475F1	940302	3	735	1	4.0	1.0	.37	.21	.37	.36	314.0
629	475F1	940302	3	933	2	13.0	9.0	.41	.24	.40	.40	328.7
630	475F1	940302	3	1130	3	24.0	16.0	.44	.26	.44	.43	333.1
631	475F1	940411	4	1024	2	15.0	11.0	.39	.23	.39	.39	304.9
632	475F1	940411	4	1226	3	21.0	11.0	.41	.23	.41	.40	310.1
633	475F1	940411	4	1430	4	26.0	15.0	.45	.26	.44	.44	313.3
634	475F1	940509	5	1407	4	32.0	25.0	.39	.23	.39	.40	292.1
635	475F1	940509	5	1557	4	40.0	29.0	.49	.29	.49	.48	313.6
636	475F1	940509	5	1735	5	34.0	30.0	.43	.25	.43	.44	303.9
637	475F1	940624	6	723	1	24.0	24.0	.38	.21	.41	.39	283.2
638	475F1	940624	6	1010	2	35.0	34.0	.42	.25	.45	.45	293.0
639	475F1	940624	6	1223	3	36.0	41.0	.48	.28	.50	.50	304.4
640	475F1	940624	6	1438	4	42.0	41.0	.53	.30	.53	.53	307.7
641	475F1	940718	7	712	1	24.0	22.0	.37	.23	.41	.41	281.7
642	475F1	940718	7	932	2	31.0	31.0	.37	.23	.41	.41	282.0
643	475F1	940718	7	1249	3	38.0	37.0	.48	.29	.50	.50	296.0
644	475F1	940718	7	1456	4	42.0	40.0	.54	.32	.53	.53	298.6
645	475F1	940718	7	1704	5	40.0	42.0	.55	.32	.54	.54	303.6
646	475F1	940817	8	727	1	21.0	22.0	.36	.23	.39	.40	283.9
647	475F1	940817	8	924	2	28.0	27.0	.40	.25	.43	.43	293.0
648	475F1	940817	8	1137	3	35.0	35.0	.46	.27	.47	.48	305.0
649	475F1	940817	8	1328	4	40.0	40.0	.52	.30	.52	.52	311.4
650	475F1	940817	8	1532	4	42.0	44.0	.57	.32	.55	.55	313.6
651	475F3	931026	10	859	1	13.0	10.0	.40	.23	.41	.41	332.4
652	475F3	931026	10	959	2	17.0	10.0	.41	.23	.41	.41	334.7
653	475F3	931026	10	1225	3	20.0	14.0	.44	.25	.44	.44	339.0
654	475F3	931026	10	1530	4	22.0	16.0	.46	.26	.46	.46	338.9
655	475F3	931026	10	1705	5	17.0	14.0	.45	.26	.45	.45	339.5

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
656	475F3	931214	12	837	1	6.0	4.0	.37	.22	.38	.38	319.3
657	475F3	931214	12	1037	2	14.0	9.0	.41	.24	.41	.40	333.4
658	475F3	931214	12	1235	3	20.0	12.0	.45	.26	.44	.43	340.0
659	475F3	931214	12	1441	4	23.0	14.0	.46	.27	.45	.45	345.9
660	475F3	931214	12	1706	5	17.0	13.0	.46	.27	.45	.45	337.9
661	475F3	940110	1	859	1	4.0	0.0	.38	.22	.38	.37	321.3
662	475F3	940110	1	1051	2	12.0	8.0	.42	.24	.41	.40	333.8
663	475F3	940110	1	1243	3	19.0	14.0	.44	.26	.44	.44	339.5
664	475F3	940110	1	1438	4	20.0	16.0	.46	.27	.46	.45	344.7
665	475F3	940110	1	1612	5	19.0	16.0	.47	.27	.46	.45	342.0
666	475F3	940207	2	844	1	16.0	3.0	.41	.24	.41	.40	337.9
667	475F3	940207	2	1033	2	12.0	10.0	.42	.25	.42	.41	340.9
668	475F3	940207	2	1237	3	22.0	16.0	.45	.27	.45	.45	348.7
669	475F3	940207	2	1441	4	22.0	19.0	.49	.29	.48	.47	358.8
670	475F3	940207	2	1642	5	15.0	11.0	.46	.28	.46	.45	347.9
671	475F3	940302	3	819	1	6.0	3.0	.39	.23	.39	.39	331.6
672	475F3	940302	3	1018	2	19.0	13.0	.42	.25	.43	.42	342.1
673	475F3	940302	3	1227	3	28.0	19.0	.47	.28	.47	.47	350.9
674	475F3	940411	4	1101	3	17.0	11.0	.43	.24	.43	.42	326.2
675	475F3	940411	4	1312	4	23.0	13.0	.45	.26	.45	.44	331.3
676	475F3	940411	4	1517	4	30.0	16.0	.48	.27	.46	.46	330.2
677	475F3	940509	5	1451	4	36.0	27.0	.48	.28	.47	.46	325.4
678	475F3	940509	5	1645	5	34.0	28.0	.48	.27	.46	.46	323.3
679	475F3	940509	5	1819	5	34.0	29.0	.48	.27	.46	.46	321.1
680	475F3	940624	6	831	1	26.0	27.0	.39	.22	.41	.39	301.0
681	475F3	940624	6	1055	2	38.0	37.0	.43	.25	.44	.45	312.9
682	475F3	940624	6	1309	4	39.0	0.0	.45	.26	.47	.47	324.5
683	475F3	940624	6	1546	4	41.0	42.0	.49	.28	.50	.49	326.9
684	475F3	940624	6	1737	5	43.0	45.0	.46	.27	.49	.50	323.3
685	475F3	940718	7	820	1	27.0	26.0	.39	.24	.41	.42	295.7
686	475F3	940718	7	1015	2	33.0	32.0	.41	.25	.44	.44	301.1
687	475F3	940718	7	1333	4	40.0	39.0	.47	.28	.48	.49	320.1
688	475F3	940718	7	1536	4	41.0	40.0	.50	.29	.49	.50	315.6
689	475F3	940718	7	1741	5	40.0	41.0	.47	.28	.48	.48	318.1
690	475F3	940817	8	812	1	23.0	23.0	.41	.25	.43	.44	318.4
691	475F3	940817	8	1025	2	32.0	31.0	.45	.27	.46	.47	323.6
692	475F3	940817	8	1235	3	37.0	38.0	.51	.29	.51	.50	333.3
693	475F3	940817	8	1421	4	42.0	42.0	.50	.30	.51	.51	345.5
694	475F3	940817	8	1618	5	42.0	44.0	.53	.31	.53	.53	339.5
695	500F1	931026	10	1007	2	15.0	11.0	.37	.21	.37	.37	292.9
696	500F1	931026	10	1140	3	21.0	13.0	.43	.24	.42	.42	300.8
697	500F1	931026	10	1454	4	23.0	16.0	.42	.24	.42	.41	297.6
698	500F1	931026	10	1619	5	17.0	15.0	.41	.23	.40	.41	291.4
699	500F1	931214	12	804	1	4.0	2.0	.39	.22	.38	.38	288.0
700	500F1	931214	12	958	2	11.0	7.0	.40	.23	.39	.38	299.1
701	500F1	931214	12	1155	3	19.0	11.0	.43	.24	.42	.41	303.7
702	500F1	931214	12	1349	4	21.0	13.0	.42	.24	.41	.40	306.1
703	500F1	931214	12	1615	5	20.0	14.0	.45	.26	.44	.43	305.2
704	500F1	940110	1	812	1	0.0	-2.0	.38	.22	.37	.37	288.0
705	500F1	940110	1	1014	2	10.0	6.0	.38	.22	.37	.37	301.9
706	500F1	940110	1	1210	3	16.0	13.0	.44	.25	.43	.41	306.4
707	500F1	940110	1	1401	4	21.0	15.0	.44	.25	.43	.42	309.6
708	500F1	940110	1	1535	4	20.0	15.0	.46	.26	.45	.43	306.6
709	500F1	940207	2	812	1	19.0	1.0	.41	.24	.40	.39	309.9
710	500F1	940207	2	953	2	9.0	6.0	.42	.24	.41	.40	312.0

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
711	500F1	940207	2	1201	3	19.0	14.0	.45	.26	.44	.43	317.1
712	500F1	940207	2	1356	4	25.0	19.0	.47	.27	.46	.44	327.0
713	500F1	940207	2	1606	5	16.0	13.0	.47	.28	.46	.45	321.6
714	500F1	940302	3	738	1	4.0	1.0	.41	.23	.40	.39	304.8
715	500F1	940302	3	942	2	14.0	11.0	.45	.26	.44	.42	316.0
716	500F1	940302	3	1133	3	24.0	17.0	.46	.27	.45	.44	320.0
717	500F1	940411	4	1028	2	17.0	11.0	.45	.25	.44	.43	301.2
718	500F1	940411	4	1230	3	21.0	11.0	.48	.26	.46	.45	307.2
719	500F1	940411	4	1434	4	26.0	14.0	.50	.28	.48	.47	312.0
720	500F1	940509	5	1410	4	33.0	26.0	.46	.26	.46	.45	304.8
721	500F1	940509	5	1601	5	40.0	28.0	.48	.28	.48	.47	308.4
722	500F1	940509	5	1738	5	35.0	29.0	.57	.31	.54	.52	307.2
723	500F1	940624	6	1013	2	34.0	35.0	.53	.29	.51	.51	287.9
724	500F1	940624	6	1227	3	38.0	41.0	.59	.31	.55	.54	299.4
725	500F1	940624	6	1457	4	41.0	41.0	.62	.33	.57	.56	302.7
726	500F1	940718	7	715	1	25.0	23.0	.46	.26	.47	.46	277.2
727	500F1	940718	7	934	2	31.0	31.0	.47	.27	.48	.47	279.9
728	500F1	940718	7	1252	3	38.0	37.0	.55	.31	.54	.53	292.5
729	500F1	940718	7	1459	4	42.0	40.0	.59	.32	.56	.55	297.3
730	500F1	940718	7	1706	5	42.0	42.0	.61	.33	.57	.56	299.8
731	500F1	940817	8	737	1	22.0	22.0	.43	.25	.44	.44	280.5
732	500F1	940817	8	933	2	28.0	28.0	.44	.26	.45	.45	287.9
733	500F1	940817	8	1141	3	36.0	34.0	.51	.29	.51	.50	297.9
734	500F1	940817	8	1331	4	40.0	40.0	.56	.31	.54	.53	301.7
735	500F1	940817	8	1534	4	43.0	43.0	.60	.32	.56	.55	304.3
736	500F3	931026	10	901	2	13.0	6.0	.40	.22	.40	.38	313.2
737	500F3	931026	10	903	2	13.0	10.0	.39	.22	.39	.38	314.2
738	500F3	931026	10	1229	3	19.0	14.0	.45	.25	.44	.43	323.7
739	500F3	931026	10	1536	4	23.0	16.0	.48	.26	.47	.45	324.3
740	500F3	931026	10	1708	5	17.0	14.0	.46	.25	.45	.43	322.1
741	500F3	931214	12	841	1	6.0	5.0	.36	.21	.36	.36	300.3
742	500F3	931214	12	1041	2	14.0	9.0	.40	.23	.40	.39	316.7
743	500F3	931214	12	1238	3	21.0	12.0	.42	.25	.42	.41	323.5
744	500F3	931214	12	1448	4	22.0	14.0	.44	.25	.43	.41	324.1
745	500F3	931214	12	1712	5	16.0	13.0	.44	.25	.43	.42	321.2
746	500F3	940110	1	902	2	4.0	1.0	.35	.20	.35	.35	302.8
747	500F3	940110	1	1054	2	12.0	9.0	.39	.23	.39	.39	314.4
748	500F3	940110	1	1248	3	19.0	14.0	.43	.25	.43	.42	320.3
749	500F3	940110	1	1440	4	20.0	16.0	.45	.26	.45	.43	324.9
750	500F3	940110	1	1618	5	19.0	16.0	.46	.27	.46	.44	328.7
751	500F3	940207	2	847	1	15.0	3.0	.39	.23	.39	.38	319.7
752	500F3	940207	2	1036	2	13.0	10.0	.41	.24	.40	.39	325.3
753	500F3	940207	2	1244	3	22.0	16.0	.43	.26	.43	.42	332.1
754	500F3	940207	2	1448	4	22.0	18.0	.46	.27	.45	.44	336.3
755	500F3	940207	2	1646	5	15.0	11.0	.45	.26	.44	.43	331.0
756	500F3	940302	3	822	1	7.0	3.0	.37	.22	.38	.37	316.4
757	500F3	940302	3	1021	2	19.0	13.0	.41	.24	.41	.40	326.2
758	500F3	940302	3	1230	3	27.0	19.0	.46	.27	.45	.44	331.9
759	500F3	940411	4	1104	3	17.0	11.0	.39	.23	.40	.39	305.5
760	500F3	940411	4	1316	4	24.0	13.0	.45	.25	.44	.42	315.2
761	500F3	940411	4	1524	4	29.0	15.0	.45	.26	.44	.43	313.6
762	500F3	940509	5	1454	4	39.0	27.0	.48	.28	.47	.46	310.1
763	500F3	940509	5	1648	5	36.0	28.0	.48	.27	.46	.45	308.0
764	500F3	940509	5	1822	5	32.0	29.0	.46	.26	.45	.44	302.9
765	500F3	940624	6	834	1	26.0	27.0	.40	.22	.41	.39	279.8

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
766	500F3	940624	6	1101	3	38.0	38.0	.46	.25	.46	.44	295.4
767	500F3	940624	6	1313	4	41.0	0.0	.53	.29	.51	.50	304.1
768	500F3	940624	6	1552	4	43.0	41.0	.56	.30	.53	.52	305.6
769	500F3	940624	6	1745	5	43.0	45.0	.53	.29	.51	.50	303.2
770	500F3	940718	7	823	1	28.0	26.0	.40	.24	.41	.41	277.2
771	500F3	940718	7	1020	2	34.0	33.0	.43	.25	.44	.43	282.7
772	500F3	940718	7	1336	4	41.0	39.0	.50	.29	.50	.49	296.2
773	500F3	940718	7	1539	4	44.0	41.0	.53	.30	.51	.50	299.0
774	500F3	940718	7	1744	5	42.0	42.0	.51	.29	.50	.49	298.4
775	500F3	940817	8	815	1	24.0	24.0	.42	.24	.42	.42	288.9
776	500F3	940817	8	1033	2	33.0	31.0	.45	.26	.45	.44	297.4
777	500F3	940817	8	1243	3	37.0	38.0	.51	.28	.49	.47	309.3
778	500F3	940817	8	1427	4	41.0	42.0	.52	.29	.51	.49	311.8
779	500F3	940817	8	1628	5	41.0	43.0	.54	.29	.52	.50	312.2
780	510F3	931026	10	842	1	12.0	5.0	.41	.23	.40	.39	310.4
781	510F3	931026	10	909	2	12.0	10.0	.42	.24	.42	.41	310.3
782	510F3	931026	10	1235	3	20.0	14.0	.46	.26	.45	.45	317.3
783	510F3	931026	10	1539	4	23.0	15.0	.49	.28	.48	.47	316.7
784	510F3	931026	10	1713	5	17.0	14.0	.47	.27	.47	.46	319.9
785	510F3	931214	12	844	1	6.0	5.0	.39	.23	.39	.38	300.3
786	510F3	931214	12	1044	2	14.0	9.0	.44	.25	.43	.41	315.1
787	510F3	931214	12	1246	3	21.0	12.0	.46	.27	.45	.44	320.7
788	510F3	931214	12	1450	4	22.0	14.0	.48	.28	.47	.46	323.8
789	510F3	931214	12	1719	5	16.0	12.0	.47	.27	.45	.45	313.5
790	510F3	940110	1	907	2	4.0	1.0	.37	.22	.37	.36	302.5
791	510F3	940110	1	1057	2	12.0	9.0	.43	.25	.42	.41	319.1
792	510F3	940110	1	1254	3	20.0	13.0	.47	.27	.46	.45	323.2
793	510F3	940110	1	1445	4	20.0	15.0	.48	.28	.48	.47	325.4
794	510F3	940110	1	1621	5	18.0	16.0	.49	.28	.48	.47	326.8
795	510F3	940207	2	850	1	15.0	3.0	.41	.24	.40	.39	316.4
796	510F3	940207	2	1042	2	13.0	10.0	.41	.24	.40	.40	320.2
797	510F3	940207	2	1247	3	21.0	17.0	.47	.28	.46	.45	328.1
798	510F3	940207	2	1459	4	21.0	18.0	.46	.28	.45	.45	326.8
799	510F3	940207	2	1649	5	15.0	11.0	.48	.28	.47	.46	327.2
800	510F3	940302	3	831	1	7.0	4.0	.40	.23	.40	.39	317.5
801	510F3	940302	3	1025	2	19.0	13.0	.44	.25	.43	.42	323.7
802	510F3	940302	3	1233	3	27.0	19.0	.49	.29	.47	.47	329.4
803	510F3	940411	4	1107	3	17.0	11.0	.42	.24	.41	.41	304.6
804	510F3	940411	4	1322	4	26.0	14.0	.46	.27	.45	.45	311.7
805	510F3	940411	4	1531	4	27.0	15.0	.48	.27	.46	.46	311.6
806	510F3	940509	5	1500	4	35.0	28.0	.45	.27	.45	.44	306.3
807	510F3	940509	5	1655	5	37.0	30.0	.49	.29	.48	.47	309.5
808	510F3	940509	5	1827	5	34.0	29.0	.45	.26	.45	.44	303.1
809	510F3	940624	6	840	1	25.0	28.0	.41	.22	.42	.40	280.5
810	510F3	940624	6	1107	3	36.0	38.0	.47	.27	.47	.46	290.1
811	510F3	940624	6	1316	4	39.0	0.0	.51	.29	.50	.49	299.1
812	510F3	940624	6	1558	4	41.0	41.0	.51	.29	.51	.49	299.2
813	510F3	940624	6	1748	5	42.0	45.0	.46	.27	.49	.49	293.0
814	510F3	940718	7	825	1	26.0	26.0	.40	.24	.41	.41	273.2
815	510F3	940718	7	1025	2	32.0	33.0	.42	.25	.43	.43	282.3
816	510F3	940718	7	1344	4	38.0	39.0	.49	.28	.49	.48	294.9
817	510F3	940718	7	1542	4	41.0	41.0	.46	.27	.48	.48	295.2
818	510F3	940817	8	818	1	23.0	24.0	.41	.24	.42	.41	284.1
819	510F3	940817	8	1036	2	30.0	31.0	.44	.26	.44	.44	288.9
820	510F3	940817	8	1246	3	35.0	38.0	.49	.28	.48	.48	303.1

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	D0_H1	D0_H2	D0_H3	D0_H4	T_ARE
821	510F3	940817	8	1436	4	39.0	41.0	.52	.29	.50	.49	303.5
822	510F3	940817	8	1631	5	39.0	44.0	.52	.30	.51	.50	305.7
823	520F1	931026	10	908	2	14.0	6.0	.35	.20	.35	.35	271.2
824	520F1	931026	10	1015	2	15.0	11.0	.38	.21	.37	.37	276.3
825	520F1	931026	10	1143	3	21.0	13.0	.39	.22	.38	.38	278.1
826	520F1	931026	10	1458	4	24.0	15.0	.41	.23	.40	.40	279.1
827	520F1	931026	10	1624	5	19.0	14.0	.40	.23	.40	.39	275.8
828	520F1	931214	12	809	1	4.0	2.0	.34	.20	.34	.34	277.1
829	520F1	931214	12	1000	2	11.0	8.0	.38	.22	.37	.36	287.7
830	520F1	931214	12	1159	3	18.0	11.0	.39	.23	.38	.37	286.5
831	520F1	931214	12	1353	4	21.0	13.0	.41	.24	.40	.40	289.8
832	520F1	931214	12	1619	5	19.0	14.0	.41	.24	.40	.39	286.3
833	520F1	940110	1	818	1	0.0	-2.0	.36	.21	.37	.36	306.4
834	520F1	940110	1	1017	2	10.0	6.0	.40	.23	.39	.38	308.7
835	520F1	940110	1	1216	3	17.0	11.0	.41	.23	.40	.39	300.5
836	520F1	940110	1	1404	4	20.0	14.0	.44	.25	.42	.42	303.0
837	520F1	940110	1	1539	4	19.0	16.0	.44	.25	.43	.42	301.9
838	520F1	940207	2	815	1	18.0	1.0	.47	.27	.44	.43	341.8
839	520F1	940207	2	959	2	9.0	7.0	.49	.28	.46	.44	340.1
840	520F1	940207	2	1205	3	19.0	15.0	.48	.28	.47	.46	329.5
841	521F9	931026	10	846	1	12.0	5.0	.38	.22	.38	.37	295.1
842	529F3	931026	10	857	1	13.0	6.0	.36	.20	.36	.35	277.6
843	530F1	940207	2	1400	4	25.0	20.0	.45	.27	.44	.44	316.5
844	530F1	940207	2	1609	5	16.0	13.0	.53	.31	.51	.51	333.6
845	530F1	940302	3	745	1	4.0	2.0	.59	.31	.52	.49	402.8
846	530F1	940302	3	946	2	15.0	11.0	.44	.25	.43	.42	320.8
847	530F1	940302	3	1144	3	25.0	17.0	.55	.32	.53	.52	333.8
848	530F1	940411	4	1033	2	17.0	11.0	.50	.29	.49	.48	315.0
849	530F1	940411	4	1235	3	21.0	12.0	.45	.26	.44	.43	301.5
850	530F1	940411	4	1441	4	27.0	14.0	.51	.29	.49	.48	309.5
851	530F1	940509	5	1413	4	31.0	26.0	.55	.32	.53	.52	304.0
852	530F1	940509	5	1605	5	37.0	28.0	.64	.38	.62	.61	322.5
853	530F1	940509	5	1742	5	35.0	30.0	.56	.32	.53	.52	308.5
854	530F1	940624	6	733	1	24.0	25.0	.48	.27	.48	.47	277.6
855	530F1	940624	6	1021	2	35.0	36.0	.58	.33	.56	.55	288.9
856	530F1	940624	6	1232	3	40.0	41.0	.68	.37	.64	.62	299.0
857	530F1	940624	6	1506	4	43.0	41.0	.63	.34	.59	.57	292.4
858	530F1	940718	7	719	1	24.0	23.0	.52	.30	.51	.50	276.7
859	530F1	940718	7	941	2	31.0	31.0	.48	.28	.47	.46	273.3
860	530F1	940718	7	1259	3	38.0	37.0	.61	.35	.58	.56	289.2
861	530F1	940718	7	1502	4	43.0	41.0	.53	.31	.52	.52	279.5
862	530F1	940718	7	1709	5	41.0	42.0	.61	.35	.58	.57	286.8
863	530F1	940817	8	740	1	22.0	22.0	.43	.26	.43	.43	268.0
864	530F1	940817	8	936	2	28.0	27.0	.45	.27	.45	.45	273.4
865	530F1	940817	8	1147	3	34.0	35.0	.50	.29	.49	.48	280.9
866	530F1	940817	8	1339	4	39.0	39.0	.56	.32	.54	.52	286.5
867	530F1	940817	8	1542	4	41.0	44.0	.61	.34	.57	.55	290.1
868	530F3	931026	10	918	2	13.0	10.0	.37	.21	.38	.36	281.1
869	530F3	931026	10	1241	3	20.0	14.0	.41	.23	.40	.39	280.9
870	530F3	931026	10	1543	4	23.0	15.0	.41	.24	.40	.40	279.2
871	530F3	931026	10	1718	5	16.0	14.0	.41	.23	.40	.39	280.1
872	530F3	931214	12	847	1	6.0	5.0	.39	.22	.38	.37	309.1
873	530F3	931214	12	1047	2	15.0	9.0	.40	.23	.39	.38	293.9
874	530F3	931214	12	1250	3	21.0	12.0	.43	.25	.42	.40	293.1
875	530F3	931214	12	1457	4	21.0	14.0	.42	.25	.41	.41	288.0

	1	2	3	4	5	6	7	8	9	10	11	12
	STATI	DATE	MON	TIME	COD	T_P	T_A	DO_H1	DO_H2	DO_H3	DO_H4	T_ARE
876	530F3	931214	12	1722	5	16.0	12.0	.41	.24	.40	.40	285.8
877	530F3	940110	1	917	2	4.0	2.0	.36	.20	.35	.34	296.2
878	530F3	940110	1	1100	3	12.0	9.0	.41	.24	.40	.39	308.6
879	530F3	940110	1	1302	4	19.0	14.0	.43	.25	.42	.41	294.2
880	530F3	940110	1	1448	4	21.0	14.0	.43	.25	.42	.42	293.2
881	530F3	940110	1	1624	5	18.0	16.0	.44	.26	.43	.42	295.0
882	530F3	940207	2	1045	2	13.0	11.0	.38	.23	.37	.37	291.6
883	530F3	940207	2	1250	3	21.0	17.0	.43	.26	.42	.41	299.0
884	530F3	940207	2	1510	4	20.0	18.0	.42	.25	.41	.40	293.8
885	530F3	940207	2	1652	5	14.0	11.0	.43	.25	.41	.41	294.8
886	530F3	940302	3	836	1	7.0	4.0	.40	.23	.39	.38	310.8
887	530F3	940302	3	1028	2	20.0	13.0	.40	.24	.39	.39	291.9
888	530F3	940302	3	1236	3	27.0	19.0	.44	.26	.42	.42	295.7
889	530F3	940411	4	1111	3	17.0	11.0	.40	.23	.40	.39	284.4
890	530F3	940411	4	1328	4	22.0	14.0	.43	.26	.43	.42	291.6
891	530F3	940411	4	1536	4	26.0	16.0	.47	.27	.45	.44	290.2
892	530F3	940509	5	1506	4	34.0	27.0	.50	.29	.47	.46	291.7
893	530F3	940509	5	1700	5	39.0	29.0	.51	.29	.48	.47	293.9
894	530F3	940509	5	1829	5	33.0	29.0	.47	.27	.44	.44	285.7
895	530F3	940624	6	844	1	27.0	29.0	.44	.24	.43	.40	270.1
896	530F3	940624	6	1110	3	36.0	38.0	.49	.28	.47	.45	275.8
897	530F3	940624	6	1325	4	39.0	0.0	.53	.30	.50	.48	280.6
898	530F3	940624	6	1601	5	43.0	40.0	.55	.31	.52	.50	280.5
899	530F3	940624	6	1750	5	43.0	45.0	.51	.29	.50	.48	274.7
900	530F3	940718	7	829	1	28.0	27.0	.43	.26	.44	.43	266.1
901	530F3	940718	7	1028	2	33.0	33.0	.50	.28	.47	.46	274.3
902	530F3	940718	7	1347	4	40.0	39.0	.56	.31	.51	.49	280.3
903	530F3	940718	7	1550	4	39.0	40.0	.56	.31	.52	.49	278.8
904	530F3	940718	7	1747	5	39.0	42.0	.53	.30	.49	.47	275.6
905	530F3	940817	8	821	1	24.0	24.0	.48	.27	.44	.42	271.9
906	530F3	940817	8	1045	2	34.0	32.0	.49	.28	.46	.44	278.1
907	530F3	940817	8	1248	3	38.0	38.0	.53	.30	.50	.48	283.2
908	530F3	940817	8	1439	4	41.0	41.0	.55	.31	.52	.49	283.0
909	530F3	940817	8	1639	5	40.0	43.0	.55	.30	.51	.49	283.4
910	531F3	940207	2	854	1	13.0	3.0	.39	.23	.39	.37	307.3

	13	14	15	16	17	18	19	20	21	22	23
	OUT3_	T_U_A	U_ARE	E1_MPA	E2_MPA	E3_MPA	E4_MPA	RMS	ITR	VM1	VM2
1	149.0	799.8	607.4	8470	748	174	157	1.08	5.0		
2	153.1	772.2	587.0	7250	648	185	154	.91	4.0		
3	151.1	728.1	560.2	5660	539	185	154	1.17	3.0		
4	148.9	700.3	542.8	3510	719	170	159	.83	5.0		
5	148.4	832.4	631.5	15300	443	177	167	.69	10.0	8.0	15.8
6	153.3	815.5	618.6	13400	372	187	156	.63	9.0	8.0	14.1
7	154.6	783.3	598.3	9580	434	175	154	.55	7.0	8.0	12.3
8	154.3	759.5	584.9	8000	419	175	152	.86	6.0	8.3	12.1
9	154.0	752.1	579.1	8130	323	193	144	1.01	7.0	8.5	12.0
10	155.7	834.9	629.3	15800	328	194	154	.85	11.0		
11	156.9	819.6	621.1	10800	665	151	163	.55	7.0		
12	156.8	785.5	600.0	9460	477	159	158	.65	7.0		
13	156.6	769.9	589.8	8880	333	183	145	.80	7.0		
14	154.1	744.3	574.2	6490	469	160	151	.89	4.0		
15	156.6	795.6	606.7	11700	374	173	158	1.06	9.0	8.5	14.2

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
16	158.2	796.6	606.4	11500	365	176	156	.91	8.0	9.8	14.6
17	159.5	773.8	590.7	8230	451	173	149	.57	6.0	10.1	14.7
18	160.4	743.0	572.1	6780	416	164	150	1.09	5.0	8.9	14.4
19	159.9	739.0	567.7	7540	279	198	139	1.70	7.0	8.0	14.2
20	153.6	811.4	615.6	12900	409	180	159	.88	9.0	11.3	16.6
21	158.5	797.3	607.2	10700	425	171	154	.58	7.0	11.0	16.6
22	159.5	768.9	591.4	8830	372	171	149	.74	7.0	10.7	16.6
23	148.3	753.9	578.0	7250	534	190	159	.67	5.0	11.9	20.3
24	148.7	735.6	566.5	6480	499	193	159	.82	4.0	11.9	20.3
25	150.0	700.3	543.2	4450	503	192	152	.52	4.0	11.9	20.3
26	141.6	714.1	551.9	4580	630	195	160	.33	4.0	11.3	15.4
27	143.3	686.1	531.7	3340	641	200	154	.40	4.0	10.2	15.2
28	144.4	628.1	491.5	2220	559	213	152	1.17	4.0	9.2	14.9
29	131.8	632.8	492.9	2510	719	267	177	.94	4.0	8.5	14.8
30	131.5	674.6	519.9	3170	709	245	163	.70	4.0	8.5	14.8
31	136.7	605.4	473.1	1560	731	243	158	.97	4.0	8.5	14.8
32	138.5	557.5	442.0	876	980	224	159	1.24	4.0	8.5	14.8
33	139.6	536.6	427.5	781	90	249	168	1.31	4.0	8.5	14.8
34	127.0	641.1	499.3	2830	679	237	172	2.64	4.0	8.0	15.4
35	128.4	644.0	500.7	2420	763	236	165	1.75	4.0	8.0	15.4
36	134.6	593.2	467.7	1230	965	224	167	.62	4.0	8.0	15.4
37	135.7	556.0	440.3	878	80	195	170	3.21	4.0	8.0	15.4
38	136.2	542.9	431.2	732	150	226	162	1.41	4.0	8.0	15.4
39	129.6	693.7	536.4	3860	758	224	171	.73	4.0	9.6	15.4
40	135.4	670.2	518.5	3580	559	230	162	1.40	4.0	9.6	15.4
41	140.2	655.6	510.4	3270	522	212	161	1.37	4.0	9.6	15.4
42	135.4	619.3	487.0	2000	674	220	166	.69	4.0	9.6	15.4
43	142.4	583.1	459.6	1190	840	191	170	3.00	4.0	9.6	15.4
44	140.9	548.8	439.2	823	994	195	171	2.62	4.0	9.6	15.4
45	158.7	747.4	574.1	5840	583	170	153	.25	3.0		
46	158.8	748.5	575.3	6350	553	169	158	.35	3.0		
47	158.8	708.9	548.3	5030	438	180	150	1.35	3.0		
48	158.7	689.1	535.6	4110	424	180	146	1.21	4.0		
49	154.3	684.8	535.3	3910	491	173	155	.80	4.0		
50	156.8	804.8	613.3	11500	463	163	159	.87	8.0	8.0	15.1
51	162.3	793.8	606.5	9700	457	157	154	.28	7.0	8.0	13.4
52	162.2	778.9	597.5	9090	369	161	146	.60	7.0	8.1	12.2
53	162.0	750.2	578.0	8150	244	193	137	.94	7.0	8.4	12.0
54	160.7	747.5	577.0	6700	425	155	147	.74	5.0	8.5	12.0
55	158.0	823.6	625.7	13100	496	156	165	.52	9.0		
56	164.5	815.0	620.0	12400	379	159	151	.71	9.0		
57	163.3	782.4	599.4	8740	434	147	149	.51	7.0		
58	162.2	761.2	585.0	8380	305	166	141	1.01	7.0		
59	161.7	740.3	572.1	6700	370	161	146	.86	5.0		
60	166.1	805.2	611.6	12200	304	180	150	.96	9.0	9.1	14.4
61	165.9	802.7	611.2	12500	283	172	151	1.03	10.0	10.4	14.7
62	166.6	779.0	598.9	8970	385	151	146	.98	8.0	9.6	14.6
63	168.8	744.6	574.5	5880	484	145	146	.74	3.0	8.3	14.3
64	164.3	756.9	581.5	7990	342	164	147	1.15	7.0	8.0	14.2
65	162.0	818.5	621.4	16400	127	255	145	.99	15.0	11.2	16.6
66	167.4	781.1	597.8	9460	347	167	145	.67	7.0	10.9	16.6
67	166.1	754.4	580.2	7860	296	165	140	1.34	7.0	10.7	16.6
68	151.1	740.3	570.4	7510	351	204	151	.83	6.0	11.9	20.3
69	152.3	727.7	560.6	6960	299	223	144	1.05	6.0	11.9	20.3
70	153.1	678.6	527.7	4000	395	209	140	.89	4.0	11.9	20.3

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
71	145.9	675.0	525.0	3620	488	209	148	.59	4.0	10.8	15.3
72	146.1	679.4	527.6	3510	520	202	146	.77	4.0	9.7	15.1
73	145.3	656.5	512.1	3100	492	220	149	.51	4.0	8.9	14.9
74	134.9	712.1	546.0	6020	404	271	154	1.30	3.0	8.5	14.8
75	136.1	677.6	525.6	3870	544	223	163	.95	4.0	8.5	14.8
76	144.4	653.3	508.6	2070	763	208	153	.66	4.0	8.5	14.8
77	146.7	610.2	480.3	1060	130	198	153	.69	4.0	8.5	14.8
78	133.0	721.4	548.7	7330	279	342	145	2.34	7.0	8.0	15.4
79	135.5	655.5	509.1	2970	580	239	157	.69	4.0	8.0	15.4
80	140.9	629.7	492.7	1670	800	212	158	1.01	4.0	8.0	15.4
81	143.8	616.5	482.5	1310	894	216	150	.50	4.0	8.0	15.4
82	143.1	618.7	484.9	1230	40	214	153	.50	4.0	8.0	15.4
83	135.7	685.3	531.6	4810	426	236	156	.91	3.0	9.6	15.4
84	140.2	655.6	510.4	3270	522	212	161	1.37	4.0	9.6	15.4
85	142.2	632.2	496.8	2360	576	212	150	2.29	4.0	9.6	15.4
86	144.4	617.0	486.7	1690	665	207	149	.84	4.0	9.6	15.4
87	147.8	607.7	475.6	1530	621	235	142	.56	4.0	9.6	15.4
88	174.0	801.3	613.7	8630	650	115	158	1.79	7.0		
89	175.8	778.8	599.4	6350	738	111	155	2.57	4.0		
90	171.6	756.5	586.9	5850	641	111	161	1.84	4.0		
91	171.2	720.2	561.8	3890	562	136	148	1.32	5.0		
92	184.7	833.6	633.7	22500	16	0	14	2.56	15.0	8.0	15.8
93	184.5	818.6	626.7	15800	55	269	128	1.02	15.0	8.0	14.0
94	184.3	789.2	609.3	15000	21	760	87	2.52	15.0	8.0	12.3
95	180.2	754.8	591.3	6980	400	111	150	1.56	7.0	8.3	12.1
96	180.9	745.5	581.4	8530	110	198	124	.26	11.0	8.5	12.0
97	186.9	838.7	636.5	24200	15	0	13	1.89	15.0		
98	192.0	839.8	635.9	21000	16	0	15	6.50	15.0		
99	184.3	787.5	608.3	14300	28	962	116	1.71	15.0		
100	181.9	755.9	588.3	9350	117	175	127	.76	14.0		
101	180.0	745.4	582.7	6950	296	127	134	1.78	7.0		
102	192.2	804.3	615.9	22000	8	0	0	1.21	11.0	8.5	14.2
103	190.6	796.9	614.6	20200	9	0	0	3.65	14.0	9.9	14.6
104	188.0	770.2	598.0	12600	52	170	0	7.72	15.0	10.1	14.7
105	187.4	733.4	574.0	6100	298	130	0	1.74	5.0	8.8	14.4
106	188.2	730.1	570.8	6370	246	132	0	1.44	5.0	8.0	14.2
107	190.8	826.9	633.5	26200	11	0	19	6.18	15.0	11.3	16.6
108	192.3	807.0	626.5	17400	17	0	12	2.74	15.0	11.0	16.6
109	188.7	755.2	589.7	8260	212	133	132	1.34	9.0	10.7	16.6
110	173.6	744.1	582.8	7510	282	150	144	.60	7.0	11.9	20.3
111	175.2	743.8	579.7	7780	238	165	137	.70	8.0	11.9	20.3
112	173.9	694.3	547.0	4440	327	156	135	.56	4.0	11.9	20.3
113	163.1	670.8	528.3	3720	344	181	136	.35	4.0	11.3	15.4
114	160.1	700.5	547.6	5770	220	214	132	1.18	5.0	10.2	15.2
115	161.7	598.7	477.5	1610	449	180	138	.50	4.0	9.2	14.9
116	147.2	591.1	470.5	1710	498	200	156	.60	4.0	8.5	14.8
117	147.2	670.2	522.2	4570	314	220	150	1.57	4.0	8.5	14.8
118	153.4	553.2	443.4	1060	542	210	144	.75	4.0	8.5	14.8
119	153.1	527.5	426.0	751	632	197	147	.79	4.0	8.5	14.8
120	154.0	509.2	411.9	622	695	196	148	1.39	4.0	8.5	14.8
121	144.3	576.8	457.2	1340	565	217	148	1.03	4.0	8.0	15.4
122	142.0	645.8	508.9	2920	511	193	159	.60	4.0	8.0	15.4
123	148.6	607.4	480.1	1600	602	204	146	.76	4.0	8.0	15.4
124	155.5	556.8	441.3	922	591	224	130	.89	4.0	8.0	15.4
125	150.0	533.0	429.5	735	715	201	147	.71	4.0	8.0	15.4

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
126	147.3	702.6	547.5	5390	386	196	154	.60	3.0	9.6	15.4
127	150.1	656.8	516.1	3720	360	196	150	.65	5.0	9.6	15.4
128	156.0	674.7	529.5	3010	561	168	145	1.32	5.0	9.6	15.4
129	154.4	602.2	478.6	1750	500	180	151	.54	4.0	9.6	15.4
130	155.6	573.3	459.1	1140	588	182	151	1.21	4.0	9.6	15.4
131	157.3	548.2	443.0	828	720	168	153	1.48	4.0	9.6	15.4
132	179.7	760.3	585.4	5990	541	137	140	1.15	3.0		
133	176.1	772.2	594.8	7390	485	139	145	1.01	6.0		
134	177.1	753.5	580.0	5960	469	143	138	.52	4.0		
135	173.4	721.5	561.1	4550	483	139	140	.85	4.0		
136	174.4	719.0	560.3	4370	503	135	142	.93	4.0		
137	171.9	811.0	618.7	10600	481	136	149	1.15	9.0	8.0	15.1
138	177.4	803.3	614.0	9750	441	136	142	.97	8.0	8.0	13.3
139	178.1	783.4	602.3	8450	400	131	142	.60	7.0	8.1	12.2
140	179.0	756.3	585.3	6750	374	133	135	.87	6.0	8.4	12.0
141	174.9	760.4	586.6	7240	341	147	133	.52	6.0	8.5	12.0
142	171.7	827.3	629.2	12600	452	140	149	1.55	10.0		
143	176.1	820.5	624.3	13000	263	160	138	.53	10.0		
144	176.0	798.5	611.4	9360	418	125	140	1.27	8.0		
145	177.7	766.8	592.0	6330	493	119	140	.88	4.0		
146	177.5	749.5	580.5	6010	423	129	135	1.33	4.0		
147	180.0	800.8	611.1	10100	395	146	141	.98	8.0	9.1	14.4
148	180.5	803.2	614.3	10300	411	132	146	.91	9.0	10.5	14.7
149	177.3	773.8	596.3	8140	390	132	142	1.31	7.0	9.6	14.6
150	182.9	753.9	582.3	6020	426	130	131	1.35	4.0	8.3	14.3
151	177.0	755.3	584.7	7070	405	128	144	1.57	6.0	8.0	14.2
152	177.9	810.0	617.3	11000	375	153	141	.61	8.0	11.2	16.6
153	178.4	795.4	608.6	8780	479	125	145	.98	8.0	10.9	16.6
154	179.7	744.8	576.5	5590	457	128	139	.91	3.0	10.7	16.6
155	162.2	753.4	581.4	7030	433	160	147	.66	5.0	11.9	20.3
156	164.8	727.2	564.1	5330	467	156	146	.75	3.0	11.9	20.3
157	163.5	688.1	538.0	3760	450	161	142	.80	4.0	11.9	20.3
158	157.7	676.2	530.4	3500	447	176	143	.51	4.0	10.8	15.3
159	157.2	677.0	528.1	3250	479	187	138	.49	4.0	9.7	15.1
160	157.2	667.7	522.0	3340	431	187	141	.55	5.0	8.9	14.9
161	150.2	683.7	530.8	3770	545	196	157	.63	4.0	8.5	14.8
162	154.8	674.7	525.0	3270	495	183	147	.79	5.0	8.5	14.8
163	155.7	649.5	510.3	1910	725	162	153	.34	4.0	8.5	14.8
164	160.8	622.0	491.0	1230	843	164	145	.72	4.0	8.5	14.8
165	158.9	634.8	499.2	1260	964	163	145	.51	4.0	8.5	14.8
166	147.0	689.7	533.6	3780	531	200	150	.76	4.0	8.0	15.4
167	150.3	658.9	515.9	2560	592	187	151	.49	4.0	8.0	15.4
168	152.1	624.3	494.7	1570	731	167	156	.47	4.0	8.0	15.4
169	155.9	619.1	490.1	1390	738	174	147	.54	4.0	8.0	15.4
170	156.2	617.6	488.0	1310	784	177	148	.82	4.0	8.0	15.4
171	154.8	693.0	539.5	4000	487	179	145	.78	4.0	9.6	15.4
172	156.0	674.7	529.5	3010	561	168	145	1.32	5.0	9.6	15.4
173	160.4	651.0	512.2	2730	452	176	141	.56	5.0	9.6	15.4
174	160.5	637.3	503.5	1690	677	161	145	.65	4.0	9.6	15.4
175	159.5	618.5	491.5	1370	736	162	148	.80	4.0	9.6	15.4
176	149.1	802.9	606.9	7640	950	152	172	.30	4.0		
177	150.5	778.4	590.3	5850	954	166	165	.34	4.0		
178	151.4	760.7	581.0	4990	945	145	173	.69	5.0		
179	149.0	742.0	569.6	3980	20	146	177	.71	5.0		
180	148.2	827.5	624.2	9650	990	136	180	.46	5.0	8.0	15.7

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
181	152.6	813.9	615.2	7960	966	140	169	.36	4.0	8.0	14.0
182	155.0	789.5	599.7	6170	931	138	166	.34	4.0	8.0	12.3
183	152.1	755.3	578.0	5050	818	147	166	.61	4.0	8.3	12.1
184	151.9	743.8	570.7	3960	925	139	165	.44	5.0	8.5	12.0
185	152.1	826.3	623.9	9020	30	135	175	.77	4.0		
186	156.0	818.4	617.8	8370	952	134	167	.76	4.0		
187	155.2	795.1	603.8	6170	981	129	170	.45	5.0		
188	155.3	761.5	585.3	4150	70	113	176	.29	5.0		
189	154.5	750.1	574.4	4110	940	128	169	.75	5.0		
190	158.8	805.3	610.0	7440	931	131	169	.44	4.0	8.6	14.2
191	158.4	793.7	603.9	6100	60	120	176	.72	5.0	9.9	14.6
192	159.1	777.9	593.8	5320	989	123	173	.28	5.0	10.1	14.7
193	162.3	748.9	575.8	3560	20	118	170	.65	5.0	8.8	14.4
194	161.9	740.1	569.3	3360	30	120	168	.43	5.0	8.0	14.2
195	154.8	809.0	613.4	7000	150	117	185	.69	5.0	11.3	16.6
196	157.8	801.1	609.6	6220	120	113	181	.53	5.0	11.0	16.6
197	159.8	756.3	580.6	4050	996	119	169	.17	5.0	10.7	16.6
198	150.0	756.5	578.1	4670	982	150	172	.32	5.0	11.9	20.3
199	150.5	762.6	582.0	5450	898	157	170	.52	4.0	11.9	20.3
200	151.3	725.9	558.7	3670	874	153	167	.52	5.0	11.9	20.3
201	146.7	724.3	555.9	3910	836	172	168	1.25	5.0	11.3	15.4
202	152.2	690.0	533.6	2380	940	166	160	.61	4.0	10.2	15.2
203	145.6	649.1	503.8	1810	881	199	159	1.09	4.0	9.1	14.9
204	133.2	634.2	491.4	1830	885	255	159	.82	4.0	8.5	14.8
205	133.9	657.7	508.8	2090	943	245	163	.41	4.0	8.5	14.8
206	137.0	577.8	457.2	893	250	230	160	.17	4.0	8.5	14.8
207	139.6	540.8	429.8	639	510	243	156	.68	3.0	8.5	14.8
208	139.5	514.1	413.5	463	840	24	300	4.72	4.0	8.5	14.8
209	130.9	623.1	486.0	1450	40	271	154	1.21	4.0	8.0	15.4
210	132.5	673.9	515.5	2720	810	257	158	1.19	4.0	8.0	15.4
211	136.4	602.5	471.1	1050	240	250	156	.59	4.0	8.0	15.4
212	137.9	563.2	444.1	729	490	249	154	.55	4.0	8.0	15.4
213	138.6	566.5	446.3	734	540	244	154	.55	4.0	8.0	15.4
214	134.4	702.5	543.7	3930	796	199	175	1.52	4.0	9.6	15.4
215	137.3	667.9	518.0	2380	899	197	175	1.86	4.0	9.6	15.4
216	149.0	732.0	568.6	7940	345	164	175	1.86	7.0	9.6	15.4
217	140.3	630.3	492.5	1500	40	193	175	1.88	4.0	9.6	15.4
218	142.7	594.4	468.9	978	250	195	169	1.62	4.0	9.6	15.4
219	142.8	576.5	454.1	865	210	216	160	1.34	4.0	9.6	15.4
220	163.1	784.1	603.1	7800	685	124	166	1.71	5.0		
221	159.1	770.6	593.5	7090	696	135	171	.80	4.0		
222	160.5	731.2	567.8	4320	744	134	166	.30	5.0		
223	161.1	751.3	581.7	6970	465	139	156	.86	6.0		
224	159.6	749.8	580.3	6130	593	131	163	.86	3.0		
225	157.6	808.6	617.9	10700	632	131	174	.89	9.0	8.0	15.1
226	163.6	809.5	616.4	11000	477	142	156	.62	8.0	8.0	13.3
227	162.7	770.2	593.2	7010	593	131	161	.27	5.0	8.1	12.2
228	163.9	761.1	587.7	6160	610	125	157	.80	4.0	8.4	12.0
229	162.1	777.6	597.5	8200	463	138	150	.78	7.0	8.5	12.0
230	161.1	835.6	634.5	15800	371	151	162	.92	12.0		
231	164.6	834.3	636.0	13200	581	113	169	1.78	11.0		
232	164.2	796.4	611.5	10500	398	134	153	.90	9.0		
233	165.3	777.8	600.0	8310	451	126	152	.88	8.0		
234	163.9	758.2	587.2	5970	610	122	156	1.15	4.0		
235	168.1	817.1	624.5	14200	315	148	159	.98	11.0	9.2	14.4

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
236	169.7	810.3	618.8	12900	311	150	153	.74	10.0	10.5	14.7
237	171.3	792.1	609.6	9980	407	125	153	1.20	9.0	9.6	14.6
238	172.6	764.9	591.6	6790	533	113	155	1.26	5.0	8.3	14.3
239	170.0	774.5	599.3	7780	521	114	161	1.13	7.0	8.0	14.2
240	165.4	817.0	623.6	11000	657	123	171	1.49	9.0	11.2	16.6
241	168.4	814.4	623.2	13100	331	137	155	1.03	11.0	10.9	16.6
242	169.8	768.4	594.4	7500	480	119	156	.89	7.0	10.7	16.6
243	157.9	784.4	604.1	9690	464	142	162	1.01	8.0	11.9	20.3
244	158.3	749.9	580.9	6380	578	135	161	1.82	4.0	11.9	20.3
245	158.9	730.1	568.2	5270	558	135	159	.99	4.0	11.9	20.3
246	152.4	701.6	547.5	3810	619	159	155	1.26	5.0	10.8	15.3
247	151.9	712.5	553.9	4630	544	165	153	.98	4.0	9.7	15.1
248	151.6	702.8	546.9	4060	589	168	155	.89	4.0	8.7	14.8
249	139.5	719.9	552.1	5340	631	229	167	.61	3.0	8.5	14.8
250	142.6	705.7	545.1	3760	703	193	157	.23	4.0	8.5	14.8
251	147.2	669.2	521.7	1710	120	180	156	.97	4.0	8.5	14.8
252	148.5	634.2	497.9	1060	500	179	156	1.16	4.0	8.5	14.8
253	148.6	621.1	489.8	918	620	183	153	1.35	4.0	8.5	14.8
254	137.3	697.0	538.5	3380	778	206	161	.70	4.0	8.0	15.4
255	138.5	675.6	522.2	3140	601	242	152	1.19	4.0	8.0	15.4
256	146.2	675.4	522.1	2180	912	184	155	.54	4.0	8.0	15.4
257	147.4	645.5	504.0	1250	290	184	154	.88	4.0	8.0	15.4
258	146.0	647.3	505.0	1300	220	194	152	.93	4.0	8.0	15.4
259	144.8	698.4	542.4	4380	642	155	171	2.66	5.0	9.6	15.4
260	149.0	732.0	568.6	7940	345	164	175	1.86	7.0	9.6	15.4
261	150.3	670.1	530.9	2470	843	125	182	1.56	5.0	9.6	15.4
262	153.8	678.3	532.7	2340	825	143	163	.70	5.0	9.6	15.4
263	153.4	654.5	515.9	1730	953	145	159	1.85	4.0	9.6	15.4
264	155.0	811.6	616.8	11400	498	173	153	1.43	8.0		
265	146.3	781.9	595.1	10100	353	255	143	.59	8.0		
266	147.9	777.0	592.9	9170	456	220	148	1.19	6.0		
267	148.1	732.6	564.0	6250	446	217	147	.86	3.0		
268	145.5	726.5	561.1	5830	463	219	147	1.23	3.0		
269	146.9	810.9	615.8	9980	740	166	164	1.64	6.0	8.0	15.7
270	152.1	813.6	616.9	12700	367	201	148	.84	10.0	8.0	14.0
271	154.4	794.8	607.9	9880	514	164	153	1.64	7.0	8.0	12.3
272	152.5	763.3	589.6	6880	605	153	156	2.21	4.0	8.3	12.1
273	153.4	760.3	584.7	6810	540	167	145	2.34	4.0	8.5	12.0
274	150.3	825.6	623.9	13900	415	201	154	.75	9.0		
275	156.1	795.9	607.6	9600	514	165	151	1.36	7.0		
276	155.0	766.6	591.4	7230	536	155	149	2.16	5.0		
277	153.9	750.9	581.5	5850	611	150	151	2.27	4.0		
278	154.8	795.7	605.5	12000	254	242	142	.19	9.0	8.6	14.2
279	157.5	783.9	598.1	10000	345	205	145	.25	7.0	9.9	14.6
280	157.5	771.6	591.1	10200	223	238	137	.26	9.0	10.1	14.7
281	156.4	740.2	570.3	8990	140	296	133	.91	10.0	8.8	14.4
282	155.8	732.3	566.7	7480	238	232	137	.09	7.0	8.0	14.2
283	152.3	809.1	613.4	13100	306	227	148	.23	9.0	11.3	16.6
284	156.4	794.7	603.9	12300	191	264	137	.32	10.0	11.0	16.6
285	156.9	757.5	581.7	8330	280	222	136	.10	7.0	10.7	16.6
286	144.9	752.6	577.1	8170	378	233	149	.87	7.0	11.9	20.3
287	144.7	743.1	571.0	7860	339	246	148	.79	6.0	11.9	20.3
288	145.0	707.1	547.9	5110	440	222	148	.95	3.0	11.9	20.3
289	137.6	685.4	529.2	4050	493	266	147	.12	4.0	11.2	15.4
290	140.4	660.1	512.2	2920	540	247	146	.86	4.0	10.1	15.2

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
291	141.6	663.4	513.3	3050	539	246	145	.66	4.0	9.1	14.9
292	130.2	658.6	506.9	2920	730	280	167	1.18	4.0	8.5	14.8
293	131.7	643.7	497.1	2250	733	261	156	.82	4.0	8.5	14.8
294	137.1	626.1	484.7	1690	810	240	154	1.37	4.0	8.5	14.8
295	138.2	594.4	464.4	1120	993	234	155	1.19	4.0	8.5	14.8
296	125.9	663.3	510.0	2820	748	281	162	.71	4.0	8.0	15.4
297	128.0	654.9	505.1	2580	731	271	159	.76	4.0	8.0	15.4
298	133.9	603.7	471.6	1290	940	260	157	.53	4.0	8.0	15.4
299	135.1	581.6	455.5	1040	988	245	155	1.34	4.0	8.0	15.4
300	135.8	565.6	443.6	845	80	282	145	.49	4.0	8.0	15.4
301	131.0	675.9	526.6	4630	436	264	157	1.01	4.0	9.6	15.4
302	132.6	665.8	516.4	4020	447	260	159	1.04	4.0	9.6	15.4
303	144.4	704.6	542.3	5500	263	345	122	1.67	4.0	9.6	15.4
304	137.9	635.8	494.6	2580	535	238	154	2.19	4.0	9.6	15.4
305	140.9	604.9	476.4	1400	770	219	154	.71	4.0	9.6	15.4
306	141.4	579.3	456.3	1080	788	243	150	1.23	4.0	9.6	15.4
307	155.6	775.1	594.4	12800	70	535	128	.73	15.0		
308	154.8	770.4	592.9	12500	90	377	139	.80	14.0		
309	156.3	746.4	577.4	10200	97	357	133	.66	12.0		
310	155.3	720.8	561.0	8920	81	405	131	1.41	15.0		
311	153.1	727.0	567.6	8060	197	224	145	.09	8.0		
312	154.3	803.6	612.9	15900	66	493	137	.56	15.0	8.0	15.0
313	160.7	795.3	607.6	14300	67	449	132	.81	15.0	8.0	13.2
314	159.3	769.7	593.1	12200	61	506	128	1.09	15.0	8.1	12.2
315	161.1	759.8	585.9	10100	115	277	127	.37	13.0	8.4	12.0
316	157.6	758.0	585.6	11600	45	950	118	1.23	14.0	8.5	12.0
317	156.7	817.2	620.9	16800	88	355	141	.94	15.0		
318	160.0	803.9	615.2	12300	305	173	150	.39	10.0		
319	160.3	776.3	597.5	12000	86	317	131	.60	14.0		
320	158.0	757.3	587.8	10300	124	243	136	.20	12.0		
321	158.1	748.9	582.0	9710	113	269	133	.46	12.0		
322	163.4	799.4	610.0	14700	72	433	133	.86	15.0	9.2	14.4
323	163.6	787.6	604.3	13200	105	289	137	.86	15.0	10.5	14.7
324	164.0	770.9	594.3	12500	49	665	124	1.51	15.0	9.6	14.5
325	165.2	742.2	575.0	9200	87	332	124	1.14	11.0	8.2	14.3
326	161.4	750.9	581.0	10200	92	321	131	1.10	12.0	8.0	14.2
327	161.6	805.3	614.0	13400	211	225	142	.39	11.0	11.1	16.6
328	162.6	784.8	602.8	11600	174	219	138	.22	11.0	10.9	16.6
329	162.8	746.5	575.7	8750	151	240	129	.75	9.0	10.7	16.6
330	149.7	760.0	586.0	10800	134	315	139	.56	11.0	11.9	20.3
331	148.7	735.9	570.7	8260	185	297	133	1.45	10.0	11.9	20.3
332	149.5	720.3	558.9	8400	118	343	135	1.50	12.0	11.9	20.3
333	144.5	695.5	539.8	5270	315	248	142	.70	2.0	10.8	15.3
334	143.6	682.5	530.5	4860	319	246	144	1.24	3.0	9.7	15.0
335	143.3	684.8	533.6	4400	402	233	147	.48	4.0	8.7	14.8
336	136.0	710.9	545.9	4910	548	239	156	.71	4.0	8.5	14.8
337	141.0	708.1	543.9	4110	631	224	153	.55	4.0	8.5	14.8
338	146.4	685.9	528.8	2640	782	205	150	.39	4.0	8.5	14.8
339	148.2	649.4	505.7	1370	150	191	151	.85	4.0	8.5	14.8
340	146.3	636.4	495.9	1240	160	201	149	.57	4.0	8.5	14.8
341	134.0	705.2	540.9	5120	470	268	150	.55	3.0	8.0	15.4
342	137.6	702.3	538.5	4230	602	218	165	2.79	4.0	8.0	15.4
343	138.1	654.0	508.5	2130	800	214	157	.73	4.0	8.0	15.4
344	143.1	647.3	504.5	1570	982	207	152	.79	4.0	8.0	15.4
345	143.6	639.8	499.7	1380	80	208	151	.76	4.0	8.0	15.4

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
346	141.2	700.8	544.1	6290	264	262	147	.96	5.0	9.6	15.4
347	144.4	704.6	542.3	5500	263	345	122	1.67	4.0	9.6	15.4
348	148.0	671.3	529.2	3280	537	173	159	.83	5.0	9.6	15.4
349	151.9	654.8	515.5	2220	685	154	166	1.38	5.0	9.6	15.4
350	149.6	639.7	502.9	1840	686	183	154	1.59	4.0	9.6	15.4
351	152.3	798.6	610.0	10600	539	165	161	1.33	7.0		
352	152.6	790.7	606.7	9320	649	149	169	1.67	7.0		
353	152.4	760.9	588.5	7800	530	154	163	1.53	6.0		
354	150.9	737.3	573.7	5660	701	136	177	1.76	4.0		
355	152.0	823.5	627.1	12700	647	133	179	1.37	9.0	8.0	15.7
356	157.5	797.4	611.2	6840	20	104	185	1.76	5.0	8.0	13.9
357	159.5	769.6	594.8	6060	807	112	174	1.61	5.0	8.0	12.3
358	157.5	742.5	578.1	4910	783	108	182	1.12	5.0	8.3	12.1
359	159.1	739.2	574.1	4290	811	115	171	1.26	5.0	8.5	12.0
360	159.6	812.4	621.1	8210	20	120	191	1.87	5.0		
361	161.7	806.8	617.6	9220	727	115	173	1.28	7.0		
362	161.1	776.7	599.3	6690	750	110	174	1.37	4.0		
363	159.9	746.9	581.2	4880	772	109	172	1.64	5.0		
364	160.4	737.5	574.7	4610	721	114	169	1.20	5.0		
365	165.1	796.4	611.2	8620	751	104	182	1.65	7.0	8.6	14.2
366	166.4	795.1	611.1	7900	797	114	184	1.24	5.0	9.9	14.6
367	166.5	773.6	597.5	6950	687	105	176	1.01	4.0	10.0	14.7
368	166.2	738.6	575.0	5340	603	120	164	1.10	4.0	8.8	14.4
369	164.9	733.5	571.2	5180	613	118	166	1.32	4.0	8.0	14.2
370	161.1	810.1	620.5	9300	844	101	195	.95	7.0	11.3	16.6
371	166.8	790.1	608.5	6830	927	86	199	1.31	5.0	11.0	16.6
372	165.6	747.1	580.8	4650	830	86	181	1.46	5.0	10.7	16.6
373	151.4	739.1	574.3	5060	834	125	186	1.35	5.0	11.9	20.3
374	151.2	724.9	565.5	4260	866	123	189	1.18	5.0	11.9	20.3
375	153.4	693.3	544.2	3170	791	130	176	1.32	5.0	11.9	20.3
376	144.0	717.1	556.7	4150	800	163	169	1.51	5.0	11.2	15.4
377	146.2	691.5	537.9	3020	822	168	163	1.46	5.0	10.1	15.1
378	145.0	637.7	501.5	1870	821	175	165	.96	4.0	9.1	14.9
379	133.5	625.9	486.6	1980	765	245	165	1.25	4.0	8.5	14.8
380	135.8	621.2	485.9	1650	852	235	163	.34	4.0	8.5	14.8
381	139.0	574.2	454.7	951	90	226	163	.38	4.0	8.5	14.8
382	140.7	566.3	448.7	778	420	220	162	.44	4.0	8.5	14.8
383	130.1	626.8	488.5	1900	822	252	168	.62	4.0	8.0	15.4
384	132.1	651.8	504.9	2480	772	237	166	.81	4.0	8.0	15.4
385	136.4	595.5	467.7	1130	60	228	162	.54	4.0	8.0	15.4
386	137.8	565.6	447.0	787	380	227	160	.74	4.0	8.0	15.4
387	137.7	549.2	437.6	657	700	226	161	.27	3.0	8.0	15.4
388	137.4	683.3	533.2	3190	831	183	174	1.48	5.0	9.6	15.4
389	140.5	653.1	508.5	2610	690	199	165	1.17	4.0	9.6	15.4
390	144.7	637.8	498.9	1840	809	203	155	1.16	4.0	9.6	15.4
391	146.0	594.0	470.0	1110	980	188	163	.64	4.0	9.6	15.4
392	149.6	588.4	463.4	961	40	211	147	1.11	4.0	9.6	15.4
393	158.9	766.4	595.8	10900	259	157	169	.50	9.0		
394	161.1	769.4	597.4	11000	257	160	162	.74	10.0		
395	160.1	743.7	582.3	8360	332	141	170	.44	7.0		
396	158.0	722.2	568.0	7440	282	148	167	.92	7.0		
397	157.5	729.2	574.4	8030	261	153	164	.38	7.0		
398	159.5	797.1	615.5	14900	135	203	160	.35	14.0	8.0	15.0
399	164.9	786.8	610.4	12200	233	150	160	.48	11.0	8.0	13.2
400	163.5	764.1	597.8	10200	251	137	167	.07	9.0	8.2	12.2

	13 OUT3_	14 T_U_A	15 U_ ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
401	163.8	755.0	590.9	8720	313	129	161	.81	9.0	8.5	12.0
402	161.9	748.7	587.5	9200	242	140	162	.48	9.0	8.5	12.0
403	159.3	805.1	620.0	16900	85	256	156	.70	15.0		
404	163.4	795.4	614.6	14500	113	202	152	.42	15.0		
405	162.7	769.1	600.5	12200	112	182	156	.45	13.0		
406	163.6	750.0	586.5	8270	314	131	159	.63	8.0		
407	163.2	747.9	586.2	8470	281	136	158	.69	8.0		
408	166.4	784.1	607.1	13300	151	182	158	.53	13.0	9.2	14.4
409	167.4	779.2	606.7	12300	230	141	166	1.36	12.0	10.5	14.8
410	168.1	756.7	590.3	9620	216	149	155	.44	9.0	9.5	14.5
411	169.6	739.9	578.0	8140	233	147	152	.99	8.0	8.2	14.2
412	164.0	743.4	581.3	8830	242	149	160	.72	8.0	8.0	14.2
413	166.5	800.2	618.7	13200	337	122	188	.57	10.0	11.1	16.6
414	164.8	772.2	600.9	11700	184	157	161	.40	11.0	10.8	16.6
415	164.3	733.1	576.2	7150	335	127	167	.32	7.0	10.7	16.6
416	153.1	757.2	586.6	9850	286	171	165	.81	8.0	11.9	20.3
417	153.2	735.3	573.6	6810	461	147	171	.49	5.0	11.9	20.3
418	151.6	717.3	562.9	6340	392	152	170	.31	5.0	11.9	20.3
419	147.0	709.9	552.5	5220	492	169	166	.76	4.0	10.7	15.3
420	143.4	669.5	527.5	3590	506	190	153	2.64	4.0	9.6	15.0
421	147.6	703.1	546.7	4660	536	171	165	1.00	4.0	8.6	14.8
422	137.7	710.6	545.8	4820	662	234	169	.73	4.0	8.5	14.8
423	142.0	695.5	534.9	3170	744	208	156	.97	4.0	8.5	14.8
424	145.2	658.6	511.7	1650	110	188	160	.32	4.0	8.5	14.8
425	146.7	629.6	493.1	1020	550	184	157	.84	4.0	8.5	14.8
426	146.2	603.0	475.0	824	700	189	156	.46	4.0	8.5	14.8
427	133.4	696.6	537.4	3970	695	209	169	.81	4.0	8.0	15.4
428	136.2	695.7	538.7	3230	839	190	170	.37	4.0	8.0	15.4
429	143.7	648.6	504.9	1610	10	190	161	1.14	4.0	8.0	15.4
430	142.3	619.0	486.4	1180	140	207	154	.80	4.0	8.0	15.4
431	143.0	628.2	493.6	1190	310	179	170	.89	4.0	8.0	15.4
432	145.5	697.5	546.1	4620	541	164	177	1.23	4.0	9.6	15.4
433	149.4	712.6	552.0	5640	453	167	167	1.62	3.0	9.6	15.4
434	150.8	665.6	524.7	2150	877	137	179	.44	4.0	9.6	15.4
435	154.3	634.4	502.8	1370	20	140	170	.30	4.0	9.6	15.4
436	154.4	651.6	512.2	1520	10	146	163	.71	4.0	9.6	15.4
437	148.4	782.3	595.7	9280	478	209	150	.68	6.0		
438	147.9	771.0	588.6	9840	314	245	142	.91	9.0		
439	147.5	740.0	569.3	6280	484	200	147	.81	3.0		
440	145.4	723.4	558.7	6130	419	219	149	.53	3.0		
441	148.5	794.3	604.4	9640	553	188	155	.85	7.0	8.0	15.7
442	151.5	789.2	602.1	8790	565	178	153	.78	6.0	8.0	13.9
443	153.1	759.9	581.1	7850	383	207	141	.41	6.0	8.0	12.3
444	151.1	735.3	568.2	6070	453	188	148	.43	3.0	8.3	12.1
445	153.0	729.1	563.6	5860	429	189	140	1.33	3.0	8.5	12.0
446	150.8	791.8	602.8	9620	539	182	157	.50	6.0		
447	155.9	781.7	596.8	9040	453	184	149	.54	6.0		
448	156.2	763.8	585.7	7320	458	179	144	.52	5.0		
449	154.4	747.5	575.2	6430	450	184	141	.56	4.0		
450	151.2	732.1	565.0	5750	449	183	142	.90	3.0		
451	159.2	780.1	596.8	8840	433	185	146	.42	6.0	8.6	14.2
452	158.1	774.2	593.7	7980	529	167	153	.65	6.0	10.0	14.6
453	159.1	752.8	579.3	6870	467	170	147	.84	5.0	10.0	14.6
454	160.3	725.6	561.0	5210	480	173	143	.71	4.0	8.8	14.4
455	155.3	798.2	607.9	12500	298	203	150	.91	11.0	11.3	16.6

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
456	159.1	767.9	591.0	7470	544	157	154	1.11	5.0	11.0	16.6
457	157.5	745.0	574.0	6760	401	186	142	.70	5.0	10.7	16.6
458	145.7	739.1	569.7	5910	595	190	157	1.25	3.0	11.9	20.3
459	147.1	737.2	569.2	6270	528	195	155	1.17	4.0	11.9	20.3
460	147.7	704.0	545.6	4830	476	200	151	.72	4.0	11.9	20.3
461	139.4	707.6	542.4	4880	501	238	149	.78	4.0	11.2	15.4
462	141.9	651.9	507.5	2490	632	221	151	.42	4.0	10.1	15.1
463	141.2	627.0	489.9	2160	555	238	149	.65	4.0	9.1	14.9
464	128.3	623.6	487.3	2230	688	257	170	.62	4.0	8.5	14.8
465	131.1	615.1	480.3	1890	691	262	160	.53	4.0	8.5	14.8
466	134.1	579.2	456.9	1260	774	242	163	.83	4.0	8.5	14.8
467	134.2	537.4	428.2	783	986	239	162	1.26	4.0	8.5	14.8
468	126.0	623.1	485.0	2040	731	267	172	1.65	4.0	8.0	15.4
469	123.9	623.5	492.2	2000	898	207	190	2.57	4.0	8.0	15.4
470	132.1	565.3	445.7	1020	834	272	156	.98	4.0	8.0	15.4
471	132.8	547.5	436.1	791	120	237	160	1.08	4.0	8.0	15.4
472	132.4	542.0	432.1	754	240	258	157	.57	4.0	8.0	15.4
473	132.5	668.9	520.8	3840	525	256	152	2.37	4.0	9.6	15.4
474	135.0	655.4	510.9	3000	593	235	156	1.23	4.0	9.6	15.4
475	136.5	621.0	489.0	1900	728	211	164	1.03	4.0	9.6	15.4
476	138.0	578.5	459.0	1100	866	218	161	.46	4.0	9.6	15.4
477	138.0	553.4	441.6	882	932	221	162	1.07	4.0	9.6	15.4
478	164.4	768.3	592.0	8380	427	155	150	1.35	7.0		
479	164.8	758.3	587.0	7230	496	148	154	1.53	5.0		
480	164.5	742.6	576.8	5890	509	145	148	1.76	3.0		
481	163.6	708.7	553.8	4640	476	144	150	1.56	4.0		
482	163.4	724.9	565.6	5550	459	145	151	1.55	3.0		
483	163.5	790.8	608.1	10300	423	147	156	1.16	8.0	8.0	15.0
484	168.7	783.9	604.1	9310	414	139	152	.98	8.0	8.0	13.1
485	167.7	748.2	582.7	6110	533	123	155	1.98	4.0	8.2	12.2
486	166.5	737.4	575.7	5970	435	136	147	1.46	4.0	8.5	12.0
487	166.3	735.2	573.3	5380	504	134	147	2.05	4.0	8.5	12.0
488	163.9	804.4	617.4	12600	338	159	155	1.38	10.0		
489	169.9	794.1	610.7	9890	428	133	151	1.28	8.0		
490	170.5	766.9	594.5	7260	481	122	149	1.87	6.0		
491	168.8	744.8	576.6	6540	331	162	131	1.13	5.0		
492	169.5	743.8	579.6	6420	422	127	146	1.95	5.0		
493	172.9	794.2	608.5	12600	183	189	141	1.00	13.0	9.2	14.4
494	173.9	785.1	605.4	10200	306	154	144	1.05	9.0	10.5	14.8
495	173.9	762.5	591.6	7980	347	142	141	1.74	7.0	9.5	14.5
496	176.1	744.2	579.1	6280	380	140	136	1.65	5.0	8.2	14.2
497	170.5	743.9	579.5	6820	389	139	145	2.14	6.0	8.0	14.2
498	168.9	795.6	609.6	12200	231	182	146	.33	10.0	11.1	16.6
499	171.3	766.6	592.5	7610	439	140	149	1.01	6.0	10.8	16.6
500	171.0	734.7	571.9	6080	368	143	140	1.23	4.0	10.7	16.6
501	153.7	730.8	567.1	5840	509	168	155	1.20	3.0	11.9	20.3
502	154.6	712.7	554.1	5220	454	176	150	1.26	3.0	11.9	20.3
503	153.2	686.3	535.1	3930	466	185	147	1.24	4.0	11.9	20.3
504	146.0	674.0	524.7	3150	573	208	148	1.13	4.0	10.7	15.3
505	148.2	692.5	536.8	3790	530	207	142	1.04	4.0	9.6	15.0
506	146.8	669.0	521.3	2980	597	201	149	1.03	4.0	8.6	14.8
507	137.0	671.3	520.5	3540	644	233	172	.86	4.0	8.5	14.8
508	142.7	675.7	522.9	3020	651	209	154	.62	4.0	8.5	14.8
509	145.4	639.4	499.6	1720	818	196	156	.68	4.0	8.5	14.8
510	149.6	619.3	485.7	1120	70	195	148	.55	4.0	8.5	14.8

	13 OUT3	14 T_U_A	15 U_ ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
511	147.6	617.5	484.2	1030	260	194	150	.38	4.0	8.5	14.8
512	135.1	664.2	514.6	2870	693	220	164	1.13	4.0	8.0	15.4
513	134.8	659.6	513.4	2870	664	207	169	.90	4.0	8.0	15.4
514	143.7	632.9	494.0	1560	866	211	153	.77	4.0	8.0	15.4
515	143.4	626.9	490.7	1470	910	197	158	.61	4.0	8.0	15.4
516	146.0	633.8	492.4	1390	988	209	151	1.13	4.0	8.0	15.4
517	140.9	667.9	523.0	3700	516	199	162	1.05	4.0	9.6	15.4
518	148.1	690.4	537.1	4140	495	188	152	.65	4.0	9.6	15.4
519	154.7	657.8	512.7	2220	718	168	145	2.69	5.0	9.6	15.4
520	152.0	643.4	504.3	1780	760	184	145	1.32	4.0	9.6	15.4
521	152.4	634.4	499.0	1590	788	185	143	1.69	4.0	9.6	15.4
522	156.6	719.8	558.0	5750	378	191	143	.50	3.0	8.0	14.2
523	165.9	786.0	598.6	7620	564	166	141	.91	5.0		
524	166.5	784.1	598.4	8450	471	171	138	1.57	6.0		
525	164.9	747.0	574.7	6360	439	163	146	.57	4.0		
526	164.6	737.3	568.1	5030	541	168	138	1.35	4.0		
527	164.7	809.4	616.0	8490	747	127	158	1.17	5.0	8.0	15.6
528	169.6	818.2	620.2	10600	505	144	145	.64	8.0	8.0	13.9
529	170.9	782.9	598.3	6580	635	129	145	1.07	4.0	8.0	12.3
530	169.2	751.8	580.8	5170	635	126	148	1.51	4.0	8.3	12.1
531	170.7	730.5	565.0	3930	594	142	138	.96	5.0	8.5	12.0
532	167.6	802.8	610.4	7270	796	126	157	.58	4.0		
533	173.7	795.8	607.0	6750	749	120	151	.80	4.0		
534	173.6	770.0	591.0	5830	620	125	145	.81	4.0		
535	173.2	745.4	575.7	4590	608	127	142	.88	5.0		
536	173.8	742.5	574.0	4590	577	130	138	.95	4.0		
537	175.2	780.0	596.5	6490	630	131	148	.23	4.0	9.0	14.3
538	173.9	776.8	597.6	6430	698	110	163	.80	4.0	10.0	14.6
539	176.1	752.0	580.2	5060	585	130	146	.41	4.0	10.0	14.6
540	176.3	716.5	555.9	3750	542	139	138	1.21	5.0	8.7	14.4
541	174.9	710.6	553.2	3470	569	136	142	.79	5.0	8.0	14.2
542	169.7	785.4	600.0	6610	720	131	156	.36	4.0	11.3	16.6
543	174.9	775.2	594.5	6090	628	131	144	.88	4.0	11.0	16.6
544	175.4	735.4	569.3	4310	579	133	141	.94	5.0	10.7	16.6
545	161.1	736.4	567.8	4440	717	149	154	.82	5.0	11.9	20.3
546	162.5	725.0	558.5	3930	691	160	146	1.29	5.0	11.9	20.3
547	162.5	679.1	530.4	2460	712	154	146	1.62	5.0	11.9	20.3
548	155.6	717.6	552.1	3930	628	187	142	.42	4.0	10.9	15.3
549	158.2	637.5	498.0	1480	785	195	139	.93	4.0	10.1	15.1
550	154.9	648.7	505.1	1800	773	192	141	1.24	4.0	9.1	14.9
551	141.8	641.1	496.0	1950	885	245	162	.80	4.0	8.5	14.8
552	144.4	618.9	482.3	1420	877	216	153	.83	4.0	8.5	14.8
553	147.9	576.0	453.1	875	50	222	147	.92	4.0	8.5	14.8
554	149.8	552.9	436.5	632	410	224	144	.99	4.0	8.5	14.8
555	141.4	649.0	503.2	1550	130	204	163	1.15	4.0	8.0	15.4
556	143.2	649.1	501.4	1690	939	224	148	.42	4.0	8.0	15.4
557	148.9	588.6	462.4	789	420	207	148	.62	4.0	8.0	15.4
558	147.2	559.3	441.0	654	420	231	141	.59	4.0	8.0	15.4
559	147.3	555.9	439.1	642	460	228	145	.61	3.0	8.0	15.4
560	149.8	677.5	524.7	2370	838	189	152	.54	4.0	9.6	15.4
561	152.3	668.2	516.9	2330	737	191	147	.87	4.0	9.6	15.4
562	156.2	622.1	486.3	1260	913	188	147	.54	4.0	9.6	15.4
563	153.7	590.3	463.0	990	848	217	145	2.37	4.0	9.6	15.4
564	157.2	582.3	458.9	765	230	201	142	.52	4.0	9.6	15.4
565	173.3	796.4	611.1	13300	101	232	136	.83	14.0		

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
566	178.3	801.9	615.0	11700	241	155	140	.29	10.0		
567	172.9	770.4	597.2	10500	157	179	141	.31	10.0		
568	174.9	749.6	585.4	7640	294	136	146	.53	7.0		
569	172.3	759.4	590.0	9660	166	167	143	.67	9.0		
570	170.0	822.7	628.2	17900	35	760	133	1.13	15.0	8.0	14.9
571	176.1	808.6	620.6	14700	66	275	134	.77	15.0	8.0	13.1
572	178.1	785.5	606.9	11100	174	152	141	.43	10.0	8.2	12.2
573	179.4	785.1	609.3	11700	114	165	138	.74	12.0	8.5	12.0
574	176.1	777.2	602.5	11700	72	241	131	.57	15.0	8.5	12.0
575	173.9	834.0	635.2	17200	93	237	135	.58	15.0		
576	178.7	824.8	631.8	16700	52	307	132	.41	15.0		
577	178.4	789.8	610.3	11700	134	160	137	.36	12.0		
578	176.9	781.8	606.9	12700	41	362	124	.69	15.0		
579	176.8	777.2	604.9	11300	110	164	137	.27	14.0		
580	178.5	812.0	621.6	16400	35	712	127	1.05	15.0	9.2	14.4
581	180.9	803.3	616.7	15200	33	881	122	1.23	15.0	10.6	14.8
582	180.9	781.9	603.6	13100	34	699	120	1.31	15.0	9.5	14.5
583	184.9	766.3	594.6	10500	73	228	127	1.20	15.0	8.2	14.2
584	180.7	771.4	597.8	11300	77	225	133	1.05	13.0	8.0	14.2
585	175.2	814.4	622.3	15800	69	286	138	1.06	15.0	11.1	16.6
586	179.6	793.2	610.0	12400	92	224	132	.98	14.0	10.8	16.6
587	180.9	766.8	598.0	12100	32	649	122	.87	15.0	10.7	16.6
588	163.6	767.1	591.8	10400	174	203	144	.76	10.0	11.9	20.3
589	166.0	748.5	580.8	7450	338	154	148	.68	6.0	11.9	20.3
590	165.5	733.9	571.5	7150	273	164	146	.50	6.0	11.9	20.3
591	161.7	725.5	560.1	6010	336	180	140	.79	4.0	10.7	15.3
592	157.6	712.1	554.2	4280	522	169	142	1.02	4.0	9.6	15.0
593	159.8	706.9	547.4	4920	400	181	142	.89	3.0	8.6	14.8
594	149.5	706.9	543.9	3980	648	203	156	.64	4.0	8.5	14.8
595	153.7	705.6	542.3	3870	585	194	145	.66	4.0	8.5	14.8
596	159.0	666.2	517.9	1690	951	162	147	.16	4.0	8.5	14.8
597	161.7	650.7	507.2	1200	170	163	143	.76	4.0	8.5	14.8
598	160.1	659.1	511.8	1200	330	159	145	.28	4.0	8.5	14.8
599	146.0	710.7	547.7	4320	588	197	152	.47	4.0	8.0	15.4
600	148.5	695.0	536.5	3060	735	185	150	.88	4.0	8.0	15.4
601	156.9	668.5	520.2	1610	40	164	147	1.37	4.0	8.0	15.4
602	156.5	654.6	510.9	1360	340	171	145	.93	4.0	8.0	15.4
603	157.1	666.0	515.9	1590	996	174	145	.65	4.0	8.0	15.4
604	154.5	717.5	559.9	5540	462	155	160	.89	3.0	9.6	15.4
605	158.7	722.9	562.0	5540	427	159	154	.74	3.0	9.6	15.4
606	164.2	694.7	543.5	3250	598	135	152	.91	5.0	9.6	15.4
607	168.8	689.8	536.4	2680	633	143	141	.44	5.0	9.6	15.4
608	165.8	652.8	510.1	1570	781	165	136	.85	4.0	9.6	15.4
609	160.4	792.0	603.7	10300	368	183	144	.77	7.0		
610	160.3	783.6	599.5	10500	301	186	146	.80	8.0		
611	157.6	750.3	576.6	8020	295	193	142	.98	7.0		
612	157.5	741.5	573.0	5980	513	160	152	.49	3.0		
613	158.7	811.2	617.4	10600	594	137	163	.85	8.0	8.0	15.2
614	164.2	816.9	621.7	11900	450	144	154	.66	9.0	8.0	13.8
615	165.0	786.7	603.9	8040	565	132	154	.77	6.0	8.0	12.3
616	163.0	772.7	595.1	9750	273	167	146	.62	8.0	8.3	12.1
617	165.9	752.0	579.8	5650	555	139	144	.96	4.0	8.5	12.0
618	162.7	814.7	620.1	10300	636	131	164	.73	8.0		
619	164.0	800.3	611.2	8720	631	126	160	.64	7.0		
620	168.1	789.8	605.1	8620	469	135	148	.32	7.0		

data file: 48SA.STA [910 cases with 50 variables]

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
621	167.3	761.9	587.8	6030	591	124	152	.78	3.0		
622	167.3	756.3	582.6	5530	580	134	145	.60	4.0		
623	169.3	788.0	603.7	7950	631	122	162	.85	6.0	9.0	14.3
624	169.8	784.2	600.8	7060	676	122	159	.79	4.0	10.0	14.6
625	170.8	764.4	590.3	6100	614	122	154	.94	4.0	10.0	14.6
626	171.3	733.4	568.8	4430	632	123	152	.98	5.0	8.7	14.4
627	170.7	730.8	567.8	4130	681	121	153	1.30	5.0	8.0	14.2
628	165.5	813.4	619.5	14900	176	193	150	1.00	13.0	11.3	16.6
629	171.6	793.9	608.5	10000	384	143	148	.59	8.0	11.0	16.6
630	170.8	760.5	587.0	7130	431	139	145	.89	6.0	10.7	16.6
631	155.9	751.0	578.8	7690	421	172	155	.86	6.0	11.9	20.3
632	158.4	738.3	570.4	5580	580	157	155	.88	4.0	11.9	20.3
633	156.0	694.6	542.7	3760	570	157	154	.86	4.0	11.9	20.3
634	148.7	724.8	557.4	5400	491	197	146	.69	3.0	10.9	15.3
635	154.5	640.0	502.6	1860	681	180	145	.75	4.0	10.0	15.1
636	151.7	681.3	529.6	3370	538	196	145	.33	4.0	9.0	14.9
637	141.2	661.8	513.8	3020	661	235	164	.58	4.0	8.5	14.8
638	145.1	631.5	493.3	1780	730	209	153	.64	4.0	8.5	14.8
639	149.8	595.8	468.2	1120	852	200	151	.97	4.0	8.5	14.8
640	150.5	567.8	450.2	807	30	191	151	1.04	4.0	8.5	14.8
641	142.5	666.0	515.2	2430	740	217	154	1.18	4.0	8.0	15.4
642	141.1	668.3	520.0	2820	682	207	154	1.06	4.0	8.0	15.4
643	145.9	585.0	459.9	951	60	190	159	1.54	4.0	8.0	15.4
644	145.8	558.1	450.7	664	520	174	163	1.08	4.0	8.0	15.4
645	148.8	558.1	443.8	715	260	177	158	2.02	4.0	8.0	15.4
646	142.5	695.7	537.9	4710	472	210	153	1.42	4.0	9.6	15.4
647	144.2	664.4	516.6	3550	456	210	153	1.22	5.0	9.6	15.4
648	149.2	619.9	486.6	1670	671	190	157	1.43	4.0	9.6	15.4
649	151.9	586.4	462.1	1050	799	192	155	2.25	4.0	9.6	15.4
650	151.8	558.1	443.9	816	865	196	153	1.88	4.0	9.6	15.4
651	170.8	778.5	598.2	11800	85	313	127	.75	14.0		
652	172.0	782.0	602.9	12000	104	249	131	.28	15.0		
653	171.0	755.0	585.5	10300	92	259	130	.77	14.0		
654	167.8	728.9	572.6	6840	258	162	142	.87	7.0		
655	170.2	742.8	581.6	7420	306	141	151	.31	7.0		
656	167.0	810.3	619.3	16500	45	576	132	1.05	15.0	8.0	14.9
657	172.9	801.3	614.8	15400	36	762	124	1.11	15.0	8.0	13.1
658	172.7	771.0	598.2	10900	108	211	133	.17	13.0	8.2	12.2
659	175.5	770.3	598.8	11000	82	235	125	.69	15.0	8.5	12.0
660	170.0	750.9	584.2	8900	161	188	133	.18	9.0	8.5	12.0
661	169.5	819.7	625.2	15300	113	236	137	.54	14.0		
662	174.2	804.3	617.0	13000	131	201	132	.25	13.0		
663	173.1	775.1	599.6	11700	59	332	124	.80	15.0		
664	174.5	764.2	590.4	11200	40	695	114	1.51	15.0		
665	172.5	758.3	588.4	10300	73	272	126	.92	15.0		
666	175.2	791.3	607.9	12300	137	214	135	.60	12.0	9.3	14.4
667	175.8	785.5	605.4	12100	110	228	132	.74	15.0	10.6	14.8
668	176.6	759.8	589.7	9890	119	209	129	.69	14.0	9.4	14.5
669	180.1	744.3	577.1	8760	98	237	123	1.10	11.0	8.1	14.2
670	174.9	743.4	578.7	7780	231	162	139	.47	7.0	8.0	14.2

	13	14	15	16	17	18	19	20	21	22	23
	OUT3_	T_U_A	U_ARE	E1_MPA	E2_MPA	E3_MPA	E4_MPA	RMS	ITR	VM1	VM2
671	173.1	802.8	614.4	13600	124	226	136	.41	14.0	11.1	16.6
672	175.8	782.8	602.3	11900	72	313	125	.90	15.0	10.8	16.6
673	175.1	741.8	575.8	9190	63	347	120	1.46	15.0	10.7	16.6
674	164.0	746.4	578.6	9210	146	235	138	.75	10.0	11.9	20.3
675	164.0	726.4	567.2	7870	166	208	139	.47	8.0	11.9	20.3
676	161.4	710.2	556.9	7410	133	232	137	.61	9.0	11.9	20.3
677	160.5	695.4	543.5	4620	351	184	140	.30	4.0	10.6	15.3
678	159.9	690.9	539.9	4010	421	181	140	.55	4.0	9.5	15.0
679	159.0	689.1	536.7	4270	385	184	142	.74	4.0	8.6	14.8
680	152.0	713.2	550.0	5320	489	203	157	.78	3.0	8.5	14.8
681	156.8	689.3	535.8	3170	608	167	146	.82	5.0	8.5	14.8
682	162.7	671.8	524.1	2150	767	149	152	.42	4.0	8.5	14.8
683	164.3	653.8	512.7	1470	942	151	148	.47	4.0	8.5	14.8
684	164.1	649.1	508.0	1160	220	144	147	.38	4.0	8.5	14.8
685	148.0	699.2	541.5	4370	483	198	148	.58	4.0	8.0	15.4
686	149.5	675.1	529.6	2800	665	172	156	.65	4.0	8.0	15.4
687	159.8	653.4	509.5	1770	727	180	135	1.54	4.0	8.0	15.4
688	156.6	635.0	502.6	1270	30	146	158	.73	4.0	8.0	15.4
689	160.2	650.4	510.2	1360	20	159	148	.78	4.0	8.0	15.4
690	158.7	712.4	553.7	5430	354	180	146	.89	3.0	9.6	15.4
691	158.0	682.6	534.4	4380	319	191	143	1.44	4.0	9.6	15.4
692	161.3	649.8	518.1	2310	599	131	167	.86	5.0	9.6	15.4
693	172.0	670.9	527.7	1930	722	133	144	1.12	5.0	9.6	15.4
694	167.5	637.1	505.6	1390	784	148	144	1.12	4.0	9.6	15.4
695	153.0	760.7	581.1	5620	721	190	147	1.09	4.0		
696	154.0	689.9	534.1	2210	973	187	148	1.33	4.0		
697	150.5	695.3	538.4	3170	711	190	149	1.15	4.0		
698	148.0	703.9	545.2	3300	756	183	150	1.61	5.0		
699	150.4	736.6	564.8	3300	70	165	158	.94	5.0	8.0	15.2
700	156.8	763.0	582.4	5290	811	151	155	.88	4.0	8.0	13.8
701	157.3	733.6	561.7	3870	789	158	148	.88	5.0	8.1	12.3
702	156.6	746.7	573.9	6990	400	183	143	.80	5.0	8.3	12.1
703	155.3	711.5	549.9	3590	641	175	142	.79	4.0	8.5	12.0
704	150.9	754.0	576.5	4330	985	160	162	.65	4.0		
705	159.6	788.2	599.2	6670	763	153	152	.53	4.0		
706	158.6	733.1	565.5	3320	915	144	151	1.12	5.0		
707	158.9	735.3	566.2	4560	603	165	141	.51	4.0		
708	155.8	709.6	551.4	3080	784	148	150	1.40	5.0		
709	161.4	748.5	574.6	4060	918	141	159	.49	5.0	9.0	14.3
710	161.8	742.9	571.5	3950	875	140	158	.57	5.0	10.0	14.6
711	162.5	722.4	558.9	3390	802	139	153	.66	5.0	9.7	14.6
712	166.8	721.8	557.5	3890	632	154	139	1.63	5.0	8.7	14.3
713	162.3	697.6	542.8	2970	696	151	149	.25	4.0	8.0	14.2
714	158.0	732.7	564.2	3310	997	146	163	.60	5.0	11.2	16.6
715	163.0	716.6	552.6	2650	985	141	154	.78	5.0	10.9	16.6
716	161.7	712.6	551.9	4070	552	163	144	.54	4.0	10.7	16.6
717	151.7	675.3	526.2	2280	845	178	154	.95	4.0	11.9	20.3
718	152.7	655.0	513.1	2010	738	201	146	1.73	4.0	11.9	20.3
719	153.2	639.3	500.3	2090	565	215	138	.97	4.0	11.9	20.3
720	150.1	661.2	515.7	3210	465	212	146	.67	4.0	10.9	15.3
721	149.5	641.2	502.5	2970	404	219	142	.95	5.0	9.8	15.1
722	146.9	571.1	455.2	1090	689	218	148	.58	4.0	9.0	14.9
723	137.0	539.1	432.7	837	870	251	162	.62	4.0	8.5	14.8
724	142.8	524.3	421.7	680	999	227	162	1.24	4.0	8.5	14.8
725	143.6	512.2	413.9	601	50	229	157	.55	4.0	8.5	14.8

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
726	134.9	571.5	451.8	1110	808	280	157	1.03	4.0	8.0	15.4
727	134.7	567.7	451.3	1100	815	247	162	.18	4.0	8.0	15.4
728	139.6	528.9	426.3	694	30	234	159	.18	4.0	8.0	15.4
729	142.0	518.9	418.1	620	60	241	155	.47	4.0	8.0	15.4
730	144.0	516.0	412.9	608	50	245	151	1.22	4.0	8.0	15.4
731	137.3	602.0	480.1	1230	130	188	181	.78	4.0	9.6	15.4
732	139.3	607.5	480.0	1730	667	225	162	.28	4.0	9.6	15.4
733	142.5	566.3	451.7	1090	725	238	156	.68	4.0	9.6	15.4
734	143.8	543.7	435.8	837	830	228	157	.31	4.0	9.6	15.4
735	144.4	529.2	425.1	739	840	234	154	.57	4.0	9.6	15.4
736	161.7	760.1	585.2	6600	616	149	160	.64	4.0		
737	163.7	779.7	598.3	7750	543	161	147	.93	5.0		
738	163.5	725.9	563.8	5020	529	151	156	.36	4.0		
739	161.3	700.5	547.7	4120	512	154	155	.32	4.0		
740	161.1	711.0	555.8	4360	565	144	160	.31	4.0		
741	158.5	809.5	616.6	11500	434	161	157	.31	8.0	8.0	14.9
742	164.9	791.8	608.5	9310	467	139	155	.58	7.0	8.0	13.0
743	166.2	773.9	598.3	9090	328	150	150	.43	7.0	8.2	12.2
744	164.5	771.8	604.2	10600	184	181	139	1.68	12.0	8.5	12.0
745	163.9	755.8	586.0	6740	475	137	152	.67	5.0	8.5	12.0
746	161.6	827.3	628.3	12900	488	145	159	.62	9.0		
747	165.7	802.1	613.1	9260	547	130	154	.52	7.0		
748	165.2	770.0	593.9	7510	463	135	149	.50	6.0		
749	165.6	750.3	581.5	6230	481	135	150	.50	4.0		
750	167.4	745.4	577.8	5460	515	134	147	.59	3.0		
751	167.8	793.2	607.7	8400	637	126	162	.92	7.0	9.3	14.4
752	169.8	787.5	603.4	8790	489	138	153	.55	7.0	10.6	14.8
753	170.6	758.1	584.9	6420	524	133	154	.23	4.0	9.4	14.5
754	171.4	744.0	574.6	6080	436	145	147	.62	4.0	8.1	14.2
755	169.1	745.5	576.3	5670	528	138	151	.29	3.0	8.0	14.2
756	166.9	803.0	611.2	10500	468	146	155	.69	8.0	11.1	16.6
757	170.0	782.3	600.9	7770	550	128	156	.25	6.0	10.8	16.6
758	168.4	737.5	572.4	5350	512	135	151	.28	4.0	10.7	16.6
759	157.0	750.7	577.8	6210	569	164	157	.20	3.0	11.9	20.3
760	159.0	711.6	554.6	3890	669	150	159	.59	4.0	11.9	20.3
761	158.0	704.8	544.9	4010	511	191	142	.75	4.0	11.9	20.3
762	153.8	659.8	517.2	2250	686	183	147	1.06	4.0	10.6	15.3
763	152.5	675.4	526.7	3360	485	202	142	.31	4.0	9.5	15.0
764	151.4	674.7	525.1	2860	615	196	147	.23	4.0	8.5	14.8
765	139.2	649.2	507.0	2300	847	229	173	.57	4.0	8.5	14.8
766	146.3	621.8	489.3	1430	948	211	161	.67	4.0	8.5	14.8
767	149.2	579.3	462.7	847	190	202	156	1.10	4.0	8.5	14.8
768	149.6	566.9	453.8	739	330	194	158	.80	4.0	8.5	14.8
769	150.3	582.0	463.9	769	510	186	160	.84	4.0	8.5	14.8
770	137.7	644.6	502.5	2140	748	232	160	1.01	4.0	8.0	15.4
771	138.6	622.7	493.4	1560	940	206	165	1.93	4.0	8.0	15.4
772	145.8	588.8	467.8	928	150	204	155	1.07	4.0	8.0	15.4
773	146.6	577.2	464.0	793	370	186	161	1.29	4.0	8.0	15.4
774	147.1	587.3	467.4	896	200	198	158	.87	4.0	8.0	15.4
775	142.9	665.7	520.7	2910	634	205	163	1.01	4.0	9.6	15.4
776	145.9	642.4	504.6	2350	639	191	167	1.44	4.0	9.6	15.4
777	151.4	622.3	492.5	1520	790	185	158	.76	4.0	9.6	15.4
778	153.1	609.0	482.8	1200	918	178	159	.68	4.0	9.6	15.4
779	151.8	599.3	473.9	1220	793	194	155	1.30	4.0	9.6	15.4
780	155.7	733.7	571.1	7670	309	201	152	.42	6.0		

	13	14	15	16	17	18	19	20	21	22	23
	OUT3_	T_U_A	U_ARE	E1_MPA	E2_MPA	E3_MPA	E4_MPA	RMS	ITR	VM1	VM2
781	154.9	726.8	565.4	7380	263	212	146	.17	6.0		
782	154.8	695.9	547.5	5680	267	202	143	.46	4.0		
783	152.0	672.4	531.6	4820	258	202	146	.45	3.0		
784	154.7	682.0	537.2	5100	252	206	141	.21	2.0		
785	153.7	766.0	590.9	9260	332	183	149	.97	8.0	8.0	14.8
786	159.8	752.1	583.1	7840	313	180	142	.60	7.0	8.0	13.0
787	159.5	725.5	566.9	6520	285	179	139	.92	6.0	8.2	12.2
788	159.2	708.6	555.3	5780	267	181	138	.70	5.0	8.5	12.0
789	154.0	710.9	557.8	6280	245	199	140	.77	6.0	8.5	12.0
790	157.0	793.9	607.6	14800	71	453	135	.61	15.0		
791	162.4	759.7	586.8	9330	202	203	138	.22	8.0		
792	161.2	727.9	567.8	6810	250	179	138	.38	6.0		
793	160.3	710.6	557.1	6110	241	181	137	.30	5.0		
794	161.0	705.8	551.0	6400	166	221	132	1.84	8.0		
795	161.7	766.1	590.1	11100	127	268	135	.72	13.0	9.3	14.4
796	163.6	771.6	592.7	13200	40	170	119	2.02	15.0	10.7	14.8
797	162.4	719.5	560.5	7570	138	245	133	1.28	10.0	9.4	14.5
798	161.1	719.7	561.0	8740	68	430	126	1.91	15.0	8.0	14.2
799	159.8	700.7	552.5	5380	310	172	144	.98	3.0	8.0	14.2
800	164.1	778.2	595.0	11300	117	315	126	.72	12.0	11.1	16.6
801	163.4	752.8	582.7	9920	99	301	130	1.07	11.0	10.8	16.6
802	160.7	708.4	554.9	7760	81	338	127	1.54	13.0	10.7	16.6
803	152.5	723.5	561.8	6550	320	205	144	.33	5.0	11.9	20.3
804	152.7	689.7	541.8	4580	382	182	148	.52	4.0	11.9	20.3
805	151.0	673.1	530.0	4220	347	200	142	1.33	4.0	11.9	20.3
806	150.3	682.1	531.5	4880	300	221	140	.86	3.0	10.4	15.2
807	151.5	648.8	508.0	2530	515	197	143	.48	4.0	9.5	15.0
808	149.6	672.1	524.5	3380	482	202	145	.43	4.0	8.5	14.8
809	138.9	655.4	509.5	2960	610	246	162	.50	4.0	8.5	14.8
810	142.1	618.5	488.4	1560	813	199	162	.34	4.0	8.5	14.8
811	147.2	594.6	472.4	981	70	201	151	1.15	4.0	8.5	14.8
812	147.4	592.5	469.6	960	90	197	154	.73	4.0	8.5	14.8
813	146.2	596.7	473.3	833	580	179	160	1.07	4.0	8.5	14.8
814	135.5	655.1	510.2	2650	647	239	156	.60	4.0	8.0	15.4
815	139.3	644.6	503.5	2380	629	226	155	.39	4.0	8.0	15.4
816	145.1	605.6	476.9	1260	862	201	153	.38	4.0	8.0	15.4
817	145.7	606.1	477.2	1190	900	208	151	.57	4.0	8.0	15.4
818	139.7	668.4	522.1	3710	498	218	160	.35	4.0	9.6	15.4
819	139.2	643.3	506.1	3290	421	229	158	.53	4.0	9.6	15.4
820	145.4	618.5	492.0	1980	574	193	158	.44	4.0	9.6	15.4
821	144.9	599.7	478.0	1550	607	211	153	1.29	4.0	9.6	15.4
822	148.4	598.2	475.7	1180	852	183	159	.52	4.0	9.6	15.4
823	138.3	731.1	565.2	5750	690	194	173	1.05	4.0		
824	140.3	721.4	557.8	5150	655	192	167	.81	4.0		
825	140.3	711.4	551.1	5010	595	198	165	.72	4.0		
826	138.8	680.6	531.9	3460	661	189	164	1.04	4.0		
827	137.3	686.0	535.6	3880	624	193	169	.24	4.0		
828	143.4	787.2	602.6	14500	116	353	146	.84	15.0	8.0	15.2
829	146.9	767.3	592.5	10800	251	221	152	1.00	10.0	8.0	13.4
830	145.4	752.0	581.6	9330	294	210	151	1.52	8.0	8.1	12.3
831	145.4	728.2	565.2	7140	320	208	148	.72	6.0	8.3	12.1
832	143.7	730.5	567.2	7650	316	199	154	.74	6.0	8.5	12.0
833	161.9	817.2	621.8	14100	219	206	140	.63	12.0		
834	158.8	783.6	605.0	11300	254	185	148	1.27	10.0		
835	153.5	758.8	585.0	8410	353	181	148	.87	7.0		

	13 OUT3	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
836	152.4	731.8	568.7	6290	425	163	152	.91	4.0		
837	151.7	725.7	564.9	5570	483	162	153	1.16	3.0		
838	174.4	759.5	587.0	7240	389	150	141	1.13	6.0	9.1	14.4
839	170.1	731.4	571.6	6030	418	140	149	1.86	4.0	10.1	14.6
840	162.8	705.6	552.5	5030	391	154	148	.80	3.0	9.7	14.6
841	150.2	749.1	581.7	7290	596	147	181	1.09	5.0		
842	139.7	742.3	577.4	8980	398	191	178	1.01	7.0		
843	157.5	714.5	557.0	6160	316	180	146	.85	5.0	8.4	14.3
844	159.2	651.5	518.3	3110	400	159	147	1.21	5.0	8.0	14.2
845	208.7	777.7	600.3	6100	507	93	138	.76	4.0	11.2	16.6
846	159.4	735.9	576.1	8260	244	177	153	.84	9.0	10.9	16.6
847	157.9	649.5	518.0	3260	360	154	148	1.41	5.0	10.7	16.6
848	149.1	644.2	514.6	3160	443	156	166	1.23	5.0	11.9	20.3
849	144.8	680.5	537.7	5770	270	202	160	.58	5.0	11.9	20.3
850	144.3	635.5	508.5	3750	307	183	163	.35	5.0	11.9	20.3
851	137.4	582.3	472.7	2150	382	190	162	2.13	5.0	10.9	15.3
852	142.9	532.2	435.4	1170	393	192	155	.67	4.0	9.8	15.1
853	140.8	587.5	472.3	2340	333	203	159	.57	5.0	9.0	14.9
854	125.0	573.5	461.3	2590	335	239	179	1.26	5.0	8.5	14.8
855	126.2	523.3	427.9	1390	399	220	181	.78	5.0	8.5	14.8
856	128.7	479.1	396.6	781	467	223	172	1.13	4.0	8.5	14.8
857	128.2	502.4	414.0	924	528	218	179	1.36	4.0	8.5	14.8
858	123.0	545.7	442.5	1800	396	228	181	1.21	5.0	8.0	15.4
859	124.3	586.5	468.3	3020	287	268	168	1.17	5.0	8.0	15.4
860	127.0	512.7	419.4	1140	432	228	170	1.18	4.0	8.0	15.4
861	127.3	540.7	437.7	1190	562	222	174	.96	4.0	8.0	15.4
862	127.3	503.2	411.8	890	554	218	178	1.05	4.0	8.0	15.4
863	122.9	617.5	494.4	4300	266	251	180	.66	5.0	9.6	15.4
864	125.4	604.8	484.5	3350	337	227	181	.81	5.0	9.6	15.4
865	127.5	579.2	466.3	2380	359	245	165	1.50	5.0	9.6	15.4
866	128.4	543.6	442.7	1390	478	217	176	1.06	4.0	9.6	15.4
867	127.3	519.9	427.7	1190	466	212	179	1.15	4.0	9.6	15.4
868	141.2	737.8	573.6	8960	306	216	166	.40	7.0		
869	137.9	698.8	549.3	5890	432	185	174	1.02	3.0		
870	136.9	696.3	546.9	5710	419	189	171	.91	3.0		
871	137.4	701.9	551.9	6260	382	196	168	1.13	4.0		
872	163.9	815.6	619.7	12400	323	177	140	.73	10.0	8.0	14.8
873	149.9	759.4	589.9	8790	446	141	182	.90	7.0	8.0	13.0
874	146.7	731.0	570.4	6940	401	163	162	.72	5.0	8.2	12.2
875	143.5	721.9	562.2	7110	310	193	155	.49	6.0	8.5	12.0
876	142.9	730.9	568.7	8230	261	204	154	.82	8.0	8.5	12.0
877	159.1	829.6	625.8	12400	464	186	146	.23	8.0		
878	159.1	771.4	594.4	8500	446	149	154	1.10	7.0		
879	147.5	728.2	567.7	6270	443	161	160	.65	4.0		
880	145.7	718.5	561.8	6280	390	169	156	1.21	4.0		
881	145.9	712.5	559.5	5620	440	160	161	1.29	3.0		
882	149.2	761.3	587.3	9350	338	195	156	.39	7.0	10.7	14.8
883	148.1	711.9	556.6	5950	423	163	163	1.33	4.0	9.4	14.5
884	146.0	714.9	558.4	6310	390	180	161	.70	4.0	8.0	14.2
885	146.7	715.5	558.5	5950	432	172	162	.69	3.0	8.0	14.2
886	162.3	780.9	597.4	8160	543	155	152	.89	6.0	11.1	16.6
887	147.3	742.8	576.6	8320	331	184	157	.90	8.0	10.8	16.6
888	146.0	709.2	554.8	6370	321	187	155	.56	5.0	10.7	16.6
889	140.7	712.8	556.5	7010	338	200	166	.57	6.0	11.9	20.3
890	141.7	686.0	541.8	5020	410	180	166	.93	3.0	11.9	20.3

	13 OUT3_	14 T_U_A	15 U_ARE	16 E1_MPA	17 E2_MPA	18 E3_MPA	19 E4_MPA	20 RMS	21 ITR	22 VM1	23 VM2
891	138.5	657.9	520.1	4430	339	202	161	1.12	4.0	11.9	20.3
892	138.2	632.7	502.8	2940	459	190	164	1.37	5.0	10.3	15.2
893	138.1	630.7	501.7	3430	358	201	161	1.01	5.0	9.2	15.0
894	136.6	650.8	513.4	4010	357	219	161	.43	4.0	8.5	14.8
895	125.8	637.0	506.8	5490	242	273	187	1.45	4.0	8.5	14.8
896	127.1	610.1	488.5	3470	329	226	177	.91	5.0	8.5	14.8
897	128.8	575.0	463.8	1850	493	214	177	.46	4.0	8.5	14.8
898	128.5	556.6	450.2	1230	524	201	152	.76	4.0	8.5	14.8
899	128.5	572.3	460.4	1380	690	203	181	.49	4.0	8.5	14.8
900	122.1	603.5	483.4	3330	355	239	184	.58	5.0	8.0	15.4
901	124.9	589.8	473.9	2720	375	228	182	.60	5.0	8.0	15.4
902	127.7	574.4	460.6	2180	387	229	175	1.15	5.0	8.0	15.4
903	127.1	558.7	451.7	1590	504	224	173	1.39	4.0	8.0	15.4
904	127.5	581.4	465.9	1980	490	223	172	1.14	4.0	8.0	15.4
905	125.8	630.8	503.5	4740	260	247	179	.67	4.0	9.6	15.4
906	127.3	617.9	494.8	4510	228	248	179	1.56	5.0	9.6	15.4
907	128.7	584.0	470.4	2490	382	216	179	.62	5.0	9.6	15.4
908	129.1	564.9	453.8	1740	487	207	180	1.34	5.0	9.6	15.4
909	129.0	572.6	462.4	1970	449	210	179	.44	4.0	9.6	15.4
910	159.8	780.0	596.1	10100	334	186	146	.98	9.0	9.3	14.4

data file: 48SA.STA [910 cases with 50 variables]

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
1													
2													
3													
4													
5	22.8	22.1	23.4	16.6	15.4	15.4	16.0	15.4	18.1	3.7	9.2	13.2	12.8
6	22.5	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.8	3.7	8.2	13.1	12.7
7	22.1	21.5	24.0	16.6	16.0	15.4	15.4	15.4	17.4	3.7	7.1	12.8	12.5
8	22.5	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
9	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
10													
11													
12													
13													
14													
15	20.9	20.3	20.9	18.5	19.7	16.0	16.0	14.8	17.2	4.0	8.3	12.1	11.8
16	20.9	20.3	20.5	18.1	19.0	16.4	15.6	16.6	17.4	4.6	8.5	12.1	11.8
17	20.8	20.3	20.3	18.1	18.6	16.5	15.4	17.2	17.4	4.7	8.5	12.1	11.8
18	20.5	20.3	20.3	18.7	18.9	16.2	15.4	15.8	17.2	4.2	8.4	11.9	11.8
19	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
20	25.2	24.0	24.0	19.1	19.1	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
21	25.2	23.7	23.7	19.1	19.7	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
22	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
23	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
24	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
25	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
26	20.9	20.3	20.3	17.2	20.3	20.3	17.8	16.0	17.6	5.3	8.9	12.1	11.8
27	20.9	20.3	20.3	17.4	20.3	19.8	17.1	16.0	17.4	4.8	8.8	12.1	11.8
28	20.9	20.3	20.3	17.7	20.3	19.4	16.4	16.0	17.2	4.3	8.7	12.1	11.8
29	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
30	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
31	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
32	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
33	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
34	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
35	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
36	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
37	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
38	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
39	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
40	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
41	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
42	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
43	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
44	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
45													
46													
47													
48													
49													
50	22.7	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.8	13.2	12.8

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
51	22.3	21.7	23.8	16.6	15.8	15.4	15.6	15.4	17.6	3.7	7.8	13.0	12.6
52	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
53	22.7	22.0	24.0	16.6	16.5	15.9	15.4	15.4	17.6	3.9	7.0	13.2	12.8
54	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
55													
56													
57													
58													
59													
60	20.9	20.3	20.7	18.3	19.4	16.2	15.8	15.6	17.3	4.2	8.4	12.1	11.8
61	20.9	20.3	20.4	17.9	18.7	16.5	15.5	17.4	17.4	4.9	8.5	12.1	11.8
62	20.7	20.3	20.3	18.3	18.7	16.4	15.4	16.6	17.3	4.5	8.5	12.0	11.8
63	20.4	20.3	20.3	18.9	19.0	16.1	15.4	15.1	17.1	3.9	8.3	11.9	11.8
64	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
65	25.2	23.9	23.9	19.1	19.2	17.2	16.0	14.8	20.0	5.2	9.6	14.6	13.9
66	25.2	23.6	23.6	19.1	19.8	17.2	16.0	14.8	19.8	5.1	9.6	14.6	13.7
67	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
68	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
69	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
70	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
71	20.9	20.3	20.3	17.3	20.3	20.1	17.5	16.0	17.5	5.0	8.9	12.1	11.8
72	20.9	20.3	20.3	17.5	20.3	19.6	16.8	16.0	17.3	4.5	8.8	12.1	11.8
73	20.9	20.3	20.3	17.7	20.3	19.3	16.3	16.0	17.2	4.2	8.7	12.1	11.8
74	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
75	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
76	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
77	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
78	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
79	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
80	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
81	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
82	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
83	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
84	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
85	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
86	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
87	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
88													
89													
90													
91													
92	22.8	22.1	23.4	16.6	15.4	15.4	16.0	15.4	18.1	3.7	9.2	13.2	12.8
93	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.8	3.7	8.1	13.0	12.7
94	22.1	21.5	24.0	16.6	16.0	15.4	15.4	15.4	17.4	3.7	7.1	12.8	12.5
95	22.5	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
96	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
97													
98													
99													
100													
101													
102	20.9	20.3	20.9	18.5	19.7	16.0	16.0	14.8	17.2	4.0	8.3	12.1	11.8
103	20.9	20.3	20.5	18.1	19.0	16.4	15.6	16.7	17.4	4.6	8.5	12.1	11.8
104	20.8	20.3	20.3	18.1	18.6	16.5	15.4	17.1	17.4	4.7	8.5	12.1	11.8
105	20.5	20.3	20.3	18.7	18.9	16.2	15.4	15.7	17.2	4.1	8.4	11.9	11.8

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
106	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
107	25.2	24.0	24.0	19.1	19.1	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
108	25.2	23.7	23.7	19.1	19.7	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
109	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
110	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
111	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
112	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
113	20.9	20.3	20.3	17.2	20.3	20.3	17.8	16.0	17.6	5.3	8.9	12.1	11.8
114	20.9	20.3	20.3	17.4	20.3	19.8	17.1	16.0	17.4	4.8	8.8	12.1	11.8
115	20.9	20.3	20.3	17.7	20.3	19.4	16.4	16.0	17.2	4.3	8.7	12.1	11.8
116	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
117	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
118	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
119	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
120	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
121	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
122	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
123	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
124	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
125	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
126	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
127	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
128	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
129	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
130	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
131	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
132													
133													
134													
135													
136													
137	22.7	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.8	13.2	12.8
138	22.3	21.7	23.8	16.6	15.8	15.4	15.6	15.4	17.6	3.7	7.7	13.0	12.6
139	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
140	22.7	22.0	24.0	16.6	16.5	15.9	15.4	15.4	17.6	3.9	7.0	13.2	12.8
141	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
142													
143													
144													
145													
146													
147	20.9	20.3	20.7	18.3	19.4	16.2	15.8	15.7	17.3	4.2	8.4	12.1	11.8
148	20.9	20.3	20.4	17.9	18.6	16.5	15.5	17.5	17.5	4.9	8.5	12.1	11.8
149	20.7	20.3	20.3	18.3	18.7	16.4	15.4	16.6	17.3	4.5	8.5	12.0	11.8
150	20.4	20.3	20.3	19.0	19.0	16.1	15.4	15.1	17.1	3.9	8.3	11.9	11.8
151	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
152	25.2	23.9	23.9	19.1	19.3	17.2	16.0	14.8	20.0	5.2	9.6	14.6	13.9
153	25.2	23.6	23.6	19.1	19.9	17.2	16.0	14.8	19.8	5.1	9.6	14.6	13.7
154	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
155	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
156	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
157	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
158	20.9	20.3	20.3	17.3	20.3	20.1	17.5	16.0	17.5	5.0	8.9	12.1	11.8
159	20.9	20.3	20.3	17.5	20.3	19.6	16.8	16.0	17.3	4.5	8.8	12.1	11.8
160	20.9	20.3	20.3	17.7	20.3	19.3	16.3	16.0	17.2	4.2	8.7	12.1	11.8

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
161	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
162	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
163	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
164	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
165	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
166	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
167	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
168	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
169	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
170	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
171	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
172	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
173	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
174	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
175	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
176													
177													
178													
179													
180	22.8	22.1	23.4	16.6	15.4	15.4	16.0	15.4	18.1	3.7	9.1	13.2	12.8
181	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.8	3.7	8.1	13.0	12.7
182	22.1	21.5	24.0	16.6	16.0	15.4	15.4	15.4	17.4	3.7	7.1	12.8	12.5
183	22.5	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
184	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
185													
186													
187													
188													
189													
190	20.9	20.3	20.9	18.5	19.7	16.0	16.0	14.9	17.2	4.0	8.3	12.1	11.8
191	20.9	20.3	20.5	18.1	18.9	16.4	15.6	16.7	17.4	4.6	8.5	12.1	11.8
192	20.8	20.3	20.3	18.1	18.6	16.5	15.4	17.1	17.4	4.7	8.5	12.1	11.8
193	20.5	20.3	20.3	18.7	18.9	16.2	15.4	15.7	17.2	4.1	8.4	11.9	11.8
194	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
195	25.2	24.0	24.0	19.1	19.1	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
196	25.2	23.7	23.7	19.1	19.7	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
197	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
198	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
199	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
200	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
201	20.9	20.3	20.3	17.2	20.3	20.3	17.8	16.0	17.6	5.3	8.9	12.1	11.8
202	20.9	20.3	20.3	17.4	20.3	19.8	17.1	16.0	17.4	4.8	8.8	12.1	11.8
203	20.9	20.3	20.3	17.7	20.3	19.4	16.4	16.0	17.2	4.2	8.7	12.1	11.8
204	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
205	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
206	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
207	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
208	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
209	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
210	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
211	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
212	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
213	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
214	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
215	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
216	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
217	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
218	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
219	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
220													
221													
222													
223													
224													
225	22.7	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.8	13.2	12.8
226	22.3	21.7	23.8	16.6	15.8	15.4	15.6	15.4	17.6	3.7	7.7	13.0	12.6
227	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
228	22.7	22.0	24.0	16.6	16.5	15.9	15.4	15.4	17.6	3.9	7.0	13.2	12.8
229	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
230													
231													
232													
233													
234													
235	20.9	20.3	20.7	18.3	19.3	16.2	15.8	15.7	17.3	4.3	8.4	12.1	11.8
236	20.9	20.3	20.4	17.9	18.6	16.5	15.5	17.5	17.5	4.9	8.5	12.1	11.8
237	20.7	20.3	20.3	18.3	18.7	16.4	15.4	16.6	17.3	4.5	8.5	12.0	11.8
238	20.4	20.3	20.3	19.0	19.0	16.1	15.4	15.1	17.1	3.9	8.3	11.9	11.8
239	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
240	25.2	23.9	23.9	19.1	19.4	17.2	16.0	14.8	20.0	5.2	9.6	14.6	13.9
241	25.2	23.6	23.6	19.1	19.9	17.2	16.0	14.8	19.8	5.1	9.6	14.6	13.7
242	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
243	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
244	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
245	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
246	20.9	20.3	20.3	17.3	20.3	20.1	17.5	16.0	17.5	5.0	8.9	12.1	11.8
247	20.9	20.3	20.3	17.5	20.3	19.6	16.8	16.0	17.3	4.5	8.8	12.1	11.8
248	20.9	20.3	20.3	17.8	20.3	19.2	16.1	16.0	17.1	4.1	8.6	12.1	11.8
249	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
250	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
251	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
252	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
253	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
254	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
255	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
256	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
257	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
258	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
259	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
260	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
261	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
262	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
263	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
264													
265													
266													
267													
268													
269	22.8	22.1	23.4	16.6	15.4	15.4	16.0	15.4	18.1	3.7	9.1	13.2	12.8
270	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.8	3.7	8.1	13.0	12.7

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
271	22.1	21.5	24.0	16.6	16.0	15.4	15.4	15.4	17.4	3.7	7.1	12.8	12.5
272	22.5	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
273	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
274													
275													
276													
277													
278	20.9	20.3	20.9	18.5	19.6	16.0	16.0	14.9	17.2	4.0	8.3	12.1	11.8
279	20.9	20.3	20.5	18.1	18.9	16.4	15.6	16.7	17.4	4.6	8.5	12.1	11.8
280	20.8	20.3	20.3	18.1	18.6	16.5	15.4	17.1	17.4	4.7	8.5	12.1	11.8
281	20.5	20.3	20.3	18.7	18.9	16.2	15.4	15.7	17.2	4.1	8.4	11.9	11.8
282	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
283	25.2	24.0	24.0	19.1	19.1	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
284	25.2	23.7	23.7	19.1	19.7	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
285	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
286	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
287	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
288	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
289	20.9	20.3	20.3	17.2	20.3	20.3	17.8	16.0	17.6	5.2	8.9	12.1	11.8
290	20.9	20.3	20.3	17.4	20.3	19.8	17.1	16.0	17.4	4.7	8.8	12.1	11.8
291	20.9	20.3	20.3	17.7	20.3	19.4	16.4	16.0	17.2	4.2	8.7	12.1	11.8
292	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
293	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
294	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
295	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
296	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
297	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
298	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
299	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
300	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
301	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
302	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
303	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
304	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
305	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
306	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
307													
308													
309													
310													
311													
312	22.6	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.7	13.1	12.8
313	22.3	21.7	23.8	16.6	15.8	15.4	15.6	15.4	17.6	3.7	7.7	13.0	12.6
314	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
315	22.7	22.0	24.0	16.6	16.5	15.9	15.4	15.4	17.6	3.9	7.0	13.2	12.8
316	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
317													
318													
319													
320													
321													
322	20.9	20.3	20.7	18.3	19.3	16.2	15.8	15.7	17.3	4.3	8.4	12.1	11.8
323	20.9	20.3	20.4	17.9	18.6	16.5	15.5	17.5	17.5	4.9	8.5	12.1	11.8
324	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.5	17.3	4.5	8.4	12.0	11.8
325	20.4	20.3	20.3	19.0	19.0	16.1	15.4	15.1	17.1	3.8	8.3	11.9	11.8

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
326	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
327	25.2	23.8	23.8	19.1	19.4	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
328	25.2	23.6	23.6	19.1	20.0	17.2	16.0	14.8	19.8	5.1	9.6	14.6	13.7
329	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
330	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
331	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
332	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
333	20.9	20.3	20.3	17.3	20.3	20.1	17.4	16.0	17.5	5.0	8.9	12.1	11.8
334	20.9	20.3	20.3	17.6	20.3	19.6	16.7	16.0	17.3	4.5	8.7	12.1	11.8
335	20.9	20.3	20.3	17.8	20.3	19.2	16.1	16.0	17.1	4.1	8.6	12.1	11.8
336	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
337	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
338	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
339	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
340	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
341	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
342	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
343	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
344	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
345	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
346	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
347	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
348	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
349	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
350	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
351													
352													
353													
354													
355	22.8	22.1	23.4	16.6	15.4	15.4	16.0	15.4	18.1	3.7	9.1	13.2	12.8
356	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.7	3.7	8.1	13.0	12.7
357	22.1	21.5	24.0	16.6	16.0	15.4	15.4	15.4	17.4	3.7	7.1	12.8	12.5
358	22.5	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
359	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
360													
361													
362													
363													
364													
365	20.9	20.3	20.9	18.5	19.6	16.0	16.0	15.0	17.2	4.0	8.3	12.1	11.8
366	20.9	20.3	20.5	18.0	18.9	16.4	15.6	16.8	17.4	4.6	8.5	12.1	11.8
367	20.8	20.3	20.3	18.1	18.6	16.5	15.4	17.1	17.4	4.7	8.5	12.1	11.8
368	20.5	20.3	20.3	18.7	18.9	16.2	15.4	15.7	17.2	4.1	8.4	11.9	11.8
369	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
370	25.2	24.0	24.0	19.1	19.2	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
371	25.2	23.7	23.7	19.1	19.8	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
372	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
373	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
374	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
375	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
376	20.9	20.3	20.3	17.2	20.3	20.3	17.8	16.0	17.6	5.2	8.9	12.1	11.8
377	20.9	20.3	20.3	17.5	20.3	19.8	17.0	16.0	17.4	4.7	8.8	12.1	11.8
378	20.9	20.3	20.3	17.7	20.3	19.4	16.4	16.0	17.2	4.2	8.7	12.1	11.8
379	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
380	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
381	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
382	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
383	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
384	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
385	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
386	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
387	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
388	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
389	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
390	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
391	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
392	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
393													
394													
395													
396													
397													
398	22.6	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.7	13.1	12.8
399	22.3	21.7	23.8	16.6	15.8	15.4	15.6	15.4	17.6	3.7	7.7	13.0	12.6
400	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
401	22.7	22.0	24.0	16.6	16.5	15.9	15.4	15.4	17.6	4.0	7.0	13.2	12.8
402	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
403													
404													
405													
406													
407													
408	20.9	20.3	20.7	18.3	19.3	16.2	15.8	15.7	17.3	4.3	8.4	12.1	11.8
409	20.9	20.3	20.3	17.9	18.6	16.6	15.4	17.6	17.5	4.9	8.6	12.1	11.8
410	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.5	17.3	4.4	8.4	12.0	11.8
411	20.3	20.3	20.3	19.0	19.1	16.0	15.4	15.0	17.1	3.8	8.3	11.8	11.8
412	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
413	25.2	23.8	23.8	19.1	19.4	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
414	25.2	23.5	23.5	19.1	20.0	17.2	16.0	14.8	19.8	5.0	9.6	14.6	13.7
415	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
416	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
417	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
418	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
419	20.9	20.3	20.3	17.3	20.3	20.1	17.4	16.0	17.5	5.0	8.9	12.1	11.8
420	20.9	20.3	20.3	17.6	20.3	19.6	16.7	16.0	17.3	4.5	8.7	12.1	11.8
421	20.9	20.3	20.3	17.8	20.3	19.2	16.1	16.0	17.1	4.0	8.6	12.1	11.8
422	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
423	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
424	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
425	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
426	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
427	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
428	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
429	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
430	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
431	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
432	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
433	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
434	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
435	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0

data file: 48SA.STA [910 cases with 50 variables]

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
436	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
437													
438													
439													
440													
441	22.8	22.1	23.4	16.6	15.4	15.4	16.0	15.4	18.1	3.7	9.1	13.2	12.8
442	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.7	3.7	8.1	13.0	12.7
443	22.2	21.5	24.0	16.6	16.0	15.4	15.4	15.4	17.4	3.7	7.1	12.9	12.5
444	22.6	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
445	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
446													
447													
448													
449													
450													
451	20.9	20.3	20.9	18.5	19.6	16.0	16.0	15.0	17.2	4.0	8.3	12.1	11.8
452	20.9	20.3	20.5	18.0	18.9	16.4	15.6	16.8	17.4	4.7	8.5	12.1	11.8
453	20.7	20.3	20.3	18.1	18.7	16.4	15.4	17.0	17.3	4.7	8.5	12.0	11.8
454	20.5	20.3	20.3	18.7	18.9	16.2	15.4	15.7	17.2	4.1	8.4	11.9	11.8
455	25.2	24.0	24.0	19.1	19.2	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
456	25.2	23.7	23.7	19.1	19.8	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
457	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
458	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
459	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
460	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
461	20.9	20.3	20.3	17.2	20.3	20.3	17.7	16.0	17.6	5.2	8.9	12.1	11.8
462	20.9	20.3	20.3	17.5	20.3	19.8	17.0	16.0	17.4	4.7	8.8	12.1	11.8
463	20.9	20.3	20.3	17.7	20.3	19.4	16.4	16.0	17.2	4.2	8.7	12.1	11.8
464	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
465	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
466	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
467	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
468	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
469	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
470	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
471	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
472	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
473	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
474	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
475	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
476	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
477	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
478													
479													
480													
481													
482													
483	22.6	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.7	13.1	12.8
484	22.3	21.6	23.9	16.6	15.9	15.4	15.5	15.4	17.6	3.7	7.6	13.0	12.5
485	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
486	22.7	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
487	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
488													
489													
490													
491													
492													
493	20.9	20.3	20.7	18.3	19.3	16.2	15.8	15.8	17.3	4.3	8.4	12.1	11.8
494	20.9	20.3	20.3	17.8	18.6	16.6	15.4	17.6	17.4	4.9	8.6	12.1	11.8
495	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.5	17.3	4.4	8.4	12.0	11.8
496	20.3	20.3	20.3	19.0	19.1	16.0	15.4	15.0	17.1	3.8	8.3	11.8	11.8
497	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
498	25.2	23.8	23.8	19.1	19.4	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
499	25.2	23.5	23.5	19.1	20.0	17.2	16.0	14.8	19.8	5.0	9.6	14.6	13.7
500	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
501	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
502	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
503	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
504	20.9	20.3	20.3	17.3	20.3	20.0	17.4	16.0	17.5	5.0	8.9	12.1	11.8
505	20.9	20.3	20.3	17.6	20.3	19.6	16.7	16.0	17.3	4.5	8.7	12.1	11.8
506	20.9	20.3	20.3	17.8	20.3	19.1	16.1	16.0	17.1	4.0	8.6	12.1	11.8
507	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
508	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
509	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
510	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
511	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
512	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
513	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
514	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
515	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
516	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
517	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
518	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
519	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
520	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
521	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
522	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
523													
524													

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
525													
526													
527	22.8	22.1	23.4	16.6	15.4	15.4	16.0	15.4	18.1	3.7	9.1	13.2	12.8
528	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.7	3.7	8.1	13.0	12.7
529	22.2	21.6	24.0	16.6	16.1	15.5	15.4	15.4	17.5	3.7	7.1	12.9	12.5
530	22.6	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
531	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
532													
533													
534													
535													
536													
537	20.9	20.3	20.8	18.3	19.4	16.1	15.9	15.4	17.3	4.2	8.3	12.1	11.8
538	20.9	20.3	20.5	18.0	18.9	16.4	15.6	16.8	17.4	4.7	8.5	12.1	11.8
539	20.7	20.3	20.3	18.1	18.7	16.4	15.4	17.0	17.3	4.7	8.5	12.0	11.8
540	20.5	20.3	20.3	18.7	18.9	16.2	15.4	15.6	17.2	4.1	8.4	11.9	11.8
541	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
542	25.2	24.0	24.0	19.1	19.2	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
543	25.2	23.7	23.7	19.1	19.8	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
544	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
545	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
546	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
547	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
548	20.9	20.3	20.3	17.3	20.3	20.1	17.6	16.0	17.5	5.1	8.9	12.1	11.8
549	20.9	20.3	20.3	17.5	20.3	19.8	17.0	16.0	17.4	4.7	8.8	12.1	11.8
550	20.9	20.3	20.3	17.7	20.3	19.3	16.4	16.0	17.2	4.2	8.7	12.1	11.8
551	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
552	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
553	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
554	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
555	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
556	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
557	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
558	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
559	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
560	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
561	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
562	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
563	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
564	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
565													
566													
567													
568													
569													
570	22.6	22.0	23.5	16.6	15.5	15.4	15.9	15.4	17.9	3.7	8.7	13.1	12.8
571	22.3	21.6	23.9	16.6	15.9	15.4	15.5	15.4	17.6	3.7	7.6	13.0	12.5

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
572	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
573	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
574	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
575													
576													
577													
578													
579													
580	20.9	20.3	20.7	18.3	19.3	16.2	15.8	15.8	17.3	4.3	8.4	12.1	11.8
581	20.9	20.3	20.3	17.8	18.6	16.6	15.4	17.6	17.5	5.0	8.6	12.1	11.8
582	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.4	17.3	4.4	8.4	12.0	11.8
583	20.3	20.3	20.3	19.0	19.1	16.0	15.4	15.0	17.1	3.8	8.3	11.8	11.8
584	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
585	25.2	23.8	23.8	19.1	19.4	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
586	25.2	23.5	23.5	19.1	20.0	17.2	16.0	14.8	19.8	5.0	9.6	14.6	13.7
587	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
588	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
589	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
590	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
591	20.9	20.3	20.3	17.3	20.3	20.0	17.4	16.0	17.5	5.0	8.9	12.1	11.8
592	20.9	20.3	20.3	17.6	20.3	19.6	16.7	16.0	17.3	4.5	8.7	12.1	11.8
593	20.9	20.3	20.3	17.8	20.3	19.1	16.1	16.0	17.1	4.0	8.6	12.1	11.8
594	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
595	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
596	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
597	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
598	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
599	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
600	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
601	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
602	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
603	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
604	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
605	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
606	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
607	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
608	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
609													
610													
611													
612													
613	22.7	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.8	13.2	12.8
614	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.7	3.7	8.0	13.0	12.7
615	22.2	21.6	24.0	16.6	16.1	15.5	15.4	15.4	17.5	3.7	7.1	12.9	12.5
616	22.6	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
617	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
618													

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
619													
620													
621													
622													
623	20.9	20.3	20.8	18.3	19.4	16.1	15.9	15.5	17.3	4.2	8.3	12.1	11.8
624	20.9	20.3	20.5	18.0	18.9	16.4	15.6	16.9	17.4	4.7	8.5	12.1	11.8
625	20.7	20.3	20.3	18.2	18.7	16.4	15.4	17.0	17.4	4.7	8.5	12.0	11.8
626	20.5	20.3	20.3	18.8	18.9	16.2	15.4	15.6	17.2	4.1	8.4	11.9	11.8
627	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
628	25.2	24.0	24.0	19.1	19.2	17.2	16.0	14.8	20.0	5.3	9.6	14.6	13.9
629	25.2	23.7	23.7	19.1	19.8	17.2	16.0	14.8	19.9	5.1	9.6	14.6	13.8
630	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
631	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
632	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
633	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
634	20.9	20.3	20.3	17.3	20.3	20.1	17.5	16.0	17.5	5.1	8.9	12.1	11.8
635	20.9	20.3	20.3	17.5	20.3	19.8	17.0	16.0	17.4	4.7	8.8	12.1	11.8
636	20.9	20.3	20.3	17.7	20.3	19.3	16.3	16.0	17.2	4.2	8.7	12.1	11.8
637	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
638	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
639	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
640	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
641	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
642	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
643	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
644	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
645	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
646	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
647	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
648	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
649	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
650	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
651													
652													
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655													
656	22.6	21.9	23.6	16.6	15.6	15.4	15.8	15.4	17.9	3.7	8.7	13.1	12.7
657	22.3	21.6	23.9	16.6	15.9	15.4	15.5	15.4	17.6	3.7	7.6	13.0	12.5
658	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
659	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
660	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
661													
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663													
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	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
666	20.9	20.3	20.7	18.3	19.3	16.2	15.8	15.8	17.3	4.3	8.4	12.1	11.8
667	20.9	20.3	20.3	17.8	18.5	16.6	15.4	17.7	17.5	5.0	8.6	12.1	11.8
668	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.4	17.3	4.4	8.4	12.0	11.8
669	20.3	20.3	20.3	19.0	19.1	16.0	15.4	14.9	17.0	3.8	8.3	11.8	11.8
670	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
671	25.2	23.8	23.8	19.1	19.4	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
672	25.2	23.5	23.5	19.1	20.0	17.2	16.0	14.8	19.8	5.0	9.6	14.6	13.7
673	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
674	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
675	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
676	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
677	20.9	20.3	20.3	17.3	20.3	20.0	17.4	16.0	17.5	5.0	8.9	12.1	11.8
678	20.9	20.3	20.3	17.6	20.3	19.5	16.7	16.0	17.3	4.4	8.7	12.1	11.8
679	20.9	20.3	20.3	17.8	20.3	19.1	16.0	16.0	17.1	4.0	8.6	12.1	11.8
680	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
681	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
682	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
683	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
684	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
685	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
686	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
687	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
688	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
689	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
690	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
691	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
692	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
693	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
694	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
695													
696													
697													
698													
699	22.7	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.8	13.2	12.8
700	22.4	21.8	23.7	16.6	15.7	15.4	15.7	15.4	17.7	3.7	8.0	13.0	12.7
701	22.2	21.6	24.0	16.6	16.1	15.5	15.4	15.4	17.5	3.8	7.1	12.9	12.5
702	22.6	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
703	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
704													
705													
706													
707													
708													
709	20.9	20.3	20.8	18.3	19.4	16.1	15.9	15.5	17.3	4.2	8.3	12.1	11.8
710	20.9	20.3	20.5	18.0	18.9	16.4	15.6	16.9	17.4	4.7	8.5	12.1	11.8
711	20.7	20.3	20.3	18.3	18.7	16.4	15.4	16.7	17.3	4.5	8.5	12.0	11.8
712	20.4	20.3	20.3	18.8	19.0	16.1	15.4	15.5	17.1	4.1	8.3	11.9	11.8

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
713	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
714	25.2	23.9	23.9	19.1	19.2	17.2	16.0	14.8	20.0	5.2	9.6	14.6	13.9
715	25.2	23.6	23.6	19.1	19.8	17.2	16.0	14.8	19.8	5.1	9.6	14.6	13.7
716	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
717	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
718	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
719	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
720	20.9	20.3	20.3	17.3	20.3	20.1	17.5	16.0	17.5	5.1	8.9	12.1	11.8
721	20.9	20.3	20.3	17.5	20.3	19.7	16.8	16.0	17.3	4.6	8.8	12.1	11.8
722	20.9	20.3	20.3	17.7	20.3	19.3	16.3	16.0	17.2	4.2	8.7	12.1	11.8
723	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
724	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
725	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
726	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
727	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
728	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
729	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
730	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
731	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
732	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
733	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
734	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
735	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
736													
737													
738													
739													
740													
741	22.6	21.9	23.6	16.6	15.6	15.4	15.8	15.4	17.9	3.7	8.7	13.1	12.7
742	22.2	21.6	23.9	16.6	15.9	15.4	15.5	15.4	17.6	3.7	7.6	12.9	12.5
743	22.3	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
744	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
745	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
746													
747													
748													
749													
750													
751	20.9	20.3	20.7	18.3	19.3	16.2	15.8	15.9	17.3	4.3	8.4	12.1	11.8
752	20.9	20.3	20.3	17.8	18.5	16.6	15.4	17.7	17.5	5.0	8.6	12.1	11.8
753	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.4	17.3	4.4	8.4	12.0	11.8
754	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.9	17.1	3.8	8.3	11.8	11.8
755	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
756	25.2	23.8	23.8	19.1	19.5	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
757	25.2	23.5	23.5	19.1	20.1	17.2	16.0	14.8	19.8	5.0	9.6	14.6	13.7
758	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
759	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
760	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
761	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
762	20.9	20.3	20.3	17.3	20.3	20.0	17.4	16.0	17.5	5.0	8.9	12.1	11.8
763	20.9	20.3	20.3	17.6	20.3	19.5	16.7	16.0	17.3	4.4	8.7	12.1	11.8
764	20.9	20.3	20.3	17.8	20.3	19.1	16.0	16.0	17.1	4.0	8.6	12.1	11.8
765	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
766	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
767	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
768	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
769	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
770	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
771	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
772	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
773	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
774	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
775	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
776	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
777	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
778	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
779	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
780													
781													
782													
783													
784													
785	22.6	21.9	23.6	16.6	15.6	15.4	15.8	15.4	17.9	3.7	8.6	13.1	12.7
786	22.2	21.6	23.9	16.6	15.9	15.4	15.5	15.4	17.6	3.7	7.6	12.9	12.5
787	22.4	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
788	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
789	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
790													
791													
792													
793													
794													
795	20.9	20.3	20.7	18.2	19.3	16.2	15.8	15.9	17.3	4.3	8.4	12.1	11.8
796	20.9	20.3	20.3	17.8	18.5	16.6	15.4	17.8	17.5	5.0	8.6	12.1	11.8
797	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.3	17.3	4.4	8.4	12.0	11.8
798	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
799	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
800	25.2	23.8	23.8	19.1	19.5	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
801	25.2	23.5	23.5	19.1	20.1	17.2	16.0	14.8	19.8	5.0	9.6	14.6	13.7
802	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
803	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
804	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
805	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
806	20.9	20.3	20.3	17.4	20.3	19.9	17.2	16.0	17.4	4.9	8.8	12.1	11.8

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
807	20.9	20.3	20.3	17.6	20.3	19.5	16.6	16.0	17.3	4.4	8.7	12.1	11.8
808	20.9	20.3	20.3	17.8	20.3	19.1	16.0	16.0	17.1	4.0	8.6	12.1	11.8
809	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
810	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
811	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
812	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
813	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
814	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
815	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
816	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
817	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
818	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
819	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
820	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
821	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
822	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
823													
824													
825													
826													
827													
828	22.7	22.0	23.5	16.6	15.5	15.4	15.9	15.4	18.0	3.7	8.8	13.2	12.8
829	22.3	21.7	23.8	16.6	15.8	15.4	15.6	15.4	17.6	3.7	7.8	13.0	12.6
830	22.2	21.6	24.0	16.6	16.1	15.5	15.4	15.4	17.5	3.8	7.1	12.9	12.5
831	22.6	21.9	24.0	16.6	16.4	15.8	15.4	15.4	17.6	3.9	7.0	13.1	12.7
832	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
833													
834													
835													
836													
837													
838	20.9	20.3	20.7	18.3	19.4	16.2	15.8	15.6	17.3	4.2	8.4	12.1	11.8
839	20.9	20.3	20.5	18.0	18.8	16.4	15.6	17.0	17.4	4.7	8.5	12.1	11.8
840	20.7	20.3	20.3	18.3	18.7	16.4	15.4	16.6	17.3	4.5	8.5	12.0	11.8
841													
842													
843	20.4	20.3	20.3	18.9	19.0	16.1	15.4	15.2	17.1	3.9	8.3	11.9	11.8
844	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
845	25.2	23.9	23.9	19.1	19.2	17.2	16.0	14.8	20.0	5.2	9.6	14.6	13.9
846	25.2	23.6	23.6	19.1	19.8	17.2	16.0	14.8	19.8	5.1	9.6	14.6	13.7
847	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
848	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
849	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
850	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
851	20.9	20.3	20.3	17.3	20.3	20.1	17.5	16.0	17.5	5.1	8.9	12.1	11.8
852	20.9	20.3	20.3	17.5	20.3	19.6	16.8	16.0	17.3	4.6	8.8	12.1	11.8
853	20.9	20.3	20.3	17.7	20.3	19.3	16.3	16.0	17.2	4.2	8.7	12.1	11.8

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
854	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
855	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
856	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
857	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
858	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
859	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
860	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
861	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
862	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
863	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
864	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
865	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
866	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
867	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
868													
869													
870													
871													
872	22.6	21.9	23.6	16.6	15.6	15.4	15.8	15.4	17.9	3.7	8.6	13.1	12.7
873	22.2	21.6	23.9	16.6	15.9	15.4	15.5	15.4	17.6	3.7	7.6	12.9	12.5
874	22.4	21.7	24.0	16.6	16.2	15.6	15.4	15.4	17.5	3.8	7.1	13.0	12.6
875	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
876	22.8	22.1	24.0	16.6	16.6	16.0	15.4	15.4	17.7	4.0	7.0	13.2	12.8
877													
878													
879													
880													
881													
882	20.9	20.3	20.3	17.8	18.5	16.6	15.4	17.8	17.5	5.0	8.6	12.1	11.8
883	20.6	20.3	20.3	18.4	18.8	16.3	15.4	16.3	17.3	4.4	8.4	12.0	11.8
884	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
885	20.3	20.3	20.3	19.1	19.1	16.0	15.4	14.8	17.0	3.7	8.3	11.8	11.8
886	25.2	23.8	23.8	19.1	19.5	17.2	16.0	14.8	19.9	5.2	9.6	14.6	13.8
887	25.2	23.5	23.5	19.1	20.1	17.2	16.0	14.8	19.8	5.0	9.6	14.6	13.7
888	25.2	23.4	23.4	19.1	20.3	17.2	16.0	14.8	19.7	5.0	9.6	14.6	13.6
889	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
890	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
891	17.6	25.2	20.9	17.2	19.7	19.1	15.4	16.0	18.9	5.6	11.8	10.2	14.6
892	20.9	20.3	20.3	17.4	20.3	19.9	17.2	16.0	17.4	4.8	8.8	12.1	11.8
893	20.9	20.3	20.3	17.6	20.3	19.4	16.5	16.0	17.2	4.3	8.7	12.1	11.8
894	20.9	20.3	20.3	17.8	20.3	19.1	16.0	16.0	17.1	4.0	8.6	12.1	11.8
895	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
896	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
897	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
898	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
899	19.1	18.5	19.1	17.8	20.3	23.4	17.2	17.8	16.3	4.0	8.6	11.1	10.7
900	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1

	24 VM3	25 VM4	26 VM5	27 VM6	28 VM7	29 VM8	30 VM9	31 VM10	32 AVM	33 GM1	34 GM2	35 GM3	36 GM4
901	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
902	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
903	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
904	19.1	19.1	10.5	17.8	20.3	23.4	17.8	21.5	15.0	3.7	8.9	11.1	11.1
905	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
906	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
907	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
908	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
909	18.5	17.2	18.5	17.2	19.1	21.5	17.8	18.5	16.1	4.5	8.9	10.7	10.0
910	20.9	20.3	20.7	18.2	19.2	16.2	15.8	15.9	17.3	4.3	8.4	12.1	11.8

data file: 48SA.STA [910 cases with 50 variables]

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
1								11.67	12.30	14.06	16.49	17.80
2								14.50	14.47	15.36	16.91	17.84
3								19.73	18.48	17.75	17.66	17.91
4								21.87	20.12	18.73	17.97	17.94
5	13.6	9.6	8.9	8.9	9.3	8.9	10.4	4.96	6.71	8.46	9.98	10.83
6	13.8	9.6	9.1	8.9	9.1	8.9	10.2	5.57	6.70	8.13	9.55	10.42
7	13.9	9.6	9.3	8.9	8.9	8.9	10.0	6.53	6.69	7.61	8.88	9.79
8	13.9	9.6	9.5	9.2	8.9	8.9	10.0	10.66	9.43	9.05	9.39	9.83
9	13.9	9.6	9.6	9.3	8.9	8.9	10.1	15.67	12.91	11.01	10.20	10.05
10								2.05	3.44	4.86	6.12	6.83
11								1.93	2.86	4.19	5.53	6.31
12								7.67	5.37	4.79	5.34	5.94
13								15.08	10.89	7.94	6.65	6.32
14								16.94	12.88	9.67	7.75	6.92
15	12.1	10.7	11.4	9.3	9.3	8.6	9.8	5.98	7.06	8.25	9.20	9.71
16	11.9	10.5	11.0	9.5	9.1	9.6	9.9	6.17	6.83	7.81	8.67	9.17
17	11.8	10.5	10.8	9.6	8.9	10.0	9.9	9.34	8.30	8.16	8.47	8.80
18	11.8	10.9	11.0	9.4	8.9	9.2	9.8	16.30	12.65	10.29	9.21	8.95
19	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
20	13.9	11.1	11.1	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
21	13.8	11.1	11.4	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
22	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
23	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
24	12.1	10.0	11.4	11.1	8.9	9.3	10.7	20.37	16.76	16.36	16.38	16.79
25	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
26	11.8	10.0	11.8	11.8	10.3	9.3	10.0	32.04	26.10	25.18	24.51	24.25
27	11.8	10.1	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
28	11.8	10.3	11.8	11.3	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
29	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.70	30.14	31.90	36.90	37.86
30	11.1	10.3	11.8	13.6	10.0	10.3	9.3	32.90	30.18	31.41	35.64	36.65
31	11.1	10.3	11.8	13.6	10.0	10.3	9.3	38.11	32.94	31.93	35.64	36.14
32	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
33	11.1	10.3	11.8	13.6	10.0	10.3	9.3	58.34	50.30	45.50	41.64	39.40
34	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.00		36.00	37.80	38.70
35	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
36	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
37	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
38	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.94		45.30	41.70	39.80
39	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
40	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
41	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
42	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
43	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
44	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
45								9.65	10.75	13.14	16.20	17.77
46								11.42	12.11	13.95	16.46	17.80
47								15.24	15.04	15.70	17.01	17.85
48								21.16	19.57	18.40	17.87	17.93
49								22.05	20.26	18.81	18.00	17.94
50	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.03	6.71	8.42	9.93	10.78

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
51	13.8	9.6	9.2	8.9	9.1	8.9	10.1	5.97	6.70	7.92	9.28	10.16
52	13.9	9.6	9.4	9.1	8.9	8.9	10.0	7.84	7.47	7.95	8.93	9.71
53	13.9	9.6	9.6	9.2	8.9	8.9	10.1	12.61	10.78	9.81	9.70	9.92
54	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
55								1.63	3.04	4.50	5.82	6.57
56								3.44	3.43	4.21	5.32	6.07
57								10.92	7.92	6.17	5.80	5.98
58								16.94	12.88	9.67	7.75	6.92
59								18.64	14.73	11.21	8.86	7.67
60	12.0	10.6	11.3	9.4	9.2	9.1	9.9	5.90	6.91	8.01	8.92	9.42
61	11.9	10.4	10.9	9.6	9.0	10.1	9.9	7.36	7.28	7.82	8.49	8.94
62	11.8	10.6	10.9	9.5	8.9	9.6	9.9	12.59	10.10	8.96	8.69	8.78
63	11.8	11.0	11.0	9.4	8.9	8.8	9.8	19.81	15.15	11.93	10.07	9.35
64	11.8	11.1	11.1	9.3	8.9	8.6	9.7	17.34	16.69	14.98	12.87	11.39
65	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
66	13.7	11.1	11.5	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
67	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
68	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
69	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
70	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
71	11.8	10.1	11.8	11.7	10.2	9.3	10.0	32.27	26.01	25.37	24.82	24.46
72	11.8	10.2	11.8	11.4	9.8	9.3	9.9	40.36	31.09	27.82	25.85	24.95
73	11.8	10.3	11.8	11.2	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
74	11.1	10.3	11.8	13.6	10.0	10.3	9.3	30.82	29.36	31.06	36.61	37.60
75	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
76	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
77	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
78	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.02		35.85	37.46	38.45
79	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
80	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
81	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
82	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
83	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
84	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
85	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
86	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
87	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
88								11.78	12.39	14.11	16.51	17.80
89								14.57	14.52	15.39	16.91	17.84
90								19.80	18.53	17.78	17.67	17.91
91								21.95	20.18	18.76	17.99	17.94
92	13.6	9.6	8.9	8.9	9.3	8.9	10.4	4.96	6.71	8.46	9.98	10.83
93	13.8	9.6	9.1	8.9	9.1	8.9	10.2	5.60	6.70	8.11	9.53	10.40
94	13.9	9.6	9.3	8.9	8.9	8.9	10.0	6.55	6.69	7.60	8.87	9.77
95	13.9	9.6	9.5	9.2	8.9	8.9	10.0	10.81	9.53	9.11	9.41	9.84
96	13.9	9.6	9.6	9.3	8.9	8.9	10.1	15.85	13.03	11.07	10.22	10.06
97								2.05	3.44	4.86	6.12	6.83
98								1.93	2.86	4.19	5.53	6.31
99								7.67	5.37	4.79	5.34	5.94
100								15.08	10.89	7.94	6.65	6.32
101								18.64	14.73	11.21	8.86	7.67
102	12.1	10.7	11.4	9.3	9.3	8.6	9.8	5.98	7.06	8.25	9.20	9.71
103	11.9	10.5	11.0	9.5	9.1	9.7	9.9	6.17	6.83	7.81	8.67	9.17
104	11.8	10.5	10.8	9.6	8.9	9.9	9.9	9.34	8.30	8.16	8.47	8.80
105	11.8	10.9	11.0	9.4	8.9	9.1	9.8	16.30	12.65	10.29	9.21	8.95

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
106	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
107	13.9	11.1	11.1	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
108	13.8	11.1	11.4	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
109	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
110	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
111	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
112	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
113	11.8	10.0	11.8	11.8	10.3	9.3	10.0	32.04	26.10	25.18	24.51	24.25
114	11.8	10.1	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
115	11.8	10.3	11.8	11.3	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
116	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.70	30.14	31.90	36.90	37.86
117	11.1	10.3	11.8	13.6	10.0	10.3	9.3	32.90	30.18	31.41	35.64	36.65
118	11.1	10.3	11.8	13.6	10.0	10.3	9.3	38.11	32.94	31.93	35.64	36.14
119	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
120	11.1	10.3	11.8	13.6	10.0	10.3	9.3	58.34	50.30	45.50	41.64	39.40
121	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.00		36.00	37.80	38.70
122	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
123	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
124	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
125	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.94		45.30	41.70	39.80
126	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
127	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
128	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
129	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
130	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
131	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
132								9.73	10.81	13.17	16.21	17.77
133								11.47	12.15	13.97	16.47	17.80
134								15.29	15.08	15.72	17.02	17.85
135								21.21	19.61	18.42	17.88	17.93
136								22.05	20.26	18.81	18.00	17.94
137	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.04	6.71	8.41	9.92	10.77
138	13.8	9.6	9.2	8.9	9.1	8.9	10.1	5.98	6.70	7.91	9.27	10.15
139	13.9	9.6	9.4	9.1	8.9	8.9	10.0	7.96	7.55	7.99	8.95	9.71
140	13.9	9.6	9.6	9.2	8.9	8.9	10.1	12.73	10.87	9.86	9.72	9.92
141	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
142								1.63	3.04	4.50	5.82	6.57
143								3.44	3.43	4.21	5.32	6.07
144								10.92	7.92	6.17	5.80	5.98
145								16.94	12.88	9.67	7.75	6.92
146								18.64	14.73	11.21	8.86	7.67
147	12.0	10.6	11.3	9.4	9.2	9.1	9.9	5.90	6.91	8.01	8.92	9.42
148	11.9	10.4	10.8	9.6	9.0	10.2	9.9	7.36	7.28	7.82	8.49	8.94
149	11.8	10.6	10.9	9.5	8.9	9.6	9.9	12.59	10.10	8.96	8.69	8.78
150	11.8	11.0	11.0	9.4	8.9	8.8	9.8	19.81	15.15	11.93	10.07	9.35
151	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
152	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
153	13.7	11.1	11.6	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
154	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
155	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
156	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
157	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
158	11.8	10.1	11.8	11.7	10.2	9.3	10.0	32.27	26.01	25.37	24.82	24.46
159	11.8	10.2	11.8	11.4	9.8	9.3	9.9	40.36	31.09	27.82	25.85	24.95
160	11.8	10.3	11.8	11.2	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
161	11.1	10.3	11.8	13.6	10.0	10.3	9.3	30.82	29.36	31.06	36.61	37.60
162	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
163	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
164	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
165	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
166	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
167	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
168	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
169	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
170	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
171	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
172	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
173	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
174	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
175	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
176								11.85	12.44	14.14	16.52	17.80
177								14.63	14.57	15.42	16.92	17.84
178								19.85	18.57	17.80	17.68	17.91
179								22.05	20.26	18.81	18.00	17.94
180	13.6	9.6	8.9	8.9	9.3	8.9	10.4	4.96	6.71	8.46	9.98	10.83
181	13.8	9.6	9.1	8.9	9.1	8.9	10.2	5.62	6.70	8.10	9.52	10.39
182	13.9	9.6	9.3	8.9	8.9	8.9	10.0	6.57	6.69	7.59	8.86	9.76
183	13.9	9.6	9.5	9.2	8.9	8.9	10.0	10.88	9.58	9.14	9.42	9.84
184	13.9	9.6	9.6	9.3	8.9	8.9	10.1	15.92	13.08	11.10	10.23	10.06
185								2.05	3.44	4.86	6.12	6.83
186								1.93	2.86	4.19	5.53	6.31
187								7.67	5.37	4.79	5.34	5.94
188								15.08	10.89	7.94	6.65	6.32
189								18.64	14.73	11.21	8.86	7.67
190	12.1	10.7	11.4	9.3	9.3	8.7	9.8	5.98	7.06	8.25	9.20	9.71
191	11.9	10.5	11.0	9.5	9.1	9.7	9.9	6.17	6.83	7.81	8.67	9.17
192	11.8	10.5	10.8	9.6	8.9	9.9	9.9	9.34	8.30	8.16	8.47	8.80
193	11.8	10.9	11.0	9.4	8.9	9.1	9.8	16.30	12.65	10.29	9.21	8.95
194	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
195	13.9	11.1	11.1	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
196	13.8	11.1	11.4	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
197	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
198	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
199	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
200	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
201	11.8	10.0	11.8	11.8	10.3	9.3	10.0	32.04	26.10	25.18	24.51	24.25
202	11.8	10.1	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
203	11.8	10.3	11.8	11.3	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
204	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.70	30.14	31.90	36.90	37.86
205	11.1	10.3	11.8	13.6	10.0	10.3	9.3	32.90	30.18	31.41	35.64	36.65
206	11.1	10.3	11.8	13.6	10.0	10.3	9.3	38.11	32.94	31.93	35.64	36.14
207	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
208	11.1	10.3	11.8	13.6	10.0	10.3	9.3	58.34	50.30	45.50	41.64	39.40
209	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.00		36.00	37.80	38.70
210	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
211	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
212	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
213	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.94		45.30	41.70	39.80
214	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
215	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
216	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
217	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
218	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
219	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
220								9.91	10.95	13.26	16.24	17.78
221								11.57	12.22	14.02	16.48	17.80
222								15.36	15.13	15.75	17.03	17.85
223								21.29	19.68	18.46	17.89	17.93
224								22.05	20.26	18.81	18.00	17.94
225	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.06	6.71	8.41	9.91	10.76
226	13.8	9.6	9.2	8.9	9.1	8.9	10.1	6.01	6.70	7.89	9.24	10.13
227	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.03	7.60	8.02	8.96	9.72
228	13.9	9.6	9.6	9.2	8.9	8.9	10.1	12.90	10.98	9.92	9.75	9.93
229	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
230								1.63	3.04	4.50	5.82	6.57
231								3.44	3.43	4.21	5.32	6.07
232								10.92	7.92	6.17	5.80	5.98
233								16.94	12.88	9.67	7.75	6.92
234								18.64	14.73	11.21	8.86	7.67
235	12.0	10.6	11.2	9.4	9.2	9.1	9.9	5.90	6.91	8.01	8.92	9.42
236	11.9	10.4	10.8	9.6	9.0	10.2	9.9	7.36	7.28	7.82	8.49	8.94
237	11.8	10.6	10.9	9.5	8.9	9.6	9.9	12.59	10.10	8.96	8.69	8.78
238	11.8	11.0	11.0	9.4	8.9	8.8	9.8	19.81	15.15	11.93	10.07	9.35
239	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
240	13.9	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
241	13.7	11.1	11.6	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
242	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
243	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
244	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
245	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
246	11.8	10.1	11.8	11.7	10.2	9.3	10.0	32.27	26.01	25.37	24.82	24.46
247	11.8	10.2	11.8	11.4	9.8	9.3	9.9	40.36	31.09	27.82	25.85	24.95
248	11.8	10.3	11.8	11.2	9.4	9.3	9.8	39.68	32.98	30.43	27.91	26.27
249	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11
250	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
251	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
252	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
253	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
254	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
255	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
256	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
257	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
258	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
259	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
260	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
261	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
262	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
263	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
264								1.93	2.86	4.19	5.53	6.31
265								11.90	12.48	14.17	16.53	17.80
266								14.75	14.66	15.47	16.94	17.84
267								19.90	18.61	17.83	17.69	17.91
268								22.05	20.26	18.81	18.00	17.94
269	13.6	9.6	8.9	8.9	9.3	8.9	10.4	4.96	6.71	8.46	9.98	10.83
270	13.8	9.6	9.1	8.9	9.1	8.9	10.2	5.64	6.70	8.09	9.51	10.38

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
271	13.9	9.6	9.3	8.9	8.9	8.9	10.0	6.60	6.69	7.58	8.84	9.74
272	13.9	9.6	9.5	9.2	8.9	8.9	10.0	10.98	9.65	9.17	9.44	9.85
273	13.9	9.6	9.6	9.3	8.9	8.9	10.1	16.09	13.20	11.17	10.26	10.07
274								2.05	3.44	4.86	6.12	6.83
275								7.67	5.37	4.79	5.34	5.94
276								15.08	10.89	7.94	6.65	6.32
277								18.64	14.73	11.21	8.86	7.67
278	12.1	10.7	11.4	9.3	9.3	8.7	9.8	5.98	7.06	8.25	9.20	9.71
279	11.9	10.5	11.0	9.5	9.1	9.7	9.9	6.17	6.83	7.81	8.67	9.17
280	11.8	10.5	10.8	9.6	8.9	9.9	9.9	9.34	8.30	8.16	8.47	8.80
281	11.8	10.9	11.0	9.4	8.9	9.1	9.8	16.30	12.65	10.29	9.21	8.95
282	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
283	13.9	11.1	11.1	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
284	13.8	11.1	11.4	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
285	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
286	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
287	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
288	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
289	11.8	10.0	11.8	11.8	10.3	9.3	10.0	32.04	26.10	25.18	24.51	24.25
290	11.8	10.1	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
291	11.8	10.3	11.8	11.3	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
292	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.70	30.14	31.90	36.90	37.86
293	11.1	10.3	11.8	13.6	10.0	10.3	9.3	32.90	30.18	31.41	35.64	36.65
294	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
295	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
296	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.00		36.00	37.80	38.70
297	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
298	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
299	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
300	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.94		45.30	41.70	39.80
301	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
302	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
303	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
304	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
305	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
306	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
307								10.01	11.03	13.30	16.25	17.78
308								11.65	12.29	14.05	16.49	17.80
309								16.20	15.78	16.14	17.15	17.86
310								21.34	19.71	18.48	17.90	17.93
311								22.05	20.26	18.81	18.00	17.94
312	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.07	6.71	8.40	9.90	10.75
313	13.8	9.6	9.2	8.9	9.1	8.9	10.1	6.03	6.70	7.88	9.23	10.12
314	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.16	7.69	8.07	8.98	9.72
315	13.9	9.6	9.6	9.2	8.9	8.9	10.1	13.14	11.15	10.02	9.79	9.94
316	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
317								1.63	3.04	4.50	5.82	6.57
318								3.44	3.43	4.21	5.32	6.07
319								10.92	7.92	6.17	5.80	5.98
320								16.94	12.88	9.67	7.75	6.92
321								18.64	14.73	11.21	8.86	7.67
322	12.0	10.6	11.2	9.4	9.2	9.1	9.9	5.90	6.91	8.01	8.92	9.42
323	11.9	10.4	10.8	9.6	9.0	10.2	9.9	7.36	7.28	7.82	8.49	8.94
324	11.8	10.7	10.9	9.5	8.9	9.6	9.9	12.59	10.10	8.96	8.69	8.78
325	11.8	11.0	11.0	9.4	8.9	8.8	9.8	19.81	15.15	11.93	10.07	9.35

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
326	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
327	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
328	13.7	11.1	11.6	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
329	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
330	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
331	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
332	12.1	10.0	11.4	11.1	8.9	9.3	10.7	30.23	24.15	21.14	19.21	18.30
333	11.8	10.1	11.8	11.7	10.1	9.3	10.0	32.27	26.01	25.37	24.82	24.46
334	11.8	10.2	11.8	11.4	9.7	9.3	9.9	40.36	31.09	27.82	25.85	24.95
335	11.8	10.3	11.8	11.2	9.4	9.3	9.8	39.68	32.98	30.43	27.91	26.27
336	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11
337	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
338	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
339	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
340	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
341	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
342	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11
343	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
344	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
345	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
346	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
347	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
348	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
349	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09
350	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
351								11.97	12.53	14.20	16.54	17.80
352								14.81	14.71	15.50	16.95	17.84
353								19.96	18.66	17.86	17.70	17.91
354								22.05	20.26	18.81	18.00	17.94
355	13.6	9.6	8.9	8.9	9.3	8.9	10.4	4.96	6.71	8.46	9.98	10.83
356	13.8	9.6	9.1	8.9	9.1	8.9	10.2	5.65	6.70	8.09	9.50	10.37
357	13.9	9.6	9.3	8.9	8.9	8.9	10.0	6.64	6.69	7.55	8.80	9.71
358	13.9	9.6	9.5	9.2	8.9	8.9	10.0	11.03	9.68	9.19	9.45	9.85
359	13.9	9.6	9.6	9.3	8.9	8.9	10.1	16.26	13.32	11.24	10.29	10.08
360								1.63	3.04	4.50	5.82	6.57
361								1.93	2.86	4.19	5.53	6.31
362								7.67	5.37	4.79	5.34	5.94
363								15.08	10.89	7.94	6.65	6.32
364								18.64	14.73	11.21	8.86	7.67
365	12.1	10.7	11.4	9.3	9.3	8.7	9.8	5.98	7.06	8.25	9.20	9.71
366	11.9	10.5	11.0	9.5	9.1	9.8	9.9	6.17	6.83	7.81	8.67	9.17
367	11.8	10.5	10.8	9.6	8.9	9.9	9.9	9.34	8.30	8.16	8.47	8.80
368	11.8	10.9	11.0	9.4	8.9	9.1	9.8	16.30	12.65	10.29	9.21	8.95
369	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
370	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
371	13.8	11.1	11.5	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
372	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
373	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
374	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
375	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
376	11.8	10.0	11.8	11.8	10.3	9.3	10.0	32.04	26.10	25.18	24.51	24.25
377	11.8	10.2	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
378	11.8	10.3	11.8	11.3	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
379	11.1	10.3	11.8	13.6	10.0	10.3	9.3	30.82	29.36	31.06	36.61	37.60
380	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
381	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
382	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
383	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.00		36.00	37.80	38.70
384	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
385	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
386	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
387	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.94		45.30	41.70	39.80
388	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
389	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
390	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
391	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
392	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
393								10.13	11.12	13.36	16.27	17.78
394								11.73	12.35	14.09	16.50	17.80
395								16.35	15.89	16.20	17.17	17.86
396								21.42	19.78	18.52	17.91	17.93
397								22.05	20.26	18.81	18.00	17.94
398	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.09	6.71	8.39	9.89	10.74
399	13.8	9.6	9.2	8.9	9.1	8.9	10.1	6.05	6.70	7.87	9.22	10.11
400	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.28	7.77	8.12	9.00	9.73
401	13.9	9.6	9.6	9.2	8.9	8.9	10.1	13.22	11.20	10.05	9.80	9.94
402	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
403								1.63	3.04	4.50	5.82	6.57
404								3.44	3.43	4.21	5.32	6.07
405								10.92	7.92	6.17	5.80	5.98
406								16.94	12.88	9.67	7.75	6.92
407								18.39	15.46	12.37	9.91	8.46
408	12.0	10.6	11.2	9.4	9.2	9.1	9.9	5.90	6.91	8.01	8.92	9.42
409	11.8	10.4	10.8	9.6	8.9	10.2	9.9	7.36	7.28	7.82	8.49	8.94
410	11.8	10.7	10.9	9.5	8.9	9.6	9.9	12.59	10.10	8.96	8.69	8.78
411	11.8	11.0	11.1	9.3	8.9	8.7	9.8	19.81	15.15	11.93	10.07	9.35
412	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
413	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
414	13.7	11.1	11.6	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
415	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
416	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
417	12.1	10.0	11.4	11.1	8.9	9.3	10.7	26.18	20.30	18.21	17.33	17.23
418	12.1	10.0	11.4	11.1	8.9	9.3	10.7	30.23	24.15	21.14	19.21	18.30
419	11.8	10.1	11.8	11.7	10.1	9.3	9.9	32.27	26.01	25.37	24.82	24.46
420	11.8	10.2	11.8	11.4	9.7	9.3	9.9	40.36	31.09	27.82	25.85	24.95
421	11.8	10.3	11.8	11.2	9.4	9.3	9.8	39.68	32.98	30.43	27.91	26.27
422	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11
423	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
424	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
425	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
426	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
427	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
428	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11
429	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
430	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
431	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
432	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.72	33.52
433	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
434	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
435	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
436	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
437								12.05	12.59	14.24	16.55	17.81
438								14.88	14.76	15.53	16.96	17.84
439								20.01	18.70	17.88	17.70	17.91
440								22.05	20.26	18.81	18.00	17.94
441	13.6	9.6	8.9	8.9	9.3	8.9	10.4	4.96	6.71	8.46	9.98	10.83
442	13.8	9.6	9.1	8.9	9.1	8.9	10.2	5.67	6.70	8.08	9.49	10.36
443	13.9	9.6	9.3	8.9	8.9	8.9	10.0	6.66	6.69	7.54	8.79	9.70
444	13.9	9.6	9.5	9.2	8.9	8.9	10.1	11.12	9.75	9.23	9.46	9.85
445	13.9	9.6	9.6	9.3	8.9	8.9	10.1	16.33	13.37	11.26	10.30	10.08
446								1.63	3.04	4.50	5.82	6.57
447								3.44	3.43	4.21	5.32	6.07
448								7.67	5.37	4.79	5.34	5.94
449								15.08	10.89	7.94	6.65	6.32
450								18.64	14.73	11.21	8.86	7.67
451	12.1	10.7	11.4	9.3	9.3	8.7	9.8	5.90	6.91	8.01	8.92	9.42
452	11.9	10.5	11.0	9.5	9.1	9.8	9.9	6.17	6.83	7.81	8.67	9.17
453	11.8	10.5	10.9	9.5	8.9	9.9	9.9	9.34	8.30	8.16	8.47	8.80
454	11.8	10.9	11.0	9.4	8.9	9.1	9.8	16.30	12.65	10.29	9.21	8.95
455	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
456	13.8	11.1	11.5	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
457	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
458	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
459	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
460	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
461	11.8	10.0	11.8	11.8	10.3	9.3	10.0	32.04	26.10	25.18	24.51	24.25
462	11.8	10.2	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
463	11.8	10.3	11.8	11.3	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
464	11.1	10.3	11.8	13.6	10.0	10.3	9.3	30.82	29.36	31.06	36.61	37.60
465	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
466	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
467	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
468	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.02		35.85	37.46	38.45
469	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
470	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
471	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
472	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.94		45.30	41.70	39.80
473	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
474	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
475	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
476	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
477	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
478								10.24	11.21	13.41	16.29	17.78
479								11.83	12.43	14.14	16.52	17.80
480								16.40	15.93	16.23	17.18	17.86
481								21.47	19.82	18.54	17.92	17.93
482								22.05	20.26	18.81	18.00	17.94
483	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.11	5.71	8.38	9.88	10.73
484	13.9	9.6	9.2	8.9	9.0	8.9	10.1	6.08	6.70	7.86	9.20	10.09
485	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.37	7.84	8.16	9.02	9.73
486	13.9	9.6	9.6	9.3	8.9	8.9	10.1	13.34	11.29	10.09	9.82	9.95
487	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
488								1.63	3.04	4.50	5.82	6.57
489								3.44	3.43	4.21	5.32	6.07
490								10.92	7.92	6.17	5.80	5.98

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
491								16.94	12.88	9.67	7.75	6.92
492								18.39	15.46	12.37	9.91	8.46
493	12.0	10.6	11.2	9.4	9.2	9.2	9.9	5.90	6.91	8.01	8.92	9.42
494	11.8	10.3	10.8	9.6	8.9	10.2	9.9	7.36	7.28	7.82	8.49	8.94
495	11.8	10.7	10.9	9.5	8.9	9.6	9.9	12.59	10.10	8.96	8.69	8.78
496	11.8	11.0	11.1	9.3	8.9	8.7	9.8	19.81	15.15	11.93	10.07	9.35
497	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
498	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
499	13.7	11.1	11.6	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
500	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
501	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
502	12.1	10.0	11.4	11.1	8.9	9.3	10.7	26.18	20.30	18.21	17.33	17.23
503	12.1	10.0	11.4	11.1	8.9	9.3	10.7	30.23	24.15	21.14	19.21	18.30
504	11.8	10.1	11.8	11.6	10.1	9.3	9.9	32.27	26.01	25.37	24.82	24.46
505	11.8	10.2	11.8	11.4	9.7	9.3	9.9	40.36	31.09	27.82	25.85	24.95
506	11.8	10.3	11.8	11.1	9.4	9.3	9.8	39.68	32.98	30.43	27.91	26.27
507	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11
508	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
509	11.1	10.3	11.8	13.6	10.0	10.3	9.3	51.16	42.82	39.29	37.39	36.72
510	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
511	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
512	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
513	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11
514	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
515	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
516	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
517	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.72	33.52
518	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
519	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
520	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09
521	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
522	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
523								12.10	12.63	14.26	16.56	17.81
524								14.95	14.81	15.56	16.97	17.84
525								20.13	18.79	17.93	17.72	17.91
526								22.05	20.26	18.81	18.00	17.94
527	13.6	9.6	8.9	8.9	9.3	8.9	10.4	4.96	6.71	8.46	9.98	10.83
528	13.8	9.6	9.1	8.9	9.1	8.9	10.2	5.69	6.70	8.06	9.47	10.34
529	13.9	9.6	9.4	9.0	8.9	8.9	10.0	6.67	6.69	7.54	8.78	9.69
530	13.9	9.6	9.5	9.2	8.9	8.9	10.1	11.17	9.78	9.25	9.47	9.85
531	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
532								1.63	3.04	4.50	5.82	6.57
533								3.44	3.43	4.21	5.32	6.07
534								10.92	7.92	6.17	5.80	5.98
535								15.08	10.89	7.94	6.65	6.32
536								18.64	14.73	11.21	8.86	7.67
537	12.1	10.6	11.3	9.4	9.2	8.9	9.9	5.90	6.91	8.01	8.92	9.42
538	11.9	10.5	11.0	9.5	9.1	9.8	9.9	6.17	6.83	7.81	8.67	9.17
539	11.8	10.5	10.9	9.5	8.9	9.9	9.9	9.34	8.30	8.16	8.47	8.80
540	11.8	10.9	11.0	9.4	8.9	9.1	9.8	16.30	12.65	10.29	9.21	8.95
541	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
542	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
543	13.8	11.1	11.5	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
544	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
545	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
546	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
547	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
548	11.8	10.1	11.8	11.7	10.2	9.3	10.0	32.27	26.01	25.37	24.82	24.46
549	11.8	10.2	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
550	11.8	10.3	11.8	11.2	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
551	11.1	10.3	11.8	13.6	10.0	10.3	9.3	30.82	29.36	31.06	36.61	37.60
552	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
553	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
554	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
555	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.02		35.85	37.46	38.45
556	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
557	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
558	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
559	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
560	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
561	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
562	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
563	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
564	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
565								10.39	11.32	13.48	16.31	17.78
566								11.93	12.50	14.18	16.53	17.80
567								16.47	15.98	16.26	17.19	17.86
568								21.52	19.85	18.57	17.92	17.93
569								22.05	20.26	18.81	18.00	17.94
570	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.12	6.71	8.37	9.87	10.72
571	13.9	9.6	9.2	8.9	9.0	8.9	10.1	6.09	6.70	7.85	9.19	10.08
572	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.50	7.92	8.20	9.04	9.74
573	13.9	9.6	9.6	9.3	8.9	8.9	10.1	13.48	11.39	10.15	9.84	9.95
574	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
575								1.63	3.04	4.50	5.82	6.57
576								3.44	3.43	4.21	5.32	6.07
577								10.92	7.92	6.17	5.80	5.98
578								16.94	12.88	9.67	7.75	6.92
579								18.39	15.46	12.37	9.91	8.46
580	12.0	10.6	11.2	9.4	9.2	9.2	9.9	5.90	6.91	8.01	8.92	9.42
581	11.8	10.3	10.8	9.6	8.9	10.2	9.9	7.36	7.28	7.82	8.49	8.94
582	11.8	10.7	10.9	9.5	8.9	9.5	9.9	12.59	10.10	8.96	8.69	8.78
583	11.8	11.0	11.1	9.3	8.9	8.7	9.8	19.81	15.15	11.93	10.07	9.35
584	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
585	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
586	13.7	11.1	11.6	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
587	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
588	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
589	12.1	10.0	11.4	11.1	8.9	9.3	10.7	26.18	20.30	18.21	17.33	17.23
590	12.1	10.0	11.4	11.1	8.9	9.3	10.7	30.23	24.15	21.14	19.21	18.30
591	11.8	10.1	11.8	11.6	10.1	9.3	9.9	32.27	26.01	25.37	24.82	24.46
592	11.8	10.2	11.8	11.4	9.7	9.3	9.9	40.36	31.09	27.82	25.85	24.95
593	11.8	10.3	11.8	11.1	9.4	9.3	9.8	39.68	32.98	30.43	27.91	26.27
594	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11
595	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
596	11.1	10.3	11.8	13.6	10.0	10.3	9.3	51.16	42.82	39.29	37.39	36.72
597	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
598	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
599	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
600	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
601	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
602	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
603	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
604	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.72	33.52
605	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
606	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
607	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09
608	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
609								12.81	13.17	14.58	16.66	17.82
610								15.03	14.88	15.60	16.98	17.85
611								20.21	18.85	17.97	17.73	17.92
612								22.05	20.26	18.81	18.00	17.94
613	13.7	9.6	9.0	8.9	9.2	8.9	10.3	4.96	6.71	8.46	9.98	10.83
614	13.8	9.6	9.1	8.9	9.1	8.9	10.1	5.71	6.70	8.05	9.45	10.33
615	13.9	9.6	9.4	9.0	8.9	8.9	10.0	6.69	6.69	7.53	8.77	9.68
616	13.9	9.6	9.5	9.2	8.9	8.9	10.1	11.25	9.83	9.28	9.48	9.86
617	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
618								1.63	3.04	4.50	5.82	6.57
619								3.44	3.43	4.21	5.32	6.07
620								10.92	7.92	6.17	5.80	5.98
621								15.08	10.89	7.94	6.65	6.32
622								18.64	14.73	11.21	8.86	7.67
623	12.1	10.6	11.3	9.4	9.2	9.0	9.9	5.90	6.91	8.01	8.92	9.42
624	11.9	10.5	11.0	9.5	9.1	9.8	9.9	6.17	6.83	7.81	8.67	9.17
625	11.8	10.6	10.9	9.5	8.9	9.9	9.9	9.34	8.30	8.16	8.47	8.80
626	11.8	10.9	11.0	9.4	8.9	9.1	9.8	16.30	12.65	10.29	9.21	8.95
627	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
628	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
629	13.8	11.1	11.5	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
630	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
631	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
632	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
633	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
634	11.8	10.1	11.8	11.7	10.2	9.3	10.0	32.27	26.01	25.37	24.82	24.46
635	11.8	10.2	11.8	11.5	9.9	9.3	9.9	37.07	28.15	26.08	25.08	24.62
636	11.8	10.3	11.8	11.2	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
637	11.1	10.3	11.8	13.6	10.0	10.3	9.3	30.82	29.36	31.06	36.61	37.60
638	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
639	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
640	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
641	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.02		35.85	37.46	38.45
642	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
643	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
644	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
645	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
646	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
647	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
648	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
649	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
650	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
651								10.46	11.37	13.51	16.32	17.78
652								12.11	12.64	14.27	16.56	17.81
653								16.52	16.02	16.28	17.20	17.87
654								21.57	19.89	18.59	17.93	17.93
655								22.05	20.26	18.81	18.00	17.94

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
656	13.7	9.6	9.1	8.9	9.2	8.9	10.3	5.14	6.71	8.36	9.86	10.71
657	13.9	9.6	9.2	8.9	9.0	8.9	10.1	6.12	6.70	7.83	9.17	10.06
658	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.57	7.97	8.23	9.05	9.74
659	13.9	9.6	9.6	9.3	8.9	8.9	10.1	13.58	11.46	10.19	9.86	9.96
660	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
661								1.93	2.86	4.19	5.53	6.31
662								3.44	3.43	4.21	5.32	6.07
663								10.92	7.92	6.17	5.80	5.98
664								16.94	12.88	9.67	7.75	6.92
665								18.39	15.46	12.37	9.91	8.46
666	12.0	10.6	11.2	9.4	9.2	9.2	9.9	5.90	6.91	8.01	8.92	9.42
667	11.8	10.3	10.7	9.6	8.9	10.3	9.9	7.36	7.28	7.82	8.49	8.94
668	11.8	10.7	10.9	9.5	8.9	9.5	9.8	12.59	10.10	8.96	8.69	8.78
669	11.8	11.0	11.1	9.3	8.9	8.7	9.7	19.81	15.15	11.93	10.07	9.35
670	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
671	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
672	13.7	11.1	11.6	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
673	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
674	12.1	10.0	11.4	11.1	8.9	9.3	10.7	20.37	16.76	16.36	16.38	16.79
675	12.1	10.0	11.4	11.1	8.9	9.3	10.7	26.18	20.30	18.21	17.33	17.23
676	12.1	10.0	11.4	11.1	8.9	9.3	10.7	30.23	24.15	21.14	19.21	18.30
677	11.8	10.1	11.8	11.6	10.1	9.3	9.9	32.27	26.01	25.37	24.82	24.46
678	11.8	10.2	11.8	11.3	9.7	9.3	9.9	40.36	31.09	27.82	25.85	24.95
679	11.8	10.3	11.8	11.1	9.3	9.3	9.8	39.68	32.98	30.43	27.91	26.27
680	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11
681	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
682	11.1	10.3	11.8	13.6	10.0	10.3	9.3	51.16	42.82	39.29	37.39	36.72
683	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
684	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
685	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
686	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11
687	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
688	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
689	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
690	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.72	33.52
691	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
692	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
693	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09
694	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
695								12.91	13.25	14.63	16.67	17.82
696								15.11	14.94	15.64	16.99	17.85
697								20.31	18.93	18.01	17.75	17.92
698								22.05	20.26	18.81	18.00	17.94
699	13.7	9.6	9.0	8.9	9.2	8.9	10.3	4.97	6.71	8.45	9.97	10.82
700	13.8	9.6	9.1	8.9	9.1	8.9	10.1	5.73	6.70	8.04	9.44	10.32
701	13.9	9.6	9.4	9.0	8.9	8.9	10.0	6.70	6.69	7.52	8.76	9.67
702	13.9	9.6	9.5	9.2	8.9	8.9	10.1	11.34	9.90	9.32	9.50	9.86
703	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
704								1.63	3.04	4.50	5.82	6.57
705								3.44	3.43	4.21	5.32	6.07
706								10.92	7.92	6.17	5.80	5.98
707								16.94	12.88	9.67	7.75	6.92
708								18.64	14.73	11.21	8.86	7.67
709	12.1	10.6	11.3	9.4	9.2	9.0	9.9	5.90	6.91	8.01	8.92	9.42
710	11.9	10.5	11.0	9.5	9.1	9.8	9.9	6.17	6.83	7.81	8.67	9.17

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
711	11.8	10.6	10.9	9.5	8.9	9.7	9.9	12.59	10.10	8.96	8.69	8.78
712	11.8	10.9	11.0	9.4	8.9	9.0	9.8	16.30	12.65	10.29	9.21	8.95
713	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
714	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
715	13.7	11.1	11.5	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
716	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
717	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
718	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
719	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
720	11.8	10.1	11.8	11.7	10.2	9.3	10.0	32.27	26.01	25.37	24.82	24.46
721	11.8	10.2	11.8	11.4	9.8	9.3	9.9	40.36	31.09	27.82	25.85	24.95
722	11.8	10.3	11.8	11.2	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
723	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
724	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
725	11.1	10.3	11.8	13.6	10.0	10.3	9.3	54.87	45.89	41.52	38.71	37.43
726	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.02		35.85	37.46	38.45
727	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
728	6.1	10.3	11.8	13.6	10.3	12.5	8.6	47.06		37.83	37.08	37.09
729	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
730	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
731	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
732	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
733	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
734	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
735	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
736								11.15	11.90	13.83	16.42	17.79
737								11.19	11.93	13.84	16.42	17.79
738								16.59	16.07	16.31	17.21	17.87
739								21.67	19.97	18.64	17.94	17.93
740								22.05	20.26	18.81	18.00	17.94
741	13.7	9.6	9.1	8.9	9.2	8.9	10.3	5.16	6.71	8.35	9.84	10.70
742	13.9	9.6	9.2	8.9	9.0	8.9	10.0	6.14	6.70	7.82	9.16	10.05
743	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.64	8.03	8.26	9.06	9.74
744	13.9	9.6	9.6	9.3	8.9	8.9	10.1	13.75	11.58	10.26	9.89	9.97
745	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
746								1.93	2.86	4.19	5.53	6.31
747								3.44	3.43	4.21	5.32	6.07
748								10.92	7.92	6.17	5.80	5.98
749								16.94	12.88	9.67	7.75	6.92
750								18.39	15.46	12.37	9.91	8.46
751	12.0	10.6	11.2	9.4	9.2	9.2	9.9	5.90	6.91	8.01	8.92	9.42
752	11.8	10.3	10.7	9.6	8.9	10.3	9.9	7.36	7.28	7.82	8.49	8.94
753	11.8	10.7	10.9	9.5	8.9	9.5	9.8	12.59	10.10	8.96	8.69	8.78
754	11.8	11.1	11.1	9.3	8.9	8.7	9.8	19.81	15.15	11.93	10.07	9.35
755	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
756	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
757	13.7	11.1	11.7	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
758	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
759	12.1	10.0	11.4	11.1	8.9	9.3	10.7	20.37	16.76	16.36	16.38	16.79
760	12.1	10.0	11.4	11.1	8.9	9.3	10.7	26.18	20.30	18.21	17.33	17.23
761	12.1	10.0	11.4	11.1	8.9	9.3	10.7	30.23	24.15	21.14	19.21	18.30
762	11.8	10.1	11.8	11.6	10.1	9.3	9.9	32.27	26.01	25.37	24.82	24.46
763	11.8	10.2	11.8	11.3	9.7	9.3	9.9	40.36	31.09	27.82	25.85	24.95
764	11.8	10.3	11.8	11.1	9.3	9.3	9.8	39.68	32.98	30.43	27.91	26.27
765	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
766	11.1	10.3	11.8	13.6	10.0	10.3	9.3	38.11	32.94	31.93	35.64	36.14
767	11.1	10.3	11.8	13.6	10.0	10.3	9.3	51.16	42.82	39.29	37.39	36.72
768	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
769	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
770	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
771	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11
772	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
773	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
774	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
775	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.72	33.52
776	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
777	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
778	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09
779	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
780								10.18	11.16	13.38	16.28	17.78
781								11.29	12.01	13.89	16.44	17.80
782								16.68	16.15	16.36	17.22	17.87
783								21.72	20.01	18.66	17.95	17.94
784								22.05	20.26	18.81	18.00	17.94
785	13.7	9.6	9.1	8.9	9.2	8.9	10.3	5.17	6.71	8.35	9.83	10.69
786	13.9	9.6	9.2	8.9	9.0	8.9	10.0	6.15	6.70	7.82	9.15	10.04
787	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.84	8.16	8.34	9.09	9.75
788	13.9	9.6	9.6	9.3	8.9	8.9	10.1	13.80	11.61	10.28	9.89	9.97
789	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
790								1.93	2.86	4.19	5.53	6.31
791								3.44	3.43	4.21	5.32	6.07
792								10.92	7.92	6.17	5.80	5.98
793								16.94	12.88	9.67	7.75	6.92
794								18.39	15.46	12.37	9.91	8.46
795	12.0	10.6	11.2	9.4	9.2	9.2	9.9	5.90	6.91	8.01	8.92	9.42
796	11.8	10.3	10.7	9.6	8.9	10.3	9.9	7.36	7.28	7.82	8.49	8.94
797	11.8	10.7	10.9	9.5	8.9	9.5	9.8	12.59	10.10	8.96	8.69	8.78
798	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
799	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
800	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
801	13.7	11.1	11.7	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
802	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
803	12.1	10.0	11.4	11.1	8.9	9.3	10.7	20.37	16.76	16.36	16.38	16.79
804	12.1	10.0	11.4	11.1	8.9	9.3	10.7	26.18	20.30	18.21	17.33	17.23
805	12.1	10.0	11.4	11.1	8.9	9.3	10.7	30.23	24.15	21.14	19.21	18.30
806	11.8	10.1	11.8	11.6	10.0	9.3	9.9	37.07	28.15	26.08	25.08	24.62
807	11.8	10.2	11.8	11.3	9.6	9.3	9.9	40.36	31.09	27.82	25.85	24.95
808	11.8	10.3	11.8	11.1	9.3	9.3	9.8	39.68	32.98	30.43	27.91	26.27
809	11.1	10.3	11.8	13.6	10.0	10.3	9.3	31.18	29.16	31.02	36.08	37.11
810	11.1	10.3	11.8	13.6	10.0	10.3	9.3	38.11	32.94	31.93	35.64	36.14
811	11.1	10.3	11.8	13.6	10.0	10.3	9.3	51.16	42.82	39.29	37.39	36.72
812	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
813	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.73	50.89	46.85	43.02	40.46
814	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
815	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11
816	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
817	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
818	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.72	33.52
819	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
820	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
821	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09
822	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
823								11.27	11.99	13.88	16.44	17.79
824								13.04	13.35	14.69	16.69	17.82
825								15.16	14.98	15.66	17.00	17.85
826								20.38	18.98	18.05	17.76	17.92
827								22.05	20.26	18.81	18.00	17.94
828	13.7	9.6	9.0	8.9	9.2	8.9	10.3	5.00	6.71	8.44	9.95	10.80
829	13.8	9.6	9.2	8.9	9.1	8.9	10.1	5.94	6.70	7.93	9.30	10.18
830	13.9	9.6	9.4	9.0	8.9	8.9	10.0	6.72	6.69	7.51	8.75	9.66
831	13.9	9.6	9.5	9.2	8.9	8.9	10.1	11.44	9.97	9.35	9.51	9.87
832	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
833								1.63	3.04	4.50	5.82	6.57
834								3.44	3.43	4.21	5.32	6.07
835								10.92	7.92	6.17	5.80	5.98
836								16.94	12.88	9.67	7.75	6.92
837								18.64	14.73	11.21	8.86	7.67
838	12.0	10.6	11.3	9.4	9.2	9.1	9.9	5.90	6.91	8.01	8.92	9.42
839	11.9	10.5	10.9	9.5	9.1	9.9	9.9	7.36	7.28	7.82	8.49	8.94
840	11.8	10.6	10.9	9.5	8.9	9.6	9.9	12.59	10.10	8.96	8.69	8.78
841								10.24	11.21	13.41	16.29	17.78
842								10.43	11.35	13.49	16.31	17.78
843	11.8	11.0	11.0	9.4	8.9	8.8	9.8	19.81	15.15	11.93	10.07	9.35
844	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
845	13.9	11.1	11.2	10.0	9.3	8.6	11.4	3.29	4.63	6.06	7.15	7.88
846	13.7	11.1	11.5	10.0	9.3	8.6	11.3	4.74	4.83	5.73	6.69	7.42
847	13.6	11.1	11.8	10.0	9.3	8.6	11.3	13.08	9.39	7.53	7.17	7.33
848	12.1	10.0	11.4	11.1	8.9	9.3	10.7	19.22	15.81	15.76	16.06	16.72
849	12.1	10.0	11.4	11.1	8.9	9.3	10.7	22.70	17.92	17.01	16.76	16.97
850	12.1	10.0	11.4	11.1	8.9	9.3	10.7	29.33	22.48	19.64	18.19	17.68
851	11.8	10.1	11.8	11.7	10.2	9.3	10.0	32.27	26.01	25.37	24.82	24.46
852	11.8	10.2	11.8	11.4	9.8	9.3	9.9	40.36	31.09	27.82	25.85	24.95
853	11.8	10.3	11.8	11.2	9.5	9.3	9.8	41.27	33.15	29.55	26.92	25.54
854	11.1	10.3	11.8	13.6	10.0	10.3	9.3	30.82	29.36	31.06	36.61	37.60
855	11.1	10.3	11.8	13.6	10.0	10.3	9.3	35.75	31.39	31.72	35.43	36.32
856	11.1	10.3	11.8	13.6	10.0	10.3	9.3	43.63	37.35	35.21	36.36	36.27
857	11.1	10.3	11.8	13.6	10.0	10.3	9.3	57.86	48.72	43.66	40.19	38.34
858	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.02		35.85	37.46	38.45
859	6.1	10.3	11.8	13.6	10.3	12.5	8.6	37.61		35.10	36.47	37.47
860	6.1	10.3	11.8	13.6	10.3	12.5	8.6	50.86		39.75	37.97	37.44
861	6.1	10.3	11.8	13.6	10.3	12.5	8.6	55.80		43.73	40.55	38.87
862	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
863	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.15	33.90
864	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.36	33.17
865	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.37	32.77
866	10.7	10.0	11.1	12.5	10.3	10.7	9.2				33.98	33.35
867	10.7	10.0	11.1	12.5	10.3	10.7	9.2				36.77	35.01
868								11.44	12.12	13.95	16.46	17.80
869								16.78	16.22	16.40	17.24	17.87
870								21.79	20.06	18.69	17.96	17.94
871								22.05	20.26	18.81	18.00	17.94
872	13.7	9.6	9.1	8.9	9.2	8.9	10.3	5.19	6.71	8.34	9.82	10.68
873	13.9	9.6	9.2	8.9	9.0	8.9	10.0	6.17	6.70	7.81	9.13	10.03
874	13.9	9.6	9.4	9.1	8.9	8.9	10.0	8.93	8.23	8.37	9.11	9.76
875	13.9	9.6	9.6	9.3	8.9	8.9	10.1	13.97	11.73	10.34	9.92	9.98

	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10	43 AGM	44 T1	45 T2	46 T3	47 T4	48 T5
876	13.9	9.6	9.6	9.3	8.9	8.9	10.1	17.50	14.18	11.72	10.49	10.13
877								1.93	2.86	4.19	5.53	6.31
878								7.67	5.37	4.79	5.34	5.94
879								15.08	10.89	7.94	6.65	6.32
880								16.94	12.88	9.67	7.75	6.92
881								18.39	15.46	12.37	9.91	8.46
882	11.8	10.3	10.7	9.6	8.9	10.3	9.9	9.34	8.30	8.16	8.47	8.80
883	11.8	10.7	10.9	9.5	8.9	9.5	9.8	16.30	12.65	10.29	9.21	8.95
884	11.8	11.1	11.1	9.3	8.9	8.6	9.7	21.70	17.57	13.74	11.14	9.96
885	11.8	11.1	11.1	9.3	8.9	8.6	9.7	19.07	17.44	14.93	12.42	10.90
886	13.8	11.1	11.3	10.0	9.3	8.6	11.4	3.27	4.42	5.81	6.89	7.64
887	13.7	11.1	11.7	10.0	9.3	8.6	11.3	8.59	6.62	6.22	6.70	7.26
888	13.6	11.1	11.8	10.0	9.3	8.6	11.3	22.77	16.58	11.88	9.50	8.41
889	12.1	10.0	11.4	11.1	8.9	9.3	10.7	20.37	16.76	16.36	16.38	16.79
890	12.1	10.0	11.4	11.1	8.9	9.3	10.7	26.18	20.30	18.21	17.33	17.23
891	12.1	10.0	11.4	11.1	8.9	9.3	10.7	31.82	25.24	22.20	20.14	18.99
892	11.8	10.1	11.8	11.6	10.0	9.3	9.9	37.07	28.15	26.08	25.08	24.62
893	11.8	10.2	11.8	11.3	9.6	9.3	9.8	41.27	33.15	29.55	26.92	25.54
894	11.8	10.3	11.8	11.1	9.3	9.3	9.8	38.65	32.59	30.64	28.50	26.89
895	11.1	10.3	11.8	13.6	10.0	10.3	9.3	32.90	30.18	31.41	35.64	36.65
896	11.1	10.3	11.8	13.6	10.0	10.3	9.3	38.11	32.94	31.93	35.64	36.14
897	11.1	10.3	11.8	13.6	10.0	10.3	9.3	51.16	42.82	39.29	37.39	36.72
898	11.1	10.3	11.8	13.6	10.0	10.3	9.3	58.34	50.30	45.50	41.64	39.40
899	11.1	10.3	11.8	13.6	10.0	10.3	9.3	58.48	51.71	47.69	43.98	41.45
900	6.1	10.3	11.8	13.6	10.3	12.5	8.6	36.13		35.30	36.90	37.93
901	6.1	10.3	11.8	13.6	10.3	12.5	8.6	40.30		35.50	36.27	37.11
902	6.1	10.3	11.8	13.6	10.3	12.5	8.6	53.72		41.86	39.15	38.07
903	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.94		45.30	41.70	39.80
904	6.1	10.3	11.8	13.6	10.3	12.5	8.6	56.66		46.53	42.90	40.73
905	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.72	33.52
906	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.20	32.90
907	10.7	10.0	11.1	12.5	10.3	10.7	9.2				32.96	32.91
908	10.7	10.0	11.1	12.5	10.3	10.7	9.2				35.32	34.09
909	10.7	10.0	11.1	12.5	10.3	10.7	9.2	47.00			38.26	36.08
910	12.0	10.6	11.2	9.4	9.2	9.2	9.9	6.17	6.83	7.81	8.67	9.17

	49 A_PT	50 T_GRA
1	12.68	27.67
2	14.77	9.98
3	18.65	-22.7
4	20.24	-36.1
5	6.71	40.24
6	6.80	29.40
7	6.94	12.58
8	9.71	-18.4
9	13.20	-53.5
10	3.45	32.31
11	2.99	26.03
12	5.94	-32.9
13	11.30	-81.9
14	13.16	-83.5
15	7.10	26.11

	49	50
	A_PT	T_GRA
16	6.94	18.90
17	8.60	-13.4
18	13.08	-68.9
19	17.67	-91.5
20	4.66	31.86
21	5.10	11.49
22	10.00	-63.6
23	16.93	-39.3
24	17.83	-45.7
25	23.82	-111.
26	27.77	-78.2
27	30.43	-125.
28	34.66	-134.
29	31.25	2.74
30	31.50	-16.6
31	34.33	-70.5
32	47.43	-153.
33	51.38	-147.
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45	11.18	40.29
46	12.49	29.22
47	15.33	5.32
48	19.71	-31.6
49	20.37	-37.2
50	6.72	39.02
51	6.86	22.46
52	7.75	1.35
53	11.07	-32.1
54	14.47	-66.3
55	3.06	33.00
56	3.69	8.96
57	8.34	-54.4
58	13.16	-83.5
59	14.86	-85.4
60	6.94	24.27
61	7.49	5.37
62	10.55	-41.6
63	15.63	-90.4
64	16.34	-27.3
65	4.66	31.86
66	5.10	11.49
67	10.00	-63.6
68	16.93	-39.3
69	19.21	-64.9
70	23.82	-111.

	49	50
	A_PT	T_GRA
71	27.88	-78.6
72	33.09	-143.
73	34.66	-134.
74	30.41	3.18
75	32.95	-45.7
76	38.73	-96.2
77	50.08	-163.
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88	12.76	26.94
89	14.82	9.56
90	18.70	-23.1
91	20.30	-36.6
92	6.71	40.24
93	6.81	28.88
94	6.95	12.14
95	9.82	-19.4
96	13.32	-54.7
97	3.45	32.31
98	2.99	26.03
99	5.94	-32.9
100	11.30	-81.9
101	14.86	-85.4
102	7.10	26.11
103	6.94	18.90
104	8.60	-13.4
105	13.08	-68.9
106	17.67	-91.5
107	4.66	31.86
108	5.10	11.49
109	10.00	-63.6
110	16.93	-39.3
111	19.21	-64.9
112	23.82	-111.
113	27.77	-78.2
114	30.43	-125.
115	34.66	-134.
116	31.25	2.74
117	31.50	-16.6
118	34.33	-70.5
119	47.43	-153.
120	51.38	-147.
121		
122		
123		
124		
125		

	49	50
	A_PT	T_GRA
126		
127		
128		
129		
130		
131		
132	11.24	39.77
133	12.53	28.91
134	15.36	5.01
135	19.75	-31.9
136	20.37	-37.2
137	6.72	38.76
138	6.86	22.20
139	7.84	.50
140	11.15	-32.9
141	14.47	-66.3
142	3.06	33.00
143	3.69	8.96
144	8.34	-54.4
145	13.16	-83.5
146	14.86	-85.4
147	6.94	24.27
148	7.49	5.37
149	10.55	-41.6
150	15.63	-90.4
151	17.15	-47.7
152	4.66	31.86
153	5.10	11.49
154	10.00	-63.6
155	16.93	-39.3
156	19.21	-64.9
157	23.82	-111.
158	27.88	-78.6
159	33.09	-143.
160	34.66	-134.
161	30.41	3.18
162	32.95	-45.7
163	38.73	-96.2
164	50.08	-163.
165	51.82	-125.
166		
167		
168		
169		
170		
171		
172		
173		
174		
175		
176	12.81	26.53
177	14.87	9.15
178	18.74	-23.4
179	20.37	-37.2
180	6.71	40.24

	49	50
	A_PT	T_GRA
181	6.81	28.53
182	6.95	11.88
183	9.87	-20.0
184	13.37	-55.3
185	3.45	32.31
186	2.99	26.03
187	5.94	-32.9
188	11.30	-81.9
189	14.86	-85.4
190	7.10	26.11
191	6.94	18.90
192	8.60	-13.4
193	13.08	-68.9
194	17.67	-91.5
195	4.66	31.86
196	5.10	11.49
197	10.00	-63.6
198	16.93	-39.3
199	19.21	-64.9
200	23.82	-111.
201	27.77	-78.2
202	30.43	-125.
203	34.66	-134.
204	31.25	2.74
205	31.50	-16.6
206	34.33	-70.5
207	47.43	-153.
208	51.38	-147.
209		
210		
211		
212		
213		
214		
215		
216		
217		
218		
219		
220	11.37	38.63
221	12.60	28.29
222	15.41	4.60
223	19.81	-32.4
224	20.37	-37.2
225	6.72	38.50
226	6.87	21.68
227	7.89	-.01
228	11.27	-34.1
229	14.47	-66.3
230	3.06	33.00
231	3.69	8.96
232	8.34	-54.4
233	13.16	-83.5
234	14.86	-85.4
235	6.94	24.27

	49	50
	A_PT	T_GRA
236	7.49	5.37
237	10.55	-41.6
238	15.63	-90.4
239	17.15	-47.7
240	4.50	29.23
241	7.14	-27.0
242	10.00	-63.6
243	16.93	-39.3
244	19.21	-64.9
245	23.82	-111.
246	27.88	-78.6
247	33.09	-143.
248	34.36	-106.
249	30.45	-1.33
250	32.95	-45.7
251	38.73	-96.2
252	50.08	-163.
253	51.82	-125.
254		
255		
256		
257		
258		
259		
260		
261		
262		
263		
264	2.99	26.03
265	12.85	26.22
266	14.96	8.42
267	18.78	-23.8
268	20.37	-37.2
269	6.71	40.24
270	6.81	28.27
271	6.95	11.36
272	9.93	-20.6
273	13.49	-56.4
274	3.45	32.31
275	5.94	-32.9
276	11.30	-81.9
277	14.86	-85.4
278	7.10	26.11
279	6.94	18.90
280	8.60	-13.4
281	13.08	-68.9
282	17.67	-91.5
283	4.66	31.86
284	5.10	11.49
285	10.00	-63.6
286	16.93	-39.3
287	19.21	-64.9
288	23.82	-111.
289	27.77	-78.2
290	30.43	-125.

	49	50
	A_PT	T_GRA
291	34.66	-134.
292	31.25	2.74
293	31.50	-16.6
294	38.73	-96.2
295	47.43	-153.
296		
297		
298		
299		
300		
301		
302		
303		
304		
305		
306		
307	11.45	38.01
308	12.66	27.77
309	16.04	-.68
310	19.85	-32.8
311	20.37	-37.2
312	6.73	38.24
313	6.87	21.33
314	7.97	-.86
315	11.44	-35.8
316	14.47	-66.3
317	3.06	33.00
318	3.69	8.96
319	8.34	-54.4
320	13.16	-83.5
321	14.86	-85.4
322	6.94	24.27
323	7.49	5.37
324	10.55	-41.6
325	15.63	-90.4
326	17.15	-47.7
327	4.50	29.23
328	7.14	-27.0
329	10.00	-63.6
330	16.93	-39.3
331	19.21	-64.9
332	25.17	-104.
333	27.88	-78.6
334	33.09	-143.
335	34.36	-106.
336	30.45	-1.33
337	32.95	-45.7
338	38.73	-96.2
339	50.08	-163.
340	51.82	-125.
341		
342		
343		
344		
345		

	49	50
	A_PT	T_GRA
346		
347		
348		
349		
350		
351	12.90	25.80
352	15.01	8.01
353	18.83	-24.2
354	20.37	-37.2
355	6.71	40.24
356	6.81	28.01
357	6.96	10.58
358	9.97	-21.0
359	13.60	-57.6
360	3.06	33.00
361	2.99	26.03
362	5.94	-32.9
363	11.30	-81.9
364	14.86	-85.4
365	7.10	26.11
366	6.94	18.90
367	8.60	-13.4
368	13.08	-68.9
369	17.67	-91.5
370	4.66	31.86
371	5.10	11.49
372	10.00	-63.6
373	16.93	-39.3
374	19.21	-64.9
375	23.82	-111.
376	27.77	-78.2
377	30.43	-125.
378	34.66	-134.
379	30.41	3.18
380	32.95	-45.7
381	38.73	-96.2
382	47.43	-153.
383		
384		
385		
386		
387		
388		
389		
390		
391		
392		
393	11.53	37.29
394	12.72	27.25
395	16.15	-1.61
396	19.91	-33.3
397	20.37	-37.2
398	6.73	37.89
399	6.87	21.07
400	8.06	-1.72

	49	50
	A_PT	T_GRA
401	11.49	-36.3
402	14.47	-66.3
403	3.06	33.00
404	3.69	8.96
405	8.34	-54.4
406	13.16	-83.5
407	15.41	-69.2
408	6.94	24.27
409	7.49	5.37
410	10.55	-41.6
411	15.63	-90.4
412	17.15	-47.7
413	4.50	29.23
414	7.14	-27.0
415	10.00	-63.6
416	16.93	-39.3
417	21.56	-91.1
418	25.17	-104.
419	27.88	-78.6
420	33.09	-143.
421	34.36	-106.
422	30.45	-1.33
423	32.95	-45.7
424	38.73	-96.2
425	50.08	-163.
426	51.82	-125.
427		
428		
429		
430		
431		
432		
433		
434		
435		
436		
437	12.96	25.29
438	15.06	7.60
439	18.86	-24.5
440	20.37	-37.2
441	6.71	40.24
442	6.82	27.75
443	6.96	10.32
444	10.03	-21.7
445	13.65	-58.1
446	3.06	33.00
447	3.69	8.96
448	5.94	-32.9
449	11.30	-81.9
450	14.86	-85.4
451	6.94	24.27
452	6.94	18.90
453	8.60	-13.4
454	13.08	-68.9
455	4.66	31.86

	49	50
	A_PT	T_GRA
456	5.10	11.49
457	10.00	-63.6
458	16.93	-39.3
459	19.21	-64.9
460	23.82	-111.
461	27.77	-78.2
462	30.43	-125.
463	34.66	-134.
464	30.41	3.18
465	32.95	-45.7
466	38.73	-96.2
467	47.43	-153.
468		
469		
470		
471		
472		
473		
474		
475		
476		
477		
478	11.62	36.56
479	12.80	26.63
480	16.19	-1.92
481	19.94	-33.6
482	20.37	-37.2
483	6.73	37.63
484	6.88	20.55
485	8.12	-2.40
486	11.57	-37.2
487	14.47	-66.3
488	3.06	33.00
489	3.69	8.96
490	8.34	-54.4
491	13.16	-83.5
492	15.41	-69.2
493	6.94	24.27
494	7.49	5.37
495	10.55	-41.6
496	15.63	-90.4
497	17.15	-47.7
498	4.50	29.23
499	7.14	-27.0
500	10.00	-63.6
501	16.93	-39.3
502	21.56	-91.1
503	25.17	-104.
504	27.88	-78.6
505	33.09	-143.
506	34.36	-106.
507	30.45	-1.33
508	32.95	-45.7
509	44.42	-136.
510	50.08	-163.

	49	50
	A_PT	T_GRA
511	51.82	-125.
512		
513		
514		
515		
516		
517		
518		
519		
520		
521		
522	17.67	-91.5
523	12.99	24.98
524	15.11	7.18
525	18.95	-25.2
526	20.37	-37.2
527	6.71	40.24
528	6.82	27.32
529	6.97	10.06
530	10.07	-22.0
531	14.47	-66.3
532	3.06	33.00
533	3.69	8.96
534	8.34	-54.4
535	11.30	-81.9
536	14.86	-85.4
537	6.94	24.27
538	6.94	18.90
539	8.60	-13.4
540	13.08	-68.9
541	17.15	-47.7
542	4.66	31.86
543	5.10	11.49
544	10.00	-63.6
545	16.93	-39.3
546	19.21	-64.9
547	23.82	-111.
548	27.88	-78.6
549	30.43	-125.
550	34.66	-134.
551	30.41	3.18
552	32.95	-45.7
553	38.73	-96.2
554	47.43	-153.
555		
556		
557		
558		
559		
560		
561		
562		
563		
564		
565	11.73	35.63

	49	50
	A_PT	T_GRA
566	12.87	26.01
567	16.24	-2.34
568	19.98	-33.9
569	20.37	-37.2
570	6.73	37.37
571	6.88	20.29
572	8.21	-3.25
573	11.68	-38.2
574	14.47	-66.3
575	3.06	33.00
576	3.69	8.96
577	8.34	-54.4
578	13.16	-83.5
579	15.41	-69.2
580	6.94	24.27
581	7.49	5.37
582	10.55	-41.6
583	15.63	-90.4
584	17.15	-47.7
585	4.50	29.23
586	7.14	-27.0
587	10.00	-63.6
588	16.93	-39.3
589	21.56	-91.1
590	25.17	-104.
591	27.88	-78.6
592	33.09	-143.
593	34.36	-106.
594	30.45	-1.33
595	32.95	-45.7
596	44.42	-136.
597	50.08	-163.
598	51.82	-125.
599		
600		
601		
602		
603		
604		
605		
606		
607		
608		
609	13.52	20.53
610	15.17	6.66
611	19.01	-25.7
612	20.37	-37.2
613	6.71	40.24
614	6.82	26.97
615	6.97	9.80
616	10.12	-22.5
617	14.47	-66.3
618	3.06	33.00
619	3.69	8.96
620	8.34	-54.4

	49	50
	A_PT	T_GRA
621	11.30	-81.9
622	14.86	-85.4
623	6.94	24.27
624	6.94	18.90
625	8.60	-13.4
626	13.08	-68.9
627	17.15	-47.7
628	4.66	31.86
629	5.10	11.49
630	10.00	-63.6
631	16.93	-39.3
632	19.21	-64.9
633	23.82	-111.
634	27.88	-78.6
635	30.43	-125.
636	34.66	-134.
637	30.41	3.18
638	32.95	-45.7
639	38.73	-96.2
640	47.43	-153.
641		
642		
643		
644		
645		
646		
647		
648		
649		
650		
651	11.78	35.22
652	13.01	24.87
653	16.27	-2.65
654	20.02	-34.2
655	20.37	-37.2
656	6.74	37.11
657	6.88	19.77
658	8.26	-3.76
659	11.74	-38.9
660	14.47	-66.3
661	2.99	26.03
662	3.69	8.96
663	8.34	-54.4
664	13.16	-83.5
665	15.41	-69.2
666	6.94	24.27
667	7.49	5.37
668	10.55	-41.6
669	15.63	-90.4
670	17.15	-47.7
671	4.50	29.23
672	7.14	-27.0
673	10.00	-63.6
674	17.83	-45.7
675	21.56	-91.1

	49	50
	A_PT	T_GRA
676	25.17	-104.
677	27.88	-78.6
678	33.09	-143.
679	34.36	-106.
680	30.45	-1.33
681	32.95	-45.7
682	44.42	-136.
683	50.08	-163.
684	51.82	-125.
685		
686		
687		
688		
689		
690		
691		
692		
693		
694		
695	13.60	19.91
696	15.23	6.15
697	19.08	-26.3
698	20.37	-37.2
699	6.71	39.98
700	6.83	26.62
701	6.97	9.54
702	10.19	-23.2
703	14.47	-66.3
704	3.06	33.00
705	3.69	8.96
706	8.34	-54.4
707	13.16	-83.5
708	14.86	-85.4
709	6.94	24.27
710	6.94	18.90
711	10.55	-41.6
712	13.08	-68.9
713	17.15	-47.7
714	4.66	31.86
715	5.10	11.49
716	10.00	-63.6
717	16.93	-39.3
718	19.21	-64.9
719	23.82	-111.
720	27.88	-78.6
721	33.09	-143.
722	34.66	-134.
723	32.95	-45.7
724	38.73	-96.2
725	47.43	-153.
726		
727		
728		
729		
730		

	49	50
	A_PT	T_GRA
731		
732		
733		
734		
735		
736	12.29	30.87
737	12.32	30.67
738	16.32	-3.06
739	20.09	-34.8
740	20.37	-37.2
741	6.74	36.77
742	6.89	19.43
743	8.31	-4.27
744	11.86	-40.1
745	14.47	-66.3
746	2.99	26.03
747	3.69	8.96
748	8.34	-54.4
749	13.16	-83.5
750	15.41	-69.2
751	6.94	24.27
752	7.49	5.37
753	10.55	-41.6
754	15.63	-90.4
755	17.15	-47.7
756	4.50	29.23
757	7.14	-27.0
758	10.00	-63.6
759	17.83	-45.7
760	21.56	-91.1
761	25.17	-104.
762	27.88	-78.6
763	33.09	-143.
764	34.36	-106.
765	30.45	-1.33
766	34.33	-70.5
767	44.42	-136.
768	50.08	-163.
769	51.82	-125.
770		
771		
772		
773		
774		
775		
776		
777		
778		
779		
780	11.57	36.98
781	12.39	30.05
782	16.40	-3.68
783	20.13	-35.1
784	20.37	-37.2
785	6.74	36.51

	49	50
	A_PT	T_GRA
786	6.89	19.17
787	8.44	-5.64
788	11.90	-40.4
789	14.47	-66.3
790	2.99	26.03
791	3.69	8.96
792	8.34	-54.4
793	13.16	-83.5
794	15.41	-69.2
795	6.94	24.27
796	7.49	5.37
797	10.55	-41.6
798	17.67	-91.5
799	17.15	-47.7
800	4.50	29.23
801	7.14	-27.0
802	10.00	-63.6
803	17.83	-45.7
804	21.56	-91.1
805	25.17	-104.
806	30.43	-125.
807	33.09	-143.
808	34.36	-106.
809	30.45	-1.33
810	34.33	-70.5
811	44.42	-136.
812	50.08	-163.
813	51.82	-125.
814		
815		
816		
817		
818		
819		
820		
821		
822		
823	12.38	30.15
824	13.69	19.08
825	15.27	5.84
826	19.13	-26.8
827	20.37	-37.2
828	6.72	39.54
829	6.86	22.98
830	6.97	9.19
831	10.25	-23.9
832	14.47	-66.3
833	3.06	33.00
834	3.69	8.96
835	8.34	-54.4
836	13.16	-83.5
837	14.86	-85.4
838	6.94	24.27
839	7.49	5.37
840	10.55	-41.6

	49	50
	A_PT	T_GRA
841	11.62	36.56
842	11.75	35.43
843	15.63	-90.4
844	17.15	-47.7
845	4.66	31.86
846	5.10	11.49
847	10.00	-63.6
848	16.93	-39.3
849	19.21	-64.9
850	23.82	-111.
851	27.88	-78.6
852	33.09	-143.
853	34.66	-134.
854	30.41	3.18
855	32.95	-45.7
856	38.73	-96.2
857	50.08	-163.
858		
859		
860		
861		
862		
863		
864		
865		
866		
867		
868	12.50	29.12
869	16.47	-4.30
870	20.18	-35.5
871	20.37	-37.2
872	6.74	36.25
873	6.89	18.91
874	8.51	-6.32
875	12.01	-41.6
876	14.47	-66.3
877	2.99	26.03
878	5.94	-32.9
879	11.30	-81.9
880	13.16	-83.5
881	15.41	-69.2
882	8.60	-13.4
883	13.08	-68.9
884	17.67	-91.5
885	17.15	-47.7
886	4.50	29.23
887	7.14	-27.0
888	17.08	-125.
889	17.83	-45.7
890	21.56	-91.1
891	26.42	-110.
892	30.43	-125.
893	34.66	-134.
894	33.96	-91.5
895	31.50	-16.6

	49	50
	A_PT	T_GRA
896	34.33	-70.5
897	44.42	-136.
898	51.38	-147.
899	52.63	-124.
900		
901		
902		
903		
904		
905		
906		
907		
908		
909		
910	6.94	18.90

data file: 48SFSUB.STA [620 cases with 50 variables]

VARIABLE SPECIFICATIONS:

No	Name	Format	MD Code	Long Label
1	STATION	5.0	-9999	TESTING POINT ID
2	ST_COD	5.0	-9999	CODE = 1 FOR MID-LANE AND 2 FOR WHE
3	DATE	6.0	-9999	DATE YYMMDD
4	MONTH	3.0	-9999	MONTH OF THE YEAR
5	TIME	5.0	-9999	TIME HHMM
6	T_PAV	3.0	-9999	PAVEMENT TEMP. IN C FROM FWD
7	T_AIR	3.0	-9999	AIR TEMP. IN C FROM FWD
8	DF_1	4.2	-9999	NORMALIZED DEFLECTION FOR DROP #1
9	DF_2	4.2	-9999	NORMALIZED DEFLECTION FOR DROP #2
10	DF_3	4.2	-9999	NORMALIZED DEFLECTION FOR DROP #3
11	DF_4	4.2	-9999	NORMALIZED DEFLECTION FOR DROP #4

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
1	OF1	1	940802	8	647	21	22	.28	.27	.27	.27
2	OF1	1	940224	2	720	6	2	.24	.23	.23	.22
3	OF1	1	940802	8	854	24	28	.29	.29	.28	.28
4	OF1	1	940706	7	1608	41	35	.37	.37	.36	.35
5	OF1	1	940706	7	1159	36	33	.33	.33	.32	.31
6	OF1	1	940224	2	937	20	12	.26	.25	.25	.24
7	OF1	1	940706	7	1413	40	34	.36	.35	.34	.34
8	OF1	1	940120	1	725	14	15	.25	.25	.25	.24
9	OF1	1	940907	9	708	23	25	.30	.29	.29	.28
10	OF1	1	940907	9	903	26	30	.31	.30	.29	.29
11	OF1	1	940802	8	1609	42	40	.37	.36	.36	.35
12	OF1	1	940802	8	1105	33	33	.30	.31	.30	.30
13	OF1	1	940120	1	922	16	16	.26	.25	.25	.23
14	OF1	1	940802	8	1342	41	37	.34	.34	.33	.33
15	OF1	1	940706	7	855	27	30	.29	.28	.28	.27
16	OF1	1	940421	4	714	17	16	.27	.27	.26	.25
17	OF1	1	940523	5	1559	41	30	.32	.32	.31	.29
18	OF1	1	940607	6	636	26	23	.30	.30	.29	.28
19	OF1	1	940523	5	1255	35	27	.32	.31	.30	.29
20	OF1	1	940523	5	654	21	17	.28	.27	.27	.25
21	OF1	1	940421	4	1041	31	24	.28	.28	.27	.26
22	OF1	1	940523	5	950	35	26	.29	.28	.27	.27
23	OF1	1	940607	6	1410	51	33	.37	.36	.35	.33
24	OF1	1	940706	7	632	24	26	.29	.28	.28	.28
25	OF1	1	940224	2	1236	31	18	.28	.28	.27	.26
26	OF1	1	940310	3	706	5	0	.25	.24	.24	.23
27	OF1	1	940310	3	1149	26	15	.26	.27	.26	.25
28	OF1	1	940607	6	900	35	27	.32	.31	.30	.29
29	OF1	1	940607	6	1140	46	31	.33	.32	.31	.30
30	OF1	1	931201	12	1008	24	23	.27	.26	.25	.24
31	OF1	1	931201	12	802	17	18	.26	.26	.25	.24
32	OF1	1	940907	9	1308	39	38	.36	.35	.34	.33
33	OF1	1	940907	9	1513	43	41	.40	.38	.37	.35

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
34	0F1	1	940907	9	1111	32	33	.33	.32	.31	.30
35	0F3	2	940523	5	1438	40	29	.37	.36	.35	.34
36	0F3	2	931201	12	827	15	14	.28	.28	.27	.26
37	0F3	2	940802	8	1157	34	34	.42	.42	.42	.41
38	0F3	2	940224	2	824	12	7	.28	.27	.27	.26
39	0F3	2	940607	6	736	29	25	.36	.36	.35	.34
40	0F3	2	940907	9	1607	38	38	.47	.47	.47	.46
41	0F3	2	940120	1	822	15	15	.28	.28	.27	.26
42	0F3	2	940907	9	1205	34	36	.42	.42	.42	.41
43	0F3	2	940310	3	811	10	6	.28	.27	.27	.26
44	0F3	2	940802	8	741	22	25	.36	.34	.35	.35
45	0F3	2	940802	8	948	27	31	.38	.38	.38	.38
46	0F3	2	940523	5	1650	40	30	.38	.38	.36	.35
47	0F3	2	940310	3	1343	31	15	.32	.32	.31	.31
48	0F3	2	940120	1	1015	17	16	.29	.29	.28	.27
49	0F3	2	940607	6	1509	47	35	.45	.45	.43	.41
50	0F3	2	940706	7	1702	38	34	.45	.45	.44	.44
51	0F3	2	940224	2	1139	29	14	.30	.30	.29	.29
52	0F3	2	940706	7	945	28	31	.37	.37	.38	.37
53	0F3	2	940607	6	959	38	28	.37	.37	.36	.35
54	0F3	2	940224	2	1357	34	20	.32	.32	.31	.30
55	0F3	2	940907	9	1417	39	40	.46	.46	.46	.44
56	0F3	2	940907	9	809	24	26	.37	.37	.37	.37
57	0F3	2	940802	8	1655	40	39	.47	.47	.47	.46
58	0F3	2	931201	12	910	20	20	.30	.30	.29	.28
59	0F3	2	940706	7	719	24	26	.36	.36	.36	.36
60	0F3	2	940907	9	947	27	31	.39	.39	.38	.38
61	0F3	2	940523	5	756	26	21	.33	.33	.32	.31
62	0F3	2	931201	12	1145	31	27	.32	.31	.31	.29
63	0F3	2	940706	7	1257	35	34	.43	.43	.43	.42
64	0F3	2	940421	4	1156	37	27	.36	.35	.35	.34
65	0F3	2	940802	8	1439	41	39	.44	.43	.44	.43
66	0F3	2	940523	5	1052	39	29	.36	.36	.35	.34
67	0F3	2	940607	6	1242	51	32	.42	.42	.41	.39
68	0F3	2	940421	4	851	24	20	.31	.31	.30	.30
69	0F3	2	940706	7	1459	39	35	.46	.46	.46	.45
70	100F1	1	940224	2	1033	20	14	.22	.22	.22	.21
71	100F1	1	940607	6	1434	49	33	.30	.29	.28	.28
72	100F1	1	940607	6	915	36	28	.24	.24	.24	.23
73	100F1	1	940907	9	1532	42	40	.31	.30	.30	.30
74	100F1	1	940706	7	1428	39	35	.30	.29	.29	.30
75	100F1	1	940310	3	724	6	2	.21	.21	.20	.20
76	100F1	1	940607	6	1158	45	32	.27	.27	.26	.26
77	100F1	1	940706	7	1622	41	35	.30	.30	.30	.30
78	100F1	1	940706	7	1213	36	34	.27	.27	.27	.27
79	100F1	1	940224	2	735	6	2	.21	.21	.21	.20
80	100F1	1	940907	9	1323	39	39	.28	.29	.28	.28
81	100F1	1	940802	8	706	21	22	.23	.23	.23	.23
82	100F1	1	940802	8	1628	42	38	.31	.31	.31	.31
83	100F1	1	940523	5	1006	37	26	.25	.25	.24	.24
84	100F1	1	940706	7	647	24	25	.23	.23	.23	.23
85	100F1	1	940421	4	732	19	16	.23	.23	.23	.22
86	100F1	1	940706	7	909	28	30	.24	.24	.24	.24
87	100F1	1	940120	1	743	14	15	.22	.22	.22	.21
88	100F1	1	940421	4	1120	38	27	.25	.25	.24	.24

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
89	100F1	1	931201	12	1040	26	25	.25	.25	.24	.23
90	100F1	1	940907	9	916	27	29	.24	.24	.24	.24
91	100F1	1	940224	2	1304	29	18	.25	.25	.24	.23
92	100F1	1	940907	9	728	23	25	.24	.23	.23	.23
93	100F1	1	940523	5	710	21	18	.24	.23	.23	.22
94	100F1	1	940523	5	1617	40	32	.27	.27	.27	.26
95	100F1	1	940120	1	939	16	16	.23	.23	.22	.21
96	100F1	1	940802	8	913	25	29	.24	.24	.24	.24
97	100F1	1	940607	6	651	27	25	.24	.23	.23	.22
98	100F1	1	940310	3	1219	27	15	.24	.23	.23	.23
99	100F1	1	931201	12	829	17	18	.23	.23	.23	.22
100	100F1	1	940523	5	1315	34	27	.26	.26	.25	.25
101	100F1	1	940802	8	1354	40	37	.29	.30	.30	.30
102	100F1	1	940802	8	1122	34	34	.27	.26	.27	.27
103	100F1	1	940907	9	1125	33	34	.25	.26	.26	.26
104	100F3	2	940607	6	1534	49	31	.32	.32	.31	.30
105	100F3	2	931201	12	851	18	16	.23	.22	.22	.21
106	100F3	2	940224	2	1443	29	20	.25	.25	.24	.24
107	100F3	2	940907	9	1623	39	36	.31	.30	.30	.29
108	100F3	2	940523	5	1117	42	29	.26	.26	.25	.25
109	100F3	2	940523	5	1457	37	29	.27	.27	.26	.25
110	100F3	2	940421	4	1224	40	28	.26	.26	.26	.25
111	100F3	2	940523	5	831	28	22	.25	.23	.23	.22
112	100F3	2	940421	4	920	27	22	.24	.24	.23	.23
113	100F3	2	940310	3	1425	32	20	.24	.24	.24	.23
114	100F3	2	940607	6	1022	37	29	.26	.26	.25	.25
115	100F3	2	940607	6	1258	46	31	.30	.29	.28	.28
116	100F3	2	940907	9	1438	42	39	.30	.30	.30	.30
117	100F3	2	940523	5	1710	36	29	.27	.27	.26	.26
118	100F3	2	940607	6	800	31	26	.25	.24	.23	.23
119	100F3	2	940310	3	849	14	9	.22	.21	.21	.20
120	100F3	2	940907	9	1227	36	37	.27	.28	.27	.27
121	100F3	2	940802	8	1458	40	38	.30	.31	.30	.30
122	100F3	2	940706	7	1313	37	34	.28	.29	.28	.28
123	100F3	2	940907	9	1010	29	32	.24	.25	.24	.24
124	100F3	2	940802	8	1007	29	32	.25	.25	.25	.25
125	100F3	2	940706	7	1716	37	34	.31	.30	.31	.30
126	100F3	2	931201	12	930	21	21	.23	.23	.23	.22
127	100F3	2	940802	8	1212	36	35	.28	.27	.28	.28
128	100F3	2	940120	1	839	15	16	.22	.23	.22	.21
129	100F3	2	940224	2	846	14	8	.22	.21	.21	.20
130	100F3	2	940706	7	1516	39	34	.30	.30	.31	.30
131	100F3	2	940802	8	758	23	25	.23	.23	.23	.23
132	100F3	2	940224	2	1205	30	16	.23	.23	.23	.23
133	100F3	2	940907	9	824	25	27	.22	.23	.23	.23
134	100F3	2	940706	7	735	25	27	.23	.24	.24	.24
135	100F3	2	940120	1	1034		17	.23	.23	.22	.22
136	100F3	2	940706	7	1005	31	31	.25	.25	.25	.25
137	100F3	2	931201	12	1209	29	27	.26	.25	.24	.23
138	100F3	2	940802	8	1714	38	35	.30	.31	.30	.30
139	125F1	1	940802	8	1125	34	34	.26	.26	.26	.26
140	125F1	1	931201	12	839	17	18	.24	.24	.23	.22
141	125F1	1	940802	8	916	27	29	.24	.24	.24	.23
142	125F1	1	940120	1	946	16	17	.23	.23	.22	.21
143	125F1	1	940907	9	1129	34	34	.26	.25	.25	.25

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
144	125F1	1	940523	5	1620	41	30	.28	.27	.26	.26
145	125F1	1	940907	9	731	23	25	.23	.22	.22	.23
146	125F1	1	940523	5	713	21	18	.23	.23	.22	.22
147	125F1	1	940802	8	1634	43	39	.31	.31	.31	.30
148	125F1	1	940907	9	919	27	30	.23	.23	.23	.23
149	125F1	1	931201	12	1050	27	25	.25	.25	.24	.23
150	125F1	1	940421	4	1132	39	27	.25	.25	.25	.24
151	125F1	1	940802	8	1357	41	38	.29	.29	.29	.29
152	125F1	1	940523	5	1326	34	28	.26	.26	.25	.24
153	125F1	1	940310	3	703	6	2	.22	.21	.21	.21
154	125F1	1	940523	5	1015	35	25	.26	.25	.24	.24
155	125F1	1	940120	1	748	14	15	.23	.23	.22	.21
156	125F1	1	940421	4	816	22	18	.23	.23	.22	.22
157	125F1	1	940310	3	1233	27	16	.24	.24	.24	.23
158	125F1	1	940706	7	1628	41	35	.30	.30	.30	.29
159	125F1	1	940706	7	912	29	30	.24	.24	.24	.24
160	125F1	1	940907	9	1331	38	38	.29	.28	.28	.27
161	125F1	1	940224	2	738	7	2	.22	.21	.21	.20
162	125F1	1	940607	6	1201	47	32	.27	.27	.26	.25
163	125F1	1	940607	6	1437	49	33	.30	.30	.29	.28
164	125F1	1	940224	2	1042		14	.23	.23	.22	.22
165	125F1	1	940706	7	1431	40	34	.30	.29	.29	.29
166	125F1	1	940706	7	1216	36	34	.28	.27	.27	.26
167	125F1	1	940907	9	1539	40	36	.30	.31	.30	.29
168	125F1	1	940802	8	709	22	23	.23	.23	.22	.22
169	125F1	1	940224	2	1315	31	17	.26	.25	.25	.24
170	125F1	1	940607	6	656	27	24	.23	.23	.22	.22
171	125F1	1	940706	7	654	24	25	.23	.22	.23	.22
172	125F1	1	940607	6	917	35	28	.24	.24	.23	.23
173	125F3	2	940523	5	837	29	23	.23	.23	.22	.21
174	125F3	2	940706	7	739	26	27	.21	.21	.22	.22
175	125F3	2	940421	4	1227	41	29	.25	.24	.24	.23
176	125F3	2	940802	8	1717	38	35	.30	.29	.29	.29
177	125F3	2	940607	6	1539	46	34	.30	.29	.28	.27
178	125F3	2	940907	9	1625	38	34	.28	.30	.28	.28
179	125F3	2	940907	9	830	25	27	.21	.22	.21	.21
180	125F3	2	940706	7	1008	31	31	.23	.23	.24	.23
181	125F3	2	940607	6	1303	44	31	.27	.27	.26	.25
182	125F3	2	940802	8	1010	30	32	.22	.23	.23	.23
183	125F3	2	940523	5	1500	38	30	.26	.25	.25	.24
184	125F3	2	940907	9	1232	36	36	.25	.27	.26	.26
185	125F3	2	940706	7	1724	35	34	.28	.28	.28	.28
186	125F3	2	940802	8	805	23	26	.21	.21	.21	.21
187	125F3	2	940523	5	1717	36	28	.26	.26	.25	.24
188	125F3	2	940607	6	803	31	26	.22	.22	.21	.21
189	125F3	2	940802	8	1214	37	36	.25	.26	.26	.26
190	125F3	2	940802	8	1503	41	39	.29	.29	.29	.29
191	125F3	2	940907	9	1444	40	41	.29	.28	.28	.28
192	125F3	2	940907	9	1013	30	32	.22	.23	.23	.23
193	125F3	2	940523	5	1121	42	30	.25	.25	.24	.23
194	125F3	2	940607	6	1027	37	30	.24	.24	.23	.22
195	125F3	2	940706	7	1526	37	35	.29	.29	.29	.29
196	125F3	2	940706	7	1317	37	34	.26	.27	.27	.27
197	125F3	2	940120	1	1037	17	17	.21	.21	.21	.20
198	125F3	2	940224	2	1452	30	21	.25	.24	.24	.23

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
199	125F3	2	931201	12	933	22	20	.23	.23	.22	.21
200	125F3	2	940310	3	853	14	9	.21	.21	.20	.20
201	125F3	2	940421	4	924	29	21	.21	.22	.21	.20
202	125F3	2	940120	1	842	15	15	.22	.21	.21	.20
203	125F3	2	931201	12	1214	29	26	.24	.24	.23	.23
204	125F3	2	940310	3	1444	31	20	.24	.23	.23	.23
205	125F3	2	940224	2	851	14	8	.21	.21	.20	.20
206	125F3	2	931201	12	857	19	16	.22	.21	.21	.20
207	125F3	2	940224	2	1209	29	17	.23	.23	.23	.22
208	150F1	1	940802	8	921	26	29	.24	.24	.23	.23
209	150F1	1	940224	2	1059	25	14	.23	.22	.22	.21
210	150F1	1	940523	5	1018	34	25	.24	.24	.24	.23
211	150F1	1	940120	1	952	16	17	.23	.22	.22	.21
212	150F1	1	940802	8	1128	34	34	.27	.26	.26	.26
213	150F1	1	940523	5	1335	36	29	.26	.26	.24	.23
214	150F1	1	940706	7	920	28	30	.23	.23	.24	.23
215	150F1	1	940706	7	1228	34	33	.27	.27	.27	.27
216	150F1	1	940706	7	1434	39	35	.29	.28	.29	.29
217	150F1	1	940706	7	1630	40	35	.30	.29	.29	.29
218	150F1	1	940224	2	1319	32	19	.24	.25	.23	.23
219	150F1	1	940421	4	820	22	19	.23	.22	.21	.21
220	150F1	1	940607	6	1443	52	34	.30	.29	.28	.27
221	150F1	1	940706	7	657	24	25	.22	.23	.23	.23
222	150F1	1	940224	2	743	7	2	.21	.21	.20	.20
223	150F1	1	940802	8	712	22	23	.23	.23	.23	.22
224	150F1	1	940607	6	1206	48	33	.27	.27	.26	.25
225	150F1	1	940907	9	924	26	30	.23	.23	.23	.23
226	150F1	1	940310	3	1238	31	17	.24	.24	.23	.23
227	150F1	1	940523	5	722	21	18	.23	.23	.22	.21
228	150F1	1	931201	12	1056	27	25	.24	.24	.23	.22
229	150F1	1	940907	9	1132	34	35	.25	.25	.26	.25
230	150F1	1	940607	6	701	26	24	.24	.23	.22	.22
231	150F1	1	940421	4	1136	36	27	.24	.24	.24	.23
232	150F1	1	940523	5	1627	44	29	.28	.27	.26	.25
233	150F1	1	940907	9	1339	38	39	.29	.28	.28	.27
234	150F1	1	940907	9	1549	38	38	.29	.30	.29	.28
235	150F1	1	940802	8	1637	42	39	.31	.31	.31	.31
236	150F1	1	940802	8	1401	40	38	.29	.29	.29	.29
237	150F1	1	940120	1	751	14	15	.23	.22	.22	.21
238	150F1	1	940310	3	736	8	3	.21	.21	.20	.20
239	150F1	1	940907	9	734	23	25	.22	.22	.22	.22
240	150F1	1	940607	6	922	36	28	.24	.24	.23	.23
241	150F1	1	931201	12	842	18	18	.23	.23	.22	.22
242	150F3	2	940523	5	1722	35	30	.27	.26	.25	.25
243	150F3	2	940224	2	1213	30	16	.22	.23	.22	.22
244	150F3	2	940706	7	744	25	28	.22	.22	.22	.22
245	150F3	2	940607	6	1033	41	30	.25	.24	.24	.23
246	150F3	2	940224	2	1458	30	20	.24	.23	.22	.22
247	150F3	2	940607	6	1312	44	31	.28	.27	.27	.26
248	150F3	2	940607	6	806	31	26	.23	.22	.22	.21
249	150F3	2	940310	3	904	15	10	.20	.20	.20	.19
250	150F3	2	940607	6	1554	51	33	.29	.29	.28	.27
251	150F3	2	940907	9	1016	30	32	.23	.23	.23	.23
252	150F3	2	931201	12	939	22	21	.22	.22	.21	.21
253	150F3	2	940907	9	834	25	28	.21	.21	.21	.22

data file: 48SFSUB.STA [620 cases with 50 variables]

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
254	150F3	2	931201	12	1228	30	29	.23	.23	.22	.22
255	150F3	2	940802	8	1720	38	36	.30	.30	.30	.30
256	150F3	2	940907	9	1452	40	41	.30	.29	.29	.29
257	150F3	2	940907	9	1632	37	33	.29	.30	.29	.29
258	150F3	2	931201	12	900	19	16	.22	.21	.21	.20
259	150F3	2	940907	9	1235	37	37	.26	.26	.26	.26
260	150F3	2	940907	9	1240	36	37	.26	.27	.27	.26
261	150F3	2	940802	8	1506	41	39	.29	.30	.30	.30
262	150F3	2	940706	7	1529	38	35	.29	.29	.29	.29
263	150F3	2	940706	7	1727	36	34	.29	.29	.29	.28
264	150F3	2	940224	2	854	14	9	.20	.20	.20	.19
265	150F3	2	940706	7	1011	30	31	.24	.24	.24	.24
266	150F3	2	940706	7	1321	37	34	.28	.28	.28	.28
267	150F3	2	940120	1	846	15	15	.20	.20	.20	.19
268	150F3	2	940802	8	1217	37	35	.26	.26	.26	.26
269	150F3	2	940802	8	1013	30	32	.23	.24	.23	.24
270	150F3	2	940120	1	1040	17	17	.21	.21	.20	.20
271	150F3	2	940802	8	811	23	26	.22	.22	.22	.22
272	150F3	2	940421	4	1247	44	28	.24	.24	.24	.23
273	150F3	2	940310	3	1452	32	20	.22	.22	.22	.22
274	150F3	2	940421	4	928	29	22	.21	.21	.21	.20
275	150F3	2	940523	5	1126	42	28	.25	.25	.24	.24
276	150F3	2	940523	5	847	30	24	.23	.23	.22	.21
277	150F3	2	940523	5	1509	39	29	.25	.26	.25	.24
278	175F1	1	931201	12	850	18	18	.23	.23	.22	.21
279	175F1	1	940607	6	932	34	28	.24	.23	.22	.21
280	175F1	1	940706	7	700	24	25	.21	.21	.21	.21
281	175F1	1	940224	2	1332	32	18	.25	.24	.23	.22
282	175F1	1	940706	7	1439	38	35	.28	.27	.27	.27
283	175F1	1	940907	9	1135	35	35	.25	.24	.24	.24
284	175F1	1	940706	7	923	30	31	.23	.23	.22	.22
285	175F1	1	940523	5	1343	35	28	.25	.24	.23	.22
286	175F1	1	940607	6	1222	50	31	.25	.26	.24	.24
287	175F1	1	940523	5	729	22	18	.22	.21	.21	.20
288	175F1	1	940310	3	743	8	4	.21	.20	.19	.19
289	175F1	1	931201	12	1124	27	27	.24	.24	.23	.22
290	175F1	1	940224	2	1105	26	13	.22	.22	.21	.21
291	175F1	1	940907	9	1348	38	39	.28	.27	.26	.26
292	175F1	1	940802	8	1640	41	39	.29	.29	.29	.28
293	175F1	1	940706	7	1236	34	34	.26	.25	.25	.25
294	175F1	1	940907	9	736	23	25	.22	.21	.21	.21
295	175F1	1	940120	1	801	14	15	.22	.21	.21	.20
296	175F1	1	940607	6	1449	54	33	.29	.28	.27	.26
297	175F1	1	940802	8	1135	32	33	.25	.25	.24	.24
298	175F1	1	940421	4	1140	37	27	.25	.24	.23	.23
299	175F1	1	940907	9	1552	39	38	.29	.28	.27	.27
300	175F1	1	940802	8	715	22	23	.22	.21	.21	.21
301	175F1	1	940120	1	956	17	17	.22	.21	.21	.20
302	175F1	1	940802	8	924	27	30	.23	.22	.22	.22
303	175F1	1	940523	5	1025	34	26	.24	.23	.23	.22

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
304	175F1	1	940310	3	1323	29	18	.23	.23	.22	.22
305	175F1	1	940706	7	1633	40	35	.28	.28	.27	.27
306	175F1	1	940421	4	826	22	19	.22	.22	.21	.20
307	175F1	1	940224	2	803	7	5	.20	.20	.20	.19
308	175F1	1	940907	9	927	27	30	.22	.22	.22	.21
309	175F1	1	940523	5	1633	42	30	.26	.26	.24	.23
310	175F1	1	940607	6	713	27	24	.22	.22	.21	.20
311	175F1	1	940802	8	1409	39	38	.28	.27	.27	.27
312	175F3	2	940607	6	1601	45	32	.29	.29	.28	.27
313	175F3	2	940706	7	755	25	28	.23	.22	.23	.22
314	175F3	2	940907	9	838	25	28	.22	.22	.22	.22
315	175F3	2	931201	12	945	22	21	.23	.23	.22	.21
316	175F3	2	940310	3	1502	32	18	.23	.23	.23	.23
317	175F3	2	940907	9	1025	30	33	.24	.24	.23	.23
318	175F3	2	940224	2	1216	29	17	.24	.23	.22	.22
319	175F3	2	940802	8	1220	37	36	.26	.26	.26	.26
320	175F3	2	940120	1	849	15	16	.22	.21	.21	.20
321	175F3	2	940706	7	1534	38	34	.29	.29	.29	.28
322	175F3	2	940523	5	854	31	25	.23	.24	.22	.22
323	175F3	2	940802	8	1020	29	32	.24	.23	.23	.23
324	175F3	2	940802	8	814	23	26	.22	.22	.22	.22
325	175F3	2	940706	7	1732	35	34	.29	.29	.28	.28
326	175F3	2	940120	1	1049	17	17	.22	.21	.21	.20
327	175F3	2	940706	7	1019	30	32	.24	.24	.24	.24
328	175F3	2	931201	12	1231	31	28	.23	.24	.23	.22
329	175F3	2	940421	4	947	31	22	.24	.22	.22	.21
330	175F3	2	940802	8	1723	38	36	.29	.30	.29	.28
331	175F3	2	940224	2	857	14	10	.21	.21	.20	.19
332	175F3	2	940523	5	1132	40	26	.27	.25	.25	.24
333	175F3	2	940706	7	1324	38	34	.28	.27	.27	.27
334	175F3	2	940802	8	1510	40	39	.30	.30	.29	.29
335	175F3	2	940523	5	1730	36	28	.26	.26	.25	.24
336	175F3	2	940907	9	1243	37	38	.27	.27	.26	.26
337	175F3	2	940523	5	1512	38	30	.26	.26	.25	.24
338	175F3	2	940907	9	1458	40	41	.29	.29	.29	.28
339	175F3	2	940421	4	1316	39	28	.25	.24	.24	.23
340	175F3	2	940310	3	912	16	10	.21	.20	.20	.19
341	175F3	2	940607	6	1038	38	29	.25	.25	.24	.23
342	175F3	2	940607	6	810	31	26	.23	.23	.22	.22
343	175F3	2	940907	9	1638	36	35	.29	.29	.29	.28
344	175F3	2	940224	2	1505	31	20	.24	.23	.23	.23
345	175F3	2	931201	12	911	19	17	.22	.22	.21	.21
346	175F3	2	940607	6	1315	44	31	.28	.28	.26	.25
347	200F1	1	940802	8	1414	39	38	.27	.26	.26	.25
348	200F1	1	940802	8	1642	41	39	.26	.26	.26	.26
349	200F1	1	940120	1	807	14	15	.21	.20	.20	.19
350	200F1	1	940523	5	1352	34	28	.23	.23	.22	.21
351	200F1	1	940224	2	807	9	5	.20	.20	.19	.19
352	200F1	1	940607	6	719	27	24	.21	.21	.20	.20
353	200F1	1	940706	7	1638	39	34	.26	.25	.25	.25
354	200F1	1	940607	6	941	36	28	.22	.22	.21	.20
355	200F1	1	940706	7	930	28	31	.22	.21	.21	.21
356	200F1	1	940310	3	746	8	4	.20	.20	.19	.18
357	200F1	1	940907	9	1357	38	39	.25	.24	.24	.24
358	200F1	1	931201	12	856		19	.22	.21	.21	.20

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
359	200F1	1	940224	2	1114	26	13	.21	.20	.20	.20
360	200F1	1	940706	7	1239	36	34	.24	.23	.24	.23
361	200F1	1	940907	9	745	23	25	.20	.20	.20	.20
362	200F1	1	940706	7	1445	38	35	.25	.24	.25	.25
363	200F1	1	940523	5	735	23	19	.21	.21	.20	.20
364	200F1	1	940523	5	1636	43	32	.25	.24	.23	.22
365	200F1	1	940224	2	1344	32	18	.23	.23	.22	.21
366	200F1	1	940907	9	930	27	30	.21	.20	.20	.20
367	200F1	1	940421	4	829	22	19	.21	.21	.20	.20
368	200F1	1	940907	9	1140	34	35	.23	.22	.22	.22
369	200F1	1	940802	8	720	22	23	.21	.20	.20	.20
370	200F1	1	940523	5	1035	35	28	.23	.23	.22	.21
371	200F1	1	940802	8	927	27	30	.22	.20	.21	.21
372	200F1	1	940120	1	959	17	17	.22	.21	.21	.20
373	200F1	1	940607	6	1452	55	33	.26	.26	.25	.24
374	200F1	1	940421	4	1144	36	26	.23	.23	.22	.21
375	200F1	1	940310	3	1329	31	17	.22	.21	.21	.20
376	200F1	1	940802	8	1138	34	33	.23	.23	.23	.23
377	200F1	1	940706	7	704	24	26	.21	.20	.20	.20
378	200F1	1	940607	6	1227	50	32	.24	.24	.23	.22
379	200F1	1	940907	9	1555	40	38	.27	.26	.26	.25
380	200F1	1	931201	12	1131	30	27	.22	.22	.21	.21
381	200F3	2	940224	2	901	14	10	.21	.20	.20	.19
382	200F3	2	940802	8	816	24	26	.21	.22	.21	.21
383	200F3	2	940802	8	1516	40	39	.29	.29	.29	.28
384	200F3	2	940802	8	1227	36	35	.28	.27	.26	.26
385	200F3	2	940523	5	900	32	24	.24	.23	.22	.21
386	200F3	2	940907	9	1641	37	35	.28	.29	.27	.27
387	200F3	2	940706	7	1329	37	34	.28	.26	.27	.26
388	200F3	2	940706	7	1540	38	35	.29	.28	.28	.28
389	200F3	2	940523	5	1736	36	30	.26	.25	.24	.24
390	200F3	2	940706	7	1740	35	34	.27	.27	.27	.26
391	200F3	2	940120	2	1053	17	18	.21	.21	.20	.20
392	200F3	2	940120	1	853	15	16	.21	.21	.20	.19
393	200F3	2	940607	6	821	32	27	.23	.23	.22	.21
394	200F3	2	940310	3	919	17	10	.21	.20	.19	.19
395	200F3	2	940523	5	1140	37	26	.25	.25	.24	.23
396	200F3	2	940802	8	1028	30	32	.24	.23	.23	.23
397	200F3	2	940907	9	1505	40	39	.29	.29	.29	.27
398	200F3	2	940310	3	1505	30	20	.23	.23	.22	.22
399	200F3	2	940523	5	1516	39	29	.26	.25	.25	.24
400	200F3	2	931201	12	918	20	18	.22	.21	.21	.20
401	200F3	2	940802	8	1726	38	36	.29	.29	.28	.28
402	200F3	2	940421	4	1351	39	29	.24	.24	.23	.23
403	200F3	2	940706	7	805	26	28	.21	.22	.22	.22
404	200F3	2	940907	9	847	26	29	.22	.22	.22	.21
405	200F3	2	931201	12	951	22	22	.22	.22	.22	.21
406	200F3	2	940907	9	1030	30	33	.24	.23	.23	.23
407	200F3	2	940607	6	1318	44	31	.26	.27	.25	.25
408	200F3	2	940421	4	1001	31	22	.22	.22	.22	.21
409	200F3	2	940607	6	1604	44	33	.29	.28	.27	.26
410	200F3	2	940224	2	1531	31	21	.24	.23	.22	.22
411	200F3	2	940706	7	1026	31	31	.24	.23	.23	.23
412	200F3	2	940907	9	1254	36	38	.24	.26	.26	.25
413	200F3	2	931201	12	1239	31	27	.23	.23	.22	.21

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
414	25F1	1	940310	3	711	5	1	.21	.21	.21	.20
415	25F1	1	940706	7	1418	39	34	.33	.32	.32	.32
416	25F1	1	931201	12	1014	24	24	.24	.24	.23	.22
417	25F1	1	940523	5	953	36	27	.27	.27	.26	.25
418	25F1	1	940224	2	1242	30	17	.25	.25	.24	.23
419	25F1	1	940706	7	635	24	26	.25	.27	.26	.26
420	25F1	1	940224	2	943	19	12	.23	.23	.22	.22
421	25F1	1	940523	5	1301	37	28	.28	.28	.27	.26
422	25F1	1	931201	12	810	17	17	.24	.24	.23	.22
423	25F1	1	940907	9	906	27	30	.27	.27	.27	.27
424	25F1	1	940421	4	1048	31	24	.27	.26	.25	.24
425	25F1	1	940120	1	926	16	16	.23	.23	.23	.21
426	25F1	1	940224	2	723	6	2	.22	.22	.21	.21
427	25F1	1	940907	9	1311	39	37	.32	.32	.31	.31
428	25F1	1	940607	6	640	26	24	.26	.26	.25	.25
429	25F1	1	940802	8	650	21	22	.25	.25	.25	.25
430	25F1	1	940802	8	1113	32	35	.28	.28	.28	.28
431	25F1	1	940607	6	903	34	27	.27	.27	.26	.26
432	25F1	1	940907	9	1516	43	41	.35	.34	.34	.33
433	25F1	1	940523	5	657	21	17	.25	.25	.24	.24
434	25F1	1	940421	4	722	18	16	.24	.24	.23	.23
435	25F1	1	940907	9	714	24	25	.26	.26	.26	.26
436	25F1	1	940706	7	1205	35	33	.31	.30	.30	.29
437	25F1	1	940907	9	1114	33	33	.30	.29	.29	.28
438	25F1	1	940607	6	1145	48	31	.31	.30	.29	.28
439	25F1	1	940802	8	1612	44	40	.34	.34	.33	.33
440	25F1	1	940523	5	1602	40	29	.29	.29	.28	.27
441	25F1	1	940120	1	729	14	15	.23	.23	.22	.21
442	25F1	1	940310	3	1202	25	15	.24	.23	.23	.22
443	25F1	1	940802	8	1345	41	37	.31	.31	.32	.31
444	25F1	1	940607	6	1413	51	33	.33	.32	.31	.30
445	25F1	1	940706	7	859	28	30	.26	.26	.27	.27
446	25F1	1	940802	8	857	26	28	.26	.26	.26	.26
447	25F1	1	940706	7	1611	41	35	.33	.33	.34	.33
448	25F3	2	940421	4	902	24	21	.28	.27	.27	.26
449	25F3	2	940907	9	953	28	31	.32	.33	.32	.32
450	25F3	2	940802	8	951	29	31	.32	.32	.32	.31
451	25F3	2	931201	12	843	17	15	.25	.24	.24	.23
452	25F3	2	940120	1	826	15	15	.26	.25	.25	.24
453	25F3	2	940421	4	1206	37	27	.31	.31	.30	.29
454	25F3	2	940802	8	1442	41	39	.41	.41	.41	.40
455	25F3	2	931201	12	1153	27	27	.29	.29	.27	.27
456	25F3	2	940907	9	813	25	27	.30	.31	.30	.30
457	25F3	2	940523	5	811	26	21	.30	.29	.28	.27
458	25F3	2	940802	8	1658	40	39	.41	.40	.40	.40
459	25F3	2	940907	9	1610	39	38	.40	.42	.40	.39
460	25F3	2	940907	9	1212	35	37	.37	.36	.36	.35
461	25F3	2	931201	12	913	21	20	.27	.27	.26	.25
462	25F3	2	940907	9	1429	39	39	.41	.41	.40	.39
463	25F3	2	940802	8	1203	35	34	.38	.35	.35	.35
464	25F3	2	940523	5	1440	38	29	.34	.32	.32	.31
465	25F3	2	940706	7	722	25	26	.29	.30	.30	.30
466	25F3	2	940310	3	1347	31	18	.28	.28	.28	.27
467	25F3	2	940607	6	1515	50	34	.39	.38	.37	.36
468	25F3	2	940224	2	1414	33	19	.29	.28	.28	.27

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
469	25F3	2	940523	5	1055	40	29	.32	.32	.31	.30
470	25F3	2	940706	7	951	30	31	.33	.32	.32	.32
471	25F3	2	940607	6	747	30	26	.30	.30	.29	.28
472	25F3	2	940224	2	830	12	6	.25	.25	.24	.23
473	25F3	2	940706	7	1505	38	35	.40	.39	.39	.39
474	25F3	2	940706	7	1704	38	34	.39	.39	.39	.38
475	25F3	2	940224	2	1142	30	16	.28	.27	.26	.26
476	25F3	2	940706	7	1301	37	34	.36	.37	.37	.37
477	25F3	2	940802	8	749	22	25	.31	.30	.30	.30
478	25F3	2	940607	6	1004	37	28	.32	.32	.31	.30
479	25F3	2	940310	3	820	10	7	.24	.24	.24	.23
480	25F3	2	940607	6	1245	49	32	.37	.36	.35	.34
481	25F3	2	940523	5	1656	39	29	.34	.34	.33	.32
482	25F3	2	940120	1	1023	17	17	.26	.26	.25	.24
483	50F1	1	940523	5	1305	36	27	.33	.33	.32	.31
484	50F1	1	940523	5	1607	40	29	.35	.34	.33	.32
485	50F1	1	940421	4	726	19	16	.29	.28	.28	.27
486	50F1	1	940706	7	1207	35	33	.33	.34	.34	.34
487	50F1	1	940706	7	1421	39	35	.37	.37	.37	.37
488	50F1	1	940310	3	1205	26	16	.29	.29	.28	.27
489	50F1	1	940224	2	947	20	13	.28	.27	.27	.26
490	50F1	1	940802	8	1619	43	40	.39	.39	.39	.39
491	50F1	1	940907	9	1316	38	37	.37	.36	.36	.35
492	50F1	1	940120	1	734	14	15	.27	.27	.27	.26
493	50F1	1	940907	9	720	23	25	.29	.29	.29	.29
494	50F1	1	940706	7	641	24	26	.30	.30	.30	.30
495	50F1	1	931201	12	1023	25	24	.29	.30	.28	.27
496	50F1	1	940907	9	909	27	30	.30	.30	.31	.30
497	50F1	1	940523	5	700	21	16	.30	.29	.29	.28
498	50F1	1	940907	9	1117	32	33	.33	.33	.33	.33
499	50F1	1	940607	6	909	34	28	.32	.32	.31	.30
500	50F1	1	940607	6	1422	50	31	.37	.37	.35	.35
501	50F1	1	940310	3	718	6	1	.26	.25	.25	.24
502	50F1	1	940907	9	1521	42	40	.38	.38	.38	.37
503	50F1	1	940607	6	1151	48	31	.35	.34	.33	.32
504	50F1	1	940421	4	1058	35	23	.31	.30	.30	.29
505	50F1	1	940224	2	1247	30	18	.30	.30	.30	.29
506	50F1	1	940706	7	903	28	30	.30	.30	.30	.30
507	50F1	1	940224	2	728	6	3	.26	.26	.25	.24
508	50F1	1	940120	1	929	16	16	.28	.28	.27	.26
509	50F1	1	940802	8	653	21	22	.30	.30	.29	.29
510	50F1	1	940607	6	644	26	24	.30	.30	.29	.28
511	50F1	1	940706	7	1616	41	35	.37	.37	.38	.37
512	50F1	1	940802	8	1116	33	34	.33	.33	.34	.33
513	50F1	1	931201	12	813	17	18	.29	.28	.28	.27
514	50F1	1	940802	8	900	26	28	.30	.30	.30	.30
515	50F1	1	940802	8	1348	41	37	.37	.37	.38	.37
516	50F1	1	940523	5	958	36	26	.32	.31	.31	.30
517	50F3	2	940224	2	1433	34	21	.32	.32	.31	.31
518	50F3	2	940802	8	1206	36	35	.37	.38	.37	.37
519	50F3	2	931201	12	846	18	14	.29	.29	.28	.27
520	50F3	2	940907	9	817	24	26	.31	.31	.31	.31
521	50F3	2	940310	3	1415	32	18	.31	.32	.31	.31
522	50F3	2	940523	5	1103	39	27	.35	.34	.34	.33
523	50F3	2	940523	5	1446	36	29	.36	.36	.35	.34

	1 STATI	2 ST_CO	3 DATE	4 MON	5 TIME	6 T_P	7 T_A	8 DF_1	9 DF_2	10 DF_3	11 DF_4
524	50F3	2	940706	7	725	25	27	.31	.31	.31	.31
525	50F3	2	940802	8	957	29	31	.33	.34	.33	.33
526	50F3	2	940907	9	1214	36	36	.37	.37	.37	.36
527	50F3	2	940421	4	910	25	21	.31	.30	.30	.29
528	50F3	2	940523	5	1659	41	28	.37	.37	.35	.35
529	50F3	2	940310	3	834	12	7	.28	.27	.27	.26
530	50F3	2	940607	6	1011	40	29	.34	.34	.33	.32
531	50F3	2	940120	1	1028	17	17	.29	.29	.29	.28
532	50F3	2	940607	6	1518	49	34	.41	.40	.39	.38
533	50F3	2	940421	4	1210	39	27	.34	.34	.33	.33
534	50F3	2	940907	9	1001	28	31	.34	.33	.33	.33
535	50F3	2	940802	8	752	23	25	.31	.32	.32	.32
536	50F3	2	931201	12	922	21	20	.31	.30	.29	.29
537	50F3	2	940607	6	1250	50	31	.38	.38	.37	.36
538	50F3	2	940907	9	1432	40	41	.41	.41	.40	.40
539	50F3	2	940224	2	1149	29	15	.31	.31	.30	.30
540	50F3	2	940802	8	1445	41	39	.41	.42	.41	.41
541	50F3	2	940224	2	834	12	7	.28	.27	.27	.26
542	50F3	2	940907	9	1613	39	38	.40	.41	.39	.39
543	50F3	2	940607	6	750	30	26	.32	.32	.31	.31
544	50F3	2	940523	5	814	26	21	.32	.31	.31	.30
545	50F3	2	940706	7	1508	39	35	.40	.40	.40	.40
546	50F3	2	940802	8	1701	40	40	.42	.42	.42	.41
547	50F3	2	931201	12	1200	31	28	.32	.33	.32	.31
548	50F3	2	940706	7	954	31	32	.34	.34	.34	.34
549	50F3	2	940120	1	832	15	16	.28	.29	.28	.27
550	50F3	2	940706	7	1707	38	34	.40	.39	.39	.39
551	50F3	2	940706	7	1304	37	34	.40	.38	.39	.38
552	75F1	1	940907	9	1121	32	33	.30	.31	.31	.31
553	75F1	1	931201	12	824	17	18	.27	.26	.26	.25
554	75F1	1	940802	8	1624	42	39	.37	.37	.37	.37
555	75F1	1	940120	1	935	16	16	.26	.25	.25	.24
556	75F1	1	940523	5	1003	36	26	.30	.29	.28	.28
557	75F1	1	940607	6	649	26	24	.28	.28	.27	.26
558	75F1	1	940802	8	904	26	29	.28	.28	.28	.28
559	75F1	1	940907	9	1319	39	38	.34	.34	.34	.34
560	75F1	1	940421	4	1109	34	26	.28	.28	.28	.27
561	75F1	1	940310	3	1209	25	15	.27	.27	.26	.26
562	75F1	1	940523	5	1615	42	31	.32	.32	.31	.30
563	75F1	1	940607	6	1154	45	31	.32	.32	.31	.31
564	75F1	1	940310	3	721	6	1	.24	.23	.23	.23
565	75F1	1	940120	1	739	14	15	.25	.26	.25	.24
566	75F1	1	940421	4	729	19	16	.27	.26	.26	.25
567	75F1	1	940706	7	1425	39	34	.34	.35	.35	.36
568	75F1	1	931201	12	1027	26	24	.28	.28	.27	.26
569	75F1	1	940907	9	912	27	30	.28	.28	.28	.29
570	75F1	1	940706	7	1619	41	35	.36	.36	.37	.37
571	75F1	1	940802	8	657	21	22	.28	.27	.27	.27
572	75F1	1	940706	7	645	24	26	.28	.28	.28	.28
573	75F1	1	940907	9	723	23	25	.27	.27	.27	.27
574	75F1	1	940706	7	906	28	30	.29	.29	.29	.29
575	75F1	1	940224	2	732	6	2	.24	.24	.24	.23
576	75F1	1	940907	9	1529	41	40	.37	.38	.37	.36
577	75F1	1	940224	2	1251	29	18	.28	.28	.27	.27
578	75F1	1	940523	5	707	21	17	.28	.27	.27	.26

	1	2	3	4	5	6	7	8	9	10	11
	STATI	ST_CO	DATE	MON	TIME	T_P	T_A	DF_1	DF_2	DF_3	DF_4
579	75F1	1	940523	5	1311	35	28	.32	.31	.30	.29
580	75F1	1	940224	2	950	20	13	.26	.26	.25	.24
581	75F1	1	940607	6	912	36	28	.28	.29	.28	.28
582	75F1	1	940802	8	1351	40	37	.34	.35	.35	.35
583	75F1	1	940802	8	1119	34	34	.31	.31	.31	.31
584	75F1	1	940607	6	1430	46	33	.35	.35	.34	.33
585	75F1	1	940706	7	1210	36	33	.33	.33	.33	.33
586	75F3	2	940907	9	1620	38	38	.45	.43	.43	.42
587	75F3	2	940607	6	757	30	26	.34	.34	.33	.32
588	75F3	2	940523	5	1706	40	30	.39	.39	.38	.37
589	75F3	2	940310	3	1422	31	20	.33	.34	.33	.32
590	75F3	2	931201	12	848	18	15	.30	.30	.29	.29
591	75F3	2	940907	9	1435	42	39	.43	.43	.43	.43
592	75F3	2	940310	3	842	13	8	.28	.28	.28	.27
593	75F3	2	940706	7	1513	39	34	.41	.42	.43	.43
594	75F3	2	940224	2	837	13	8	.30	.29	.28	.28
595	75F3	2	940120	1	836	15	15	.30	.31	.30	.29
596	75F3	2	940802	8	1453	39	38	.43	.45	.45	.44
597	75F3	2	940802	8	1707	38	38	.43	.45	.44	.44
598	75F3	2	940523	5	820	27	21	.33	.33	.32	.31
599	75F3	2	940706	7	1310	36	34	.42	.40	.41	.41
600	75F3	2	940802	8	755	22	25	.35	.33	.33	.33
601	75F3	2	940802	8	1001	30	32	.33	.36	.36	.35
602	75F3	2	940120	1	1031	17	17	.30	.31	.30	.29
603	75F3	2	940802	8	1209	36	35	.38	.39	.39	.40
604	75F3	2	940523	5	1111	38	27	.38	.37	.36	.35
605	75F3	2	940421	4	916	26	21	.34	.34	.32	.32
606	75F3	2	940706	7	1713	36	34	.43	.41	.43	.42
607	75F3	2	931201	12	926	21	20	.32	.32	.31	.30
608	75F3	2	940224	2	1440	31	20	.35	.34	.33	.33
609	75F3	2	940607	6	1526	49	32	.43	.44	.42	.41
610	75F3	2	940607	6	1253	44	31	.42	.41	.40	.39
611	75F3	2	940421	4	1221	40	28	.37	.37	.36	.35
612	75F3	2	940607	6	1018	42	29	.36	.37	.35	.35
613	75F3	2	940907	9	1221	36	36	.39	.40	.40	.39
614	75F3	2	940224	2	1154	30	16	.33	.32	.32	.31
615	75F3	2	931201	12	1204	31	26	.34	.34	.33	.33
616	75F3	2	940706	7	1000	30	32	.36	.35	.36	.36
617	75F3	2	940907	9	820	25	26	.32	.33	.33	.33
618	75F3	2	940907	9	1006	29	31	.35	.34	.34	.35
619	75F3	2	940523	5	1451	39	30	.39	.39	.37	.36
620	75F3	2	940706	7	729	25	27	.33	.33	.34	.34

data file: 48SFSUB.STA [620 cases with 50 variables]

VARIABLE SPECIFICATIONS:

No	Name	Format	MD Code	Long Label
12	T_AREA	5.1	-9999	TOTAL DEFL. AREA IN MM SQ.
13	OUT_3	5.1	-9999	DEFL. AREA UNDER THE OUTER 3 DEFLEC
14	T_U_A	6.1	-9999	UNIT DEFLEC. IN MM
15	A_TUA	6.1	-9999	APPROXIMATE UNIT DEFLEC.
16	E1	7.1	-9999	E1 IN MPA (FOR AC LAYER)
17	E2	6.1	-9999	E2 IN MPA (FOR COMBINED BASE AND SU
18	E3	6.1	-9999	E3 IN MPA (FOR UPPER 1 METER OF SUB
19	E4	5.1	-9999	E4 IN MPA (FOR LOWER SUBGRADE)
20	AV_E3	5.1	-9999	=(E3+E4)/2
21	RMS	4.2	-9999	RMS ERROR %
22	ITR	2.0	-9999	NUMBER OF ITERATIONS TO FINAL SOLUT

	12	13	14	15	16	17	18	19	20	21	22
	T_ARE	OUT_3	T_U_A	A_TUA	E1	E2	E3	E4	AV_E3	RMS	IT
1	271.0	159.6	954.2	679.8	8560.0	1000.0	94.4	144.0	119.2	.40	8
2	244.2	147.0	1026.0	718.9	17000.0	986.0	120.0	147.0	133.5	.46	7
3	274.5	161.3	933.8	665.0	6620.0	1120.0	89.5	143.0	116.3	.20	9
4	302.5	174.8	828.7	597.9	2280.0	1390.0	77.9	138.0	108.0	.38	9
5	290.2	169.0	881.9	631.8	3710.0	1260.0	77.3	143.0	110.2	.24	9
6	251.6	150.1	1002.2	706.0	14000.0	940.0	114.0	145.0	129.5	.36	7
7	305.3	178.6	864.9	619.1	2570.0	1680.0	39.0	189.0	114.0	1.35	13
8	250.8	149.6	995.1	702.0	12900.0	963.0	126.0	142.0	134.0	.70	7
9	274.8	161.4	928.5	661.0	6210.0	1070.0	115.0	132.0	123.5	.72	8
10	280.0	163.9	921.2	658.7	6080.0	1100.0	81.5	149.0	115.3	.39	9
11	306.9	177.0	840.7	606.2	2410.0	1410.0	58.3	153.0	105.6	.51	10
12	283.8	165.4	915.5	658.2	4860.0	1470.0	18.6	950.0	484.3	.57	18
13	250.6	149.6	1006.4	709.8	16000.0	776.0	150.0	136.0	143.0	.40	5
14	298.6	172.9	873.2	630.5	3260.0	1480.0	24.0	361.0	192.5	.58	15
15	276.5	164.2	953.4	675.7	6750.0	1450.0	43.7	204.0	123.9	1.19	15
16	260.6	155.6	990.9	698.7	10800.0	1120.0	93.5	148.0	120.8	.65	10
17	281.8	165.6	923.9	657.5	5610.0	1110.0	95.5	132.0	113.8	.20	8
18	270.7	160.2	930.2	658.7	5690.0	1180.0	132.0	122.0	127.0	.51	8
19	279.9	165.1	923.8	655.3	5160.0	1180.0	107.0	126.0	116.5	.48	8
20	265.1	158.8	993.0	696.8	10600.0	1030.0	131.0	123.0	127.0	.26	7
21	267.2	158.2	971.6	688.2	10300.0	876.0	134.0	128.0	131.0	.45	7
22	273.6	163.2	980.7	690.9	9390.0	978.0	120.0	122.0	121.0	.36	8
23	299.5	174.5	858.2	616.1	2840.0	1320.0	87.2	130.0	108.6	.33	9
24	272.8	160.7	931.2	661.5	5900.0	1270.0	75.3	154.0	114.7	.25	10
25	263.8	156.0	976.9	693.6	11300.0	832.0	121.0	135.0	128.0	.52	7
26	246.2	147.5	1009.0	709.4	13700.0	1210.0	77.6	175.0	126.3	.45	11
27	261.7	155.1	987.6	700.3	12400.0	965.0	85.8	163.0	124.4	.45	9
28	277.9	164.2	923.2	654.1	4960.0	1250.0	112.0	125.0	118.5	.66	8
29	292.3	172.4	919.2	652.7	4570.0	1290.0	76.2	136.0	106.1	.09	9
30	249.4	148.1	993.6	703.6	15300.0	733.0	140.0	139.0	139.5	.44	5
31	248.2	147.4	984.8	698.4	13200.0	833.0	139.0	138.0	138.5	.38	6
32	304.6	176.3	870.3	626.1	3370.0	1200.0	67.5	149.0	108.3	.17	9
33	310.5	179.2	832.6	599.8	2180.0	1480.0	61.3	153.0	107.1	.71	10

	12	13	14	15	16	17	18	19	20	21	22	
	T	ARE	OUT_3	T_U_A	A_TUA	E1	E2	E3	E4	AV_E3	RMS	IT
34	289.7	168.7	905.3	648.6	5180.0	1040.0	87.9	139.0	113.5	.18	9	
35	336.5	196.7	948.0	676.2	7330.0	661.0	95.0	109.0	102.0	.35	8	
36	281.4	168.2	1016.0	718.5	15500.0	704.0	97.8	135.0	116.4	.59	6	
37	376.4	215.8	889.8	644.2	4310.0	663.0	57.1	119.0	88.0	.09	9	
38	283.5	170.2	1030.8	725.3	17600.0	751.0	82.8	143.0	112.9	.27	6	
39	332.5	194.2	934.1	667.8	6270.0	779.0	81.5	119.0	100.3	.15	9	
40	399.5	226.9	841.0	613.5	2570.0	751.0	44.0	127.0	85.5	.43	10	
41	287.4	171.7	1019.0	719.2	15800.0	730.0	84.5	142.0	113.3	.39	7	
42	382.0	219.7	898.8	648.4	4270.0	699.0	46.7	126.0	86.4	.45	10	
43	286.8	172.0	1017.0	717.6	13600.0	1030.0	47.6	188.0	117.8	.32	12	
44	344.8	201.4	952.5	682.5	8060.0	631.0	67.3	121.0	94.2	.19	9	
45	355.1	204.9	908.2	655.6	5200.0	721.0	52.7	132.0	92.4	.11	10	
46	345.3	202.0	938.3	670.5	6350.0	692.0	90.3	106.0	98.2	.16	8	
47	314.7	185.3	974.4	694.0	9750.0	752.0	67.8	139.0	103.4	.35	9	
48	289.0	172.7	1006.9	712.0	12900.0	862.0	70.7	147.0	108.8	.35	10	
49	373.1	214.1	859.8	622.6	2970.0	792.0	72.9	110.0	91.5	.20	8	
50	381.2	217.7	839.6	609.7	2350.0	861.0	56.2	118.0	87.1	.38	9	
51	301.8	179.3	1002.7	711.8	14000.0	546.0	116.0	118.0	117.0	.60	8	
52	351.0	203.2	918.9	661.1	5590.0	694.0	66.8	121.0	93.9	.17	9	
53	344.8	201.7	944.8	674.8	6890.0	690.0	85.7	111.0	98.3	.15	8	
54	311.0	183.9	990.4	703.7	12200.0	574.0	104.0	116.0	110.0	.23	5	
55	393.3	222.6	851.3	623.5	3270.0	635.0	52.9	121.0	87.0	.61	9	
56	350.7	203.4	922.8	662.2	5420.0	766.0	52.7	131.0	91.9	.61	10	
57	395.2	225.0	837.3	608.7	2280.0	822.0	43.9	124.0	84.0	.28	9	
58	294.2	175.3	1014.5	716.8	14700.0	678.0	87.7	133.0	110.3	.68	6	
59	344.8	200.4	922.0	661.4	5430.0	789.0	59.0	129.0	94.0	.32	10	
60	361.3	208.0	914.7	663.3	6500.0	514.0	86.9	108.0	97.5	.50	8	
61	318.3	188.3	976.3	691.9	9250.0	706.0	102.0	111.0	106.5	.26	7	
62	304.1	179.9	997.1	708.0	13700.0	521.0	115.0	117.0	116.0	.38	9	
63	373.1	212.8	857.8	624.4	3080.0	780.0	52.1	131.0	91.5	.31	10	
64	335.6	196.4	950.8	680.0	7690.0	687.0	79.5	120.0	99.8	.22	9	
65	390.3	223.2	881.1	637.9	3650.0	694.0	45.0	124.0	84.5	.46	10	
66	335.7	196.6	953.7	679.3	8330.0	528.0	137.0	95.8	116.4	.16	5	
67	364.0	209.8	885.7	639.3	3890.0	756.0	73.1	113.0	93.0	.12	8	
68	310.6	183.9	989.0	702.8	11800.0	637.0	98.5	121.0	109.8	.25	6	
69	386.5	220.3	838.3	610.0	2400.0	803.0	58.0	115.0	86.5	.30	9	
70	231.3	139.0	1028.0	720.5	19900.0	789.0	175.0	139.0	157.0	.43	9	
71	262.5	153.7	892.8	635.4	4220.0	1410.0	104.0	142.0	123.0	.18	8	
72	230.4	136.5	960.0	678.0	10300.0	990.0	210.0	130.0	170.0	.34	6	
73	268.3	157.5	865.6	618.4	2690.0	2140.0	38.8	237.0	137.9	.63	13	
74	266.8	156.2	877.8	624.5	2790.0	2350.0	19.6	160.0	89.8	1.41	23	
75	224.3	134.9	1038.3	729.3	24800.0	814.0	126.0	171.0	148.5	.21	11	
76	249.1	146.3	922.6	658.0	6550.0	1190.0	123.0	145.0	134.0	.38	8	
77	262.9	152.4	856.2	615.5	3280.0	1440.0	90.3	154.0	122.2	.10	8	
78	250.5	146.0	904.2	646.9	5470.0	1300.0	83.2	169.0	126.1	.29	9	
79	222.9	134.1	1036.8	728.5	24700.0	721.0	153.0	157.0	155.0	.19	12	
80	261.8	152.5	890.5	637.0	4530.0	1330.0	88.7	157.0	122.8	.30	9	
81	233.1	137.9	959.1	681.5	9910.0	1150.0	127.0	154.0	140.5	.47	8	
82	270.6	156.2	845.6	611.9	2840.0	1710.0	34.5	271.0	152.8	.86	13	
83	242.3	143.4	965.4	682.3	9900.0	1030.0	149.0	137.0	143.0	.47	7	
84	229.9	135.7	945.9	670.2	8770.0	1160.0	151.0	145.0	148.0	.26	8	
85	231.9	138.1	1008.2	711.4	19000.0	658.0	191.0	140.0	165.5	.30	9	
86	234.0	137.5	932.3	663.5	7680.0	1210.0	124.0	154.0	139.0	.20	8	
87	235.2	141.5	1031.4	723.7	20400.0	1000.0	91.0	175.0	133.0	.38	7	
88	247.5	146.3	982.1	696.5	13500.0	790.0	148.0	139.0	143.5	.28	5	

	12	13	14	15	16	17	18	19	20	21	22
	T_ARE	OUT_3	T_U_A	A_TUA	E1	E2	E3	E4	AV_E3	RMS	IT
89	243.1	145.9	1021.4	719.6	17900.0	829.0	120.0	146.0	133.0	.26	6
90	232.6	136.4	937.7	667.8	8800.0	1110.0	134.0	155.0	144.5	.17	8
91	244.7	146.0	1007.0	711.7	15700.0	877.0	110.0	153.0	131.5	.43	6
92	230.8	135.6	945.9	674.4	9920.0	1050.0	139.0	155.0	147.0	.21	7
93	231.7	138.0	981.8	690.8	12400.0	972.0	194.0	132.0	163.0	.06	6
94	254.2	149.2	931.3	662.5	7420.0	961.0	163.0	127.0	145.0	.46	7
95	234.0	140.6	1031.0	723.5	21300.0	758.0	150.0	147.0	148.5	.23	10
96	235.1	138.3	952.0	676.1	9760.0	1090.0	124.0	155.0	139.5	.35	7
97	227.1	134.8	966.4	680.7	9910.0	1230.0	154.0	147.0	150.5	.48	8
98	242.6	144.4	1006.7	710.6	17000.0	860.0	114.0	158.0	136.0	.28	6
99	235.4	141.5	1032.7	726.4	24100.0	418.0	251.0	125.0	188.0	.31	11
100	246.2	145.3	946.9	671.0	7940.0	1140.0	129.0	140.0	134.5	.38	8
101	265.7	152.4	865.4	629.9							
102	250.1	145.1	899.6	650.0	5590.0	1470.0	29.3	421.0	225.1	.98	18
103	245.5	143.6	916.2	655.0	6410.0	1230.0	103.0	159.0	131.0	.13	9
104	263.5	153.7	847.3	604.1	2800.0	1560.0	135.0	130.0	132.5	.29	7
105	228.7	137.7	1035.0	723.2	22200.0	647.0	211.0	130.0	170.5	.27	10
106	244.1	145.2	984.3	693.6	11300.0	1030.0	131.0	139.0	135.0	.49	7
107	265.9	154.1	855.1	611.5	3060.0	1550.0	79.5	157.0	118.3	.87	9
108	243.2	144.2	949.9	667.8	7400.0	1230.0	160.0	128.0	144.0	.44	7
109	247.5	146.3	930.5	657.6	6290.0	1240.0	154.0	129.0	141.5	.19	7
110	251.9	148.8	957.6	677.3	9000.0	999.0	154.0	130.0	142.0	.46	7
111	229.3	137.5	988.4	690.2	11200.0	1090.0	229.0	121.0	175.0	.40	6
112	236.3	140.8	988.9	695.5	13500.0	824.0	225.0	124.0	174.5	.38	5
113	240.9	142.6	983.1	694.0	12600.0	970.0	125.0	149.0	137.0	.49	7
114	238.6	141.4	921.4	650.6	5750.0	1350.0	187.0	127.0	157.0	.38	7
115	254.4	149.2	877.3	625.8	3810.0	1450.0	134.0	135.0	134.5	.43	7
116	268.8	155.2	853.3	612.9	3260.0	1380.0	81.6	155.0	118.3	.71	9
117	249.4	147.7	927.2	653.7	5730.0	1270.0	169.0	123.0	146.0	.52	7
118	228.1	135.8	946.5	665.7	7500.0	1370.0	182.0	134.0	158.0	.27	7
119	227.5	137.6	1048.3	730.9	25500.0	686.0	210.0	138.0	174.0	.20	11
120	254.9	148.4	891.3	635.6	4880.0	1270.0	107.0	147.0	127.0	.48	8
121	271.4	156.8	861.5	619.7	3270.0	1610.0	28.9	322.0	175.4	1.22	15
122	260.0	151.4	884.4	629.7	3840.0	1560.0	74.8	166.0	120.4	1.00	10
123	240.2	141.8	941.9	665.6	8570.0	960.0	220.0	120.0	170.0	.34	6
124	241.7	142.0	926.2	658.5	5950.0	1720.0	27.5	398.0	212.8	.92	15
125	264.5	153.5	842.4	602.2	2670.0	1660.0	95.6	146.0	120.8	.95	9
126	235.4	141.3	1028.1	719.9	20800.0	605.0	219.0	127.0	173.0	.39	10
127	253.8	146.2	878.1	633.2	4890.0	1270.0	60.3	201.0	130.6	.78	11
128	230.0	138.4	1022.2	715.1	16700.0	1080.0	129.0	150.0	139.5	.28	7
129	223.1	134.6	1032.7	720.8	18900.0	1210.0	103.0	172.0	137.5	.34	9
130	268.3	155.9	854.6	616.3	3130.0	1450.0	86.9	154.0	120.5	.55	9
131	234.5	138.2	949.4	671.7	9490.0	1040.0	164.0	139.0	151.5	.38	7
132	236.2	141.2	1005.3	708.0	15400.0	888.0	153.0	139.0	146.0	.40	5
133	229.5	135.1	932.9	660.8	8040.0	1120.0	182.0	136.0	159.0	.20	7
134	231.9	136.4	934.9	661.7	7690.0	1240.0	150.0	146.0	148.0	.32	8
135	231.0	139.2	1022.1	713.2	15300.0	1210.0	113.0	152.0	132.5	.41	8
136	242.2	142.6	917.2	648.7	4320.0	2300.0	24.0	709.0	366.5	1.45	24
137	244.0	145.7	1012.4	711.2	16500.0	814.0	141.0	137.0	139.0	.45	5
138	267.0	154.0	845.1	608.1							
139	239.4	137.7	889.8	640.0	6160.0	1170.0	99.2	177.0	138.1	.69	8
140	229.2	135.6	996.3	707.5	19500.0	562.0	192.0	144.0	168.0	.35	10
141	225.3	130.6	916.0	652.8	8190.0	996.0	197.0	148.0	172.5	1.35	6
142	225.2	133.1	996.4	707.8	18300.0	810.0	125.0	176.0	150.5	.35	6
143	237.8	138.6	904.0	643.6	5560.0	1450.0	93.9	175.0	134.5	.68	9

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
144	245.0	143.2	914.3	649.8	6570.0	1060.0	174.0	130.0	152.0	.21	6
145	217.4	126.7	913.3	652.9	8080.0	1190.0	159.0	163.0	161.0	.82	8
146	220.1	130.3	969.8	683.2	11900.0	1060.0	184.0	145.0	164.5	.39	7
147	261.4	149.9	824.5	596.0	2760.0	1450.0	97.8	154.0	125.9	.44	8
148	222.2	129.0	914.4	653.9	7890.0	1190.0	134.0	172.0	153.0	.32	8
149	238.7	141.0	990.4	704.3	17000.0	636.0	160.0	146.0	153.0	.16	9
150	237.5	138.5	942.3	673.5	10500.0	853.0	163.0	148.0	155.5	.44	6
151	256.1	146.6	850.8	615.6	3950.0	1160.0	113.0	152.0	132.5	.18	7
152	235.6	137.8	931.0	660.0	8090.0	974.0	203.0	131.0	167.0	.76	6
153	223.5	133.1	1011.1	714.9	20000.0	889.0	125.0	177.0	151.0	.32	6
154	235.9	139.1	955.1	677.9	10500.0	839.0	224.0	126.0	175.0	.63	5
155	226.5	134.2	1002.0	711.2	20000.0	727.0	143.0	168.0	155.5	.20	10
156	225.4	133.0	980.0	694.9	14600.0	879.0	170.0	155.0	162.5	.60	5
157	237.1	138.9	967.8	691.5	14600.0	734.0	152.0	157.0	154.5	.11	5
158	253.2	145.6	833.0	600.0	2970.0	1490.0	105.0	157.0	131.0	.61	8
159	225.0	130.9	907.1	646.3	6820.0	1240.0	147.0	158.0	152.5	.58	7
160	251.4	145.5	872.8	626.4	3890.0	1680.0	52.0	236.0	144.0	.97	12
161	216.6	128.6	1007.3	714.3	21800.0	645.0	189.0	160.0	174.5	.50	10
162	237.3	137.9	895.4	637.6	5750.0	1170.0	174.0	139.0	156.5	.43	7
163	255.7	148.8	872.7	624.1	3960.0	1340.0	131.0	139.0	135.0	.25	7
164	226.2	133.5	987.9	701.9	17000.0	787.0	148.0	164.0	156.0	.27	6
165	253.0	145.4	840.7	605.4	3200.0	1470.0	93.1	165.0	129.0	.74	9
166	237.3	136.4	863.0	622.2	4520.0	1360.0	98.0	181.0	139.5	.67	9
167	259.8	150.7	846.3	610.5	3180.0	1440.0	114.0	147.0	130.5	.83	8
168	221.7	129.5	935.4	666.6	9460.0	1110.0	156.0	161.0	158.5	.41	7
169	238.9	140.1	967.1	690.3	13600.0	743.0	147.0	151.0	149.0	.21	5
170	215.3	127.0	944.1	668.2	8850.0	1370.0	145.0	164.0	154.5	.22	8
171	216.9	126.1	918.9	656.5	8800.0	1090.0	168.0	161.0	164.5	.38	7
172	222.9	130.6	932.5	661.7	8780.0	1090.0	192.0	144.0	168.0	.22	6
173	213.9	127.7	963.6	675.3	9190.0	1330.0	220.0	134.0	177.0	.30	6
174	211.4	123.9	927.3	656.8	8530.0	1200.0	198.0	150.0	174.0	.63	6
175	229.6	135.1	944.7	669.6	9150.0	1050.0	183.0	139.0	161.0	.24	7
176	248.8	142.8	823.8	594.9	2810.0	1620.0	76.5	180.0	128.3	1.02	9
177	243.9	142.7	852.6	608.4	3030.0	1820.0	121.0	148.0	134.5	.58	8
178	246.1	141.4	823.1	592.7	2990.0	1400.0	144.0	144.0	144.0	.36	7
179	211.4	126.3	939.8	669.0	5820.0	2270.0	42.7	288.0	165.4	2.14	15
180	220.2	128.7	906.1	643.3	5950.0	1560.0	112.0	174.0	143.0	1.11	10
181	236.7	138.7	889.8	632.9	4880.0	1350.0	174.0	135.0	154.5	.23	7
182	222.3	130.0	922.5	653.0	6530.0	1620.0	69.3	209.0	139.2	1.14	12
183	229.0	134.8	912.3	645.8	6120.0	1270.0	200.0	132.0	166.0	.17	6
184	231.0	132.5	858.7	618.5	5050.0	1130.0	166.0	150.0	158.0	.40	7
185	244.2	141.8	847.9	604.7	2810.0	2080.0	67.8	191.0	129.4	1.84	11
186	212.3	124.5	939.3	665.3	8340.0	1660.0	52.7	270.0	161.4	1.14	14
187	230.3	135.7	914.0	646.9	5740.0	1400.0	170.0	138.0	154.0	.29	7
188	209.0	124.3	945.5	663.1	8180.0	1420.0	235.0	138.0	186.5	.14	6
189	234.9	136.4	886.4	633.6	4870.0	1540.0	65.7	201.0	133.3	1.14	12
190	253.7	145.9	834.5	600.0	3060.0	1410.0	109.0	150.0	129.5	.73	8
191	249.7	145.0	852.4	609.0	3130.0	1620.0	99.2	154.0	126.6	.63	8
192	216.8	126.6	914.7	650.5	8080.0	1090.0	213.0	143.0	178.0	.20	6
193	225.2	132.6	930.4	659.2	7520.0	1240.0	174.0	142.0	158.0	.12	7
194	220.7	130.7	935.2	659.1	7700.0	1250.0	228.0	131.0	179.5	.22	6
195	246.9	142.8	834.1	597.6	2730.0	1800.0	94.9	164.0	129.5	1.17	9
196	239.5	139.2	858.5	613.3	3290.0	1890.0	75.0	187.0	131.0	1.23	11
197	213.7	127.1	998.5	704.1	17900.0	762.0	242.0	143.0	192.5	.53	8
198	227.7	133.6	952.7	676.4	10500.0	997.0	151.0	151.0	151.0	.39	7

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
199	219.0	129.6	982.1	694.8	15500.0	815.0	197.0	146.0	171.5	.22	5
200	213.0	126.7	1004.8	709.3	20600.0	704.0	240.0	150.0	195.0	.39	9
201	211.5	125.8	983.8	690.9	12900.0	1140.0	196.0	148.0	172.0	.86	7
202	212.7	126.7	1003.5	707.8	18100.0	876.0	191.0	154.0	172.5	.62	5
203	227.1	133.8	966.6	685.3	12700.0	838.0	189.0	140.0	164.5	.42	5
204	228.5	133.5	948.2	677.1	11700.0	864.0	163.0	153.0	158.0	.35	6
205	211.1	126.1	1010.1	710.0	18600.0	994.0	173.0	160.0	166.5	.39	5
206	212.5	126.7	1011.7	711.7	20800.0	621.0	263.0	137.0	200.0	.39	9
207	222.2	130.8	970.4	689.2	13700.0	839.0	181.0	148.0	164.5	.47	5
208	223.3	130.3	922.8	656.6	8170.0	1110.0	173.0	149.0	161.0	.59	6
209	223.1	132.6	991.7	700.1	15200.0	936.0	167.0	150.0	158.5	.27	5
210	226.5	134.3	951.7	669.6	8750.0	1120.0	225.0	127.0	176.0	.30	6
211	219.9	131.1	1004.3	708.2	18000.0	807.0	198.0	147.0	172.5	.54	7
212	232.1	132.6	872.6	633.5	5020.0	1560.0	35.2	431.0	233.1	1.14	16
213	229.1	135.5	946.6	666.1	7910.0	1270.0	172.0	136.0	154.0	.57	7
214	223.9	129.9	921.4	653.3	8890.0	926.0	215.0	137.0	176.0	1.52	6
215	241.1	139.9	876.8	626.6	4820.0	1150.0	180.0	132.0	156.0	.25	6
216	252.3	146.6	861.1	617.3							
217	251.9	145.8	842.4	602.9	2870.0	1700.0	90.0	161.0	125.5	1.14	10
218	236.1	139.8	975.7	686.9	11900.0	838.0	218.0	124.0	171.0	.61	5
219	218.4	129.7	979.4	689.3	13100.0	1010.0	209.0	141.0	175.0	.29	6
220	251.7	147.2	874.0	621.1	3610.0	1570.0	125.0	140.0	132.5	.56	7
221	217.8	127.1	926.9	659.3	9000.0	1060.0	185.0	150.0	167.5	.72	7
222	211.2	126.4	1020.4	715.4	21500.0	736.0	236.0	143.0	189.5	.45	9
223	220.1	128.9	932.7	663.0	9230.0	1020.0	220.0	141.0	180.5	.53	5
224	237.7	139.3	903.6	640.7	5600.0	1210.0	203.0	128.0	165.5	.35	6
225	217.8	126.9	911.3	648.9	7770.0	1050.0	231.0	140.0	185.5	.14	5
226	238.5	141.9	989.8	695.4	13700.0	787.0	236.0	121.0	178.5	.41	4
227	214.8	127.9	967.5	678.0	10500.0	1150.0	250.0	131.0	190.5	.27	5
228	232.1	138.1	1004.8	709.0	21500.0	330.0	359.0	116.0	237.5	.80	11
229	232.1	134.6	889.4	636.3	5850.0	1150.0	168.0	145.0	156.5	.25	7
230	214.8	127.1	946.3	667.1	9400.0	1110.0	262.0	132.0	197.0	.24	5
231	229.9	135.2	949.9	673.0	10100.0	956.0	199.0	136.0	167.5	.24	6
232	237.8	139.9	918.0	648.9	6380.0	1150.0	203.0	124.0	163.5	.51	6
233	246.4	142.5	864.7	620.2	4150.0	1290.0	137.0	145.0	141.0	.29	7
234	250.4	142.9	837.5	612.0	4190.0	1010.0	160.0	144.0	152.0	1.28	7
235	260.7	149.9	825.1	593.6	2670.0	1450.0	117.0	140.0	128.5	.71	7
236	253.4	145.6	850.2	614.1	3750.0	1280.0	101.0	156.0	128.5	.86	8
237	224.5	134.0	1006.9	707.1	16800.0	875.0	194.0	141.0	167.5	.58	5
238	214.5	128.3	1012.0	710.7	19500.0	883.0	200.0	152.0	176.0	.38	8
239	214.1	125.5	923.0	655.4	8130.0	1180.0	207.0	147.0	177.0	.19	6
240	222.5	131.1	931.2	657.9	8200.0	1070.0	257.0	127.0	192.0	.20	5
241	228.6	136.5	1007.2	706.7	17800.0	623.0	272.0	122.0	197.0	.27	8
242	236.5	140.1	923.9	648.7	5560.0	1400.0	194.0	124.0	159.0	.56	7
243	224.9	135.1	1004.1	701.2	13500.0	1060.0	198.0	129.0	163.5	.40	6
244	219.8	129.8	939.4	661.5	8400.0	1160.0	236.0	131.0	183.5	.27	6
245	228.7	136.1	945.2	662.3	7460.0	1260.0	238.0	121.0	179.5	.12	6
246	228.8	137.4	999.0	698.6	12600.0	1050.0	207.0	125.0	166.0	.43	6
247	244.5	144.6	908.8	640.0	4570.0	1580.0	147.0	133.0	140.0	.41	7
248	215.1	128.3	960.3	672.0	8730.0	1320.0	255.0	129.0	192.0	.84	6
249	212.0	128.3	1034.1	719.4	19900.0	1110.0	193.0	147.0	170.0	.26	5
250	250.6	147.2	879.2	622.3	3620.0	1520.0	168.0	125.0	146.5	.56	7
251	224.3	131.9	926.8	654.7	7670.0	1150.0	213.0	132.0	172.5	.19	6
252	222.8	134.8	1036.1	719.9	19100.0	932.0	206.0	130.0	168.0	.33	5
253	214.4	126.6	944.6	665.8	9410.0	1160.0	215.0	140.0	177.5	.26	6

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
254	228.7	138.2	1012.1	702.4	12500.0	1180.0	203.0	121.0	162.0	.48	7
255	260.4	151.1	840.1	602.1	2820.0	1610.0	83.9	155.0	119.5	1.05	10
256	258.0	149.9	846.0	605.0	3050.0	1410.0	136.0	132.0	134.0	.19	7
257	253.7	147.2	843.0	602.9	3070.0	1470.0	130.0	138.0	134.0	.37	7
258	215.4	130.6	1040.6	722.7	19300.0	1050.0	192.0	136.0	164.0	.46	6
259	244.7	144.0	893.0	638.9	4200.0	1720.0	66.4	183.0	124.7	1.16	12
260	245.9	144.8	897.5	638.9	4300.0	1620.0	92.8	157.0	124.9	.88	10
261	262.3	151.9	843.4	605.1	3200.0	1260.0	137.0	129.0	133.0	.37	7
262	255.9	149.4	850.2	605.9	3030.0	1480.0	153.0	126.0	139.5	.54	7
263	252.9	147.6	854.4	607.4	3140.0	1480.0	163.0	126.0	144.5	.42	7
264	209.9	127.4	1044.5	726.8	21900.0	1060.0	185.0	149.0	167.0	.40	6
265	229.1	134.8	920.2	649.2	5800.0	1580.0	119.0	158.0	138.5	.82	9
266	251.9	148.1	880.9	621.7	2890.0	2700.0	21.1	871.0	446.1	2.30	24
267	213.4	129.6	1046.0	727.4	22600.0	927.0	213.0	139.0	176.0	.23	8
268	244.4	142.8	898.6	638.0	5550.0	1150.0	172.0	128.0	150.0	.46	6
269	226.6	132.7	913.5	650.6	6850.0	1280.0	132.0	158.0	145.0	1.10	9
270	216.3	130.9	1030.0	716.0	17800.0	1020.0	232.0	130.0	181.0	.35	5
271	216.9	128.0	943.2	667.7	8750.0	1470.0	92.2	186.0	139.1	.69	10
272	234.9	140.4	970.5	678.7	8850.0	1220.0	201.0	123.0	162.0	.40	7
273	228.9	136.7	986.8	692.8	12300.0	1080.0	171.0	137.0	154.0	.15	7
274	215.0	129.2	1004.8	701.2	15000.0	979.0	272.0	126.0	199.0	.35	4
275	234.1	139.4	944.1	661.7	6970.0	1260.0	220.0	120.0	170.0	.35	6
276	217.9	130.5	968.7	676.4	9760.0	1130.0	310.0	117.0	213.5	.29	5
277	235.7	140.4	939.1	658.6	6530.0	1280.0	221.0	118.0	169.5	.20	6
278	219.9	131.4	995.2	700.4	14900.0	894.0	222.0	135.0	178.5	.61	5
279	208.4	123.4	934.5	655.8	7450.0	1520.0	201.0	145.0	173.0	.91	7
280	202.8	119.4	913.7	645.7	6790.0	1590.0	195.0	159.0	177.0	.45	6
281	226.3	134.1	975.3	689.5	13000.0	869.0	199.0	135.0	167.0	.10	5
282	232.8	135.7	843.3	602.8	3040.0	1890.0	119.0	157.0	138.0	1.06	9
283	218.6	127.7	885.1	629.1	5020.0	1530.0	170.0	152.0	161.0	.41	7
284	207.9	122.2	908.0	642.0	5990.0	1670.0	151.0	165.0	158.0	.64	8
285	218.4	129.6	945.4	664.1	7830.0	1340.0	208.0	135.0	171.5	.31	6
286	224.6	132.7	898.3	632.6	4700.0	1670.0	186.0	136.0	161.0	.71	7
287	204.8	122.9	979.7	684.4	11300.0	1380.0	223.0	140.0	181.5	.44	6
288	206.4	123.9	1017.0	712.9	18800.0	1140.0	161.0	166.0	163.5	.32	6
289	225.7	134.1	985.6	695.2	14000.0	869.0	197.0	136.0	166.5	.22	5
290	215.4	128.1	992.6	699.3	16500.0	884.0	199.0	146.0	172.5	.44	5
291	230.7	134.6	851.2	610.0	3380.0	1830.0	119.0	165.0	142.0	.42	8
292	241.3	140.0	820.7	589.8	2500.0	1930.0	110.0	157.0	133.5	.77	8
293	226.4	133.3	881.0	623.1	3730.0	2090.0	102.0	167.0	134.5	1.27	10
294	201.7	118.9	917.0	648.1	7090.0	1500.0	223.0	152.0	187.5	.18	6
295	216.1	129.4	1005.3	705.0	15600.0	1110.0	163.0	153.0	158.0	.43	6
296	239.7	141.6	868.4	615.5	3190.0	1980.0	133.0	142.0	137.5	.53	8
297	222.0	129.4	888.0	635.6	4570.0	2120.0	35.0	386.0	210.5	.93	15
298	225.3	132.8	938.9	664.6	7960.0	1280.0	151.0	151.0	151.0	.60	8
299	237.2	138.5	835.2	596.6	2690.0	2040.0	124.0	155.0	139.5	.31	8
300	204.3	120.7	937.1	662.5	8400.0	1480.0	177.0	160.0	168.5	.22	7
301	213.2	127.2	1001.1	704.5	16800.0	996.0	176.0	155.0	165.5	.28	5
302	210.7	123.7	919.9	652.0	7400.0	1400.0	180.0	156.0	168.0	.53	7
303	215.0	127.7	942.8	662.8	7760.0	1350.0	225.0	134.0	179.5	.26	6
304	223.9	132.7	973.7	688.2	12000.0	1130.0	149.0	157.0	153.0	.46	7
305	233.4	136.0	830.6	593.7	2600.0	2110.0	115.0	161.0	138.0	.53	8
306	210.3	124.9	973.8	686.3	12800.0	1040.0	239.0	142.0	190.5	.40	5
307	203.2	121.6	1011.2	707.1	20000.0	787.0	291.0	140.0	215.5	.49	8
308	206.3	121.1	912.7	647.1	7200.0	1360.0	221.0	150.0	185.5	.16	6

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
309	224.5	133.0	923.9	650.2	6230.0	1430.0	193.0	132.0	162.5	.71	7
310	203.4	121.3	946.0	662.5	7760.0	1600.0	233.0	143.0	188.0	.42	6
311	236.7	137.5	848.5	608.4	3330.0	1660.0	119.0	155.0	137.0	.50	8
312	244.7	143.2	870.7	618.1	3860.0	1360.0	209.0	122.0	165.5	.36	6
313	215.6	126.6	929.5	657.3	8520.0	1090.0	240.0	136.0	188.0	.32	5
314	212.8	124.8	933.5	659.5	9530.0	1000.0	263.0	134.0	198.5	.35	5
315	222.2	132.9	1005.6	705.9	16300.0	871.0	204.0	135.0	169.5	.22	5
316	228.7	135.2	969.1	683.7	11400.0	965.0	190.0	137.0	163.5	.54	6
317	222.8	130.2	920.7	653.5	8420.0	980.0	237.0	133.0	185.0	.15	6
318	223.6	132.9	985.0	692.6	12900.0	973.0	193.0	136.0	164.5	.48	6
319	240.8	139.8	888.6	637.0	5360.0	1360.0	74.3	186.0	130.2	1.13	11
320	214.5	129.0	1021.3	712.4	17900.0	1080.0	180.0	147.0	163.5	.46	5
321	248.6	144.4	848.5	604.8	3420.0	1220.0	227.0	116.0	171.5	.41	5
322	220.3	131.2	970.7	679.9	11400.0	851.0	361.0	113.0	237.0	.45	4
323	221.0	128.0	909.7	653.3	7350.0	1460.0	45.3	310.0	177.6	.97	14
324	217.9	128.3	947.6	664.4	8750.0	1290.0	158.0	150.0	154.0	1.51	9
325	243.0	140.8	834.9	596.4	3010.0	1500.0	172.0	132.0	152.0	.79	6
326	219.2	131.9	1024.5	716.9	21900.0	485.0	397.0	116.0	256.5	.45	10
327	226.3	132.6	919.9	649.1	7510.0	957.0	302.0	118.0	210.0	.38	5
328	229.5	136.8	993.5	697.1	14100.0	788.0	253.0	120.0	186.5	.43	4
329	218.1	130.3	1000.4	700.2	15900.0	831.0	277.0	127.0	202.0	.35	5
330	247.4	142.1	835.8	601.2	3240.0	1440.0	99.8	160.0	129.9	1.18	9
331	210.2	126.7	1030.2	717.6	20300.0	928.0	238.0	139.0	188.5	.48	6
332	232.9	137.6	939.3	661.7	8080.0	1010.0	253.0	118.0	185.5	.16	5
333	241.7	140.2	866.5	619.3	4270.0	1270.0	158.0	137.0	147.5	.69	7
334	254.6	146.9	851.7	610.5	3390.0	1450.0	81.1	163.0	122.0	1.16	10
335	232.4	136.6	918.7	646.2	6450.0	1110.0	266.0	118.0	192.0	.67	5
336	241.7	140.0	891.9	637.0	6300.0	976.0	192.0	130.0	161.0	.60	6
337	234.7	138.6	935.0	657.4	7170.0	1110.0	241.0	119.0	180.0	.47	6
338	252.8	146.6	856.9	612.1	3800.0	1160.0	190.0	121.0	155.5	.29	6
339	230.6	136.5	960.9	676.7	10400.0	939.0	239.0	124.0	181.5	.27	5
340	213.0	127.8	1019.1	713.6	21000.0	750.0	273.0	138.0	205.5	.22	9
341	230.9	136.7	934.9	656.9	7560.0	1050.0	298.0	114.0	206.0	.16	5
342	216.5	128.4	953.9	670.5	9890.0	1030.0	303.0	124.0	213.5	.29	4
343	245.9	142.8	844.9	601.1	3050.0	1550.0	159.0	135.0	147.0	.85	7
344	227.4	134.9	971.8	684.9	12200.0	798.0	273.0	120.0	196.5	.28	4
345	221.4	133.8	1039.5	722.4	24400.0	331.0	560.0	102.0	331.0	.09	12
346	239.5	139.9	893.8	634.5	5510.0	1130.0	216.0	124.0	170.0	.53	6
347	235.4	138.9	891.6	633.7	3830.0	1970.0	87.1	168.0	127.5	.68	10
348	235.1	138.7	877.1	623.1	3410.0	2000.0	103.0	155.0	129.0	.10	8
349	212.7	127.5	1032.7	727.7	26900.0	588.0	206.0	158.0	182.0	.59	12
350	218.1	130.5	977.8	683.9	10200.0	1210.0	240.0	127.0	183.5	.83	6
351	203.9	122.0	1034.8	727.7	32500.0	175.0	807.0	129.0	468.0	.51	18
352	203.5	122.2	988.0	689.2	12300.0	1190.0	305.0	130.0	217.5	.72	5
353	229.5	136.0	893.0	631.4	3660.0	2260.0	79.6	178.0	128.8	.43	10
354	210.1	126.3	986.2	688.0	10600.0	1480.0	192.0	141.0	166.5	.31	7
355	209.6	124.8	979.5	684.1	12100.0	1280.0	169.0	149.0	159.0	1.42	9
356	205.3	123.2	1036.6	727.8	27600.0	663.0	216.0	162.0	189.0	.59	11
357	224.7	132.8	913.3	642.2	4680.0	1880.0	129.0	157.0	143.0	1.91	9
358	214.6	128.7	1036.9	729.3	27600.0	339.0	356.0	132.0	244.0	1.16	15
359	211.1	125.2	1010.1	717.3	25500.0	332.0	337.0	143.0	240.0	.67	12
360	221.1	130.4	913.7	646.5	5750.0	1520.0	163.0	146.0	154.5	.33	7
361	198.8	118.1	969.7	683.6	12300.0	1260.0	204.0	158.0	181.0	.26	7
362	229.7	136.0	907.7	641.3	4390.0	2000.0	84.1	173.0	128.5	.45	10
363	209.2	126.3	1015.5	705.5	15800.0	1010.0	305.0	123.0	214.0	.57	4

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
364	220.5	132.1	963.1	674.6	7590.0	1690.0	131.0	150.0	140.5	.38	8
365	221.1	131.2	1000.6	709.4	20900.0	365.0	370.0	124.0	247.0	.76	10
366	203.9	121.3	961.9	676.9	10100.0	1360.0	200.0	150.0	175.0	.37	7
367	211.6	126.7	1022.2	716.8	21600.0	739.0	237.0	144.0	190.5	.57	9
368	215.1	127.7	947.4	668.4	7850.0	1610.0	118.0	169.0	143.5	.11	9
369	206.0	122.8	971.8	684.1	10800.0	1470.0	148.0	164.0	156.0	.32	8
370	214.6	128.5	988.9	692.2	11600.0	1330.0	170.0	146.0	158.0	.53	8
371	207.5	123.2	965.0	679.5	11000.0	1240.0	200.0	148.0	174.0	.36	6
372	212.4	127.1	1026.0	724.2	25600.0	510.0	249.0	148.0	198.5	.80	11
373	233.3	139.6	926.0	650.5	4830.0	1870.0	139.0	139.0	139.0	.39	8
374	223.1	132.4	991.4	700.1	16400.0	624.0	290.0	127.0	208.5	1.00	8
375	218.5	129.6	1006.8	713.3	23600.0	350.0	355.0	134.0	244.5	.59	11
376	219.8	130.6	927.5	653.8	5830.0	1810.0	118.0	160.0	139.0	.17	9
377	202.6	121.2	974.2	683.3	10800.0	1530.0	149.0	162.0	155.5	.58	9
378	222.3	133.1	958.3	673.8	7460.0	1710.0	119.0	157.0	138.0	.41	9
379	231.7	137.1	891.3	631.1	3660.0	2280.0	72.7	190.0	131.3	.34	11
380	218.8	130.6	1017.9	719.2	23600.0	411.0	302.0	133.0	217.5	.77	11
381	208.5	125.4	1032.2	721.0	23900.0	685.0	264.0	139.0	201.5	.40	10
382	207.7	121.8	944.3	668.2	10400.0	1060.0	218.0	152.0	185.0	2.24	7
383	241.2	137.1	817.8	591.4	3500.0	1050.0	208.0	134.0	171.0	.97	6
384	233.9	134.0	853.6	615.0	4160.0	1460.0	79.3	199.0	139.2	.81	10
385	213.3	126.7	973.8	683.8	12600.0	889.0	315.0	125.0	220.0	.54	4
386	237.8	138.0	843.3	605.1	3390.0	1480.0	151.0	145.0	148.0	.59	7
387	232.1	133.1	856.4	617.9	4490.0	1280.0	135.0	163.0	149.0	.43	7
388	240.9	138.7	839.5	603.1	3530.0	1280.0	180.0	136.0	158.0	.50	6
389	228.0	134.3	923.1	652.0	6810.0	1190.0	225.0	128.0	176.5	.34	6
390	233.4	134.5	848.7	607.8	3540.0	1430.0	174.0	145.0	159.5	1.67	7
391	210.5	125.0	1007.0	711.4	24000.0	380.0	378.0	135.0	256.5	.20	11
392	210.1	125.1	1015.1	715.4	25300.0	380.0	376.0	136.0	256.0	.44	11
393	210.4	124.2	947.5	667.0	9670.0	1090.0	281.0	133.0	207.0	.64	5
394	208.5	124.5	1026.9	723.4	31200.0	229.0	499.0	138.0	318.5	.23	15
395	224.5	132.0	931.3	660.0	8460.0	959.0	272.0	125.0	198.5	.57	5
396	215.2	124.3	904.3	649.7							
397	241.3	138.6	837.8	603.6	3750.0	1230.0	160.0	143.0	151.5	.32	7
398	221.5	129.3	946.5	677.1	12700.0	679.0	256.0	139.0	197.5	.83	5
399	227.8	134.1	914.7	647.4	6700.0	1050.0	289.0	118.0	203.5	.66	5
400	209.8	125.7	1023.4	720.1	25200.0	444.0	317.0	134.0	225.5	.13	11
401	242.9	139.9	834.6	598.5	2960.0	1740.0	71.2	192.0	131.6	1.49	11
402	227.5	133.8	955.8	676.6	11100.0	861.0	230.0	133.0	181.5	.67	5
403	207.9	120.7	911.7	651.5	8710.0	1050.0	215.0	156.0	185.5	.52	6
404	205.9	120.0	919.2	655.6	9750.0	964.0	262.0	146.0	204.0	.22	5
405	216.9	128.7	999.7	705.6	20400.0	450.0	347.0	128.0	237.5	.51	10
406	214.3	123.5	900.3	649.1	9200.0	765.0	294.0	140.0	217.0	1.18	4
407	232.4	135.7	893.9	634.6	5610.0	1130.0	248.0	125.0	186.5	.45	5
408	215.1	127.3	982.3	692.9	15900.0	711.0	280.0	134.0	207.0	.38	7
409	237.4	137.9	857.1	611.7	4090.0	1170.0	257.0	121.0	189.0	.45	5
410	219.4	128.4	962.5	684.9	16500.0	373.0	437.0	120.0	278.5	.36	9
411	216.7	125.4	895.3	640.9	6940.0	1140.0	179.0	157.0	168.0	.30	7
412	225.6	129.6	864.4	622.9	5570.0	1100.0	177.0	152.0	164.5	.33	7
413	221.2	130.6	991.7	705.1	20600.0	308.0	427.0	124.0	275.5	.88	11
414	222.1	132.8	1014.1	714.5	19400.0	990.0	125.0	174.0	149.5	.23	6
415	278.1	158.7	848.0	614.6	3650.0	1050.0	93.5	148.0	120.8	.56	8
416	232.4	137.6	993.2	703.8	18100.0	506.0	252.0	128.0	190.0	.18	9
417	250.7	147.2	946.1	673.9	9210.0	932.0	136.0	139.0	137.5	.14	7
418	234.6	137.8	965.3	687.8	12400.0	882.0	133.0	156.0	144.5	.28	6

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
419	251.8	146.8	929.3	662.3	7750.0	1010.0	117.0	148.0	132.5	.45	8
420	228.0	135.6	1000.1	707.0	17300.0	830.0	154.0	153.0	153.5	.14	5
421	254.8	148.7	926.5	659.9	7580.0	914.0	157.0	130.0	143.5	.21	7
422	228.3	135.9	997.0	703.2	15300.0	913.0	158.0	147.0	152.5	.41	5
423	253.6	146.6	909.0	653.7	7470.0	864.0	142.0	142.0	142.0	.05	7
424	245.9	144.4	957.0	681.2	11400.0	787.0	166.0	136.0	151.0	.11	5
425	228.0	136.0	1000.0	703.6	14700.0	1130.0	115.0	165.0	140.0	.29	8
426	219.8	130.8	1003.4	709.6	19400.0	721.0	198.0	150.0	174.0	.26	9
427	277.9	158.9	863.1	622.3	4250.0	1010.0	105.0	143.0	124.0	.64	8
428	246.2	144.6	943.3	668.4	8490.0	999.0	165.0	133.0	149.0	.48	7
429	246.3	143.4	936.5	670.9	9630.0	854.0	148.0	145.0	146.5	.40	6
430	262.7	151.1	902.9	653.0							
431	252.2	147.8	941.1	669.2	9000.0	845.0	180.0	126.0	153.0	.24	5
432	282.6	159.8	821.6	599.4	3170.0	997.0	109.0	144.0	126.5	.38	7
433	244.0	144.6	975.9	687.5	11700.0	855.0	195.0	125.0	160.0	.32	5
434	236.7	140.3	986.2	697.7	15000.0	667.0	239.0	127.0	183.0	.62	7
435	249.0	144.1	915.6	656.5	8050.0	869.0	149.0	143.0	146.0	.34	7
436	268.2	153.9	879.2	633.5	5130.0	921.0	128.0	136.0	132.0	.33	7
437	262.8	150.6	884.7	639.8	6130.0	853.0	134.0	142.0	138.0	.20	7
438	266.2	154.8	908.5	649.6	6320.0	926.0	147.0	127.0	137.0	.14	6
439	280.2	158.0	814.5	595.8	2670.0	1320.0	45.2	224.0	134.6	1.68	11
440	259.9	151.1	915.3	652.4	6740.0	897.0	166.0	125.0	145.5	.44	7
441	229.9	137.1	1008.4	713.0	18700.0	742.0	173.0	147.0	160.0	.49	9
442	234.7	138.5	978.1	693.2	14000.0	813.0	177.0	144.0	160.5	.59	5
443	276.2	156.8	852.3	623.6	4060.0	1100.0	50.2	217.0	133.6	.38	10
444	273.1	157.1	864.3	621.1	4290.0	951.0	158.0	123.0	140.5	.19	6
445	254.5	148.0	925.4	663.2	8060.0	914.0	120.0	146.0	133.0	.27	8
446	251.7	145.7	918.5	660.1	8620.0	772.0	168.0	135.0	151.5	.25	5
447	280.2	159.4	821.6	595.7	2810.0	1140.0	103.0	140.0	121.5	.74	8
448	268.5	158.0	979.9	697.9	14000.0	597.0	143.0	132.0	137.5	.19	7
449	298.7	170.6	907.9	660.1	9280.0	449.0	139.0	120.0	129.5	1.94	5
450	297.8	170.9	910.7	658.0	7860.0	583.0	127.0	122.0	124.5	.29	6
451	247.1	147.6	1021.1	720.9	21200.0	439.0	209.0	125.0	167.0	.30	11
452	255.2	151.9	1012.8	715.9	19700.0	529.0	159.0	134.0	146.5	.41	11
453	287.2	167.3	941.5	673.5	8790.0	653.0	145.0	118.0	131.5	.46	6
454	335.2	185.9	809.8	596.7	3220.0	592.0	107.0	116.0	111.5	.32	7
455	271.3	160.2	982.8	697.9	13600.0	510.0	198.0	112.0	155.0	.42	8
456	289.4	166.5	921.8	663.9	8950.0	528.0	157.0	117.0	137.0	.30	5
457	279.3	164.8	973.2	689.2	11200.0	642.0	168.0	112.0	140.0	.22	5
458	334.7	186.4	822.4	602.9	3460.0	574.0	121.0	109.0	115.0	.44	6
459	332.6	184.9	821.2	602.5	3530.0	595.0	113.0	116.0	114.5	.41	7
460	315.8	177.4	858.2	626.6	5210.0	558.0	121.0	119.0	120.0	.51	7
461	261.9	155.6	999.5	706.6	14100.0	796.0	109.0	142.0	125.5	.74	7
462	333.2	185.2	818.6	601.0	3440.0	604.0	113.0	117.0	115.0	.28	7
463	312.2	175.7	867.2	635.4	5630.0	575.0	101.0	132.0	116.5	.25	7
464	293.3	169.8	919.5	659.2	7370.0	617.0	168.0	109.0	138.5	.30	5
465	288.1	166.4	923.4	663.3	7620.0	757.0	96.3	139.0	117.7	.64	8
466	273.7	160.2	960.4	685.4	10600.0	721.0	120.0	134.0	127.0	.49	6
467	319.1	181.2	848.6	614.5	3660.0	715.0	140.0	108.0	124.0	.43	6
468	272.9	160.4	967.8	687.9	10700.0	706.0	138.0	124.0	131.0	.49	6
469	292.4	170.3	937.3	671.1	8850.0	581.0	162.0	110.0	136.0	.19	4
470	300.1	172.9	914.9	657.9	7410.0	620.0	126.0	118.0	122.0	1.05	6
471	280.2	163.5	940.1	669.9	8490.0	736.0	149.0	120.0	134.5	.30	6
472	249.6	149.2	1023.0	721.3	21500.0	504.0	185.0	131.0	158.0	.15	11
473	327.5	184.3	827.1	602.3	3090.0	735.0	105.0	115.0	110.0	.88	7

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
474	324.1	181.9	828.9	604.5	3300.0	692.0	113.0	115.0	114.0	.65	7
475	264.6	156.3	987.2	700.5	13400.0	745.0	110.0	141.0	125.5	.31	6
476	319.0	179.6	850.8	622.6	4740.0	537.0	137.0	110.0	123.5	.90	6
477	291.0	167.9	929.9	669.4	9820.0	510.0	154.0	118.0	136.0	.42	4
478	292.1	168.7	921.5	661.0	7960.0	573.0	178.0	110.0	144.0	.39	4
479	250.5	150.1	1026.8	721.9	21400.0	589.0	169.0	135.0	152.0	.20	11
480	310.6	177.3	875.0	633.6	4990.0	678.0	129.0	115.0	122.0	.30	6
481	299.7	173.0	908.2	651.6	6160.0	725.0	127.0	117.0	122.0	.31	7
482	256.6	153.2	1014.2	715.5	16600.0	791.0	112.0	145.0	128.5	.37	6
483	294.4	170.9	925.8	665.1	7140.0	811.0	86.6	140.0	113.3	.11	9
484	304.9	176.4	902.0	649.3	5350.0	817.0	103.0	124.0	113.5	.56	8
485	276.2	162.7	979.6	697.1	12700.0	688.0	117.0	135.0	126.0	.27	5
486	308.2	176.1	883.2	641.9	4960.0	822.0	68.3	154.0	111.2	.23	9
487	319.7	181.6	850.4	621.4	3490.0	900.0	58.2	161.0	109.6	.20	9
488	283.7	166.8	978.1	698.9	12500.0	712.0	86.1	152.0	119.0	.34	7
489	271.1	160.7	993.2	706.6	13000.0	954.0	53.3	202.0	127.6	.38	11
490	327.5	184.7	822.8	604.6	2660.0	987.0	44.3	181.0	112.6	.40	10
491	316.8	179.7	860.9	627.8	4230.0	773.0	81.9	139.0	110.5	.16	8
492	274.6	163.4	1005.8	712.2	14700.0	801.0	84.6	152.0	118.3	.40	8
493	282.9	163.7	924.5	664.8	7750.0	791.0	97.2	144.0	120.6	.20	8
494	285.5	165.1	918.0	661.0	7140.0	790.0	98.8	140.0	119.4	.15	8
495	279.8	164.9	981.8	699.9	12600.0	695.0	97.0	141.0	119.0	.37	6
496	287.8	165.9	916.6	662.5	7600.0	741.0	93.3	146.0	119.7	.12	8
497	282.1	166.3	962.7	684.4	9360.0	824.0	113.0	128.0	120.5	.33	7
498	301.2	172.1	888.4	645.5	5630.0	774.0	80.5	148.0	114.3	.04	9
499	289.0	168.1	929.4	666.4	7230.0	854.0	94.0	139.0	116.5	.33	9
500	317.0	182.0	873.2	632.3	3850.0	973.0	64.8	149.0	106.9	.26	9
501	263.3	156.7	1012.6	716.8	17500.0	792.0	84.9	168.0	126.5	.31	7
502	325.0	184.4	846.2	619.5	3350.0	898.0	58.7	161.0	109.9	.44	9
503	304.0	175.2	896.9	647.3	5280.0	829.0	96.7	131.0	113.8	.65	8
504	288.3	168.5	954.6	683.7	9620.0	741.0	96.1	140.0	118.0	.53	8
505	286.6	167.5	961.7	689.3	11100.0	615.0	110.0	133.0	121.5	.39	5
506	290.1	167.8	926.9	668.0	7830.0	765.0	81.6	150.0	115.8	.18	9
507	258.1	153.5	1008.2	716.0	17400.0	710.0	107.0	155.0	131.0	.55	6
508	272.3	161.7	997.3	709.4	13700.0	925.0	56.6	194.0	125.3	.25	11
509	285.2	165.4	929.1	671.1	8310.0	708.0	112.0	136.0	124.0	1.01	7
510	280.3	163.9	940.6	672.4	8100.0	872.0	101.0	139.0	120.0	.13	8
511	321.9	182.4	838.4	612.0	3010.0	955.0	57.9	159.0	108.5	.26	9
512	304.4	173.5	882.4	642.7	5570.0	713.0	90.2	138.0	114.1	.25	8
513	275.7	162.5	984.5	702.0	13600.0	687.0	94.3	148.0	121.2	.18	6
514	290.1	167.5	926.7	669.0	7740.0	828.0	63.6	171.0	117.3	.43	10
515	321.5	181.2	841.7	618.0	3430.0	872.0	48.7	177.0	112.9	.32	10
516	289.5	169.0	939.9	673.4	7920.0	773.0	108.0	128.0	118.0	.64	8
517	304.6	177.0	954.7	687.0	11000.0	495.0	112.0	125.0	118.5	.10	5
518	329.2	185.4	855.0	625.4	4700.0	543.0	123.0	112.0	117.5	.71	7
519	282.4	166.5	987.3	704.9	14400.0	538.0	123.0	130.0	126.5	.42	9
520	297.6	170.6	915.6	664.0	8500.0	589.0	102.0	137.0	119.5	.10	7
521	301.7	174.9	942.9	679.1	8820.0	727.0	68.2	159.0	113.6	.39	9
522	313.0	180.1	915.3	662.6	7190.0	601.0	107.0	124.0	115.5	.68	7
523	322.3	184.8	905.4	654.1	6630.0	559.0	120.0	113.0	116.5	.19	6
524	297.5	170.6	915.4	663.0	8320.0	560.0	119.0	129.0	124.0	.24	6
525	311.0	176.7	893.7	653.8	6330.0	775.0	37.6	240.0	138.8	.32	12
526	325.1	182.7	857.8	629.3	4880.0	602.0	87.7	133.0	110.3	.23	8
527	293.2	171.3	967.8	692.5	12900.0	487.0	132.0	125.0	128.5	.29	8
528	322.0	184.6	894.4	647.7	5790.0	625.0	111.0	116.0	113.5	.22	7

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
529	279.3	165.0	1001.2	712.8	19000.0	378.0	163.0	129.0	146.0	.13	11
530	308.0	177.6	919.5	662.4	7580.0	592.0	130.0	117.0	123.5	.23	6
531	287.5	169.3	988.1	705.4	14900.0	522.0	116.0	134.0	125.0	.28	10
532	335.5	189.9	851.5	622.4	3930.0	672.0	98.7	119.0	108.8	.31	7
533	313.1	180.1	918.1	665.0	7750.0	555.0	116.0	122.0	119.0	.53	6
534	305.4	174.4	893.0	648.8	6560.0	616.0	111.0	126.0	118.5	.21	7
535	303.1	174.9	912.8	661.4	7360.0	764.0	58.4	167.0	112.7	1.27	11
536	289.3	169.6	967.6	692.6	11000.0	679.0	95.1	140.0	117.5	.63	7
537	325.8	184.7	868.8	634.4	5040.0	611.0	106.0	122.0	114.0	.31	7
538	341.5	190.1	822.9	607.8	3500.0	634.0	75.1	135.0	105.0	.40	8
539	298.0	174.2	970.8	697.4	12900.0	460.0	120.0	126.0	123.0	.46	9
540	345.8	191.1	807.8	598.6	3070.0	638.0	68.0	141.0	104.5	.30	8
541	277.5	164.2	1001.7	711.9	17100.0	492.0	139.0	131.0	135.0	.34	10
542	337.8	188.6	821.8	605.9	3340.0	687.0	73.4	137.0	105.2	.52	8
543	296.1	171.0	919.6	661.6	7450.0	643.0	139.0	120.0	129.5	.83	6
544	298.5	174.2	950.8	681.4	9650.0	598.0	126.0	119.0	122.5	.28	5
545	337.9	188.6	824.1	605.2	3210.0	679.0	88.7	127.0	107.8	.30	8
546	344.4	191.8	804.6	596.1	2380.0	963.0	22.8	406.0	214.4	1.04	15
547	302.8	176.1	955.2	687.0	11000.0	503.0	118.0	124.0	121.0	.16	5
548	312.3	178.1	887.2	645.1	6240.0	504.0	165.0	106.0	135.5	.72	5
549	284.7	168.3	995.4	708.6	14400.0	712.0	76.6	159.0	117.8	.27	7
550	332.4	185.6	822.7	604.7	3060.0	797.0	63.4	155.0	109.2	.59	8
551	331.8	186.0	837.8	613.9	3680.0	646.0	98.1	123.0	110.5	.36	7
552	294.9	170.3	921.4	664.3	6960.0	916.0	49.5	199.0	124.3	.52	11
553	268.7	160.8	1029.5	729.8	19500.0	748.0	60.3	188.0	124.1	.53	7
554	323.6	183.9	840.4	614.8	2820.0	1080.0	39.7	193.0	116.4	.40	10
555	268.5	161.0	1044.8	738.2	25700.0	548.0	73.0	180.0	126.5	.26	17
556	281.8	166.0	968.3	690.2	10400.0	789.0	97.3	138.0	117.7	.30	8
557	267.9	157.6	960.1	684.9	9410.0	983.0	82.9	160.0	121.5	.60	10
558	281.8	164.8	955.3	685.0	9590.0	884.0	59.9	175.0	117.5	.17	10
559	311.9	179.3	886.1	642.1	4200.0	1060.0	40.9	212.0	126.5	.57	11
560	286.3	169.5	1001.2	711.8	15700.0	546.0	115.0	132.0	123.5	.57	10
561	279.1	165.3	1011.4	721.6	19300.0	527.0	84.7	164.0	124.3	.47	13
562	294.7	171.9	932.5	669.8	7090.0	897.0	70.3	153.0	111.7	.28	10
563	296.4	172.2	920.5	662.1	6290.0	926.0	71.8	153.0	112.4	.56	10
564	256.1	154.1	1053.9	743.7	30800.0	428.0	102.0	170.0	136.0	.25	17
565	269.1	161.7	1051.2	742.2	27000.0	596.0	58.1	207.0	132.5	.33	17
566	270.6	161.0	1017.2	721.2	19100.0	606.0	95.0	154.0	124.5	.28	12
567	315.4	180.1	859.4	626.6	3430.0	1040.0	42.5	201.0	121.8	.18	11
568	275.7	164.9	1028.9	727.2	19100.0	675.0	73.0	161.0	117.0	.26	7
569	279.1	162.2	936.7	674.0	8250.0	903.0	66.1	177.0	121.5	.30	10
570	317.7	180.9	844.8	616.5	2980.0	1070.0	44.6	192.0	118.3	.15	10
571	276.3	162.4	966.0	691.0	10200.0	874.0	77.4	160.0	118.7	1.30	10
572	276.9	161.7	948.4	679.5	8670.0	972.0	56.0	193.0	124.5	.33	11
573	272.6	159.2	953.1	683.6	9930.0	855.0	78.2	167.0	122.6	.26	9
574	282.7	164.1	926.8	668.0	7260.0	947.0	59.4	184.0	121.7	.22	10
575	256.0	153.8	1049.1	740.0	28000.0	540.0	84.3	179.0	131.7	.24	17
576	320.6	181.3	839.4	616.4	3210.0	972.0	45.8	202.0	123.9	.24	10
577	281.1	167.0	1014.9	722.3	19200.0	432.0	116.0	136.0	126.0	.49	13
578	269.6	160.3	991.1	701.9	12300.0	820.0	117.0	133.0	125.0	.66	7
579	290.2	170.6	948.5	677.8	7210.0	1110.0	42.3	205.0	123.6	.12	12
580	265.0	158.2	1035.3	734.5	25300.0	379.0	121.0	150.0	135.5	.63	15
581	277.4	163.0	956.7	683.1	9260.0	865.0	95.6	143.0	119.3	.43	8
582	315.9	180.7	870.3	636.0							
583	298.4	173.2	915.2	660.5	5330.0	1220.0	19.9	619.0	319.4	.36	18

	12 T_ARE	13 OUT_3	14 T_U_A	15 A_TUA	16 E1	17 E2	18 E3	19 E4	20 AV_E3	21 RMS	22 IT
584	310.4	179.1	889.5	643.2	4570.0	962.0	65.1	153.0	109.0	.30	9
585	304.2	174.8	884.4	641.9	4420.0	1050.0	41.7	217.0	129.4	.17	11
586	356.3	195.9	802.5	596.9	2880.0	646.0	58.3	155.0	106.6	.59	9
587	304.0	173.7	904.8	657.2	7630.0	529.0	131.0	123.0	127.0	.18	5
588	328.4	185.4	862.0	632.4	4600.0	647.0	84.5	136.0	110.3	.84	9
589	318.5	184.0	947.9	685.8	10500.0	488.0	86.6	137.0	111.8	.27	5
590	293.9	173.2	989.5	706.5	13800.0	583.0	89.2	139.0	114.1	.35	6
591	361.3	198.4	810.1	604.5	3380.0	552.0	65.3	144.0	104.7	.28	8
592	292.7	173.2	1005.9	715.9	17000.0	522.0	103.0	141.0	122.0	.53	11
593	356.3	196.9	806.2	598.3	2720.0	698.0	55.2	159.0	107.1	.28	9
594	291.8	171.9	995.9	711.5	17700.0	366.0	135.0	129.0	132.0	.16	12
595	301.6	177.6	988.9	706.0	14100.0	513.0	103.0	130.0	116.5	.31	9
596	363.7	199.4	801.1	598.6	2930.0	607.0	50.5	164.0	107.3	.18	9
597	363.8	198.9	789.1	589.5	2610.0	619.0	56.8	153.0	104.9	.42	9
598	304.4	176.1	936.6	677.1	9950.0	467.0	138.0	119.0	128.5	.48	5
599	348.3	193.6	829.2	612.9	3080.0	841.0	28.9	327.0	177.9	1.09	15
600	312.8	177.5	896.2	654.6	7690.0	472.0	121.0	124.0	122.5	.67	6
601	324.6	183.4	889.4	652.2	7020.0	518.0	83.1	140.0	111.5	.12	8
602	303.1	178.8	990.6	707.2	13500.0	622.0	73.5	147.0	110.3	.15	6
603	344.9	191.0	835.1	620.3	4380.0	521.0	75.1	138.0	106.5	.32	8
604	326.9	186.1	895.6	652.2	6340.0	560.0	98.0	125.0	111.5	.39	8
605	313.4	180.4	935.5	678.7	9940.0	442.0	118.0	125.0	121.5	.66	5
606	352.1	194.2	803.9	595.0	2700.0	695.0	65.2	147.0	106.1	.59	8
607	302.7	176.9	973.2	699.7	13700.0	410.0	118.0	126.0	122.0	.26	10
608	317.7	182.7	934.3	679.5	9870.0	443.0	101.0	129.0	115.0	.38	5
609	353.4	197.6	823.8	606.4	3050.0	666.0	83.8	124.0	103.9	.51	8
610	340.0	188.9	833.2	616.0	3920.0	582.0	90.7	132.0	111.3	.70	8
611	331.7	188.6	906.2	662.5	7750.0	452.0	102.0	127.0	114.5	.55	6
612	318.4	180.3	877.1	640.7	5720.0	575.0	113.0	125.0	119.0	.41	7
613	342.4	189.8	837.2	620.8	4420.0	550.0	71.7	145.0	108.3	.14	8
614	310.7	180.5	961.9	694.0	12300.0	413.0	111.0	127.0	119.0	.46	9
615	317.8	183.8	945.7	684.4	10200.0	464.0		126.0		.44	5
616	324.6	183.1	879.7	643.5	5750.0	586.0	82.7	139.0	110.8	.40	8
617	310.2	176.4	899.1	654.6	7550.0	500.0	129.0	121.0	125.0	.53	6
618	319.3	179.8	881.9	650.0	7710.0	394.0	131.0	122.0	126.5	.62	5
619	330.2	186.4	871.2	638.6	5230.0	579.0	93.1	129.0	111.0	.54	8
620	312.7	177.3	896.0	654.1	7260.0	527.0	102.0	134.0	118.0	.15	7

data file: 48SFSUB.STA [620 cases with 50 variables]

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
1	12.3	27.4	29.5	28.9	30.8	32.4	33.1	32.6	32.4	32.2
2	14.1	25.1	25.6	28.9	31.5	32.6	33.4	33.1	33.1	29.5
3	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
4	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.1	32.2
5	12.6	27.6	29.6	29.0	31.1	32.5	33.5	33.1	32.2	32.2
6	13.9	25.1	25.8	29.0	31.5	32.8	33.4	33.1	33.1	29.1
7	12.6	27.6	29.0	29.0	31.1	32.6	33.7	33.1	32.2	32.2
8	14.1	25.1	25.6	28.8	31.5	32.6	33.4	33.1	33.1	29.5
9	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
10	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
11	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
12	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
13	13.8	24.8	25.4	28.4	32.5	32.1	33.5	30.2	33.3	29.0
14	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.2
15	12.7	27.6	29.7	29.0	31.1	32.5	33.3	33.1	32.1	32.2
16	13.8	27.4	27.9	31.7	31.5	32.9	33.4	33.1	33.1	32.4
17	13.5	27.7	28.7	30.6	31.5	32.9	33.5	33.1	33.1	32.2
18	13.8	27.6	29.3	29.5	31.3	32.9	33.4	33.1	33.1	32.2
19	13.5	27.7	29.0	30.6	31.5	32.9	33.5	33.1	33.1	32.1
20	13.8	27.6	28.1	30.4	31.3	32.6	33.7	33.1	33.1	32.4
21	13.8	27.1	28.1	31.5	31.5	32.9	33.6	33.1	33.1	32.6
22	13.6	27.8	28.7	30.6	31.4	32.8	33.7	33.1	33.1	32.2
23	13.8	27.8	29.9	29.5	31.5	32.9	33.7	33.1	33.1	32.4
24	12.9	27.6	29.3	29.0	31.1	32.6	33.1	33.1	32.0	32.2
25	13.7	25.4	25.8	29.2	31.6	32.9	33.5	33.1	33.1	29.1
26	13.8	25.8	25.7	29.0	31.5	32.9	33.7	33.1	33.1	27.7
27	13.8	25.3	26.4	29.3	31.5	32.9	33.7	33.1	33.1	28.9
28	14.0	27.6	29.6	29.3	31.3	32.9	33.4	33.1	33.1	32.2
29	14.0	27.7	29.8	29.4	31.3	32.9	33.5	33.1	33.1	32.2
30	13.6	24.6	25.3	28.2	32.9	31.9	33.6	29.0	33.3	28.7
31	14.0	25.0	25.5	28.7	31.9	32.4	33.4	32.0	33.2	29.3
32	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
33	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
34	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
35	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
36	13.9	25.0	25.5	28.6	32.0	32.4	33.5	31.6	33.2	29.2
37	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
38	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.3
39	13.9	27.6	29.4	29.5	31.3	32.9	33.4	33.1	33.1	32.2
40	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
41	13.9	25.0	25.5	28.6	32.0	32.4	33.5	31.7	33.2	29.2
42	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
43	13.8	25.7	25.9	29.1	31.5	32.9	33.7	33.1	33.1	28.0
44	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
45	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.4
46	13.5	27.7	28.4	30.6	31.5	32.9	33.6	33.1	33.1	32.3
47	13.8	25.1	26.7	29.4	31.5	32.9	33.7	33.1	33.1	29.4
48	13.6	24.6	25.3	28.2	32.9	31.8	33.6	28.9	33.3	28.7
49	13.7	27.8	30.0	29.6	31.6	32.9	33.7	33.1	33.1	32.5
50	12.6	27.6	29.0	29.0	31.2	32.9	33.7	33.1	32.0	32.2

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
51	13.7	25.3	25.8	29.1	31.6	32.9	33.4	33.1	33.1	29.0
52	12.7	27.6	29.8	29.0	31.1	32.4	33.3	33.1	32.1	32.2
53	14.1	27.6	29.7	29.3	31.3	32.9	33.4	33.1	33.1	32.2
54	13.6	25.6	25.8	29.2	31.7	32.9	33.6	33.1	33.1	29.2
55	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
56	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
57	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
58	13.8	24.8	25.4	28.4	32.4	32.1	33.5	30.4	33.3	29.0
59	12.8	27.6	29.4	29.0	31.1	32.6	33.2	33.1	32.0	32.2
60	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
61	13.7	27.6	28.3	30.5	31.3	32.7	33.7	33.1	33.1	32.3
62	13.7	25.1	25.9	29.1	31.5	33.0	33.4	33.1	33.1	28.6
63	12.6	27.6	29.4	29.0	31.1	32.5	33.5	33.1	32.2	32.2
64	13.8	27.0	28.2	31.5	31.5	32.9	33.7	33.1	33.1	32.7
65	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.9	32.4	32.1
66	13.5	27.8	28.9	30.6	31.5	32.9	33.7	33.1	33.1	32.2
67	14.0	27.7	29.9	29.4	31.4	32.9	33.5	33.1	33.1	32.3
68	13.8	27.3	28.0	31.7	31.5	32.9	33.5	33.1	33.1	32.5
69	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
70	13.8	25.1	25.8	29.0	31.5	32.9	33.4	33.1	33.1	28.9
71	13.8	27.8	29.9	29.5	31.5	32.9	33.7	33.1	33.1	32.4
72	14.1	27.6	29.6	29.3	31.3	32.9	33.4	33.1	33.1	32.2
73	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
74	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.2	32.2
75	13.8	25.8	25.8	29.0	31.5	32.9	33.7	33.1	33.1	27.8
76	14.0	27.7	29.8	29.4	31.3	32.9	33.5	33.1	33.1	32.2
77	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.0	32.2
78	12.6	27.6	29.5	29.0	31.1	32.5	33.5	33.1	32.2	32.2
79	14.1	25.1	25.6	28.9	31.5	32.7	33.4	33.1	33.1	29.5
80	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
81	12.3	27.4	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
82	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
83	13.5	27.8	28.8	30.6	31.5	32.9	33.7	33.1	33.1	32.2
84	12.9	27.6	29.3	29.0	31.1	32.6	33.1	33.1	32.0	32.2
85	13.8	27.4	27.9	31.7	31.5	32.9	33.4	33.1	33.1	32.4
86	12.7	27.6	29.8	29.0	31.1	32.5	33.3	33.1	32.1	32.2
87	14.1	25.1	25.6	28.8	31.6	32.6	33.4	32.8	33.1	29.4
88	13.8	27.0	28.1	31.5	31.5	32.9	33.7	33.1	33.1	32.6
89	13.5	24.6	25.3	28.2	33.1	31.8	33.7	28.6	33.4	28.6

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
90	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
91	13.6	25.5	25.8	29.2	31.7	32.9	33.6	33.1	33.1	29.1
92	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
93	13.8	27.6	28.3	30.4	31.3	32.7	33.7	33.1	33.1	32.4
94	13.5	27.7	28.5	30.6	31.5	32.9	33.5	33.1	33.1	32.3
95	13.7	24.8	25.4	28.4	32.6	32.1	33.6	30.0	33.3	28.9
96	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
97	13.8	27.6	29.3	29.5	31.3	32.9	33.4	33.1	33.1	32.2
98	13.8	25.3	26.5	29.3	31.5	32.9	33.7	33.1	33.1	29.0
99	13.9	24.9	25.5	28.6	32.0	32.4	33.5	31.6	33.2	29.2
100	13.5	27.7	29.0	30.6	31.5	32.9	33.5	33.1	33.1	32.1
101	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.2
102	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
103	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
104	13.7	27.9	30.0	29.6	31.6	32.9	33.8	33.1	33.1	32.5
105	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.3	33.2	29.2
106	13.5	25.7	25.8	29.3	31.7	32.9	33.7	33.1	33.1	29.3
107	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
108	13.5	27.8	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.1
109	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
110	13.8	26.9	28.2	31.4	31.5	32.9	33.8	33.1	33.1	32.7
111	13.7	27.7	28.5	30.5	31.4	32.8	33.7	33.1	33.1	32.3
112	13.8	27.2	28.0	31.6	31.5	32.9	33.5	33.1	33.1	32.5
113	13.8	25.0	26.8	29.5	31.5	32.9	33.7	33.1	33.1	29.6
114	14.1	27.6	29.8	29.3	31.3	32.9	33.4	33.1	33.1	32.2
115	13.9	27.7	29.9	29.4	31.4	32.9	33.5	33.1	33.1	32.3
116	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
117	13.5	27.8	28.2	30.6	31.5	32.9	33.6	33.1	33.1	32.4
118	14.0	27.6	29.5	29.4	31.3	32.9	33.4	33.1	33.1	32.2
119	13.8	25.7	25.9	29.1	31.5	32.9	33.7	33.1	33.1	28.1
120	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
121	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.1
122	12.6	27.6	29.3	29.0	31.1	32.6	33.6	33.1	32.2	32.2
123	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
124	12.3	27.2	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.4
125	12.6	27.6	29.0	29.0	31.2	32.9	33.7	33.1	32.0	32.2
126	13.7	24.8	25.4	28.4	32.5	32.1	33.6	30.1	33.3	28.9
127	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
128	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.4	33.2	29.2
129	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.2
130	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
131	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
132	13.7	25.4	25.8	29.1	31.6	32.9	33.5	33.1	33.1	29.0
133	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
134	12.8	27.6	29.5	29.0	31.1	32.6	33.2	33.1	32.0	32.2
135	13.5	24.6	25.3	28.2	33.0	31.8	33.6	28.6	33.4	28.7
136	12.6	27.6	29.9	29.0	31.1	32.4	33.4	33.1	32.2	32.2
137	13.7	25.1	26.0	29.1	31.5	33.0	33.4	33.1	33.1	28.5
138	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
139	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
140	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.4	33.2	29.2
141	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
142	13.7	24.8	25.4	28.4	32.6	32.0	33.6	29.9	33.3	28.9
143	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
144	13.5	27.7	28.5	30.6	31.5	32.9	33.5	33.1	33.1	32.3

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
145	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
146	13.8	27.6	28.3	30.4	31.3	32.7	33.7	33.1	33.1	32.4
147	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
148	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
149	13.5	24.6	25.3	28.1	33.1	31.7	33.7	28.4	33.4	28.6
150	13.8	27.0	28.1	31.5	31.5	32.9	33.7	33.1	33.1	32.7
151	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.2
152	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
153	13.8	25.8	25.7	29.0	31.5	32.9	33.7	33.1	33.1	27.7
154	13.5	27.8	28.8	30.6	31.5	32.9	33.7	33.1	33.1	32.2
155	14.1	25.1	25.6	28.8	31.6	32.6	33.4	32.7	33.1	29.4
156	13.8	27.3	28.0	31.7	31.5	32.9	33.4	33.1	33.1	32.5
157	13.8	25.2	26.5	29.3	31.5	32.9	33.7	33.1	33.1	29.1
158	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.0	32.2
159	12.7	27.6	29.8	29.0	31.1	32.5	33.3	33.1	32.1	32.2
160	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
161	14.1	25.1	25.6	28.9	31.5	32.7	33.4	33.1	33.1	29.5
162	14.0	27.7	29.8	29.4	31.4	32.9	33.5	33.1	33.1	32.3
163	13.8	27.8	29.9	29.5	31.5	32.9	33.7	33.1	33.1	32.4
164	13.8	25.1	25.8	29.0	31.5	32.9	33.4	33.1	33.1	28.9
165	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.2	32.2
166	12.6	27.6	29.5	29.0	31.1	32.5	33.5	33.1	32.2	32.2
167	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
168	12.3	27.4	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
169	13.6	25.5	25.8	29.2	31.7	32.9	33.6	33.1	33.1	29.2
170	13.8	27.6	29.3	29.5	31.3	32.9	33.4	33.1	33.1	32.2
171	12.9	27.6	29.3	29.0	31.1	32.6	33.1	33.1	32.0	32.2
172	14.1	27.6	29.6	29.3	31.3	32.9	33.4	33.1	33.1	32.2
173	13.7	27.7	28.5	30.5	31.4	32.8	33.7	33.1	33.1	32.3
174	12.8	27.6	29.5	29.0	31.1	32.6	33.2	33.1	32.0	32.2
175	13.8	26.9	28.2	31.4	31.5	32.9	33.8	33.1	33.1	32.7
176	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.0
177	13.7	27.9	30.0	29.6	31.6	32.9	33.8	33.1	33.1	32.5
178	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
179	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
180	12.6	27.6	29.9	29.0	31.1	32.4	33.4	33.1	32.2	32.2
181	13.9	27.7	29.9	29.5	31.4	32.9	33.6	33.1	33.1	32.3
182	12.3	27.2	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.4
183	13.5	27.6	28.8	30.6	31.5	32.9	33.4	33.1	33.1	32.2
184	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
185	12.6	27.6	29.0	29.0	31.3	32.9	33.7	33.1	32.0	32.2
186	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.3
187	13.5	27.8	28.2	30.6	31.5	32.9	33.6	33.1	33.1	32.4
188	14.0	27.6	29.5	29.4	31.3	32.9	33.4	33.1	33.1	32.2
189	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
190	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.1
191	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
192	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
193	13.5	27.8	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.1
194	14.1	27.6	29.8	29.3	31.3	32.9	33.4	33.1	33.1	32.2
195	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
196	12.6	27.6	29.3	29.0	31.1	32.6	33.6	33.1	32.2	32.2
197	13.5	24.6	25.3	28.2	33.0	31.8	33.7	28.6	33.4	28.7
198	13.5	25.7	25.8	29.3	31.8	32.9	33.7	33.1	33.1	29.3
199	13.7	24.8	25.4	28.4	32.5	32.1	33.6	30.1	33.3	28.9

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
200	13.8	25.7	25.9	29.1	31.5	32.9	33.7	33.1	33.1	28.1
201	13.8	27.2	28.0	31.6	31.5	32.9	33.5	33.1	33.1	32.5
202	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.4	33.2	29.2
203	13.6	25.1	26.0	29.1	31.5	33.0	33.4	33.1	33.1	28.5
204	13.8	25.0	26.8	29.5	31.5	32.9	33.7	33.1	33.1	29.6
205	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.2
206	13.9	24.9	25.5	28.6	32.2	32.3	33.5	31.2	33.2	29.1
207	13.7	25.4	25.8	29.1	31.6	32.9	33.5	33.1	33.1	29.0
208	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
209	13.8	25.2	25.8	29.1	31.5	32.9	33.4	33.1	33.1	28.9
210	13.5	27.8	28.8	30.6	31.5	32.9	33.7	33.1	33.1	32.2
211	13.7	24.7	25.4	28.4	32.6	32.0	33.6	29.8	33.3	28.9
212	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
213	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
214	12.7	27.6	29.8	29.0	31.1	32.5	33.3	33.1	32.1	32.2
215	12.6	27.6	29.5	29.0	31.1	32.5	33.5	33.1	32.2	32.2
216	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.2	32.2
217	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.0	32.2
218	13.6	25.5	25.8	29.2	31.7	32.9	33.6	33.1	33.1	29.2
219	13.8	27.3	28.0	31.7	31.5	32.9	33.4	33.1	33.1	32.5
220	13.8	27.8	30.0	29.5	31.5	32.9	33.7	33.1	33.1	32.4
221	12.9	27.6	29.3	29.0	31.1	32.6	33.1	33.1	32.0	32.2
222	14.1	25.1	25.6	28.9	31.5	32.7	33.4	33.1	33.1	29.5
223	12.3	27.4	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
224	14.0	27.7	29.8	29.4	31.4	32.9	33.5	33.1	33.1	32.3
225	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
226	13.8	25.2	26.5	29.3	31.5	32.9	33.7	33.1	33.1	29.1
227	13.8	27.6	28.3	30.5	31.3	32.7	33.7	33.1	33.1	32.4
228	13.5	24.6	25.3	28.1	33.1	31.7	33.7	28.4	33.4	28.6
229	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
230	13.9	27.6	29.4	29.5	31.3	32.9	33.4	33.1	33.1	32.2
231	13.8	27.0	28.2	31.5	31.5	32.9	33.7	33.1	33.1	32.7
232	13.5	27.7	28.5	30.6	31.5	32.9	33.6	33.1	33.1	32.3
233	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
234	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
235	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
236	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.9	32.4	32.2
237	14.1	25.1	25.6	28.8	31.7	32.6	33.4	32.7	33.1	29.4
238	13.8	25.8	25.8	29.0	31.5	32.9	33.7	33.1	33.1	27.8
239	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
240	14.1	27.6	29.6	29.3	31.3	32.9	33.4	33.1	33.1	32.2
241	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.4	33.2	29.2
242	13.5	27.8	28.2	30.6	31.5	32.9	33.7	33.1	33.1	32.4
243	13.7	25.4	25.8	29.1	31.6	32.9	33.5	33.1	33.1	29.0
244	12.8	27.6	29.5	29.0	31.1	32.6	33.2	33.1	32.0	32.2
245	14.1	27.6	29.8	29.3	31.3	32.9	33.4	33.1	33.1	32.2
246	13.5	25.7	25.8	29.3	31.8	32.9	33.7	33.1	33.1	29.3
247	13.9	27.7	29.9	29.5	31.4	32.9	33.6	33.1	33.1	32.3
248	14.0	27.6	29.5	29.4	31.3	32.9	33.4	33.1	33.1	32.2
249	13.8	25.6	26.0	29.1	31.5	32.9	33.7	33.1	33.1	28.2
250	13.7	27.9	30.0	29.6	31.6	32.9	33.8	33.1	33.1	32.5
251	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
252	13.7	24.8	25.4	28.4	32.6	32.1	33.6	30.0	33.3	28.9
253	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
254	13.6	25.1	26.0	29.1	31.5	33.0	33.4	33.1	33.1	28.4

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
255	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.0
256	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
257	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
258	13.8	24.8	25.4	28.5	32.4	32.2	33.5	30.6	33.3	29.0
259	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
260	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
261	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.1
262	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
263	12.6	27.6	29.0	29.0	31.3	32.9	33.7	33.1	32.0	32.2
264	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.2
265	12.6	27.6	29.9	29.0	31.1	32.4	33.4	33.1	32.2	32.2
266	12.6	27.6	29.3	29.0	31.1	32.6	33.6	33.1	32.2	32.2
267	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.3	33.2	29.2
268	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
269	12.3	27.2	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.4
270	13.5	24.6	25.3	28.2	33.1	31.8	33.7	28.6	33.4	28.6
271	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.3
272	13.8	26.9	28.2	31.4	31.5	32.9	33.8	33.1	33.1	32.7
273	13.8	25.0	26.9	29.5	31.5	32.9	33.7	33.1	33.1	29.6
274	13.8	27.2	28.0	31.6	31.5	32.9	33.5	33.1	33.1	32.5
275	13.5	27.7	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.1
276	13.7	27.7	28.5	30.5	31.4	32.8	33.7	33.1	33.1	32.3
277	13.5	27.6	28.8	30.6	31.5	32.9	33.4	33.1	33.1	32.2
278	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.3	33.2	29.2
279	14.1	27.6	29.7	29.3	31.3	32.9	33.4	33.1	33.1	32.2
280	12.8	27.6	29.4	29.0	31.1	32.6	33.2	33.1	32.0	32.2
281	13.6	25.6	25.8	29.2	31.7	32.9	33.6	33.1	33.1	29.2
282	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.2	32.2
283	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
284	12.7	27.6	29.8	29.0	31.1	32.5	33.3	33.1	32.1	32.2
285	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
286	14.0	27.7	29.9	29.4	31.4	32.9	33.5	33.1	33.1	32.3
287	13.8	27.6	28.3	30.5	31.3	32.7	33.7	33.1	33.1	32.4
288	13.8	25.8	25.8	29.0	31.5	32.9	33.7	33.1	33.1	27.8
289	14.1	25.1	25.6	28.9	31.5	32.6	33.4	33.1	33.1	29.5
290	13.8	25.2	25.8	29.1	31.5	32.9	33.4	33.1	33.1	28.9
291	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
292	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
293	12.6	27.6	29.4	29.0	31.1	32.5	33.5	33.1	32.2	32.2
294	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
295	14.0	25.0	25.5	28.7	31.9	32.4	33.4	32.0	33.2	29.3
296	13.8	27.8	30.0	29.5	31.5	32.9	33.7	33.1	33.1	32.4
297	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
298	13.8	27.0	28.2	31.5	31.5	32.9	33.7	33.1	33.1	32.7
299	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
300	12.3	27.4	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
301	13.7	24.7	25.4	28.3	32.7	32.0	33.6	29.8	33.3	28.9
302	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
303	13.5	27.8	28.8	30.6	31.5	32.9	33.7	33.1	33.1	32.2
304	13.8	25.1	26.7	29.4	31.5	32.9	33.7	33.1	33.1	29.3
305	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.0	32.2
306	13.8	27.3	28.0	31.7	31.5	32.9	33.5	33.1	33.1	32.5
307	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.3
308	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
309	13.5	27.7	28.4	30.6	31.5	32.9	33.6	33.1	33.1	32.3

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
310	13.9	27.6	29.4	29.5	31.3	32.9	33.4	33.1	33.1	32.2
311	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.9	32.4	32.2
312	13.7	27.9	30.0	29.6	31.6	32.9	33.8	33.1	33.1	32.5
313	12.8	27.6	29.5	29.0	31.1	32.6	33.2	33.1	32.0	32.2
314	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
315	13.7	24.8	25.4	28.4	32.6	32.0	33.6	29.9	33.3	28.9
316	13.8	24.9	26.9	29.5	31.5	32.9	33.7	33.1	33.1	29.8
317	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
318	13.7	25.4	25.8	29.1	31.6	32.9	33.5	33.1	33.1	29.0
319	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
320	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.3	33.2	29.2
321	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
322	13.7	27.7	28.5	30.5	31.4	32.8	33.7	33.1	33.1	32.3
323	12.3	27.2	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.4
324	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.3
325	12.6	27.6	29.0	29.0	31.3	32.9	33.7	33.1	32.0	32.2
326	13.5	24.6	25.3	28.1	33.1	31.8	33.7	28.4	33.4	28.6
327	12.6	27.6	29.9	29.0	31.1	32.4	33.4	33.1	32.2	32.2
328	13.6	25.1	26.0	29.1	31.5	33.0	33.4	33.1	33.1	28.4
329	13.8	27.2	28.0	31.6	31.5	32.9	33.5	33.1	33.1	32.5
330	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.0
331	14.0	25.1	25.7	28.9	31.5	32.8	33.4	33.1	33.1	29.2
332	13.5	27.7	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.1
333	12.6	27.6	29.2	29.0	31.1	32.6	33.6	33.1	32.2	32.2
334	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.1
335	13.5	27.8	28.2	30.6	31.5	32.9	33.7	33.1	33.1	32.4
336	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
337	13.5	27.6	28.8	30.6	31.5	32.9	33.4	33.1	33.1	32.2
338	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
339	13.8	26.8	28.3	31.4	31.5	32.9	33.8	33.1	33.1	32.8
340	13.8	25.6	26.0	29.1	31.5	32.9	33.7	33.1	33.1	28.3
341	14.1	27.6	29.8	29.3	31.3	32.9	33.4	33.1	33.1	32.2
342	14.0	27.6	29.5	29.4	31.3	32.9	33.4	33.1	33.1	32.2
343	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
344	13.5	25.8	25.8	29.3	31.8	32.9	33.7	33.1	33.1	29.4
345	13.8	24.8	25.4	28.4	32.4	32.1	33.5	30.4	33.3	29.0
346	13.9	27.7	29.9	29.5	31.4	32.9	33.6	33.1	33.1	32.3
347	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.9	32.4	32.2
348	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
349	14.0	25.0	25.5	28.7	31.9	32.4	33.4	31.9	33.2	29.3
350	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
351	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.3
352	13.9	27.6	29.4	29.5	31.3	32.9	33.4	33.1	33.1	32.2
353	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.0	32.2
354	14.1	27.6	29.7	29.3	31.3	32.9	33.4	33.1	33.1	32.2
355	12.7	27.6	29.8	29.0	31.1	32.5	33.3	33.1	32.1	32.2
356	13.8	25.8	25.8	29.0	31.5	32.9	33.7	33.1	33.1	27.8
357	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
358	13.9	24.9	25.5	28.6	32.2	32.3	33.5	31.2	33.2	29.1
359	13.8	25.2	25.8	29.1	31.5	32.9	33.4	33.1	33.1	28.9
360	12.6	27.6	29.4	29.0	31.1	32.5	33.5	33.1	32.2	32.2
361	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
362	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
363	13.8	27.6	28.3	30.5	31.3	32.7	33.7	33.1	33.1	32.3
364	13.5	27.7	28.4	30.6	31.5	32.9	33.6	33.1	33.1	32.3

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
365	13.6	25.6	25.8	29.2	31.7	32.9	33.6	33.1	33.1	29.2
366	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
367	13.8	27.3	28.0	31.7	31.5	32.9	33.5	33.1	33.1	32.5
368	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
369	12.3	27.4	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
370	13.5	27.8	28.9	30.6	31.5	32.9	33.7	33.1	33.1	32.2
371	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
372	13.7	24.7	25.4	28.3	32.7	32.0	33.6	29.7	33.3	28.9
373	13.8	27.8	30.0	29.5	31.5	32.9	33.7	33.1	33.1	32.4
374	13.8	27.0	28.2	31.5	31.5	32.9	33.7	33.1	33.1	32.7
375	13.8	25.1	26.7	29.4	31.5	32.9	33.7	33.1	33.1	29.3
376	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
377	12.8	27.6	29.4	29.0	31.1	32.6	33.2	33.1	32.0	32.2
378	14.0	27.7	29.9	29.4	31.4	32.9	33.5	33.1	33.1	32.3
379	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
380	13.7	25.1	25.9	29.1	31.5	33.0	33.4	33.1	33.1	28.7
381	13.9	25.1	25.7	29.0	31.5	32.8	33.4	33.1	33.1	29.1
382	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.3
383	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.1
384	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
385	13.6	27.7	28.6	30.5	31.4	32.8	33.7	33.1	33.1	32.2
386	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
387	12.6	27.6	29.2	29.0	31.1	32.6	33.6	33.1	32.2	32.2
388	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
389	13.5	27.8	28.1	30.6	31.5	32.9	33.7	33.1	33.1	32.4
390	12.6	27.6	29.0	29.0	31.3	32.9	33.7	33.1	32.0	32.2
391	13.5	24.6	25.3	28.1	33.1	31.7	33.7	28.4	33.4	28.6
392	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.2	33.2	29.2
393	14.0	27.6	29.5	29.4	31.3	32.9	33.4	33.1	33.1	32.2
394	13.8	25.6	26.0	29.1	31.5	32.9	33.7	33.1	33.1	28.3
395	13.5	27.7	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.1
396	12.3	27.2	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.4
397	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
398	13.8	24.9	26.9	29.5	31.5	32.9	33.7	33.1	33.1	29.8
399	13.5	27.6	28.8	30.6	31.5	32.9	33.4	33.1	33.1	32.2
400	13.8	24.8	25.4	28.4	32.5	32.1	33.5	30.3	33.3	29.0
401	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.6	32.4	32.0
402	13.8	26.8	28.3	31.4	31.5	32.9	33.8	33.1	33.1	32.8
403	12.8	27.6	29.6	29.0	31.1	32.5	33.2	33.1	32.1	32.2
404	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
405	13.7	24.7	25.4	28.4	32.6	32.0	33.6	29.8	33.3	28.9
406	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
407	13.9	27.7	29.9	29.5	31.4	32.9	33.6	33.1	33.1	32.3
408	13.8	27.1	28.1	31.6	31.5	32.9	33.6	33.1	33.1	32.6
409	13.7	27.9	30.0	29.6	31.6	32.9	33.8	33.1	33.1	32.5
410	13.4	25.8	25.8	29.3	31.8	32.9	33.7	33.1	33.1	29.4
411	12.6	27.6	29.9	29.0	31.1	32.4	33.4	33.1	32.2	32.2
412	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
413	13.6	25.1	26.0	29.2	31.5	33.0	33.4	33.1	33.1	28.4
414	13.8	25.8	25.7	29.0	31.5	32.9	33.7	33.1	33.1	27.8
415	12.6	27.6	29.0	29.0	31.1	32.6	33.7	33.1	32.2	32.2
416	13.6	24.6	25.3	28.2	32.9	31.8	33.6	28.9	33.3	28.7
417	13.6	27.8	28.7	30.6	31.4	32.8	33.7	33.1	33.1	32.2
418	13.7	25.4	25.8	29.2	31.6	32.9	33.5	33.1	33.1	29.1
419	12.9	27.6	29.3	29.0	31.1	32.6	33.1	33.1	32.0	32.2

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
420	13.9	25.1	25.8	29.0	31.5	32.8	33.4	33.1	33.1	29.0
421	13.5	27.7	29.0	30.6	31.5	32.9	33.5	33.1	33.1	32.1
422	14.0	25.0	25.5	28.7	31.9	32.4	33.4	31.8	33.2	29.3
423	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
424	13.8	27.1	28.1	31.5	31.5	32.9	33.6	33.1	33.1	32.6
425	13.7	24.8	25.4	28.4	32.5	32.1	33.6	30.2	33.3	29.0
426	14.1	25.1	25.6	28.9	31.5	32.6	33.4	33.1	33.1	29.5
427	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
428	13.8	27.6	29.3	29.5	31.3	32.9	33.4	33.1	33.1	32.2
429	12.3	27.4	29.5	28.9	30.8	32.4	33.1	32.6	32.4	32.2
430	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
431	14.0	27.6	29.6	29.3	31.3	32.9	33.4	33.1	33.1	32.2
432	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
433	13.8	27.6	28.2	30.4	31.3	32.6	33.7	33.1	33.1	32.4
434	13.8	27.4	27.9	31.7	31.5	32.9	33.4	33.1	33.1	32.4
435	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
436	12.6	27.6	29.5	29.0	31.1	32.5	33.5	33.1	32.2	32.2
437	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
438	14.0	27.7	29.8	29.4	31.3	32.9	33.5	33.1	33.1	32.2
439	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
440	13.5	27.7	28.5	30.6	31.5	32.9	33.5	33.1	33.1	32.3
441	14.1	25.1	25.6	28.8	31.5	32.6	33.4	33.0	33.1	29.5
442	13.8	25.3	26.5	29.3	31.5	32.9	33.7	33.1	33.1	29.0
443	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.2
444	13.8	27.8	29.9	29.5	31.5	32.9	33.7	33.1	33.1	32.4
445	12.7	27.6	29.7	29.0	31.1	32.5	33.3	33.1	32.1	32.2
446	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
447	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.1	32.2
448	13.8	27.2	28.0	31.6	31.5	32.9	33.5	33.1	33.1	32.5
449	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
450	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.4
451	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.4	33.2	29.2
452	13.9	25.0	25.5	28.6	32.0	32.4	33.5	31.6	33.2	29.2
453	13.8	26.9	28.2	31.4	31.5	32.9	33.7	33.1	33.1	32.7
454	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.9	32.4	32.1
455	13.7	25.1	25.9	29.1	31.5	33.0	33.4	33.1	33.1	28.6
456	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
457	13.7	27.7	28.4	30.5	31.4	32.7	33.7	33.1	33.1	32.3
458	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
459	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
460	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
461	13.8	24.8	25.4	28.4	32.4	32.1	33.5	30.4	33.3	29.0
462	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
463	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
464	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
465	12.8	27.6	29.4	29.0	31.1	32.6	33.2	33.1	32.0	32.2
466	13.8	25.1	26.7	29.4	31.5	32.9	33.7	33.1	33.1	29.4
467	13.7	27.8	30.0	29.6	31.6	32.9	33.7	33.1	33.1	32.5
468	13.5	25.7	25.8	29.3	31.7	32.9	33.7	33.1	33.1	29.3
469	13.5	27.8	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.2
470	12.6	27.6	29.8	29.0	31.1	32.4	33.3	33.1	32.1	32.2
471	13.9	27.6	29.4	29.4	31.3	32.9	33.4	33.1	33.1	32.2
472	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.3
473	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
474	12.6	27.6	29.0	29.0	31.2	32.9	33.7	33.1	32.0	32.2

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
475	13.7	25.3	25.8	29.1	31.6	32.9	33.4	33.1	33.1	29.0
476	12.6	27.6	29.3	29.0	31.1	32.6	33.6	33.1	32.2	32.2
477	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
478	14.1	27.6	29.7	29.3	31.3	32.9	33.4	33.1	33.1	32.2
479	13.8	25.7	25.9	29.1	31.5	32.9	33.7	33.1	33.1	28.0
480	13.9	27.7	29.9	29.4	31.4	32.9	33.5	33.1	33.1	32.3
481	13.5	27.7	28.4	30.6	31.5	32.9	33.6	33.1	33.1	32.3
482	13.6	24.6	25.3	28.2	33.0	31.8	33.6	28.8	33.3	28.7
483	13.5	27.7	29.0	30.6	31.5	32.9	33.5	33.1	33.1	32.1
484	13.5	27.7	28.5	30.6	31.5	32.9	33.5	33.1	33.1	32.3
485	13.8	27.4	27.9	31.7	31.5	32.9	33.4	33.1	33.1	32.4
486	12.6	27.6	29.5	29.0	31.1	32.5	33.5	33.1	32.2	32.2
487	12.6	27.6	29.0	29.0	31.1	32.6	33.7	33.1	32.2	32.2
488	13.8	25.3	26.5	29.3	31.5	32.9	33.7	33.1	33.1	29.0
489	13.9	25.1	25.8	29.0	31.5	32.8	33.4	33.1	33.1	29.0
490	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
491	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
492	14.1	25.1	25.6	28.8	31.6	32.6	33.4	32.9	33.1	29.5
493	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
494	12.9	27.6	29.3	29.0	31.1	32.6	33.1	33.1	32.0	32.2
495	13.6	24.6	25.3	28.2	33.0	31.8	33.6	28.8	33.3	28.7
496	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
497	13.8	27.6	28.2	30.4	31.3	32.7	33.7	33.1	33.1	32.4
498	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
499	14.0	27.6	29.6	29.3	31.3	32.9	33.4	33.1	33.1	32.2
500	13.8	27.8	29.9	29.5	31.5	32.9	33.7	33.1	33.1	32.4
501	13.8	25.8	25.7	29.0	31.5	32.9	33.7	33.1	33.1	27.8
502	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
503	14.0	27.7	29.8	29.4	31.3	32.9	33.5	33.1	33.1	32.2
504	13.8	27.1	28.1	31.5	31.5	32.9	33.6	33.1	33.1	32.6
505	13.7	25.4	25.8	29.2	31.6	32.9	33.5	33.1	33.1	29.1
506	12.7	27.6	29.7	29.0	31.1	32.5	33.3	33.1	32.1	32.2
507	14.1	25.1	25.6	28.9	31.5	32.7	33.4	33.1	33.1	29.5
508	13.7	24.8	25.4	28.4	32.5	32.1	33.6	30.1	33.3	28.9
509	12.3	27.4	29.5	28.9	30.8	32.4	33.1	32.6	32.4	32.2
510	13.8	27.6	29.3	29.5	31.3	32.9	33.4	33.1	33.1	32.2
511	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.1	32.2
512	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
513	14.0	25.0	25.5	28.7	32.0	32.4	33.4	31.8	33.2	29.3
514	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
515	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.2
516	13.6	27.8	28.7	30.6	31.5	32.8	33.7	33.1	33.1	32.2
517	13.5	25.7	25.8	29.3	31.7	32.9	33.7	33.1	33.1	29.3
518	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
519	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.3	33.2	29.2
520	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
521	13.8	25.0	26.8	29.5	31.5	32.9	33.7	33.1	33.1	29.5
522	13.5	27.8	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.2
523	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
524	12.8	27.6	29.4	29.0	31.1	32.6	33.2	33.1	32.0	32.2
525	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.4
526	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
527	13.8	27.2	28.0	31.6	31.5	32.9	33.5	33.1	33.1	32.5
528	13.5	27.7	28.4	30.6	31.5	32.9	33.6	33.1	33.1	32.3
529	13.8	25.7	25.9	29.1	31.5	32.9	33.7	33.1	33.1	28.1

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
530	14.1	27.6	29.8	29.3	31.3	32.9	33.4	33.1	33.1	32.2
531	13.6	24.6	25.3	28.2	33.0	31.8	33.6	28.7	33.3	28.7
532	13.7	27.8	30.0	29.6	31.6	32.9	33.7	33.1	33.1	32.5
533	13.8	26.9	28.2	31.4	31.5	32.9	33.7	33.1	33.1	32.7
534	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
535	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
536	13.8	24.8	25.4	28.4	32.5	32.1	33.5	30.2	33.3	29.0
537	13.9	27.7	29.9	29.4	31.4	32.9	33.5	33.1	33.1	32.3
538	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
539	13.7	25.3	25.8	29.1	31.6	32.9	33.5	33.1	33.1	29.0
540	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.9	32.4	32.1
541	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.3
542	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
543	13.9	27.6	29.4	29.4	31.3	32.9	33.4	33.1	33.1	32.2
544	13.7	27.7	28.4	30.5	31.4	32.7	33.7	33.1	33.1	32.3
545	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
546	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
547	13.7	25.1	26.0	29.1	31.5	33.0	33.4	33.1	33.1	28.5
548	12.6	27.6	29.8	29.0	31.1	32.4	33.3	33.1	32.1	32.2
549	13.9	24.9	25.5	28.6	32.0	32.3	33.5	31.5	33.2	29.2
550	12.6	27.6	29.0	29.0	31.2	32.9	33.7	33.1	32.0	32.2
551	12.6	27.6	29.3	29.0	31.1	32.6	33.6	33.1	32.2	32.2
552	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
553	13.9	25.0	25.5	28.6	32.0	32.4	33.5	31.6	33.2	29.2
554	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
555	13.7	24.8	25.4	28.4	32.5	32.1	33.6	30.1	33.3	28.9
556	13.5	27.8	28.8	30.6	31.5	32.9	33.7	33.1	33.1	32.2
557	13.8	27.6	29.3	29.5	31.3	32.9	33.4	33.1	33.1	32.2
558	12.3	27.3	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.3
559	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
560	13.8	27.0	28.1	31.5	31.5	32.9	33.7	33.1	33.1	32.6
561	13.8	25.3	26.5	29.3	31.5	32.9	33.7	33.1	33.1	29.0
562	13.5	27.7	28.5	30.6	31.5	32.9	33.5	33.1	33.1	32.3
563	14.0	27.7	29.8	29.4	31.3	32.9	33.5	33.1	33.1	32.2
564	13.8	25.8	25.7	29.0	31.5	32.9	33.7	33.1	33.1	27.8
565	14.1	25.1	25.6	28.8	31.6	32.6	33.4	32.9	33.1	29.5
566	13.8	27.4	27.9	31.7	31.5	32.9	33.4	33.1	33.1	32.4
567	12.6	27.6	29.0	29.0	31.1	32.6	33.7	33.1	32.2	32.2
568	13.6	24.6	25.3	28.2	33.0	31.8	33.6	28.7	33.3	28.7
569	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
570	12.6	27.6	29.0	29.0	31.2	32.8	33.7	33.1	32.0	32.2
571	12.3	27.4	29.5	28.9	30.8	32.4	33.1	32.6	32.4	32.2
572	12.9	27.6	29.3	29.0	31.1	32.6	33.1	33.1	32.0	32.2
573	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
574	12.7	27.6	29.7	29.0	31.1	32.5	33.3	33.1	32.1	32.2
575	14.1	25.1	25.6	28.9	31.5	32.7	33.4	33.1	33.1	29.5
576	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
577	13.7	25.4	25.8	29.2	31.6	32.9	33.5	33.1	33.1	29.1
578	13.8	27.6	28.2	30.4	31.3	32.7	33.7	33.1	33.1	32.4
579	13.5	27.7	29.0	30.6	31.5	32.9	33.5	33.1	33.1	32.1
580	13.9	25.1	25.8	29.0	31.5	32.8	33.4	33.1	33.1	29.0
581	14.0	27.6	29.6	29.3	31.3	32.9	33.4	33.1	33.1	32.2
582	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.2
583	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.3
584	13.8	27.8	29.9	29.5	31.5	32.9	33.7	33.1	33.1	32.4

	33 GM1	34 GM2	35 GM3	36 GM4	37 GM5	38 GM6	39 GM7	40 GM8	41 GM9	42 GM10
585	12.6	27.6	29.5	29.0	31.1	32.5	33.5	33.1	32.2	32.2
586	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
587	13.9	27.6	29.4	29.4	31.3	32.9	33.4	33.1	33.1	32.2
588	13.5	27.8	28.2	30.6	31.5	32.9	33.6	33.1	33.1	32.4
589	13.8	25.0	26.8	29.5	31.5	32.9	33.7	33.1	33.1	29.6
590	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.3	33.2	29.2
591	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
592	13.8	25.7	25.9	29.1	31.5	32.9	33.7	33.1	33.1	28.1
593	12.6	27.6	29.0	29.0	31.1	32.7	33.7	33.1	32.1	32.2
594	14.0	25.1	25.7	28.9	31.5	32.7	33.4	33.1	33.1	29.3
595	13.9	24.9	25.5	28.6	32.1	32.3	33.5	31.5	33.2	29.2
596	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.9	32.4	32.1
597	12.3	27.4	29.8	29.0	30.8	32.4	33.1	32.7	32.4	32.0
598	13.7	27.7	28.5	30.5	31.4	32.8	33.7	33.1	33.1	32.3
599	12.6	27.6	29.3	29.0	31.1	32.6	33.6	33.1	32.2	32.2
600	12.3	27.3	29.6	28.9	30.8	32.4	33.1	32.6	32.4	32.2
601	12.3	27.2	29.7	29.0	30.8	32.4	33.1	32.6	32.4	32.4
602	13.6	24.6	25.3	28.2	33.0	31.8	33.6	28.7	33.3	28.7
603	12.3	27.3	29.8	29.0	30.8	32.4	33.1	32.8	32.4	32.3
604	13.5	27.8	28.9	30.6	31.5	32.9	33.6	33.1	33.1	32.2
605	13.8	27.2	28.0	31.6	31.5	32.9	33.5	33.1	33.1	32.5
606	12.6	27.6	29.0	29.0	31.2	32.9	33.7	33.1	32.0	32.2
607	13.7	24.8	25.4	28.4	32.5	32.1	33.6	30.2	33.3	29.0
608	13.5	25.7	25.8	29.3	31.7	32.9	33.7	33.1	33.1	29.3
609	13.7	27.9	30.0	29.6	31.6	32.9	33.7	33.1	33.1	32.5
610	13.9	27.7	29.9	29.4	31.4	32.9	33.5	33.1	33.1	32.3
611	13.8	26.9	28.2	31.4	31.5	32.9	33.7	33.1	33.1	32.7
612	14.1	27.6	29.8	29.3	31.3	32.9	33.4	33.1	33.1	32.2
613	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
614	13.7	25.3	25.8	29.1	31.6	32.9	33.5	33.1	33.1	29.0
615	13.7	25.1	26.0	29.1	31.5	33.0	33.4	33.1	33.1	28.5
616	12.6	27.6	29.9	29.0	31.1	32.4	33.4	33.1	32.2	32.2
617	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
618	12.9	27.2	29.8	28.6	30.8	32.4	33.1	32.4	30.8	29.0
619	13.5	27.6	29.0	30.6	31.5	32.9	33.4	33.1	33.1	32.1
620	12.8	27.6	29.4	29.0	31.1	32.6	33.2	33.1	32.0	32.2

data file: 48SFSUB.STA [620 cases with 50 variables]

VARIABLE SPECIFICATIONS:

No	Name	Format	MD Code	Long Label
43	A_GM	4.2	-9999	=(gm3+gm4+gm5+gm6+gm7+gm8+gm9+gm10)
44	T1	4.2	-9999	temp. in C at 25mm in AC layer
45	T2	4.2	-9999	temp. in C at 99mm in AC layer
46	T3	4.2	-9999	temp. in C at 173mm in AC layer
47	T4	4.2	-9999	temp in C at the base layer (@249 m
48	T5	4.2	-9999	temp in C at the base layer (@326 m
49	T_AV	4.2	-9999	= (t1+t2+t3)/3; Average AC temp in
50	T_GRAD	5.2	-9999	=(T1-T3)/(.148) ; IN C/M

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
1	31.5	26.2	29.5	31.7	34.5	35.1	29.1	-37.1
2	31.0	7.29	10.4	12.7	16.6	17.6	10.1	-36.2
3	31.5	29.0	29.5	30.8	33.6	34.4	29.8	-12.5
4	31.6	33.2	47.3	42.7	36.6	35.9	41.0	-64.1
5	31.6	31.4	38.9	36.0	34.7	35.1	35.4	-30.7
6	31.0	11.9	11.7	12.7	16.0	17.1	12.1	-5.00
7	31.6	33.3	45.0	40.2	35.6	35.4	39.5	-46.7
8	31.0	13.6	13.8	13.9	14.2	14.5	13.7	-1.95
9	30.9	23.0						
10	30.9	26.0						
11	31.5	30.1	47.3	42.0	35.5	34.7	39.8	-80.9
12	31.6	31.5	34.3	32.7	33.2	33.9	32.8	-8.59
13	30.6	14.5	14.2	14.1	14.3	14.5	14.2	2.56
14	31.6	29.9	42.8	37.9	33.9	33.9	36.9	-54.1
15	31.6	23.1	32.1	32.8	35.0	35.5	29.3	-65.8
16	32.0	19.3	20.4	21.6	23.9	24.5	20.4	-15.6
17	32.0	40.4	37.3	34.4	30.8	30.5	37.4	40.34
18	31.8	27.5	30.0	31.8	33.8	34.0	29.7	-28.8
19	32.0	36.7	34.4	32.3	29.8	29.9	34.5	30.13
20	31.8	22.4	25.8	27.9	30.6	31.1	25.4	-36.9
21	32.1	33.1	27.3	24.7	23.6	24.0	28.4	56.43
22	32.0	31.7	28.4	27.9	29.5	30.1	29.3	25.39
23	32.0	49.6	42.9	38.4	33.5	33.1	43.6	75.90
24	31.6	19.4	31.5	33.3	35.8	36.4	28.1	-93.5
25	31.0	24.9	18.7	16.1	15.7	16.7	19.9	59.24
26	30.8	6.90	9.08	11.2	15.4	16.6	9.06	-29.0
27	31.1	27.8	21.4	18.0	15.4	16.0	22.4	66.56
28	31.9	32.9	30.9	31.2	32.9	33.3	31.7	11.08
29	31.9	44.0	37.2	34.2	32.7	32.9	38.5	66.17
30	30.4	24.0						
31	30.8	17.0						
32	30.9	39.0						
33	30.9	43.0						
34	30.9	32.0						
35	32.0	40.1	35.6	33.1	30.4	30.2	36.3	47.25
36	30.7	15.0						

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
37	31.6	24.7	37.3	34.3	33.2	33.8	32.1	-64.9
38	31.0	8.11	10.4	12.4	16.3	17.3	10.3	-29.0
39	31.8	28.9	29.9	31.3	33.3	33.6	30.0	-16.2
40	30.9	38.0						
41	30.8	13.8	13.9	14.0	14.2	14.5	13.9	-.88
42	30.9	34.0						
43	30.9	11.0	10.4	11.4	15.1	16.3	10.9	-3.00
44	31.5	26.6	29.1	31.0	34.0	34.7	28.9	-29.9
45	31.6	32.7	31.0	31.2	33.4	34.1	31.6	9.59
46	31.9	42.9	38.1	34.9	31.2	30.7	38.7	53.96
47	31.2	33.0	26.4	21.8	16.5	16.5	27.1	76.04
48	30.4	15.2	14.6	14.3	14.3	14.5	14.7	6.22
49	32.1	53.2	45.0	39.8	34.1	33.4	46.0	90.23
50	31.6	31.2	47.9	43.9	37.7	36.6	41.0	-85.7
51	31.0	19.8	15.3	14.1	15.7	16.7	16.4	38.32
52	31.6	25.7	33.6	33.3	34.8	35.4	30.8	-51.5
53	31.9	36.0	32.9	32.0	32.7	33.1	33.6	26.55
54	31.1	30.8	23.3	19.2	16.1	17.1	24.4	78.07
55	30.9	39.0						
56	30.9	24.0						
57	31.5	28.7	48.0	43.0	36.1	35.1	39.9	-97.1
58	30.6	20.0						
59	31.6	20.8	31.3	32.9	35.4	36.0	28.3	-81.9
60	30.9	27.0						
61	31.9	23.8	25.5	27.2	30.0	30.6	25.5	-23.0
62	31.0	31.0						
63	31.6	31.8	41.9	37.7	35.0	35.1	37.1	-39.8
64	32.1	39.0	31.1	27.1	23.9	24.1	32.4	80.34
65	31.6	30.7	45.0	39.7	34.4	34.1	38.4	-60.8
66	32.0	36.2	31.3	29.3	29.4	29.9	32.3	46.49
67	32.0	47.8	40.1	35.9	32.9	32.9	41.3	80.05
68	32.0	25.5	22.5	22.2	23.6	24.2	23.4	22.56
69	31.6	33.9	46.2	41.2	35.9	35.5	40.5	-49.4
70	31.0	15.2	12.8	12.9	15.8	16.8	13.6	15.41
71	32.0	51.4	43.8	39.0	33.8	33.2	44.7	83.74
72	31.9	33.7	31.4	31.4	32.8	33.3	32.2	14.95
73	30.9	42.0						
74	31.6	33.5	45.4	40.5	35.7	35.4	39.8	-47.6
75	30.9	7.94	9.36	11.2	15.3	16.5	9.50	-22.1
76	31.9	45.0	37.7	34.5	32.7	32.9	39.1	71.26
77	31.6	32.9	47.4	42.8	36.8	36.0	41.0	-67.3
78	31.6	31.5	39.6	36.3	34.8	35.1	35.8	-32.8
79	31.0	7.30	10.3	12.5	16.5	17.5	10.0	-35.4
80	30.9	39.0						
81	31.5	26.5	29.2	31.3	34.2	34.8	29.0	-32.6
82	31.5	29.5	47.6	42.5	35.7	34.9	39.8	-87.6
83	32.0	33.0	29.1	28.2	29.4	30.1	30.1	32.50
84	31.6	19.7	31.5	33.2	35.7	36.3	28.1	-91.5
85	32.0	20.0	20.6	21.6	23.8	24.5	20.7	-10.7
86	31.6	23.7	32.5	32.9	34.9	35.5	29.7	-62.1
87	30.9	13.6	13.8	13.9	14.2	14.5	13.8	-1.93
88	32.1	36.3	29.2	25.9	23.8	24.1	30.5	70.61
89	30.3	26.0						
90	30.9	27.0						
91	31.1	26.9	20.2	17.0	15.8	16.7	21.4	67.03

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
92	30.9	23.0						
93	31.9	23.2	25.6	27.5	30.3	30.8	25.4	-29.6
94	31.9	41.2	37.6	34.6	31.0	30.5	37.8	44.97
95	30.5	14.7	14.3	14.1	14.3	14.5	14.4	3.86
96	31.6	30.2	29.9	30.9	33.5	34.3	30.3	-5.19
97	31.8	27.7	30.0	31.7	33.7	34.0	29.8	-26.9
98	31.1	29.6	22.8	18.9	15.6	16.0	23.8	72.71
99	30.7	17.0						
100	32.0	36.9	34.5	32.5	29.9	29.9	34.6	29.76
101	31.6	30.4	43.3	38.2	33.9	33.9	37.3	-53.0
102	31.6	29.2	35.3	33.2	33.2	33.8	32.6	-27.0
103	30.9	33.0						
104	32.1	53.0	45.8	40.5	34.4	33.6	46.4	84.69
105	30.7	18.0						
106	31.1	32.7	25.5	21.0	16.5	17.5	26.4	79.23
107	30.9	39.0						
108	32.0	36.8	32.0	29.8	29.4	29.9	32.9	46.86
109	32.0	41.5	36.1	33.3	30.5	30.2	37.0	55.64
110	32.1	39.9	32.5	28.1	24.2	24.2	33.5	80.18
111	31.9	25.5	26.0	27.2	29.9	30.5	26.2	-11.6
112	32.0	27.3	23.7	22.7	23.5	24.2	24.6	30.56
113	31.3	34.4	29.0	24.5	17.5	17.0	29.3	66.80
114	31.9	37.2	33.6	32.4	32.7	33.1	34.4	32.78
115	32.0	48.8	40.9	36.5	33.0	32.9	42.0	83.19
116	30.9	42.0						
117	31.9	42.8	38.3	35.2	31.3	30.7	38.8	52.03
118	31.9	29.2	29.8	31.1	33.2	33.6	30.0	-13.2
119	30.9	14.3	11.9	12.0	15.0	16.2	12.7	15.36
120	30.9	36.0						
121	31.6	30.7	45.8	40.3	34.6	34.2	38.9	-65.3
122	31.6	32.0	42.4	38.1	35.0	35.1	37.5	-41.0
123	30.9	29.0						
124	31.6	33.3	31.7	31.5	33.3	34.0	32.2	12.58
125	31.6	30.9	48.1	44.0	37.8	36.7	41.0	-88.9
126	30.5	21.0						
127	31.6	24.8	37.9	34.7	33.3	33.8	32.5	-66.9
128	30.7	14.0	14.0	14.0	14.2	14.5	14.0	-.09
129	31.0	8.86	10.6	12.5	16.3	17.3	10.7	-24.3
130	31.6	33.8	46.5	41.6	36.1	35.6	40.6	-52.8
131	31.5	26.7	29.0	30.9	33.9	34.6	28.9	-28.4
132	31.0	21.8	16.6	14.8	15.6	16.6	17.7	47.57
133	30.9	25.0						
134	31.6	21.0	31.3	32.8	35.3	35.9	28.4	-79.8
135	30.3	15.5	14.8	14.4	14.3	14.5	14.9	7.16
136	31.7	26.6	34.2	33.5	34.7	35.3	31.4	-46.5
137	31.0	29.0						
138	31.5	26.9	48.9	44.3	36.9	35.6	40.0	-118.
139	31.6	28.9	35.5	33.3	33.2	33.8	32.5	-30.2
140	30.7	17.0						
141	31.6	30.4	30.0	31.0	33.5	34.3	30.4	-3.92
142	30.5	14.8	14.3	14.2	14.3	14.5	14.4	4.40
143	30.9	34.0						
144	31.9	41.4	37.6	34.6	31.0	30.5	37.9	45.79
145	30.9	23.0						
146	31.9	23.2	25.6	27.5	30.3	30.8	25.5	-29.2

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
147	31.5	29.3	47.7	42.6	35.8	34.9	39.9	-89.7
148	30.9	27.0						
149	30.3	27.0						
150	32.1	37.2	29.9	26.3	23.8	24.1	31.1	73.85
151	31.6	30.5	43.4	38.3	34.0	33.9	37.4	-52.7
152	32.0	36.9	34.5	32.5	29.9	29.9	34.7	29.94
153	30.8	18.7	20.2	21.6	23.9	24.6	20.2	-19.5
154	32.0	33.6	29.5	28.4	29.4	30.1	30.5	35.24
155	30.9	13.6	13.8	13.9	14.2	14.5	13.8	-1.93
156	32.0	21.2	20.9	21.6	23.7	24.4	21.2	-3.11
157	31.2	30.5	23.5	19.4	15.7	16.1	24.5	75.50
158	31.6	32.8	47.4	42.9	36.9	36.0	41.0	-68.7
159	31.6	23.9	32.6	32.9	34.9	35.5	29.8	-61.2
160	30.9	38.0						
161	31.0	7.30	10.3	12.5	16.5	17.5	10.0	-35.3
162	31.9	45.2	37.8	34.5	32.7	32.9	39.2	71.82
163	32.0	51.6	43.9	39.0	33.8	33.3	44.8	84.72
164	31.0	15.5	12.9	12.9	15.8	16.8	13.8	17.32
165	31.6	33.5	45.4	40.6	35.7	35.4	39.9	-47.7
166	31.6	31.5	39.7	36.4	34.8	35.1	35.9	-33.3
167	30.9	40.0						
168	31.5	26.5	29.2	31.3	34.2	34.8	29.0	-32.4
169	31.1	27.9	21.0	17.6	15.8	16.8	22.2	69.93
170	31.8	27.8	30.0	31.7	33.7	33.9	29.8	-26.3
171	31.6	19.8	31.5	33.2	35.7	36.3	28.1	-90.6
172	31.9	33.8	31.5	31.5	32.8	33.3	32.2	15.47
173	31.9	25.8	26.1	27.2	29.8	30.5	26.4	-9.43
174	31.6	21.1	31.3	32.8	35.3	35.9	28.4	-79.3
175	32.1	40.0	32.7	28.2	24.2	24.2	33.6	80.02
176	31.5	26.8	49.0	44.4	36.9	35.6	40.1	-119.
177	32.1	53.0	45.9	40.6	34.4	33.6	46.5	83.58
178	30.9	38.0						
179	30.9	25.0						
180	31.7	26.7	34.3	33.6	34.7	35.3	31.5	-46.2
181	32.0	48.9	41.0	36.5	33.0	32.9	42.1	83.58
182	31.6	33.3	31.8	31.5	33.3	34.0	32.2	11.69
183	32.0	41.8	36.2	33.3	30.5	30.2	37.1	56.96
184	30.9	36.0						
185	31.6	30.7	48.1	44.2	37.9	36.8	41.0	-90.7
186	31.5	26.9	29.0	30.9	33.9	34.6	29.0	-27.0
187	31.9	42.5	38.3	35.2	31.3	30.8	38.7	48.76
188	31.9	29.4	29.9	31.1	33.2	33.5	30.1	-12.0
189	31.6	24.9	38.0	34.7	33.3	33.8	32.5	-66.7
190	31.6	30.7	45.9	40.4	34.7	34.2	39.0	-66.0
191	30.9	40.0						
192	30.9	30.0						
193	32.0	36.8	32.1	29.9	29.4	29.9	32.9	46.37
194	31.9	37.5	33.7	32.5	32.7	33.1	34.6	34.19
195	31.6	33.7	46.6	41.8	36.2	35.6	40.7	-55.0
196	31.6	32.0	42.5	38.1	35.1	35.1	37.5	-41.2
197	30.3	15.5	14.8	14.4	14.3	14.5	14.9	7.31
198	31.1	33.0	25.9	21.3	16.6	17.6	26.8	79.35
199	30.5	22.0						
200	30.9	14.6	12.1	12.1	15.0	16.2	12.9	17.29
201	32.0	27.5	23.9	22.8	23.5	24.2	24.7	31.26

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
202	30.7	14.0	14.0	14.0	14.2	14.5	14.0	.05
203	31.0	29.0						
204	31.3	34.7	29.7	25.1	17.8	17.1	29.8	64.66
205	31.0	9.03	10.7	12.5	16.2	17.3	10.7	-23.3
206	30.7	19.0						
207	31.0	22.6	17.1	15.1	15.7	16.7	18.3	50.49
208	31.6	30.7	30.2	31.0	33.5	34.2	30.6	-1.81
209	31.0	16.1	13.1	13.0	15.8	16.8	14.1	21.15
210	32.0	33.8	29.7	28.5	29.4	30.0	30.7	36.15
211	30.5	14.9	14.4	14.2	14.3	14.5	14.5	4.86
212	31.6	28.5	35.6	33.4	33.2	33.8	32.5	-33.5
213	32.0	37.0	34.5	32.6	30.0	30.0	34.7	30.08
214	31.6	24.3	32.8	33.0	34.9	35.4	30.0	-58.9
215	31.6	31.6	40.4	36.8	34.8	35.1	36.3	-35.2
216	31.6	33.6	45.5	40.7	35.7	35.4	39.9	-47.9
217	31.6	32.7	47.4	42.9	36.9	36.0	41.0	-69.1
218	31.1	28.2	21.2	17.7	15.9	16.9	22.4	70.71
219	32.0	22.9	21.5	21.8	23.7	24.3	22.1	6.96
220	32.0	52.0	44.1	39.2	33.8	33.3	45.1	86.68
221	31.6	19.8	31.5	33.2	35.7	36.2	28.2	-90.2
222	31.0	7.30	10.2	12.5	16.5	17.5	10.0	-35.0
223	31.5	26.5	29.2	31.2	34.1	34.8	29.0	-32.1
224	31.9	45.5	38.1	34.7	32.8	32.9	39.5	73.00
225	30.9	26.0						
226	31.2	30.9	23.8	19.6	15.8	16.1	24.7	76.49
227	31.9	23.3	25.6	27.5	30.2	30.8	25.5	-28.0
228	30.3	27.0						
229	30.9	34.0						
230	31.8	28.4	29.9	31.4	33.5	33.8	29.9	-20.7
231	32.1	37.5	30.1	26.4	23.8	24.1	31.3	74.93
232	31.9	41.7	37.7	34.7	31.0	30.6	38.1	47.70
233	30.9	38.0						
234	30.9	38.0						
235	31.5	29.2	47.7	42.6	35.8	34.9	39.9	-90.7
236	31.6	30.6	43.5	38.4	34.0	33.9	37.5	-52.4
237	30.9	13.6	13.8	13.9	14.2	14.5	13.8	-1.92
238	30.9	8.63	9.55	11.2	15.3	16.5	9.80	-17.5
239	30.9	23.0						
240	31.9	34.0	31.6	31.5	32.8	33.2	32.4	16.75
241	30.7	18.0						
242	31.9	42.2	38.3	35.3	31.4	30.8	38.6	46.43
243	31.0	22.9	17.4	15.2	15.7	16.7	18.5	51.78
244	31.6	21.1	31.3	32.8	35.3	35.9	28.4	-78.6
245	31.9	37.9	33.9	32.6	32.7	33.1	34.8	35.89
246	31.1	33.3	26.2	21.5	16.7	17.7	27.0	79.43
247	32.0	48.9	41.3	36.8	33.1	33.0	42.4	81.39
248	31.9	29.6	29.9	31.1	33.2	33.5	30.2	-10.8
249	31.0	15.3	12.4	12.2	14.9	16.2	13.3	20.68
250	32.1	52.9	46.3	41.0	34.6	33.7	46.8	80.25
251	30.9	30.0						
252	30.5	22.0						
253	30.9	25.0						
254	31.0	30.0						
255	31.5	26.7	49.0	44.5	37.0	35.6	40.1	-120.
256	30.9	40.0						

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
257	30.9	37.0						
258	30.6	19.0						
259	30.9	37.0						
260	30.9	36.0						
261	31.6	30.6	45.9	40.5	34.7	34.3	39.0	-66.6
262	31.6	33.6	46.7	41.9	36.2	35.6	40.7	-55.6
263	31.6	30.7	48.1	44.2	37.9	36.8	41.0	-91.4
264	31.0	9.13	10.7	12.5	16.2	17.3	10.8	-22.6
265	31.7	26.8	34.4	33.6	34.7	35.3	31.6	-45.9
266	31.6	32.1	42.6	38.2	35.1	35.1	37.6	-41.5
267	30.7	14.0	14.0	14.0	14.2	14.5	14.0	.23
268	31.6	25.0	38.1	34.8	33.3	33.8	32.6	-66.4
269	31.6	33.2	31.9	31.6	33.3	34.0	32.3	10.80
270	30.3	15.5	14.8	14.4	14.3	14.5	14.9	7.45
271	31.5	27.2	29.1	30.9	33.8	34.5	29.1	-25.2
272	32.1	40.6	33.7	28.9	24.4	24.3	34.4	78.98
273	31.3	34.8	29.9	25.4	17.9	17.2	30.0	63.76
274	32.0	27.7	24.1	22.9	23.5	24.1	24.9	31.95
275	32.0	36.8	32.2	30.0	29.4	29.9	33.0	45.77
276	31.9	26.4	26.2	27.2	29.8	30.4	26.6	-5.77
277	32.0	41.6	36.4	33.5	30.6	30.3	37.1	54.47
278	30.7	18.0						
279	31.9	34.5	32.0	31.7	32.8	33.2	32.7	19.33
280	31.6	20.5	31.4	33.0	35.5	36.1	28.3	-84.5
281	31.1	29.1	21.9	18.2	15.9	16.9	23.1	73.23
282	31.6	33.7	45.6	40.8	35.8	35.4	40.0	-48.2
283	30.9	35.0						
284	31.6	24.5	32.9	33.0	34.8	35.4	30.1	-58.0
285	32.0	37.1	34.5	32.6	30.0	30.0	34.7	30.20
286	31.9	46.5	39.0	35.3	32.8	32.9	40.3	76.14
287	31.9	23.4	25.6	27.4	30.2	30.8	25.5	-27.1
288	30.9	9.04	9.66	11.2	15.2	16.5	9.98	-14.8
289	31.0	27.0						
290	31.0	16.6	13.4	13.1	15.8	16.8	14.4	23.35
291	30.9	38.0						
292	31.5	29.1	47.8	42.7	35.9	35.0	39.9	-91.8
293	31.6	31.6	40.8	37.0	34.9	35.1	36.5	-36.5
294	30.9	23.0						
295	30.8	13.7	13.9	13.9	14.2	14.5	13.8	-1.89
296	32.0	52.4	44.4	39.3	33.9	33.3	45.4	88.64
297	31.6	27.6	36.0	33.6	33.2	33.8	32.4	-41.1
298	32.1	37.8	30.3	26.5	23.9	24.1	31.5	76.01
299	30.9	39.0						
300	31.5	26.5	29.2	31.2	34.1	34.8	29.0	-31.9
301	30.5	15.0	14.4	14.2	14.3	14.5	14.5	5.17
302	31.6	30.9	30.3	31.0	33.5	34.2	30.7	-.54
303	32.0	34.3	30.0	28.7	29.4	30.0	31.0	38.28
304	31.2	32.3	24.9	20.4	16.0	16.2	25.9	80.88
305	31.6	32.7	47.4	43.0	36.9	36.1	41.0	-69.8
306	32.0	23.4	21.7	21.9	23.6	24.3	22.3	9.98
307	31.0	7.30	10.1	12.4	16.4	17.4	9.92	-34.1
308	30.9	27.0						
309	31.9	42.1	37.8	34.8	31.1	30.6	38.2	49.33
310	31.8	28.5	29.9	31.4	33.4	33.7	29.9	-19.1
311	31.6	30.6	43.9	38.7	34.1	34.0	37.7	-54.3

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
312	32.1	52.9	46.5	41.2	34.6	33.7	46.9	78.92
313	31.6	21.3	31.3	32.7	35.2	35.8	28.4	-77.2
314	30.9	25.0						
315	30.5	22.0						
316	31.3	35.6	31.6	27.0	18.5	17.5	31.4	58.13
317	30.9	30.0						
318	31.0	23.2	17.5	15.4	15.7	16.7	18.7	52.76
319	31.6	25.1	38.2	34.9	33.3	33.8	32.7	-66.1
320	30.7	14.1	14.0	14.0	14.2	14.5	14.0	.37
321	31.6	33.6	46.8	42.0	36.3	35.7	40.8	-56.7
322	31.9	26.8	26.3	27.2	29.7	30.4	26.8	-3.21
323	31.6	33.0	32.3	31.8	33.3	34.0	32.3	8.72
324	31.5	27.3	29.1	30.9	33.8	34.5	29.1	-24.3
325	31.6	30.6	48.2	44.3	38.0	36.9	41.0	-92.6
326	30.3	15.6	14.9	14.5	14.3	14.5	15.0	7.90
327	31.7	27.1	34.6	33.7	34.7	35.3	31.8	-45.1
328	31.0	31.0						
329	32.0	28.6	25.0	23.4	23.5	24.1	25.7	35.25
330	31.5	26.6	49.1	44.5	37.0	35.6	40.1	-121.
331	31.0	9.23	10.8	12.5	16.2	17.3	10.8	-22.0
332	32.0	36.8	32.3	30.1	29.5	29.9	33.1	45.04
333	31.6	32.1	42.7	38.3	35.1	35.1	37.7	-41.6
334	31.6	30.6	46.0	40.6	34.7	34.3	39.1	-67.4
335	31.9	41.7	38.3	35.4	31.4	30.8	38.5	42.70
336	30.9	37.0						
337	32.0	41.5	36.4	33.5	30.6	30.3	37.2	53.64
338	30.9	40.0						
339	32.1	41.0	34.3	29.4	24.5	24.3	34.9	78.31
340	31.0	15.7	13.6	13.4	15.2	16.3	14.2	15.72
341	31.9	38.2	34.1	32.6	32.7	33.1	34.9	37.31
342	31.9	29.8	30.0	31.1	33.1	33.5	30.3	-9.13
343	30.9	36.0						
344	31.1	33.4	26.3	21.6	16.7	17.7	27.1	79.46
345	30.6	19.0						
346	32.0	48.9	41.4	36.9	33.1	33.0	42.4	80.84
347	31.6	30.6	44.0	38.8	34.1	34.0	37.8	-55.4
348	31.5	29.1	47.8	42.8	35.9	35.0	39.9	-92.5
349	30.8	13.7	13.9	13.9	14.2	14.5	13.8	-1.57
350	32.0	37.1	34.5	32.7	30.1	30.0	34.8	30.35
351	31.0	7.54	10.2	12.4	16.3	17.4	10.0	-32.6
352	31.8	28.6	29.9	31.3	33.4	33.7	29.9	-18.3
353	31.6	32.5	47.5	43.0	37.0	36.1	41.0	-71.0
354	31.9	35.0	32.3	31.8	32.8	33.2	33.0	21.65
355	31.6	24.8	33.1	33.1	34.8	35.4	30.4	-55.9
356	30.9	9.21	9.71	11.2	15.2	16.5	10.1	-13.7
357	30.9	38.0						
358	30.7	0.00						
359	31.0	17.4	13.9	13.4	15.7	16.7	14.9	27.31
360	31.6	31.7	40.9	37.1	34.9	35.1	36.6	-36.9
361	30.9	23.0						
362	31.6	33.7	45.8	40.9	35.8	35.5	40.1	-48.5
363	31.9	23.5	25.6	27.4	30.2	30.7	25.5	-26.3
364	31.9	42.2	37.9	34.8	31.1	30.6	38.3	50.15
365	31.1	29.9	22.6	18.7	16.0	17.0	23.7	75.55
366	30.9	27.0						

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
367	32.0	23.6	21.8	21.9	23.6	24.3	22.5	11.49
368	30.9	34.0						
369	31.5	26.5	29.2	31.2	34.1	34.8	29.0	-31.5
370	32.0	35.0	30.5	28.9	29.4	30.0	31.5	41.32
371	31.6	31.2	30.4	31.0	33.4	34.2	30.9	.73
372	30.5	15.0	14.4	14.2	14.3	14.5	14.6	5.47
373	32.0	52.6	44.5	39.4	33.9	33.3	45.5	89.62
374	32.1	38.1	30.5	26.7	23.9	24.1	31.7	77.09
375	31.2	32.8	25.9	21.3	16.4	16.4	26.7	77.61
376	31.6	27.2	36.2	33.7	33.2	33.8	32.4	-44.3
377	31.6	20.5	31.4	33.0	35.5	36.0	28.3	-83.9
378	31.9	46.8	39.3	35.4	32.8	32.9	40.5	77.11
379	30.9	40.0						
380	31.0	30.0						
381	31.0	10.7	11.3	12.6	16.1	17.1	11.5	-12.7
382	31.5	27.4	29.1	30.9	33.8	34.5	29.1	-23.7
383	31.6	30.6	46.1	40.7	34.8	34.3	39.2	-68.6
384	31.6	25.4	38.5	35.1	33.4	33.8	33.0	-65.5
385	31.9	27.1	26.4	27.2	29.7	30.4	26.9	-1.01
386	30.9	37.0						
387	31.6	32.2	42.8	38.4	35.1	35.1	37.8	-41.9
388	31.6	33.5	46.9	42.1	36.3	35.7	40.8	-58.0
389	31.9	40.0	38.3	35.8	31.6	31.0	38.0	28.72
390	31.6	30.4	48.2	44.4	38.1	36.9	41.0	-94.4
391	30.3	15.8	15.0	14.5	14.3	14.6	15.1	8.45
392	30.7	14.1	14.0	14.0	14.3	14.5	14.1	.88
393	31.9	30.5	30.2	31.2	33.1	33.5	30.6	-4.69
394	31.0	16.1	13.8	13.5	15.2	16.3	14.5	17.22
395	32.0	36.8	32.4	30.2	29.5	29.9	33.1	44.07
396	31.6	32.9	32.6	31.9	33.2	34.0	32.5	6.34
397	30.9	40.0						
398	31.3	35.7	31.7	27.1	18.5	17.5	31.5	57.79
399	32.0	41.4	36.5	33.6	30.6	30.3	37.2	52.53
400	30.6	20.0						
401	31.5	26.5	49.1	44.6	37.1	35.6	40.1	-122.
402	32.1	37.8	34.4	30.7	25.1	24.6	34.3	48.18
403	31.6	21.4	31.2	32.7	35.2	35.8	28.4	-76.5
404	30.9	26.0						
405	30.5	22.0						
406	30.9	30.0						
407	32.0	48.9	41.5	37.0	33.1	33.0	42.5	80.30
408	32.1	29.3	25.6	23.7	23.5	24.1	26.2	37.50
409	32.1	52.6	47.8	42.4	35.1	34.0	47.6	69.16
410	31.2	34.0	27.0	22.2	16.8	17.8	27.7	79.66
411	31.7	27.3	34.8	33.8	34.7	35.3	32.0	-44.4
412	30.9	36.0						
413	31.0	31.0						
414	30.8	7.19	9.15	11.2	15.4	16.6	9.18	-27.1
415	31.6	33.4	45.1	40.3	35.6	35.4	39.6	-47.0
416	30.4	24.0						
417	32.0	31.9	28.5	27.9	29.5	30.1	29.5	26.98
418	31.0	25.4	19.1	16.3	15.7	16.7	20.3	61.19
419	31.6	19.5	31.5	33.3	35.8	36.3	28.1	-93.1
420	31.0	12.1	11.7	12.7	16.0	17.0	12.2	-3.72
421	32.0	36.7	34.5	32.4	29.8	29.9	34.5	29.53

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
422	30.8	17.0						
423	30.9	27.0						
424	32.1	33.7	27.6	24.9	23.6	24.0	28.8	59.66
425	30.5	14.5	14.2	14.1	14.3	14.5	14.3	2.87
426	31.0	7.29	10.4	12.6	16.6	17.6	10.1	-36.0
427	30.9	39.0						
428	31.8	27.5	30.0	31.7	33.7	34.0	29.8	-28.3
429	31.5	26.2	29.5	31.7	34.5	35.1	29.1	-36.9
430	31.6	30.4	34.8	33.0	33.2	33.9	32.7	-17.2
431	31.9	33.0	31.0	31.3	32.9	33.3	31.8	11.85
432	30.9	43.0						
433	31.9	22.5	25.8	27.9	30.6	31.1	25.4	-36.5
434	32.0	19.6	20.5	21.6	23.9	24.5	20.6	-13.5
435	30.9	24.0						
436	31.6	31.4	39.2	36.1	34.7	35.1	35.6	-31.5
437	30.9	33.0						
438	31.9	44.3	37.3	34.3	32.7	32.9	38.6	67.58
439	31.5	30.0	47.3	42.1	35.5	34.8	39.8	-81.9
440	31.9	40.5	37.3	34.4	30.9	30.5	37.4	40.88
441	30.9	13.6	13.8	13.9	14.2	14.5	13.7	-1.95
442	31.1	28.4	21.8	18.2	15.4	16.0	22.8	68.92
443	31.6	30.0	43.0	38.0	33.9	33.9	37.0	-53.8
444	32.0	49.8	43.0	38.5	33.5	33.1	43.8	76.88
445	31.6	23.2	32.2	32.8	34.9	35.5	29.4	-64.8
446	31.5	29.1	29.5	30.8	33.6	34.3	29.8	-11.6
447	31.6	33.1	47.3	42.7	36.7	35.9	41.0	-64.8
448	32.0	26.3	22.8	22.3	23.6	24.2	23.8	27.09
449	30.9	28.0						
450	31.6	32.9	31.1	31.3	33.3	34.1	31.7	10.86
451	30.7	17.0						
452	30.8	13.9	13.9	14.0	14.2	14.5	13.9	-.69
453	32.1	39.3	31.3	27.2	24.0	24.1	32.6	81.42
454	31.6	30.7	45.1	39.7	34.4	34.1	38.5	-61.4
455	31.0	27.0						
456	30.9	25.0						
457	31.9	24.4	25.7	27.2	30.0	30.6	25.8	-18.9
458	31.5	28.6	48.0	43.1	36.1	35.1	39.9	-98.1
459	30.9	39.0						
460	30.9	35.0						
461	30.6	21.0						
462	30.9	39.0						
463	31.6	24.3	37.5	34.4	33.2	33.8	32.1	-68.1
464	32.0	40.2	35.7	33.1	30.4	30.2	36.3	48.13
465	31.6	20.8	31.3	32.9	35.4	36.0	28.3	-81.5
466	31.2	33.1	26.5	21.9	16.6	16.5	27.2	75.59
467	32.1	53.1	45.2	40.0	34.2	33.5	46.1	88.90
468	31.1	31.0	23.5	19.3	16.1	17.1	24.6	78.65
469	32.0	36.4	31.5	29.4	29.4	29.9	32.4	47.40
470	31.6	26.0	33.8	33.3	34.7	35.3	31.0	-49.7
471	31.8	29.0	29.8	31.2	33.2	33.6	30.0	-14.8
472	31.0	8.32	10.5	12.4	16.3	17.3	10.4	-27.7
473	31.6	33.9	46.3	41.3	35.9	35.5	40.5	-50.5
474	31.6	31.1	48.0	43.9	37.7	36.6	41.0	-86.1
475	31.0	20.1	15.5	14.2	15.7	16.7	16.6	39.64
476	31.6	31.8	42.0	37.8	35.0	35.1	37.2	-40.3

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
477	31.5	26.7	29.0	31.0	33.9	34.6	28.9	-29.3
478	31.9	36.2	33.0	32.1	32.7	33.1	33.8	27.69
479	30.9	11.8	10.7	11.6	15.1	16.3	11.4	1.35
480	32.0	48.0	40.2	36.0	32.9	32.9	41.4	80.64
481	31.9	43.2	38.2	35.0	31.2	30.7	38.8	55.60
482	30.4	15.3	14.7	14.3	14.3	14.5	14.8	6.61
483	32.0	36.8	34.5	32.4	29.8	29.9	34.6	29.61
484	31.9	40.7	37.4	34.5	30.9	30.5	37.5	42.25
485	32.0	19.8	20.5	21.6	23.8	24.5	20.6	-12.4
486	31.6	31.4	39.3	36.2	34.7	35.1	35.6	-31.9
487	31.6	33.4	45.2	40.4	35.7	35.4	39.7	-47.2
488	31.1	28.7	22.0	18.4	15.5	16.0	23.0	69.92
489	31.0	12.3	11.8	12.7	16.0	17.0	12.3	-2.87
490	31.5	29.8	47.4	42.3	35.6	34.8	39.8	-84.4
491	30.9	38.0						
492	30.9	13.6	13.8	13.9	14.2	14.5	13.7	-1.94
493	30.9	23.0						
494	31.6	19.6	31.5	33.2	35.8	36.3	28.1	-92.3
495	30.4	25.0						
496	30.9	27.0						
497	31.9	23.0	25.7	27.6	30.4	30.9	25.4	-30.9
498	30.9	32.0						
499	31.9	33.3	31.2	31.4	32.9	33.3	32.0	13.40
500	32.0	50.5	43.4	38.7	33.6	33.2	44.2	79.82
501	30.9	7.59	9.27	11.2	15.3	16.6	9.35	-24.4
502	30.9	42.0						
503	31.9	44.6	37.5	34.4	32.7	32.9	38.8	69.28
504	32.1	34.8	28.2	25.2	23.7	24.0	29.4	65.20
505	31.0	25.8	19.4	16.5	15.7	16.7	20.6	62.81
506	31.6	23.4	32.3	32.8	34.9	35.5	29.5	-63.9
507	31.0	7.29	10.3	12.6	16.5	17.5	10.1	-35.8
508	30.5	14.6	14.2	14.1	14.3	14.5	14.3	3.10
509	31.5	26.2	29.5	31.6	34.5	35.0	29.1	-36.6
510	31.8	27.6	30.0	31.7	33.7	34.0	29.8	-27.8
511	31.6	33.0	47.3	42.8	36.7	35.9	41.0	-65.9
512	31.6	30.0	35.0	33.1	33.2	33.9	32.7	-20.5
513	30.8	17.0						
514	31.6	29.2	29.5	30.8	33.6	34.3	29.9	-10.7
515	31.6	30.1	43.1	38.1	33.9	33.9	37.1	-53.5
516	32.0	32.4	28.7	28.0	29.5	30.1	29.7	29.62
517	31.1	32.3	25.0	20.6	16.4	17.4	26.0	79.09
518	31.6	24.5	37.7	34.5	33.3	33.8	32.3	-67.5
519	30.7	18.0						
520	30.9	24.0						
521	31.3	33.3	26.9	22.3	16.7	16.6	27.5	74.12
522	32.0	36.8	31.7	29.5	29.4	29.9	32.7	48.92
523	32.0	40.7	35.8	33.2	30.4	30.2	36.6	50.78
524	31.6	20.9	31.3	32.9	35.4	35.9	28.3	-81.1
525	31.6	33.3	31.3	31.3	33.3	34.1	32.0	13.40
526	30.9	36.0						
527	32.0	26.8	23.2	22.5	23.5	24.2	24.2	28.83
528	31.9	43.4	38.3	35.0	31.2	30.7	38.9	56.69
529	30.9	13.0	11.3	11.8	15.0	16.3	12.0	8.11
530	31.9	36.6	33.2	32.2	32.7	33.1	34.0	29.67
531	30.3	15.4	14.7	14.4	14.3	14.5	14.8	6.86

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
532	32.1	53.1	45.3	40.1	34.2	33.5	46.2	88.24
533	32.1	39.5	31.8	27.6	24.1	24.1	33.0	80.90
534	30.9	28.0						
535	31.5	26.7	29.0	31.0	33.9	34.6	28.9	-29.1
536	30.6	21.0						
537	32.0	48.3	40.5	36.2	32.9	32.9	41.6	81.62
538	30.9	40.0						
539	31.0	20.7	15.9	14.4	15.7	16.7	17.0	42.72
540	31.6	30.7	45.2	39.8	34.5	34.1	38.6	-62.1
541	31.0	8.45	10.5	12.4	16.3	17.3	10.5	-26.9
542	30.9	39.0						
543	31.8	29.0	29.8	31.2	33.2	33.6	30.0	-14.4
544	31.9	24.6	25.7	27.2	30.0	30.6	25.8	-17.8
545	31.6	33.9	46.3	41.4	36.0	35.5	40.5	-51.1
546	31.5	28.5	48.1	43.2	36.2	35.1	39.9	-98.9
547	31.0	31.0						
548	31.6	26.1	33.9	33.4	34.7	35.3	31.1	-48.8
549	30.7	13.9	13.9	14.0	14.2	14.5	13.9	-.41
550	31.6	31.1	48.0	43.9	37.7	36.7	41.0	-86.8
551	31.6	31.9	42.1	37.9	35.0	35.1	37.3	-40.5
552	30.9	32.0						
553	30.8	17.0						
554	31.5	29.6	47.5	42.4	35.7	34.8	39.8	-86.2
555	30.5	14.7	14.3	14.1	14.3	14.5	14.3	3.56
556	32.0	32.6	28.8	28.0	29.5	30.1	29.8	30.68
557	31.8	27.7	30.0	31.7	33.7	34.0	29.8	-27.2
558	31.6	29.5	29.7	30.8	33.6	34.3	30.0	-8.99
559	30.9	39.0						
560	32.1	35.5	28.6	25.5	23.7	24.1	29.9	67.64
561	31.1	29.0	22.3	18.5	15.5	16.0	23.2	70.71
562	31.9	41.1	37.5	34.6	30.9	30.5	37.7	44.43
563	31.9	44.8	37.6	34.4	32.7	32.9	39.0	70.13
564	30.9	7.76	9.31	11.2	15.3	16.6	9.43	-23.3
565	30.9	13.6	13.8	13.9	14.2	14.5	13.8	-1.94
566	32.0	19.9	20.5	21.6	23.8	24.5	20.7	-11.6
567	31.6	33.5	45.3	40.5	35.7	35.4	39.7	-47.4
568	30.3	26.0						
569	30.9	27.0						
570	31.6	32.9	47.3	42.8	36.8	36.0	41.0	-66.6
571	31.5	26.4	29.3	31.3	34.2	34.8	29.0	-33.0
572	31.6	19.6	31.5	33.2	35.7	36.3	28.1	-91.8
573	30.9	23.0						
574	31.6	23.5	32.4	32.9	34.9	35.5	29.6	-63.0
575	31.0	7.30	10.3	12.6	16.5	17.5	10.1	-35.6
576	30.9	41.0						
577	31.0	26.2	19.7	16.7	15.7	16.7	20.8	64.11
578	31.9	23.1	25.6	27.6	30.3	30.9	25.4	-30.0
579	32.0	36.8	34.5	32.4	29.8	29.9	34.6	29.70
580	31.0	12.4	11.8	12.7	16.0	17.0	12.3	-2.23
581	31.9	33.5	31.3	31.4	32.9	33.3	32.1	14.18
582	31.6	30.3	43.2	38.1	33.9	33.9	37.2	-53.3
583	31.6	29.6	35.1	33.1	33.2	33.8	32.6	-23.7
584	32.0	51.1	43.7	38.9	33.7	33.2	44.5	82.43
585	31.6	31.5	39.4	36.3	34.7	35.1	35.7	-32.3
586	30.9	38.0						

	43 A_GM	44 T1	45 T2	46 T3	47 T4	48 T5	49 T_AV	50 T_GRA
587	31.8	29.1	29.8	31.1	33.2	33.6	30.0	-13.6
588	31.9	43.1	38.3	35.1	31.3	30.7	38.8	53.89
589	31.3	34.3	28.9	24.4	17.5	17.0	29.2	67.14
590	30.7	18.0						
591	30.9	42.0						
592	30.9	13.7	11.6	11.9	15.0	16.2	12.4	11.98
593	31.6	33.8	46.4	41.5	36.0	35.6	40.6	-52.2
594	31.0	8.55	10.5	12.4	16.3	17.3	10.5	-26.3
595	30.7	13.9	14.0	14.0	14.2	14.5	14.0	-.23
596	31.6	30.7	45.5	40.1	34.6	34.2	38.8	-63.8
597	31.5	27.1	48.8	44.2	36.8	35.5	40.0	-115.
598	31.9	24.9	25.8	27.2	29.9	30.5	26.0	-15.7
599	31.6	31.9	42.3	38.0	35.0	35.1	37.4	-40.8
600	31.5	26.7	29.0	31.0	33.9	34.6	28.9	-28.8
601	31.6	33.5	31.4	31.3	33.3	34.1	32.1	14.66
602	30.3	15.4	14.7	14.4	14.3	14.5	14.8	7.01
603	31.6	24.7	37.8	34.6	33.3	33.8	32.4	-67.2
604	32.0	36.8	31.9	29.7	29.4	29.9	32.8	47.59
605	32.0	27.1	23.5	22.6	23.5	24.2	24.4	29.87
606	31.6	31.0	48.0	44.0	37.8	36.7	41.0	-88.2
607	30.5	21.0						
608	31.1	32.6	25.4	20.8	16.5	17.5	26.3	79.19
609	32.1	53.1	45.5	40.3	34.3	33.5	46.3	86.46
610	32.0	48.5	40.7	36.3	33.0	32.9	41.8	82.21
611	32.1	39.9	32.4	28.0	24.1	24.2	33.4	80.33
612	31.9	37.0	33.4	32.3	32.7	33.1	34.3	31.65
613	30.9	36.0						
614	31.0	21.2	16.2	14.6	15.7	16.7	17.3	44.93
615	31.0	31.0						
616	31.7	26.5	34.1	33.4	34.7	35.3	31.3	-47.0
617	30.9	25.0						
618	30.9	29.0						
619	32.0	41.1	36.0	33.2	30.5	30.2	36.8	52.99
620	31.6	20.9	31.3	32.8	35.4	35.9	28.4	-80.6

APPENDIX B: Complete Monthly Values of E1 and E3 (Seasonal Decomposition)

Case	E1_MPA	Moving Averages	Differncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irrreg. Compon.
300F3	G_1:1	9864.00		2893.43	6970.57	6863.762	106.81
300F3	G_2:2	9508.00		1988.50	7519.50	6684.391	835.10
300F3	G_3:3	8660.00		3096.90	5563.10	6325.649	-762.55
300F3	G_4:4	6156.67		-60.45	6217.11	6238.280	-21.17
300F3	G_5:5	3410.00		-2387.74	5797.74	6200.717	-402.98
300F3	G_6:6	3255.00		-3997.00	7252.00	6373.670	878.33
300F3	G_7:7	1795.00	-4082.01	-4116.91	5911.91	6088.053	-176.14
300F3	G_8:8	2825.00	-3018.35	-3145.61	5970.61	5586.868	383.75
C_9		3936.50	-1808.35	-877.28	4813.78	4940.354	-126.58
300F3	G_9:10	5048.00	-679.90	1381.40	3666.60	4697.191	-1030.59
C_11		7038.00	1375.38	2202.48	4835.52	5025.728	-190.21
300F3	G_10:12	9028.00	3369.26	3022.28	6005.72	5647.272	358.45
325F3	G_1:1	9460.00	3881.85	2893.43	6566.57	6064.606	501.97
325F3	G_2:2	8326.00	2720.60	1988.50	6337.50	6033.853	303.64
325F3	G_3:3	8456.67	2873.35	3096.90	5359.77	5771.056	-411.29
325F3	G_4:4	5373.33	-224.11	-60.45	5433.78	5682.835	-249.05
325F3	G_5:5	3363.33	-2284.44	-2387.74	5751.07	5809.939	-58.87
325F3	G_6:6	2288.00	-3365.36	-3997.00	6285.00	5997.151	287.85
325F3	G_7:7	2122.00	-3492.19	-4116.91	6238.91	5936.923	301.99
325F3	G_8:8	2560.00	-3162.19	-3145.61	5705.61	5568.535	137.08
C_21		4106.00	-1783.19	-877.28	4983.28	5115.965	-132.69
325F3	G_9:10	5652.00	-410.25	1381.40	4270.60	4869.414	-598.82
C_23		7105.00	897.75	2202.48	4902.52	5240.673	-338.15
325F3	G_10:12	8558.00	2283.81	3022.28	5535.72	6083.272	-547.55
350F3	G_1:1	10756.00	4459.34	2893.43	7862.57	7075.680	786.89
350F3	G_2:2	10330.00	4022.67	1988.50	8341.50	7592.446	749.05
350F3	G_3:3	10533.33	4137.67	3096.90	7436.44	7528.538	-92.10
350F3	G_4:4	7113.33	639.76	-60.45	7173.78	7155.458	18.32
350F3	G_5:5	4166.67	-2374.41	-2387.74	6554.40	6769.258	-214.85
350F3	G_6:6	2557.60	-4019.56	-3997.00	6554.60	6605.092	-50.49
350F3	G_7:7	2250.00	-4331.83	-4116.91	6366.91	6468.205	-101.29
350F3	G_8:8	3620.00	-2988.62	-3145.61	6765.61	6278.046	487.57
C_33		5041.00	-1515.12	-877.28	5918.28	5905.520	12.76
350F3	G_9:10	6462.00	-153.84	1381.40	5080.60	5567.414	-486.82
C_35		7538.00	752.16	2202.48	5335.52	5717.062	-381.54
350F3	G_10:12	8614.00	1771.77	3022.28	5591.72	6289.606	-697.88
375F3	G_1:1	11077.50	4210.57	2893.43	8184.07	7183.032	1001.04
375F3	G_2:2	9700.00	2808.07	1988.50	7711.50	7846.038	-134.54
375F3	G_3:3	11250.00	4340.90	3096.90	8153.10	8191.667	-38.56

Case	El_MPA	Moving Averages	Differences	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
375F3	9153.33	7075.653	2077.68	-60.45	9213.78	8108.021	1105.76
375F3	4843.33	7391.597	-2548.26	-2387.74	7231.07	7626.976	-395.91
375F3	2854.00	7642.736	-4788.74	-3997.00	6851.00	7170.484	-319.48
375F3	2550.00	7829.069	-5279.07	-4116.91	6666.91	6977.108	-310.20
375F3	3826.00	7709.833	-3883.83	-3145.61	6971.61	7311.720	-340.11
C 45	7039.67	7771.333	-731.67	-877.28	7916.94	7828.224	88.72
375F3	10253.33	7724.111	2529.22	1381.40	8871.93	8216.377	655.55
C 47	10551.67	7600.222	2951.44	2202.48	8349.19	8124.117	225.07
375F3	10850.00	7608.278	3241.72	3022.28	7827.72	7889.939	-62.22
400F3	9646.67	7561.844	2084.82	2893.43	6753.24	7638.865	-885.62
400F3	10438.00	7535.678	2902.32	1988.50	8449.50	7731.409	718.09
400F3	10683.33	7471.844	3211.49	3096.90	7586.44	7688.167	-101.73
400F3	7666.67	7393.789	272.88	-60.45	7727.11	7528.109	199.00
400F3	4940.00	7301.511	-2361.51	-2387.74	7327.74	7107.154	220.58
400F3	2296.80	7263.456	-4966.66	-3997.00	6293.80	6686.158	-392.36
400F3	2236.00	7279.622	-5043.62	-4116.91	6352.91	6485.064	-132.15
400F3	3060.00	7187.567	-4127.57	-3145.61	6205.61	6593.513	-387.90
C 57	6103.00	7089.817	-986.82	-877.28	6980.28	7014.076	-33.80
400F3	9146.00	6918.706	2227.29	1381.40	7764.60	7474.080	290.52
C 59	10095.00	6696.206	3398.79	2202.48	7892.52	7542.117	350.41
400F3	11044.00	6560.094	4483.91	3022.28	8021.72	7354.272	667.45
425F3	8542.00	6542.528	1999.47	2893.43	5648.57	6774.198	-1125.62
425F3	9265.00	6525.528	2739.47	1988.50	7276.50	6363.520	912.98
425F3	8630.00	6504.069	2125.93	3096.90	5533.10	5845.501	-312.40
425F3	4996.67	6376.340	-1379.67	-60.45	5057.11	5665.095	-607.98
425F3	3306.67	6142.340	-2835.67	-2387.74	5694.40	5671.717	22.69
425F3	2086.00	5895.278	-3809.28	-3997.00	6083.00	5882.318	200.68
425F3	2032.00	5635.153	-3603.15	-4116.91	6148.91	5961.210	187.70
425F3	2802.50	5881.653	-3079.15	-3145.61	5948.11	5786.313	161.80
C 69	4570.25	6051.236	-1480.99	-877.28	5447.53	5469.854	-22.33
425F3	6338.00	6365.403	-27.40	1381.40	4956.60	5163.191	-206.59
C 71	7130.25	6643.458	486.79	2202.48	4927.77	5394.562	-466.79
425F3	7922.50	6790.403	1132.10	3022.28	4900.22	6226.384	-1326.16
450F3	11500.00	6815.569	4684.43	2893.43	8606.57	7608.226	998.35
450F3	11300.00	6845.236	4454.76	1988.50	9311.50	8560.872	750.62
450F3	12400.00	6921.361	5478.64	3096.90	9303.10	8820.464	482.64
450F3	8333.33	7135.340	1197.99	-60.45	8393.78	8266.613	127.17
450F3	5070.00	7487.174	-2417.17	-2387.74	7457.74	7526.532	-68.80
450F3	2388.00	7807.986	-5419.99	-3997.00	6385.00	6926.188	-541.19
450F3	2388.00	8097.778	-5709.78	-4116.91	6504.91	6831.219	-326.31

Case	El_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
450F3	G_8:8	8318.611	-4602.61	-3145.61	6861.61	7243.202	-381.59
C_81		7138.00	-1045.82	-877.28	8015.28	7934.298	80.98
450F3	G_9:10	10560.00	2276.18	1381.40	9178.60	8484.525	694.07
C_83		10980.00	2710.35	2202.48	8777.52	8968.562	-191.04
450F3	G_10:12	11400.00	3194.51	3022.28	8377.72	9119.328	-741.61
475F3	G_1:1	14150.00	5922.35	2893.43	11256.57	9465.976	1790.60
475F3	G_2:2	9682.50	1461.01	1988.50	7694.00	9244.760	-1550.76
475F3	G_3:3	13600.00	5430.85	3096.90	10503.10	9032.130	1470.97
475F3	G_4:4	8163.33	81.60	-60.45	8223.78	8155.335	68.45
475F3	G_5:5	4300.00	-3659.24	-2387.74	6687.74	7416.310	-728.57
475F3	G_6:6	2654.00	-5181.49	-3997.00	6651.00	6738.633	-87.63
475F3	G_7:7	2314.00	-5396.49	-4116.91	6430.91	6523.997	-93.09
475F3	G_8:8	3088.00	-4132.65	-3145.61	6233.61	6650.535	-416.92
C_93		6089.00	-914.11	-877.28	6966.28	6945.187	21.09
475F3	G_9:10	9090.00	2564.11	1381.40	7708.60	7194.969	513.63
C_95		9495.00	3257.44	2202.48	7292.52	7043.895	248.63
475F3	G_10:12	9900.00	3785.50	3022.28	6877.72	6529.717	348.00
500F3	G_1:1	8272.00	2277.25	2893.43	5378.57	5791.902	-413.33
500F3	G_2:2	7072.00	1164.80	1988.50	5083.50	5244.668	-161.17
500F3	G_3:3	7873.33	2070.13	3096.90	4776.44	4957.056	-180.62
500F3	G_4:4	4703.33	-901.20	-60.45	4763.78	4951.539	-187.76
500F3	G_5:5	2823.33	-2487.87	-2387.74	5211.07	5082.836	128.23
500F3	G_6:6	1217.00	-3928.70	-3997.00	5214.00	5174.907	39.09
500F3	G_7:7	1263.40	-3844.63	-4116.91	5380.31	5148.168	232.14
500F3	G_8:8	1840.00	-3229.87	-3145.61	4985.61	4920.513	65.10
C_105		3705.00	-1349.70	-877.28	4582.28	4753.565	-171.29
500F3	G_9:10	5570.00	536.69	1381.40	4188.60	4861.636	-673.04
C_107		7509.00	2410.41	2202.48	5306.52	5183.451	123.07
500F3	G_10:12	9448.00	4296.36	3022.28	6425.72	5424.606	1001.12
530F3	G_1:1	7814.00	2540.11	2893.43	4920.57	5249.161	-328.59
530F3	G_2:2	6890.00	1524.72	1988.50	4901.50	5062.001	-160.51
530F3	G_3:3	7616.67	2147.22	3096.90	4519.77	5024.982	-505.21
530F3	G_4:4	5486.67	-82.15	-60.45	5547.11	5439.872	107.24
530F3	G_5:5	3460.00	-2203.40	-2387.74	5847.74	5888.458	-40.72
530F3	G_6:6	2684.00	-2995.28	-3997.00	6681.00	6275.003	406.00
530F3	G_7:7	2360.00	-3256.44	-4116.91	6476.91	6320.719	156.19
530F3	G_8:8	3090.00	-2732.44	-3145.61	6235.61	6134.979	100.64
C_117		4897.50	-1113.28	-877.28	5774.78	5824.076	-49.30
530F3	G_9:10	6705.00	428.11	1381.40	5323.60	5602.414	-278.82
C_119		7699.50	1374.83	2202.48	5497.02	5738.784	-241.76

Case	El_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
530F3	G_10:12	6318.000	2376.00	3022.28	5671.72	6142.161	-470.44
300F1	G_1:1	6242.617	4043.38	2893.43	7392.57	6783.809	608.77
300F1	G_2:2	6167.672	2982.33	1988.50	7161.50	7054.223	107.27
300F1	G_3:3	6174.964	4635.04	3096.90	7713.10	6984.834	728.27
300F1	G_4:4	6060.00	-98.51	-60.45	6120.45	6473.435	-352.99
300F1	G_5:5	6158.506	-2738.30	-2387.74	5767.74	6043.065	-275.33
300F1	G_6:6	6118.297	-4409.96	-3997.00	5776.40	5829.266	-52.86
300F1	G_7:7	6189.360	-4911.03	-4116.91	5577.58	5808.531	-230.95
300F1	G_8:8	6371.693	-2867.36	-3145.61	6323.11	5766.283	556.83
C_129		6044.860	-1012.03	-877.28	5577.28	5665.289	-88.01
300F1	G_9:10	5712.026	931.58	1381.40	4841.10	5840.025	-998.93
C_131		5290.915	3383.28	2202.48	6349.77	5944.312	405.46
300F1	G_10:12	5168.971	3769.70	3022.28	7859.72	5692.050	2167.67
350F1	G_1:1	5112.304	1286.40	2893.43	3470.57	4608.411	-1137.84
350F1	G_2:2	5077.604	88.73	1988.50	3167.50	3808.890	-641.39
350F1	G_3:3	5067.265	709.85	3096.90	2659.77	3576.315	-916.55
350F1	G_4:4	5046.821	-414.62	-60.45	4657.11	4221.539	435.58
350F1	G_5:5	5011.286	-2260.66	-2387.74	5087.74	4823.413	264.32
350F1	G_6:6	4960.661	-3392.18	-3997.00	5360.00	5321.933	38.07
350F1	G_7:7	4755.182	-3058.25	-4116.91	5453.51	5497.188	-43.68
350F1	G_8:8	4394.849	-1911.52	-3145.61	6077.78	5448.409	629.37
C_141		4843.682	-951.60	-877.28	5150.86	5045.874	104.99
350F1	G_9:10	5225.182	-67.40	1381.40	4233.60	4487.117	-253.52
350F1		5682.404	199.93	2202.48	3884.02	4577.571	-693.55
C_143		5886.571	618.10	3022.28	3535.72	5340.828	-1805.11
350F1	G_10:12	5939.904	5757.43	2893.43	8856.57	6795.846	2060.73
375F1	G_1:1	5992.571	3709.90	1988.50	7745.50	7542.816	202.68
375F1	G_2:2	6024.104	5186.41	3096.90	8146.44	7636.538	509.90
375F1	G_3:3	6056.924	880.73	-60.45	7107.11	6978.576	128.54
375F1	G_4:4	6165.938	-3011.15	-2387.74	5727.74	6373.310	-645.57
375F1	G_5:5	6351.146	-4627.72	-3997.00	5992.00	6074.892	-82.89
375F1	G_6:6	6622.722	-5265.67	-4116.91	5831.91	6067.747	-235.84
375F1	G_7:7	6980.667	-3235.67	-3145.61	6471.61	6271.646	199.97
375F1	G_8:8	6561.667	-735.25	-877.28	6459.03	6467.483	-8.46
C_153		6317.000	1880.22	1381.40	6456.10	6763.877	-307.78
375F1	G_9:10	5957.278	3628.42	2202.48	7142.94	6698.969	443.97
C_155		5717.000	5163.56	3022.28	7831.05	6300.198	1530.86
375F1	G_10:12	5689.778	1086.83	2893.43	3828.57	5304.393	-1475.82
400F1	G_1:1	5635.174	1189.84	1988.50	4809.50	4644.446	165.05
400F1	G_2:2	5608.157	1433.83	3096.90	3829.77	4309.501	-479.73
400F1	G_3:3	5492.840					

Case	El_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
400F1	G_4:4	5456.328	-1292.99	-60.45	4223.78	4586.585	-362.80
400F1	G_5:5	5498.619	-2485.29	-2387.74	5401.07	4962.417	438.65
400F1	G_6:6	5357.543	-4017.79	-3997.00	5336.75	5237.712	99.04
400F1	G_7:7	5033.099	-3642.30	-4116.91	5507.71	5421.579	86.13
400F1	G_8:8	5108.932	-3166.73	-3145.61	5087.81	5624.552	-536.74
C_165		5144.515	-.92	-877.28	6020.88	5902.576	118.30
400F1	G_9:10	5309.793	3035.21	1381.40	6963.60	5873.125	1090.47
C_167		5435.349	2217.15	2202.48	5450.02	5434.684	15.34
400F1	G_10:12	5448.960	1511.04	3022.28	3937.72	4932.272	-994.55
425F1	G_1:1	5465.710	2166.29	2893.43	4738.57	4869.698	-131.12
425F1	G_2:2	5445.747	1779.25	1988.50	5236.50	5164.557	71.94
425F1	G_3:3	5427.272	3482.73	3096.90	5813.10	5519.575	293.53
425F1	G_4:4	5398.764	271.24	-60.45	5730.45	5635.622	94.83
425F1	G_5:5	5360.222	-2183.56	-2387.74	5564.40	5590.097	-25.69
425F1	G_6:6	5369.368	-3828.62	-3997.00	5537.75	5430.549	107.20
425F1	G_7:7	5426.201	-4274.95	-4116.91	5268.16	5317.266	-49.11
425F1	G_8:8	5274.035	-3553.53	-3145.61	4866.11	5392.340	-526.23
C_177		5091.951	-290.45	-877.28	5678.78	5622.076	56.70
425F1	G_9:10	4821.951	3060.55	1381.40	6501.10	5718.469	782.63
C_179		4650.285	3111.97	2202.48	5559.77	5279.145	280.63
425F1	G_10:12	4585.840	3056.16	3022.28	4619.72	4484.050	135.67
450F1	G_1:1	4559.049	1246.95	2893.43	2912.57	3579.226	-666.65
450F1	G_2:2	4551.861	488.14	1988.50	3051.50	3157.335	-105.84
450F1	G_3:3	4548.590	1121.41	3096.90	2573.10	3207.427	-634.32
450F1	G_4:4	4504.559	-894.56	-60.45	3670.45	3778.604	-108.16
450F1	G_5:5	4419.767	-2016.43	-2387.74	4791.07	4433.513	357.56
450F1	G_6:6	4348.705	-3129.45	-3997.00	5216.25	4899.114	317.14
450F1	G_7:7	4291.372	-3226.37	-4116.91	5181.91	5063.715	118.20
450F1	G_8:8	4460.872	-2779.62	-3145.61	4826.86	5093.896	-267.03
C_189		4535.372	-262.25	-877.28	5150.40	5106.784	43.62
450F1	G_9:10	4952.594	1912.41	1381.40	5483.60	4991.580	492.02
C_191		5124.816	1784.68	2202.48	4707.02	4783.187	-76.16
450F1	G_10:12	5219.816	1734.18	3022.28	3931.72	4503.495	-571.77
475F1	G_1:1	5258.358	2581.64	2893.43	4946.57	4764.550	182.02
475F1	G_2:2	5312.628	621.37	1988.50	3945.50	5173.112	-1227.62
475F1	G_3:3	5396.399	5280.27	3096.90	7579.77	5886.908	1692.86
475F1	G_4:4	5514.743	161.92	-60.45	5737.11	5984.141	-247.03
475F1	G_5:5	5667.660	-2124.33	-2387.74	5931.07	6004.208	-73.14
475F1	G_6:6	5837.201	-4155.45	-3997.00	5678.75	5792.660	-113.91
475F1	G_7:7	6023.368	-4307.12	-4116.91	5833.16	5891.423	-58.26

Case	El_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
475F1	G_8:8	5736.035	-3049.53	-3145.61	5832.11	6144.563	-312.45
C_201		5545.868	147.38	-877.28	6570.53	6509.743	60.78
475F1	G_9:10	4934.757	3765.24	1381.40	7318.60	6730.858	587.74
C_203		4638.924	4305.08	2202.48	6741.52	6140.256	601.27
475F1	G_10:12	4545.590	4642.41	3022.28	6165.72	4884.384	1281.34
500F1	G_1:1	4464.278	-72.28	2893.43	1498.57	3015.791	-1517.22
500F1	G_2:2	4390.124	-738.12	1988.50	1663.50	1870.372	-206.88
500F1	G_3:3	4260.015	-916.68	3096.90	246.44	1638.908	-1392.47
500F1	G_4:4	3981.419	-1854.75	-60.45	2187.11	2560.317	-373.20
500F1	G_5:5	3554.336	-1131.00	-2387.74	4811.07	3711.465	1099.60
500F1	G_6:6	3149.961	-2443.96	-3997.00	4703.00	4452.855	250.15
500F1	G_7:7	2768.294	-1941.89	-4116.91	4943.31	4535.112	408.20
500F1	G_8:8	2787.419	-1662.22	-3145.61	4270.81	4005.602	265.21
C_213		2869.336	-519.24	-877.28	3227.38	3271.476	-44.10
500F1	G_9:10	3080.169	494.83	1381.40	2193.60	2518.903	-325.31
C_215		3255.169	836.33	2202.48	1889.02	2020.128	-131.11
500F1	G_10:12	3199.475	1408.53	3022.28	1585.72	1870.161	-284.44
530F1	G_1:1	3259.079	1362.42	2893.43	1728.07	2034.902	-306.83
530F1	G_2:2	3324.213	1310.79	1988.50	2646.50	2535.705	110.79
530F1	G_3:3	3440.613	2432.72	3096.90	2776.44	3118.593	-342.16
530F1	G_4:4	4226.67		-60.45	4287.11	3862.715	424.40
530F1	G_5:5	1755.00		-2387.74	4142.74	4482.254	-339.52
530F1	G_6:6	1421.25		-3997.00	5418.25	5104.975	313.28
530F1	G_7:7	1608.00		-4116.91	5724.91	5603.592	121.32
530F1	G_8:8	2522.00		-3145.61	5667.61	5852.900	-185.29

VARIABLE E1, SITE 4RSE								
Case	E1	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.	
OF1	G_1:1	14450.00		3122.07	11327.93	12253.62	-925.69	
	G_2:2	14100.00		1668.10	12431.90	12444.99	-13.08	
	G_3:3	13050.00		-525.13	13575.13	12827.73	747.40	
	G_4:4	10550.00		-2685.41	13235.41	12546.57	688.85	
	G_5:5	7690.00		-4371.61	12061.61	11456.65	604.96	
	G_6:6	4515.00		-4992.48	9507.48	9809.98	-302.50	
	G_7:7	4242.00	9287.25	-5045.25	7864.06	7974.05	-109.98	
	G_8:8	5142.00	9474.75	-4332.75	6680.61	6361.42	319.18	
	G_9:9	4604.00	9663.64	-5059.64	867.58	5398.22	-1661.80	
	C_10	7819.33	9967.81	-2148.47	3316.79	4502.54	5703.26	-1200.72
OF1	G_10:12	11034.67	10188.64	846.03	3890.29	7144.37	7390.18	-245.80
	G_1:1	14250.00	10281.76	3968.24	4870.48	9379.52	9864.92	-485.40
	G_2:2	16700.00	10490.93	6209.07	3122.07	13577.93	12584.39	993.54
	G_3:3	16366.67	10594.10	5772.57	1668.10	14698.57	14551.86	146.71
	G_4:4	16700.00	10686.01	6013.99	-525.13	17225.13	15511.16	1713.97
	G_5:5	13200.00	10786.85	2413.15	-2685.41	15885.41	15020.09	865.33
	G_6:6	8807.50	10922.13	-2114.63	-4371.61	13179.11	13518.92	-339.81
	G_7:7	7025.00	11091.85	-4066.85	-4992.48	12017.48	11587.09	430.39
	G_8:8	5480.00	11296.01	-5816.01	-3622.06	9102.06	9448.21	-346.15
	G_9:9	6245.00	11087.68	-4842.68	-1538.61	7783.61	7732.35	51.26
C_22		5814.00	10876.57	-5062.57	867.58	4946.42	6771.26	-1824.84
		9442.67	10734.90	-1292.24	3316.79	6125.87	7360.63	-1234.76
	G_10:12	13071.33	10564.90	2506.43	3890.29	9181.04	8830.92	350.12
	G_1:1	16700.00	10451.15	6248.85	4870.48	11829.52	10477.51	1352.01
	G_2:2	14200.00	10375.32	3824.68	3122.07	11077.93	11769.94	-692.01
	G_3:3	13833.33	10359.15	3474.18	1668.10	12165.24	12819.64	-654.40
	G_4:4	15000.00	10300.57	4699.43	-525.13	15525.13	13498.75	2026.38
	G_5:5	11160.00	10292.07	867.93	-2685.41	13845.41	13276.38	569.03
	G_6:6	7442.50	10186.40	-2743.90	-4371.61	11814.11	12197.92	-383.81
	G_7:7	6115.00	9983.57	-3868.57	-4992.48	11107.48	10632.54	474.95
C_34	G_8:8	5286.00	9683.57	-4397.57	-3622.06	8908.06	8862.10	45.96
	G_9:9	5542.00	9846.07	-4304.07	-1538.61	7080.61	7190.24	-109.63
		5712.00	10293.29	-4581.29	867.58	4844.42	6007.26	-1162.84
	G_10:12	8174.67	10651.63	-2476.96	3316.79	4857.87	5896.30	-1038.42
	G_1:1	10637.33	11171.63	-534.29	3890.29	6747.04	7143.14	-396.10
	G_2:2	13100.00	11322.25	1777.75	4870.48	8229.52	9625.36	-1395.84
	G_3:3	16150.00	11427.88	4722.13	3122.07	13027.93	13019.87	8.06
		19200.00	11433.38	7766.63	1668.10	17531.90	16290.75	1241.15
		19300.00	11553.63	7746.38	-525.13	19825.13	17928.84	1896.29

Case	E1	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
75F1	17400.00	11620.13	5779.88	-2685.41	20085.41	17450.73	2634.68
75F1	9250.00	11836.68	-2586.68	-4371.61	13621.61	14953.87	-1332.26
75F1	7382.50	12203.29	-4820.79	-4992.48	12374.98	12325.04	49.95
75F1	5352.00	12719.96	-7367.96	-3622.06	8974.06	9775.93	-801.87
75F1	6985.00	13111.63	-6126.63	-1538.61	8523.61	8292.81	230.79
75F1	6510.00	13186.63	-6676.63	867.58	5642.42	7667.56	-2025.13
C_46	10773.33	13319.96	-2546.63	3316.79	7456.54	8766.70	-1310.16
C_47	15036.67	13224.13	1812.54	3890.29	11146.37	11175.73	-29.36
75F1	19300.00	13237.88	6062.13	4870.48	14429.52	14102.85	326.68
100F1	20850.00	13268.08	7581.92	3122.07	17727.93	16830.90	897.02
100F1	20100.00	13288.58	6811.42	1668.10	18431.90	18551.86	-119.96
100F1	20900.00	13291.92	7608.08	-525.13	21425.13	18947.17	2477.96
100F1	16250.00	13288.58	2961.42	-2685.41	18935.41	17599.90	1335.51
100F1	9415.00	13282.19	-3867.19	-4371.61	13786.61	15038.98	-1252.37
100F1	7745.00	13272.75	-5527.75	-4992.48	12737.48	12413.87	323.61
100F1	5598.00	13260.25	-7662.25	-3622.06	9220.06	9961.27	-741.20
100F1	7025.00	12978.31	-5953.31	-1538.61	8563.61	8383.68	179.92
100F1	6470.00	12744.97	-6274.97	867.58	5602.42	7660.81	-2058.39
C_58	10696.67	12049.14	-1352.47	3316.79	7379.87	8694.85	-1314.98
C_59	14923.33	11467.06	3456.28	3890.29	11033.04	10707.21	325.83
125F1	19150.00	11252.06	7897.94	4870.48	14279.52	12956.18	1323.34
125F1	17466.67	11045.14	6421.53	3122.07	14344.59	14107.20	237.39
125F1	17300.00	11087.31	6212.69	1668.10	15631.90	14218.34	1413.56
125F1	12550.00	10978.56	1571.44	-525.13	13075.13	13326.80	-251.67
125F1	9265.00	11264.11	-1999.11	-2685.41	11950.41	12255.68	-305.27
125F1	6835.00	11545.50	-4710.50	-4371.61	11206.61	11203.42	3.19
125F1	5262.00	11822.72	-6560.72	-4992.48	10254.48	10204.20	50.28
125F1	6104.00	11676.89	-5572.89	-3622.06	9726.06	9382.23	343.83
125F1	5720.00	11571.33	-5851.33	-1538.61	7258.61	8921.91	-1663.30
C_70	9896.67	11513.00	-1616.33	867.58	9029.09	9689.26	-660.17
C_71	14073.33	11433.83	2639.50	3316.79	10756.54	10981.70	-225.16
125F1	18250.00	11360.50	6889.50	3890.29	14359.71	12417.58	1942.12
150F1	17400.00	11349.46	6050.54	4870.48	12529.52	13128.03	-598.51
150F1	16200.00	11443.88	4756.13	3122.07	13077.93	13404.61	-326.68
150F1	16600.00	11415.88	5184.13	1668.10	14931.90	13200.20	1731.71
150F1	11600.00	11440.71	159.29	-525.13	12125.13	12503.56	-378.43
150F1	8385.00	11496.15	-3111.15	-2685.41	11070.41	11769.90	-699.49
150F1	6702.50	11582.21	-4879.71	-4371.61	11074.11	11072.59	1.52
150F1	6395.00	11698.88	-5303.88	-4992.48	11387.48	10413.09	974.39
150F1	5768.00	11598.88	-5830.88	-3622.06	9390.06	9647.43	-257.37

Case	E1	Moving Averages	Differncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
150F1	G 9:9	11623.88	-5605.88	-1538.61	7556.61	9335.05	-1778.45
C 82		10562.00	-961.88	867.58	9694.42	10324.96	-630.54
C 83		15106.00	3683.79	3316.79	11789.21	11684.67	104.54
150F1	G 10:12	19650.00	8236.54	3890.29	15759.71	12954.33	2805.38
175F1	G 1:1	16200.00	4863.83	4870.48	11329.52	13087.22	-1757.70
175F1	G 2:2	16500.00	5327.58	3122.07	13377.93	12991.27	386.65
175F1	G 3:3	15400.00	11172.42	1668.10	13731.90	12450.75	1281.15
175F1	G 4:4	10380.00	4271.58	-525.13	10905.13	11737.17	-832.04
175F1	G 5:5	8280.00	-2573.14	-2685.41	10965.41	10906.01	59.40
175F1	G 6:6	5775.00	-4763.08	-4371.61	10146.61	10109.20	37.41
175F1	G 7:7	4430.00	-5674.75	-4992.48	9422.48	9318.31	104.17
175F1	G 8:8	5240.00	-4987.67	-3622.06	8862.06	8460.01	402.06
175F1	G 9:9	5076.00	-5518.33	-1538.61	6614.61	7740.57	-1125.97
C 94		8200.67	-2693.67	867.58	7333.09	7851.93	-518.84
C 95		11325.33	354.54	3316.79	8008.54	8803.37	-794.83
175F1	G 10:12	14450.00	3436.08	3890.29	10559.71	10935.14	-375.43
200F1	G 1:1	17675.00	6530.67	4870.48	12804.52	13381.03	-576.51
200F1	G 2:2	20900.00	9543.67	3122.07	17777.93	15109.89	2668.04
200F1	G 4:4	19000.00	7437.17	1668.10	17331.90	15053.81	2278.10
200F1	G 5:5	11297.50	-669.72	-525.13	11822.63	13620.79	-1798.16
200F1	G 6:6	8797.50	-3497.94	-2685.41	11482.91	12312.85	-829.93
200F1	G 7:7	7340.00	-5207.50	-4371.61	11711.61	11688.48	23.13
200F1	G 8:8	6974.00	-5586.00	-4992.48	11966.48	11661.44	305.04
200F1	G 9:9	7718.00	-4342.00	-3622.06	11340.06	11541.23	-201.17
C 106		9928.67	-1201.75	-1538.61	11467.27	11402.79	64.48
C 107		12139.33	1941.00	867.58	11271.76	11207.33	64.42
OF3	G 1:1	14350.00	4676.04	3316.79	11033.21	10592.70	440.50
OF3	G 2:2	14600.00	5345.00	3890.29	10709.71	9522.14	1187.57
OF3	G 3:3	11675.00	2640.00	4870.48	6804.52	8028.77	-1224.25
OF3	G 4:4	9745.00	924.00	3122.07	6622.93	6890.16	-267.24
OF3	G 5:5	7815.00	-1014.09	1668.10	6146.90	6222.97	-76.07
OF3	G 6:6	5005.00	-3932.06	-525.13	5530.13	6387.73	-857.60
OF3	G 7:7	3770.00	-5374.89	-2685.41	6455.41	7123.90	-668.49
OF3	G 8:8	4700.00	-4761.56	-4371.61	9071.61	8432.22	639.40
OF3	G 9:9	4406.00	-5105.56	-4992.48	9398.48	9825.70	-427.21
C 118		7815.11	-2056.86	-3622.06	11437.18	11274.61	162.56
C 119		11224.22	1214.75	-1538.61	12762.83	12547.34	215.49
OF3	G 10:12	14633.33	4575.53	867.58	13765.76	13248.47	517.29
25F3	G 1:1	18150.00	7986.36	3316.79	14833.21	13171.43	1661.77
25F3	G 2:2	15200.00	4914.53	3890.29	11309.71	11988.14	-678.43

Case	E1	Moving Averages	Differncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
25F3	G 3:3	10393.64	5606.36	4870.48	11129.52	10457.10	672.42
25F3	G 4:4	11395.00	861.69	3122.07	8272.93	8737.94	-465.01
25F3	G 5:5	8395.00	-2277.71	1668.10	6726.90	7708.20	-981.29
25F3	G 6:6	6275.00	-4536.86	-525.13	6800.13	7592.40	-792.27
25F3	G 7:7	5232.00	-5718.75	-2685.41	7917.41	8432.57	-515.15
25F3	G 8:8	5998.00	-4661.08	-4371.61	10369.61	9889.20	480.41
25F3	G 9:9	6082.00	-4449.31	-4992.48	11074.48	11392.54	-318.05
C 130		9488.00	-869.14	-3622.06	13110.06	12905.16	204.91
C 131		12894.00	2626.03	-1538.61	14432.61	13643.39	789.22
25F3	G 10:12	16300.00	6122.03	867.58	15432.42	13412.81	2019.61
50F3	G 1:1	14650.00	4494.94	3316.79	11333.21	11987.70	-654.50
50F3	G 2:2	13666.67	3539.11	3890.29	9776.37	10301.10	-524.73
50F3	G 3:3	13910.00	3884.94	4870.48	9039.52	8673.03	366.49
50F3	G 4:4	10325.00	360.44	3122.07	7202.93	7475.90	-272.98
50F3	G 5:5	7315.00	-2493.48	1668.10	5646.90	6780.42	-1133.51
50F3	G 6:6	6000.00	-3556.83	-525.13	6525.13	6931.84	-406.71
50F3	G 7:7	4902.00	-4307.61	-2685.41	7587.41	7787.46	-200.04
50F3	G 8:8	4768.00	-4370.78	-4371.61	9139.61	9005.88	133.73
50F3	G 9:9	5356.00	-3751.39	-4992.48	10348.48	10088.81	259.68
C 142		7615.11	-1478.94	-3622.06	11237.18	10848.84	388.34
C 143		9874.22	903.50	-1538.61	11412.83	1119.56	293.27
50F3	G 10:12	12133.33	3228.03	867.58	11265.76	10914.02	351.73
75F3	G 1:1	13800.00	4971.36	3316.79	10483.21	10341.43	141.77
75F3	G 2:2	13290.00	4511.36	3890.29	9399.71	9323.70	76.01
75F3	G 3:3	13750.00	4958.19	4870.48	8879.52	8025.44	854.08
75F3	G 4:4	8845.00	67.19	3122.07	5722.93	6628.50	-905.57
75F3	G 5:5	6530.00	-2250.51	1668.10	4861.90	5900.97	-1039.07
75F3	G 6:6	5080.00	-3719.92	-525.13	5605.13	6170.51	-565.38
75F3	G 7:7	4302.00	-4534.03	-2685.41	6987.41	7312.23	-324.82
75F3	G 8:8	4926.00	-4093.36	-4371.61	9297.61	8789.26	508.35
75F3	G 9:9	5188.00	-3990.53	-4992.48	10180.48	10034.34	146.15
C 154		7647.56	-1435.14	-3622.06	11269.62	10939.77	329.85
C 155		10107.11	824.00	-1538.61	11645.72	11526.47	119.24
75F3	G 10:12	12566.67	3189.81	867.58	11699.09	11814.94	-115.85
100F3	G 1:1	16000.00	6632.72	3316.79	12683.21	11493.61	1189.60
100F3	G 2:2	15200.00	9369.61	3890.29	11309.71	10509.07	800.64
100F3	G 3:3	12600.00	3149.22	4870.48	7729.52	8970.44	-1240.92
100F3	G 4:4	11250.00	1768.06	3122.07	8127.93	7624.05	503.88
100F3	G 5:5	7655.00	-2049.57	1668.10	5986.90	6660.20	-673.29
100F3	G 6:6	4965.00	-5153.67	-525.13	5490.13	6763.84	-1273.71

Case	E1	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
100F3	G 7:7	10724.22	-6394.22	-2685.41	7015.41	7679.01	-663.60
100F3	G 8:8	10890.89	-4990.89	-4371.61	10271.61	9487.33	784.29
100F3	G 9:9	10813.11	-5251.11	-4992.48	10554.48	11524.36	-969.88
C 166		11108.94	-789.83	-3622.06	13941.18	13933.28	7.90
C 167		11090.19	3986.03	-1538.61	16614.83	15655.12	959.71
100F3	G 10:12	11047.49	8785.85	867.58	18965.76	15978.99	2986.77
125F3	G 1:1	11129.36	6870.64	3316.79	14683.21	14514.25	168.96
125F3	G 2:2	11157.03	3109.64	3890.29	10376.37	12213.70	-1837.32
125F3	G 3:3	11092.19	5057.81	4870.48	11279.52	10061.64	1217.88
125F3	G 4:4	11025.00	-4.74	3122.07	7902.93	8229.52	-326.59
125F3	G 5:5	10890.88	-3748.38	1668.10	5474.40	7089.03	-1614.62
125F3	G 6:6	10675.61	-4728.11	-525.13	6472.63	6939.79	-467.16
125F3	G 7:7	10383.94	-5721.94	-2685.41	7347.41	7694.90	-347.49
125F3	G 8:8	10567.28	-5445.28	-4371.61	9493.61	9059.23	434.38
125F3	G 9:9	10711.72	-5899.22	-4992.48	9804.98	10481.21	-676.23
C 178		10707.56	-2054.78	-3622.06	12274.84	12161.91	112.93
C 179		10782.56	1710.50	-1538.61	14031.66	13807.15	224.51
125F3	G 10:12	10787.76	5545.57	867.58	15465.76	14734.62	731.14
150F3	G 1:1	10800.06	9399.94	3316.79	16883.21	14562.41	2320.79
150F3	G 2:2	10835.93	5164.07	3890.29	12109.71	12980.36	-870.66
150F3	G 3:3	10861.93	5238.07	4870.48	11229.52	10881.55	347.97
150F3	G 4:4	10901.17	1023.83	3122.07	8802.93	8741.27	61.65
150F3	G 5:5	10944.92	-3739.92	1668.10	5536.90	7384.92	-1848.01
150F3	G 6:6	10993.18	-4898.18	-525.13	6620.13	7233.17	-613.04
150F3	G 7:7	11045.96	-5953.46	-2685.41	7777.91	7999.77	-221.86
150F3	G 8:8	11020.96	-5586.96	-4371.61	9805.61	9438.25	367.36
150F3	G 9:9	10948.74	-5665.40	-4992.48	10275.82	10936.34	-660.53
C 190		10957.07	-1779.29	-3622.06	12799.84	12675.28	124.56
C 191		11059.15	2013.07	-1538.61	14610.83	14276.60	334.23
150F3	G 10:12	11148.32	5818.35	867.58	16099.09	14969.80	1129.29
175F3	G 1:1	11199.15	8700.85	3316.79	16583.21	14486.03	2097.18
175F3	G 2:2	11220.28	3913.06	3890.29	11243.04	12853.51	-1610.47
175F3	G 3:3	11235.61	4964.39	4870.48	11329.52	11080.07	249.45
175F3	G 4:4	11313.67	1836.33	3122.07	10027.93	9381.09	646.84
175F3	G 5:5	11401.81	-3126.81	1668.10	6606.90	8188.64	-1581.74
175F3	G 6:6	11500.06	-4795.06	-525.13	7230.13	7887.17	-657.04
175F3	G 7:7	11608.39	-6262.39	-2685.41	8031.41	8483.68	-452.27
175F3	G 8:8	11240.33	-5622.33	-4371.61	9989.61	9949.38	40.24
175F3	G 9:9	11037.56	-4817.56	-4992.48	11212.48	11683.67	-471.19
C 202		10812.56	-577.00	-3622.06	13857.62	13662.88	194.74

Case	E1	Moving Averages	Diffnres	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
C 203	14251.11	10436.93	3814.18	-1538.61	15789.72	14806.84	982.87
175F3	18266.67	10285.40	7981.26	867.58	17399.09	14530.79	2868.30
200F3	15483.33	10180.15	5303.18	3316.79	12166.54	12592.94	-426.40
200F3	12700.00	10029.65	2670.35	3890.29	8809.71	10104.53	-1294.82
200F3	13500.00	10089.15	3410.85	4870.48	8629.52	7944.88	684.64
200F3	8642.50	11279.15	-2636.65	3122.07	5520.43	6463.81	-943.38
200F3	6456.67			1668.10	4788.57	5799.53	-1010.96

SERIES								
Case		E3_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
300F3	G_1:1	157.8000			12.2943	145.5057	128.1508	17.3548
300F3	G_2:2	162.4000			28.9203	133.4797	137.8222	-4.3425
300F3	G_3:3	166.0000			31.5189	134.4811	157.1648	-22.6837
300F3	G_4:4	212.0000			13.3899	198.6101	180.4385	18.1716
300F3	G_5:5	210.3333			8.9787	201.3547	200.7429	.6118
300F3	G_6:6	225.0000			2.0354	222.9646	217.8367	5.1279
300F3	G_7:7	220.2500	190.4194	29.8306	-4.7416	224.9916	225.1047	-1.1131
300F3	G_8:8	222.5000	188.4861	34.0139	-17.8339	240.3339	226.1098	14.2241
C_9		198.4500	186.0861	12.3639	-24.5656	223.0156	217.3897	5.6259
300F3	G_9:10	174.4000	183.5306	-9.1306	-20.6077	195.0077	203.1625	-8.1548
C_11		170.1000	179.1139	-9.0139	-21.6855	191.7855	184.1888	7.5966
300F3	G_10:12	165.8000	176.8639	-11.0639	-7.7032	173.5032	160.9310	12.5722
325F3	G_1:1	134.6000	172.5806	-37.9806	12.2943	122.3057	135.4314	-13.1258
325F3	G_2:2	133.6000	169.3097	-35.7097	28.9203	104.6797	120.5992	-15.9195
325F3	G_3:3	135.3333	164.8681	-29.5347	31.5189	103.8145	123.1870	-19.3725
325F3	G_4:4	159.0000	161.1556	-2.1556	13.3899	145.6101	141.0459	4.5642
325F3	G_5:5	183.3333	158.1722	25.1611	8.9787	174.3547	160.7744	13.5803
325F3	G_6:6	173.6000	155.4639	18.1361	2.0354	171.5646	174.1701	-2.6054
325F3	G_7:7	181.0000	153.0306	27.9694	-4.7416	185.7416	180.8047	4.9369
325F3	G_8:8	169.2000	152.5806	16.6194	-17.8339	187.0339	180.0321	7.0019
C_21		153.9000	152.2806	1.6194	-24.5656	178.4656	174.7674	3.6981
325F3	G_9:10	138.6000	151.5306	-12.9306	-20.6077	159.2077	164.9402	-5.7326
C_23		137.6000	149.7250	-12.1250	-21.6855	159.2855	153.3610	5.9244
325F3	G_10:12	136.6000	148.1139	-11.5139	-7.7032	144.3032	138.3977	5.9055
350F3	G_1:1	129.2000	149.7139	-20.5139	12.2943	116.9057	121.7314	-4.8258
350F3	G_2:2	130.0000	151.4639	-21.4639	28.9203	101.0797	110.5473	-9.4676
350F3	G_3:3	126.3333	149.3847	-23.0514	31.5189	94.8145	111.8241	-17.0096
350F3	G_4:4	137.3333	148.0951	-10.7618	13.3899	123.9434	129.2607	-5.3173
350F3	G_5:5	164.0000	147.5951	16.4049	8.9787	155.0213	155.1151	-0.938
350F3	G_6:6	192.8000	147.2118	45.5882	2.0354	190.7646	175.7608	15.0038
350F3	G_7:7	202.0000	146.9451	55.0549	-4.7416	206.7416	182.6593	24.0823
350F3	G_8:8	144.2500	157.0535	-12.8035	-17.8339	162.0839	174.4098	-12.3259
C_33		138.4250	165.2201	-26.7951	-24.5656	162.9906	164.5536	-1.5630
350F3	G_9:10	132.6000	174.8868	-42.2868	-20.6077	153.2077	155.3514	-2.1437
C_35		133.0000	181.1090	-48.1090	-21.6855	154.6855	161.5416	-6.8561
350F3	G_10:12	133.4000	186.1299	-52.7299	-7.7032	141.1032	173.4866	-32.3834
375F3	G_1:1	250.5000	188.6799	61.8201	12.2943	238.2057	195.6092	42.5965
375F3	G_3:3	228.0000	188.4150	39.5850	28.9203	199.0797	203.8881	-4.8084
375F3	G_5:5	242.3333	190.9146	51.4188	31.5189	210.8145	209.0333	1.7812

Case	E3_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
375F3	212.0000	191.8514	20.1486	13.3899	198.6101	207.6051	-8.9951
375F3	224.2500	193.6014	30.6486	8.9787	215.2713	211.1269	4.1445
375F3	223.4000	193.7958	29.6042	2.0354	221.3646	210.2725	11.0921
C_45	198.8222	195.7347	3.0875	-4.7416	203.5639	203.0090	.5548
C_47	174.2444	189.0264	-14.7819	-17.8339	192.0784	191.9333	.1451
400F3	149.6667	186.7431	-37.0764	-24.5656	174.2322	179.5390	-5.3068
400F3	153.6000	182.7986	-29.1986	-20.6077	174.2077	171.2859	2.9218
400F3	135.3333	177.6986	-42.3653	-21.6855	157.0188	164.4610	-7.4422
400F3	156.6667	171.6194	-14.9528	-7.7032	164.3699	163.1607	1.2092
400F3	170.0000	165.6528	4.3472	12.2943	157.7057	162.8573	-5.1517
400F3	200.6000	161.7343	38.8657	28.9203	171.6797	162.1325	9.5472
400F3	195.0000	159.8639	35.1361	31.5189	163.4811	156.5167	6.9645
400F3	150.8000	159.1083	-8.3083	13.3899	137.4101	149.4755	-12.0654
C_57	151.3000	159.3292	-8.0292	8.9787	142.3213	146.8151	-4.4938
400F3	151.8000	160.9681	-9.1681	2.0354	149.7646	150.4515	-.6869
C_59	151.8000	162.6069	-10.8069	-4.7416	156.5416	157.3232	-.7816
400F3	151.8000	165.5514	-13.7514	-17.8339	169.6339	164.3265	5.3074
425F3	140.6000	165.9514	-25.3514	-24.5656	165.1656	169.0786	-3.9130
425F3	156.2500	167.1014	-10.8514	-20.6077	176.8577	174.2162	2.6415
425F3	155.0000	170.2847	-15.2847	-21.6855	176.6855	178.8944	-2.2089
425F3	176.3333	171.6931	4.6403	-7.7032	184.0365	182.7662	1.2703
425F3	205.3333	171.3264	34.0069	12.2943	193.0390	183.7907	9.2483
425F3	205.4000	170.4951	34.9049	28.9203	176.4797	181.0807	-4.6010
425F3	208.8000	169.1993	39.6007	31.5189	177.2811	176.4759	.8052
425F3	189.0000	170.9826	18.0174	13.3899	175.6101	169.0755	6.5346
C_69	168.2000	176.7118	-8.5118	8.9787	159.2213	160.3846	-1.1632
425F3	147.4000	182.4618	-35.0618	2.0354	145.3646	153.0404	-7.6758
C_71	141.8250	182.2396	-40.4146	-4.7416	146.5666	153.8204	-7.2538
425F3	136.2500	179.8507	-43.6007	-17.8339	154.0839	168.8321	-14.7481
450F3	162.0000	177.4174	-15.4174	-24.5656	186.5656	194.5924	-8.0269
450F3	225.0000	174.8674	50.1326	-20.6077	245.6077	215.1977	30.4100
450F3	224.0000	171.7340	52.2660	-21.6855	245.6855	215.7722	29.9133
450F3	173.6667	171.2674	2.3993	-7.7032	181.3699	195.2347	-13.8649
450F3	176.6667	173.4674	3.1993	12.2943	164.3723	171.4203	-7.0480
450F3	176.2000	175.4944	.7056	28.9203	147.2797	153.7029	-6.4232
450F3	178.2000	177.3486	.8514	31.5189	146.6811	147.6241	-.9429
450F3	151.4000	182.0569	-30.6569	13.3899	138.0101	148.1866	-10.1765
C_81	162.6000	180.4319	-17.8319	8.9787	153.6213	155.3318	-1.7105
450F3	173.8000	180.5986	-6.7986	2.0354	171.7646	164.2960	7.4687
C_83	166.1500	184.8764	-18.7264	-4.7416	170.8916	178.3954	-7.5038

Case	E3_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
450F3	G_10:12	185.4042	-26.9042	-17.8339	176.3339	194.9765	-18.6426
475F3	G_1:1	184.2875	34.2125	-24.5656	243.0656	216.9619	26.1037
475F3	G_2:2	183.6875	21.8125	-20.6077	226.1077	229.8736	-3.7659
475F3	G_3:3	184.1208	41.8792	-21.6855	247.6855	230.4944	17.1911
475F3	G_4:4	186.2104	38.7896	-7.7032	232.7032	210.5421	22.1611
475F3	G_5:5	189.9563	-6.9563	12.2943	170.7057	181.3833	-10.6776
475F3	G_6:6	193.5375	-30.7375	28.9203	133.8797	155.3251	-21.4454
475F3	G_7:7	196.9542	-25.9542	31.5189	139.4811	146.8917	-7.4105
475F3	G_8:8	190.0625	-33.4625	13.3899	143.2101	157.3977	-14.1877
C_93		184.2708	3.4042	8.9787	178.6963	178.8096	-1.1132
475F3	G_9:10	176.7986	41.9514	2.0354	216.7146	199.5349	17.1798
C_95		172.0764	37.0486	-4.7416	213.8666	205.4177	8.4490
475F3	G_10:12	172.9653	26.5347	-17.8339	217.3339	197.0876	20.2463
500F3	G_1:1	176.4319	-40.6319	-24.5656	160.3656	177.8739	-17.5084
500F3	G_2:2	179.2819	-43.2819	-20.6077	156.6077	166.6625	-10.0548
500F3	G_3:3	182.1153	-45.7819	-21.6855	158.0188	164.5647	-6.5460
500F3	G_4:4	180.7424	-12.4090	-7.7032	176.0365	170.9977	5.0388
500F3	G_5:5	175.1632	18.5035	12.2943	181.3723	175.4277	5.9446
500F3	G_6:6	170.4611	33.9389	28.9203	175.4797	176.6436	-1.1639
500F3	G_7:7	166.6361	38.5639	31.5189	173.6811	174.4463	-7.651
500F3	G_8:8	169.0694	21.5306	13.3899	177.2101	169.8533	7.3568
C_105		172.5278	-1.3278	8.9787	162.2213	163.5262	-1.3049
500F3	G_9:10	175.7778	-23.9778	2.0354	149.7646	159.6960	-9.9313
C_107		177.9167	-25.2167	-4.7416	157.4416	162.9454	-5.5038
500F3	G_10:12	178.7222	-25.1222	-17.8339	171.4339	172.9098	-1.4759
530F3	G_1:1	180.3056	-15.3056	-24.5656	189.5656	184.6934	4.8722
530F3	G_2:2	182.2556	-4.7556	-20.6077	198.1077	193.4032	4.7045
530F3	G_3:3	185.1722	-9.8389	-21.6855	197.0188	196.8092	.2096
530F3	G_4:4	188.4931	5.5069	-7.7032	201.7032	197.0903	4.6129
530F3	G_5:5	192.2181	11.1153	12.2943	191.0390	195.5092	-4.4702
530F3	G_6:6	194.9972	28.4028	28.9203	194.4797	197.0658	-2.5862
530F3	G_7:7	196.8306	31.7694	31.5189	197.0811	199.7481	-2.6670
530F3	G_8:8	197.1972	28.4028	13.3899	212.2101	202.6533	9.5568
C_117		197.1389	13.9111	8.9787	202.0713	200.8262	1.2451
530F3	G_9:10	197.0278	-5.5278	2.0354	194.4646	197.1960	-2.7313
C_119		196.8333	-10.7833	-4.7416	190.7916	193.8010	-3.0094
530F3	G_10:12	196.7778	-21.1778	-17.8339	193.4339	193.5209	-0.0870
300F1	G_1:1	198.6278	-29.2278	-24.5656	193.9656	194.4508	-4.852
300F1	G_2:2	198.6333	-21.8333	-20.6077	197.4077	196.0365	1.3711
300F1	G_3:3	198.2917	-24.2917	-21.6855	195.6855	196.1055	-4.200

Case	E3_MPA	Moving Averages	Differncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
300F1	191.6667	197.3708	-5.7042	-7.7032	199.3699	198.2570	1.1129
300F1	202.6667	195.8708	6.7958	12.2943	190.3723	199.5610	-9.1887
300F1	245.6000	195.3625	50.2375	28.9203	216.6797	203.6177	13.0620
300F1	228.6667	195.8458	32.8208	31.5189	197.1478	202.4907	-5.3429
300F1	221.5000	192.3792	29.1208	13.3899	208.1101	199.3125	8.7975
C 129	200.0000	187.8458	12.1542	8.9787	191.0213	191.5614	-5.5401
300F1	178.5000	183.0403	-4.5403	2.0354	176.4646	187.5738	-11.1091
C 131	179.9500	179.8458	.1042	-4.7416	184.6916	183.2065	1.4851
300F1	181.4000	177.8736	3.5264	-17.8339	199.2339	176.8098	22.4241
350F1	127.8000	177.6778	-49.8778	-24.5656	152.3656	162.6989	-10.3334
350F1	122.4000	179.8056	-57.4056	-20.6077	143.0077	152.2291	-9.2215
350F1	116.3333	177.5139	-61.1806	-21.6855	138.0188	149.0240	-11.0052
350F1	153.3333	175.2743	-21.9410	-7.7032	161.0365	161.0995	-0.0630
350F1	179.0000	173.0868	5.9132	12.2943	166.7057	179.0610	-12.3554
350F1	243.2500	170.2681	72.9819	28.9203	214.3297	195.9344	18.3953
350F1	254.2000	166.8181	87.3819	31.5189	222.6811	198.7528	23.9284
350F1	194.0000	171.4181	22.5819	13.3899	180.6101	186.6699	-6.0599
C 141	173.1250	181.4347	-8.3097	8.9787	164.1463	169.7374	-5.5910
350F1	152.2500	191.5458	-39.2958	2.0354	150.2146	157.6793	-7.4647
C 143	146.1250	198.2403	-52.1153	-4.7416	150.8666	160.0454	-9.1788
350F1	140.0000	204.4069	-64.4069	-17.8339	157.8339	178.1987	-20.3648
375F1	183.0000	205.2819	-22.2819	-24.5656	207.5656	208.3332	-0.7676
375F1	242.6000	206.4153	36.1847	-20.6077	263.2077	235.8514	27.3563
375F1	237.6667	212.4319	25.2347	-21.6855	259.3521	248.3870	10.9652
375F1	233.6667	218.5861	15.0806	-7.7032	241.3699	245.8070	-4.4371
375F1	253.0000	224.8778	28.1222	12.2943	240.7057	238.9055	1.8002
375F1	253.7500	229.5653	24.1847	28.9203	224.8297	235.8492	-11.0195
375F1	267.8000	232.6486	35.1514	31.5189	236.2811	238.0917	-1.8105
375F1	266.2000	226.8653	39.3347	13.3899	252.8101	239.7255	13.0846
C 153	246.9750	215.9986	30.9764	8.9787	237.9963	234.9374	3.0590
375F1	227.7500	203.7764	23.9736	2.0354	225.7146	223.8904	1.8242
C 155	202.3750	194.8042	7.5708	-4.7416	207.1166	204.2899	2.8268
375F1	177.0000	187.7764	-10.7764	-17.8339	194.8339	181.5098	13.3241
400F1	113.6000	185.9222	-72.3222	-24.5656	138.1656	154.3980	-16.2324
400F1	112.2000	183.1056	-70.9056	-20.6077	132.8077	136.5180	-3.7103
400F1	91.0000	177.3222	-86.3222	-21.6855	112.6855	129.5129	-16.8274
400F1	126.0000	171.2326	-45.2326	-7.7032	133.7032	141.6236	-7.9204
400F1	168.6667	164.8368	3.8299	12.2943	156.3723	161.8722	-5.4998
400F1	231.5000	159.0306	72.4694	28.9203	202.5797	182.5066	20.0731
400F1	234.0000	153.8139	80.1861	31.5189	202.4811	188.9685	13.5126

Case	E3_MPA	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irrreg. Compon.
400F1	196.8000	159.5472	37.2528	13.3899	183.4101	181.8422	1.5679
C_165	173.9000	164.6764	9.2236	8.9787	164.9213	166.6040	-1.6827
400F1	151.0000	172.2597	-21.2597	2.0354	148.9646	151.9182	-2.9536
C_167	132.7000	178.0097	-45.3097	-4.7416	137.4416	149.6232	-12.1816
400F1	114.4000	183.3153	-68.9153	-17.8339	132.2339	158.7598	-26.5259
425F1	182.4000	184.8569	-2.4569	-24.5656	206.9656	179.4674	27.4981
425F1	173.7500	186.8986	-13.1486	-20.6077	194.3577	193.2569	1.1008
425F1	182.0000	188.9361	-6.9361	-21.6855	203.6855	203.5759	.1096
425F1	195.0000	192.7569	2.2431	-7.7032	202.7032	207.8884	-5.1852
425F1	232.3333	198.3611	33.9722	12.2943	220.0390	215.3722	4.6668
425F1	250.0000	204.3132	45.6868	28.9203	221.0797	218.6492	2.4305
425F1	258.5000	210.6132	47.8868	31.5189	226.9811	218.8481	8.1330
425F1	221.2500	205.8799	15.3701	13.3899	207.8601	215.1533	-7.2932
C_177	219.7500	202.1674	17.5826	8.9787	210.7713	212.9235	-2.1521
425F1	218.2500	197.9729	20.2771	2.0354	216.2146	211.5127	4.7020
C_179	204.1250	194.5840	9.5410	-4.7416	208.8666	203.9593	4.9073
425F1	190.0000	191.1674	-1.1674	-17.8339	207.8339	189.7321	18.1019
450F1	125.6000	189.2299	-63.6299	-24.5656	150.1656	169.7776	-19.6121
450F1	129.2000	185.9215	-56.7215	-20.6077	149.8077	158.4810	-8.6733
450F1	131.6667	183.5049	-51.8382	-21.6855	153.3521	156.9944	-3.6422
450F1	154.3333	180.1611	-25.8278	-7.7032	162.0365	166.5032	-4.4667
450F1	191.3333	175.8903	15.4431	12.2943	179.0390	177.4981	1.5409
450F1	226.7500	171.4049	55.3451	28.9203	197.8297	185.2251	12.6046
450F1	218.8000	166.7049	52.0951	31.5189	187.2811	184.9898	2.2913
450F1	192.2500	167.0715	25.1785	13.3899	178.8601	179.4699	-.6099
C_189	179.6250	166.4715	13.1535	8.9787	170.6463	171.3235	-.6771
450F1	167.0000	168.6938	-1.6937	2.0354	164.9646	164.0627	.9020
C_191	150.3000	169.3326	-19.0326	-4.7416	155.0416	158.1260	-3.0844
450F1	133.6000	169.3049	-35.7049	-17.8339	151.4339	153.4543	-2.0204
475F1	130.0000	167.8049	-37.8049	-24.5656	154.5656	154.0934	.4722
475F1	122.0000	165.9882	-43.9882	-20.6077	142.6077	157.5699	-14.9622
475F1	158.3333	166.7590	-8.4257	-21.6855	180.0188	166.4388	13.5800
475F1	162.0000	167.7069	-5.7069	-7.7032	169.7032	172.1107	-2.4074
475F1	191.0000	168.8319	22.1681	12.2943	178.7057	175.6314	3.0742
475F1	208.7500	169.8194	38.9306	28.9203	179.8297	176.1862	3.6435
475F1	197.0000	170.6694	26.3306	31.5189	165.4811	177.0055	-11.5244
475F1	201.5000	172.6694	28.8306	13.3899	188.1101	179.7366	8.3735
C_201	191.0000	174.5861	16.4139	8.9787	182.0213	179.0651	2.9562
475F1	180.5000	173.8917	6.6083	2.0354	178.4646	175.8849	2.5798
C_203	162.1500	176.8917	-14.7417	-4.7416	166.8916	171.2732	-4.3816

Case	E3_MPA	Moving Averages	Diffnrcs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
475F1	G_10:12	179.0028	-35.2028	-17.8339	161.6339	168.8765	-7.2426
500F1	G_1:1	181.2458	-27.2458	-24.5656	178.5656	169.8619	8.7037
500F1	G_2:2	185.6125	-40.6125	-20.6077	165.6077	173.8514	-8.2437
500F1	G_3:3	187.3708	-37.3708	-21.6855	171.6855	182.2536	-10.5682
500F1	G_4:4	188.5417	9.4583	-7.7032	205.7032	193.4347	12.2685
500F1	G_5:5	189.1250	27.2083	12.2943	204.0390	202.9536	1.0854
500F1	G_6:6	190.3583	45.3083	28.9203	206.7463	208.7770	-2.0306
500F1	G_7:7	192.2417	57.1583	31.5189	217.8811	209.5185	8.3626
500F1	G_8:8	193.4042	29.1958	13.3899	209.2101	205.3051	3.9049
C_213		195.4458	9.6042	8.9787	196.0713	197.4596	-1.3882
500F1	G_9:10	194.7236	-7.2236	2.0354	185.4646	189.4849	-4.0202
C_215		193.2514	-16.3014	-4.7416	181.6916	185.8954	-4.2038
500F1	G_10:12	191.6819	-25.2819	-17.8339	184.2339	186.2987	-2.0648
530F1	G_1:1	190.7931	-22.8431	-24.5656	192.5156	185.6600	6.8555
530F1	G_2:2	189.4097	-19.9097	-20.6077	190.1077	183.7402	6.3674
530F1	G_3:3	190.0597	-48.7264	-21.6855	163.0188	180.3407	-17.3219
530F1	G_4:4			-7.7032	188.0365	182.9718	5.0648

Case	E3	Moving Averages	Differences	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
OF1	G 1:1	138.0000		23.6787	114.3213	100.3238	13.9975
OF1	G 2:2	118.3333		14.9919	103.3414	103.3261	.0153
OF1	G 3:3	81.7000		-10.6157	92.3157	109.3308	-17.0151
OF1	G 4:4	113.7500		-20.4364	134.1864	114.6990	19.4874
OF1	G 5:5	113.3750		-4.2779	117.6529	111.7463	5.9066
OF1	G 6:6	101.8500		-4.6034	106.4534	101.8134	4.6400
OF1	G 7:7	62.6400	-39.934	-16.5225	79.1625	87.7407	-8.5782
OF1	G 8:8	56.9600	-46.114	-12.1830	69.1430	81.9116	-12.7686
OF1	G 9:9	82.6400	-24.045	-.6931	83.3331	86.7244	-3.3913
C 10		101.5933	-10.867	3.2625	98.3309	97.7622	.5687
C 11		120.5467	.691	4.1364	116.4103	109.1135	7.2967
OF1	G 10:12	139.5000	15.467	23.2625	116.2375	118.5757	-2.3382
25F1	G 1:1	144.0000	14.913	23.6787	120.3213	129.4238	-9.1025
25F1	G 2:2	161.6667	28.441	14.9919	146.6748	149.2302	-2.5555
25F1	G 3:3	151.0000	13.950	-10.6157	161.6157	168.0187	-6.4031
25F1	G 4:4	202.5000	61.687	-20.4364	222.9364	182.3749	40.5615
25F1	G 5:5	163.5000	18.359	-4.2779	167.7779	174.8724	-7.0945
25F1	G 6:6	162.5000	12.465	-4.6034	167.1034	159.1645	7.9389
25F1	G 7:7	112.3000	-43.193	-16.5225	128.8225	138.5568	-9.7343
25F1	G 8:8	102.8500	-46.526	-12.1830	115.0330	130.7894	-15.7564
25F1	G 9:9	127.8000	-15.612	-.6931	128.4931	135.5600	-7.0669
C 22		153.5333	15.579	3.2625	150.2709	150.5366	-.2658
C 23		179.2667	49.308	4.1364	175.1303	151.6469	23.4834
25F1	G 10:12	205.0000	80.113	23.2625	181.7375	134.9661	46.7714
50F1	G 1:1	70.6000	-48.173	23.6787	46.9213	102.8557	-55.9343
50F1	G 2:2	90.1000	-25.395	14.9919	75.1081	91.1247	-16.0166
50F1	G 3:3	85.5000	-27.404	-10.6157	96.1157	94.0428	2.0729
50F1	G 4:4	106.5500	-2.564	-20.4364	126.9864	106.2092	20.7772
50F1	G 5:5	102.6500	-.900	-4.2779	106.9279	105.3124	1.6155
50F1	G 6:6	89.1250	-7.086	-4.6034	93.7284	98.3262	-4.5977
50F1	G 7:7	72.9600	-14.139	-16.5225	89.4825	90.4146	-.9321
50F1	G 8:8	71.7600	-18.274	-12.1830	83.9430	86.0055	-2.0625
50F1	G 9:9	82.3200	-9.872	-.6931	83.0131	84.4978	-1.4846
C 34		86.7633	-5.362	3.2625	83.5009	83.0000	.5009
C 35		91.2067	-.790	4.1364	87.0703	82.0163	5.0539
50F1	G 10:12	95.6500	5.397	23.2625	72.3875	82.2338	-9.8464
75F1	G 1:1	105.8250	16.428	23.6787	82.1463	86.1796	-4.0332
75F1	G 2:2	116.0000	28.613	14.9919	101.0081	95.0858	5.9223
75F1	G 3:3	84.7000	-.809	-10.6157	95.3157	100.7761	-5.4605

Case	E3	MOVING Averages	Differncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
75F1	G 4:4	83.3238	21.676	-20.4364	125.4364	102.6009	22.8355
75F1	G 5:5	81.0615	.663	-4.2779	86.0029	92.9407	-6.9378
75F1	G 6:6	78.7221	.128	-4.6034	83.4534	82.2150	1.2384
75F1	G 7:7	76.3054	-27.465	-16.5225	65.3625	69.8451	-4.4826
75F1	G 8:8	77.5283	-28.303	-12.1830	61.4080	63.1492	-1.7412
75F1	G 9:9	80.0283	-23.928	-.6931	56.7931	58.9181	-2.1250
C 46	59.6167	82.9700	-23.353	3.2625	56.3542	56.1598	.1944
C 47	63.1333	88.3450	-25.212	4.1364	58.9969	58.8987	.0982
75F1	G 10:12	66.6500	-28.114	23.2625	43.3875	69.9068	-26.5193
100F1	G 1:1	100.5054	19.995	23.6787	96.8213	92.0964	4.7249
100F1	G 2:2	104.2371	41.763	14.9919	131.0081	120.1358	10.8723
100F1	G 3:3	106.6933	13.307	-10.6157	130.6157	143.7317	-13.1160
100F1	G 4:4	110.4100	59.090	-20.4364	189.9364	160.0509	29.8855
100F1	G 5:5	116.1892	42.561	-4.2779	163.0279	157.1579	5.8699
100F1	G 6:6	124.0308	23.719	-4.6034	152.3534	142.6912	9.6623
100F1	G 7:7	133.9350	-40.315	-16.5225	110.1425	120.1468	-10.0043
100F1	G 8:8	135.0600	-56.360	-12.1830	90.8830	108.1975	-17.3145
100F1	G 9:9	136.3378	-35.638	-.6931	101.3931	111.1770	-9.7839
C 58	128.9667	137.8794	-8.913	3.2625	125.7042	126.5792	-.8750
C 59	157.2333	137.6294	19.604	4.1364	153.0969	138.5432	14.5538
100F1	G 10:12	185.5000	44.746	23.2625	162.2375	142.8438	19.3936
125F1	G 1:1	141.8169	-7.817	23.6787	110.3213	138.9260	-28.6047
125F1	G 2:2	144.2003	17.133	14.9919	146.3414	145.2302	1.1112
125F1	G 3:3	148.6919	-10.192	-10.6157	149.1157	158.3058	-9.1901
125F1	G 4:4	149.5153	16.985	-20.4364	186.9364	174.6157	12.3207
125F1	G 5:5	149.8003	46.450	-4.2779	200.5279	177.0579	23.4699
125F1	G 6:6	149.5469	10.953	-4.6034	165.1034	167.2856	-2.1822
125F1	G 7:7	148.7553	-26.535	-16.5225	138.7425	149.7557	-11.0132
125F1	G 8:8	153.9219	-21.322	-12.1830	144.7830	136.5120	8.2710
125F1	G 9:9	157.7275	-47.147	-.6931	111.2731	130.0481	-18.7750
C 70	132.3867	164.3525	-31.966	3.2625	129.1242	134.1726	-5.0484
C 71	154.1933	167.4775	-13.284	4.1364	150.0569	144.1654	5.8915
125F1	G 10:12	168.8317	7.168	23.2625	152.7375	158.2335	-5.4960
150F1	G 1:1	173.1025	22.897	23.6787	172.3213	176.1253	-3.8040
150F1	G 2:2	176.8758	30.124	14.9919	192.0081	195.0080	-2.9999
150F1	G 3:3	176.5958	41.404	-10.6157	228.6157	211.9817	16.6340
150F1	G 4:4	182.4308	21.569	-20.4364	224.4364	219.1620	5.2744
150F1	G 5:5	186.1403	26.360	-4.2779	216.7779	216.0613	.7166
150F1	G 6:6	187.7242	24.026	-4.6034	216.3534	201.8356	14.5178
150F1	G 7:7	187.1825	-19.683	-16.5225	184.0225	185.0768	-1.0543

Case	E3	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
150F1	G_8:8	189.9881	-60.748	-12.1830	141.4230	171.6546	-30.2316
150F1	G_9:9	185.6547	-5.055	-.6931	181.2931	169.6763	11.6168
C_82		183.7381	-6.838	3.2625	173.6375	167.6985	5.9390
C_83		184.4256	-11.226	4.1364	169.0636	170.4691	-1.4055
175F1	G_1:1	182.4047	-12.905	23.2625	146.2375	166.9401	-20.7027
175F1	G_2:2	176.1256	53.541	23.6787	205.9880	173.9038	32.0842
175F1	G_3:3	172.5172	-17.517	14.9919	140.0081	180.2395	-40.2314
175F1	G_4:4	176.0306	18.969	-10.6157	205.6157	195.6391	9.9766
175F1	G_5:5	176.3222	35.928	-20.4364	232.6864	197.2620	35.4244
175F1	G_6:6	177.9806	10.269	-4.2779	192.5279	185.7002	6.8277
175F1	G_7:7	181.0056	-44.606	-4.6034	141.0034	167.3089	-26.3055
175F1	G_8:8	186.5889	-62.389	-16.5225	140.7225	160.9624	-20.2399
175F1	G_9:9	189.4083	-18.008	-12.1830	183.5830	170.7024	12.8806
C_94		194.1167	-10.017	-.6931	184.7931	183.8563	.9368
C_95		193.5958	3.204	3.2625	193.5375	195.3052	-1.7676
175F1	G_10:12	186.6533	22.847	4.1364	205.3636	206.0284	-.6648
200F1	G_1:1	181.9008	54.599	23.2625	213.2375	213.3475	-.1101
200F1	G_4:4	182.5958	80.904	23.6787	239.8213	215.9649	23.8564
200F1	G_5:5	182.4425	29.058	14.9919	196.5081	203.3902	-6.8821
200F1	G_6:6	176.4908	12.259	-10.6157	199.3657	185.0206	14.3451
200F1	G_7:7	167.6158	-38.676	-20.4364	149.3764	162.6342	-13.2578
200F1	G_8:8	159.6269	-28.407	-4.2779	135.4979	149.1313	-13.6334
200F1	G_9:9	146.9769	-2.237	-4.6034	149.3434	139.8145	9.5289
C_106		134.6853	-12.325	-16.5225	138.8825	128.1613	10.7212
C_107		121.5665	-21.587	-12.1830	112.1630	113.0949	-.9320
OF3	G_1:1	110.4665	-32.867	-.6931	78.2931	94.1104	-15.8172
OF3	G_2:2	99.6057	1.328	3.2625	97.6709	81.6252	16.0457
OF3	G_3:3	93.2940	-35.594	4.1364	53.5636	72.0219	-18.4583
OF3	G_4:4	87.0790	1.921	23.2625	65.7375	70.0124	-4.2749
OF3	G_5:5	80.9464	25.129	23.6787	82.3963	69.7644	12.6320
OF3	G_6:6	77.8879	.412	14.9919	63.3081	70.2402	-6.9321
OF3	G_7:7	77.9035	-19.483	-10.6157	69.0357	69.3678	-.3321
OF3	G_8:8	82.7285	-29.528	-20.4364	73.6364	68.8752	4.7612
OF3	G_9:9	86.3451	-29.705	-4.2779	60.9179	72.5274	-11.6096
C_118		93.5785	-22.430	-4.6034	75.7523	82.1599	-6.4076
C_119		85.1618	-12.504	-16.5225	102.1803	97.7618	4.4185
OF3	G_10:12	102.3431	-2.176	-12.1830	112.3497	114.5132	-2.1636
25F3	G_1:1	108.2347	27.265	-.6931	136.1931	128.6627	7.5304
25F3	G_2:2	112.9881	31.345	3.2625	141.0709	134.3792	6.6916
25F3	G_3:3	118.7214	25.779	4.1364	140.3636	134.8302	5.5334

Case	E3	Moving Averages	Diffrncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
25F3	144.0000	124.7181	19.282	23.2625	120.7375	131.4624	-10.7249
25F3	156.2500	130.7112	25.539	23.6787	132.5713	130.4049	2.1664
25F3	149.0000	136.7008	12.299	14.9919	134.0081	131.3880	2.6201
25F3	115.4600	142.6869	-27.227	-10.6157	126.0757	132.9517	-6.8760
25F3	122.0000	139.4203	-17.420	-20.4364	142.4364	136.3216	6.1148
25F3	128.6000	137.6981	-9.098	-4.2779	132.8779	142.1087	-9.2308
C_130	143.0667	135.2897	7.777	-4.6034	147.6701	153.7219	-6.0518
C_131	157.5333	133.6231	23.910	-16.5225	174.0558	157.3050	16.7509
25F3	172.0000	130.2689	41.731	-12.1830	184.1830	151.4135	32.7695
50F3	96.3000	127.7210	-31.421	-6.931	96.9931	131.7415	-34.7483
50F3	123.6667	127.0026	-3.336	3.2625	120.4042	118.1163	2.2879
50F3	115.6000	121.9993	-6.399	4.1364	111.4636	107.3321	4.1315
50F3	124.0000	118.7693	5.231	23.2625	100.7375	103.7355	-2.9980
50F3	116.0000	114.9502	1.050	23.6787	92.3213	101.5805	-9.2592
50F3	118.4250	110.5421	7.883	14.9919	103.4331	101.4430	1.9901
50F3	106.8400	105.5449	1.295	-10.6157	117.4557	101.1628	16.2929
50F3	61.9600	104.8740	-42.914	-20.4364	82.3964	97.2901	-14.8937
50F3	89.8400	104.2074	-14.367	-4.2779	94.1179	98.8269	-4.7091
C_142	97.2378	102.4740	-5.236	-4.6034	101.8412	104.7431	-2.9019
C_143	104.6356	101.3074	3.328	-16.5225	121.1581	110.9611	10.1969
50F3	112.0333	100.2574	11.776	-12.1830	124.2163	111.8996	12.3167
75F3	88.2500	99.1074	-10.857	-6.931	88.9431	105.7658	-16.8227
75F3	115.6667	95.7707	19.896	3.2625	112.4042	100.8200	11.5842
75F3	94.8000	97.0490	-2.249	4.1364	90.6636	93.2154	-2.5518
75F3	110.0000	97.1507	12.849	23.2625	86.7375	89.2244	-2.4869
75F3	103.4000	96.9842	6.416	23.6787	79.7213	84.4427	-4.7214
75F3	104.6250	96.5496	8.075	14.9919	89.6331	85.2941	4.3390
75F3	66.8000	95.8468	-29.047	-10.6157	77.4157	86.8939	-9.4783
75F3	77.3000	98.5760	-21.276	-20.4364	97.7364	92.0214	5.7150
75F3	91.0600	99.6871	-8.627	-4.2779	95.3379	97.1702	-1.8323
C_154	95.2400	102.2037	-6.964	-4.6034	99.8434	103.9567	-4.1133
C_155	99.4200	108.8287	-9.409	-16.5225	115.9425	110.6790	5.2635
75F3	103.6000	115.0454	-11.445	-12.1830	115.7830	116.4668	-6838
100F3	121.0000	119.6183	1.382	-6.931	121.6931	120.5474	1.1457
100F3	129.0000	121.2400	7.760	3.2625	125.7375	127.1496	-1.4121
100F3	125.0000	120.6462	4.354	4.1364	120.8636	135.8395	-14.9759
100F3	189.5000	124.2262	65.274	23.2625	166.2375	146.5920	19.6455
100F3	178.0000	129.0222	48.978	23.6787	154.3213	144.6883	9.6331
100F3	159.5000	135.0340	24.466	14.9919	144.5081	132.5297	11.9784
100F3	86.2600	142.2618	-56.002	-10.6157	96.8757	117.0539	-20.1782

Case	E3	Moving Averages	Differncs	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
100F3	70.1750	150.2201	-80.045	-20.4364	90.6114	116.0093	-25.3979
100F3	134.0200	153.4979	-19.478	-4.2779	138.2979	132.8740	5.4239
C_166	152.7911	159.8729	-7.082	-4.6034	157.3945	157.5641	-1.1695
C_167	171.5622	159.8729	11.689	-16.5225	188.0847	182.1741	5.9106
100F3	190.3333	160.9562	29.377	-12.1830	202.5163	193.3967	9.1197
125F3	216.5000	163.4562	53.044	-6.931	217.1931	196.9113	20.2818
125F3	168.3333	165.3963	2.937	3.2625	165.0709	188.1200	-23.0491
125F3	201.5000	165.7683	35.732	4.1364	197.3636	182.1358	15.2278
125F3	189.5000	167.5625	21.938	23.2625	166.2375	174.1846	-7.9471
125F3	191.0000	169.4808	21.519	23.6787	167.3213	166.7749	.5464
125F3	189.5000	171.5233	17.977	14.9919	174.5081	151.0880	23.4201
125F3	109.5400	173.6900	-64.150	-10.6157	120.1557	136.3095	-16.1538
125F3	74.6400	174.1900	-99.550	-20.4364	95.0764	133.3465	-38.2702
125F3	155.5500	176.5511	-21.001	-4.2779	159.8279	151.4684	8.3595
C_178	175.8111	174.9261	.885	-4.6034	180.4145	178.8535	1.5610
C_179	196.0722	178.8428	17.229	-16.5225	212.5947	204.2963	8.2984
125F3	216.3333	182.6136	33.720	-12.1830	228.5163	214.5493	13.9671
150F3	222.5000	183.6553	38.845	-6.931	223.1931	211.5421	11.6510
150F3	196.6667	188.5061	8.161	3.2625	193.4042	202.6755	-9.2713
150F3	182.0000	192.5711	-10.571	4.1364	177.8636	198.0710	-20.2074
150F3	236.5000	191.4586	45.041	23.2625	213.2375	200.1105	13.1270
150F3	236.2500	190.2725	45.977	23.6787	212.5713	199.3816	13.1897
150F3	202.0000	189.0128	12.987	14.9919	187.0081	188.8880	-1.8799
150F3	167.7500	187.6794	-19.929	-10.6157	178.3657	172.8750	5.4906
150F3	123.4200	193.1794	-69.759	-20.4364	143.8564	159.3828	-15.5265
150F3	142.2000	196.3461	-54.146	-4.2779	146.4779	159.4836	-13.0057
C_190	161.5778	200.4711	-38.893	-4.6034	166.1812	171.4254	-5.2442
C_191	180.9556	202.2628	-21.307	-16.5225	197.4781	198.3889	-9.9109
150F3	200.3333	205.9294	-5.596	-12.1830	212.5163	223.1641	-10.6478
175F3	288.5000	210.4711	78.029	-6.931	289.1931	242.2513	46.9418
175F3	234.6667	214.8086	19.858	3.2625	231.4042	241.6200	-10.2158
175F3	231.5000	212.1653	19.335	4.1364	237.3636	240.0154	-12.6518
175F3	258.0000	217.6653	40.335	23.2625	234.7375	238.3327	-3.5953
175F3	280.2500	222.5463	57.704	23.6787	256.5713	242.2205	14.3508
175F3	256.5000	226.8083	29.692	14.9919	241.5081	227.2636	14.2445
175F3	219.8000	230.4514	-10.651	-10.6157	230.4157	207.5095	22.9062
175F3	91.7000	227.7431	-136.043	-20.4364	112.1364	187.6064	-75.4700
175F3	208.2000	229.4375	-21.238	-4.2779	212.4779	198.9168	13.5611
C_202	220.1500	233.0833	-12.933	-4.6034	224.7534	218.3145	6.4389
C_203	232.1000	233.4167	-1.317	-16.5225	248.6225	241.8901	6.7324

Case		E3	Moving Averages	Differences	Seasonal Factors	Adjusted Series	Smoothed Trend-c.	Irreg. Compon.
200F3	G_1:1	244.0500	224.7792	19.271	-12.1830	256.2330	250.6468	5.5862
200F3	G_-3:3	256.0000	213.3625	42.637	-.6931	256.6931	256.1952	.4980

APPENDIX C: SVPD PROGRAM LISTING

```
Dim DAMAGE(365), AREA(365), struc(100, 2)
Dim DAMAGE1(361), DAMAGE2(361), ESAL(361), TOTAREA1(361), TOTAREA2(361), TOTWMR(361), TOTWE2(361), EQMR(361), EQE2(361), TOTESAL(361)
Dim EMIN(361), EMAX(361), EAV(361), EQDAMAG(361), EQDAMAG2(361)
Const pi = 3.14
```

```
Public Sub Com1_Click()
Form2.Show
Form2.ComOK.Caption = "&CALCULATE SN USING EFFECTIVE ROADBED RESILIENT MODULUS"
CHOICE = 1
```

```
Form2.FRM.R.Enabled = False
Form2.FrE2.Enabled = False
Form2.FrE1.Enabled = False
Form2.FrTRF.Enabled = False
Form2.Label5.Enabled = False
Form2.Label20.Enabled = False
```

```
End Sub
```

```
Private Sub Com2_Click()
CHOICE = 2
Form2.Show
Form2.ComOK.Caption = "&CALCULATE SN USING INTEGRAL METHOD W/CONSTANT SN"
```

```
Form2.Label2.Enabled = False
Form2.Label19.Enabled = False
Form2.FrE2.Enabled = False
Form2.FrE1.Enabled = False
```

```
End Sub
```

```
Private Sub Com3_Click()
CHOICE = 3
Form2.Show
Form2.ComOK.Caption = "&CALCULATE SN USING INTEGRAL METHOD W/VARIABLE SN"
```

```
Form2.Label19.Enabled = False
Form2.Label2.Enabled = False
Form2.Label18.Enabled = False
Form2.FrE2.Enabled = False
End Sub
```

```
Private Sub ComEQUI_Click()
CHOICE = 5
Form2.Show
Form2.ComOK.Caption = "&CALCULATE THE EQUIVALENT MODULI"
Form2.FrGEN.Enabled = False
End Sub
```

```
Private Sub ComINFO_Click()
Form1.Picture1.Cls
Form1.Picture1.FontSize = 11
Form1.Picture1.Visible = True
Form1.Picture1.Print "          How Different Methods Account for the Seasonal Variation "
Form1.Picture1.Print
```

Form1 - 2

```
Form1.Picture1.Print
Form1.Picture1.Print "• Effective Roadbed Resilient Modulus method accounts for "
Form1.Picture1.Print "the seasonal variation of the subgrade resilient modulus by taking the "
Form1.Picture1.Print "weighted average (based on the damage) of the resilient moduli of "
Form1.Picture1.Print "the seasons. It assumes that traffic volume (the number of ESAL's) is"
Form1.Picture1.Print "constant in all seasons. It also assumes that the structural number"
Form1.Picture1.Print "of the pavement stays constant throughout the year."
Form1.Picture1.Print
Form1.Picture1.Print "• Integral Method w/ Constant Structural Number accounts for seasonal"
Form1.Picture1.Print "variation by calculating the expected traffic and subgrade resilient"
Form1.Picture1.Print "modulus in each season (the year is divided into a large finite "
Form1.Picture1.Print "number of seasons, say days) and numerically integrating the damage"
Form1.Picture1.Print "values. It assumes that the pavement structural number remains constant"
Form1.Picture1.Print
Form1.Picture1.Print "• Integral Method w/ Variable Structural Number is similar in concept"
Form1.Picture1.Print "to the above method but assumes that as the mean monthly temperature"
Form1.Picture1.Print "changes, the strength of the surface layer changes and ultimately "
Form1.Picture1.Print "affects the structural number. Therefore, SN should be variable."
Form1.Picture1.Print
Form1.Picture1.Print "• Mechanistic-Empirical Method takes into account the variations in "
Form1.Picture1.Print "subgrade resilient modulus, the AC layer elastic modulus and traffic"
Form1.Picture1.Print
Form1.Picture1.Print "• The Equivalent Pavement Layer Moduli are estimates for the seasonally"
Form1.Picture1.Print "adjusted moduli, based on the expected seasonal and long term traffic"
Form1.Picture1.Print "and layer moduli variation"

Form1.Picture1.Print "                                     click anywhere to close"
End Sub
```

```
Private Sub Command2_Click()
MsgBox "Welcome to SVPD, A Pavement Design Program, to simulate the Seasonal Variation of paveme
nt structural properties and incorporate such variation in the design of flexible pavements. The
program is written by Hesham Ali as part of Ph.D. work under Dr. Neville Parker's Supervision,
1996. For more information about available options, please select General Information."
End Sub
```

```
Private Sub ComMECH_Click()
CHOICE = 4
Form2.Show
Form2.ComOK.Caption = "&CALCULATE EXPECTED PERFORMANCE LIFE"
Form2.PrGEN.Enabled = False
Form2.PrE2.Enabled = False
Form2.Label18.Enabled = False
Form2.Label19.Enabled = False
End Sub
```

```
Private Sub ComQT_Click()
End
End Sub
```

```
Private Sub Picture1_Click()
Form1.Picture1.Visible = False
End Sub
```



```
Form2 - 1
```

```
Dim DAMAGE(365), AREA(365), struc(100, 2), INP$(7), ETC(4), ECC(4)
Dim DAMAGE1(361), DAMAGE2(361), ESAL(361), TOTAREA1(361), TOTAREA2(361), TOTWMR(361), TOTWE2(361),
EQMR(361), EQE2(361), TOTESAL(361)
Dim EMIN(361), EMAX(361), EAV(361), EQDAMAG(361), EQDAMAG2(361)
```

```
Private Sub Command1_Click()
Form1.Show
End Sub
```

```
Private Sub ComOK_Click()
Form1.PICTURE2.Cls
Form1.PICTURE3.Cls
Form2.FRM1.Enabled = True
Form2.FrE2.Enabled = True
Form2.FrE1.Enabled = True
Form2.FrTRF.Enabled = True
Form2.FrGEN.Enabled = True
```

```
Form2.Label18.Enabled = True
Form2.Label19.Enabled = True
Form2.Label20.Enabled = True
Form2.Label12.Enabled = True
Form2.Label15.Enabled = True
```

```
Form1.Show
```

```
Form1.MousePointer = 11
Select Case CHOICE
Case 1
1 PSI = Val(Form2.TxSL.Text)
ESAL1 = Val(Form2.TxTESAL.Text)
Z = Val(Form2.TxR.Text)
S = Val(Form2.TxS.Text)
AVMR = Val(Form2.TxMRAV.Text)
AMPMR = Val(Form2.TxMRAMP.Text)
SHFMR = Val(Form2.TxMRSHF.Text)
```

```
***** PROCEDURE TO CHECK MISSING DATA
```

```
If Form2.TxSL.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxTESAL.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxR.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxS.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxMRAV.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxMRAMP.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
```

```

Form2 . 2

GoTo 200
End If
If Form2.TxMRSHF.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If

totdamage = 0
For I = 1 To 12
DAMAGE(I) = 1.18 * 10 ^ 8 * (AVMR * AMPMR * Sin(3.14 / 6 * I + SHFMR)) ^ -2.32
totdamage = totdamage + DAMAGE(I)
Next I
avdamage = totdamage / 12
Mr = (1.18 * 10 ^ 8 / avdamage) ^ (1 / 2.32)
C = ESAL1 / 10 ^ (S * Z - 8.27) / Mr ^ 2.32

SNR = 10
K = 1
Do
SN = SNR

B = 0.4 + 1094 / (SN + 1) ^ 5.19

SNR = -1 + (C / (PSI / 2.7) ^ (1 / B)) ^ (1 / 9.36)
K = K + 1
Form1.PICTURE2.Print SNR
Loop Until (Abs(SNR - SN) <= 0.0000001) Or (K = 100)

If K = 100 Then
Form1.PICTURE2.Print "DID NOT CONVERGE: K = "; K
Form1.PICTURE2.Print "FINEL VALUE= "; SNR
Else: Form1.PICTURE2.Print "REQUIRED SN = "; SNR
End If

Case 2
Form1.PICTURE2.Cls
PSI = Val(Form2.TxSL.Text)
Z = Val(Form2.TxR.Text)
S = Val(Form2.TxS.Text)
N = Val(Form2.TXN.Text)
AVMR = Val(Form2.TxMRAV.Text)
AMPMR = Val(Form2.TxMRAMP.Text)
SHFMR = Val(Form2.TxMRSHF.Text)
R = Val(Form2.TxTGR.Text)
AVTR = Val(Form2.TxTRAV.Text)
AMPTR = Val(Form2.TxTRAMP.Text)
SHFTR = Val(Form2.TxTRSHF.Text)

..... PROCEDURE TO CHECK MISSING DATA
If (Form2.TxSL.Text = "") Or (Form2.TxTGR.Text = "") Or (Form2.TxTRAV.Text = "") Or (Form2.TxTRAMP.Text = "") Or (Form2.TxTRSHF.Text = "") Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TXN.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxR.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING PLEASE ENTER MISSING DATA", 48
GoTo 200

```

```

Form2 - 3

End If
If Form2.TxS.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxMRAV.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxMRAMP.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxMRSHF.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If

For I = 0 To 360
DAMAGE(I) = (AVTR + AMPTR * Sin(3.14 / 6 * I / 30 - SHFTR)) / 360 / (AVMR + AMPMR * Sin(3.14 /
6 * I / 30 + SHFMR)) ^ 2.32
Next I
TOTAREA = 0
For I = 1 To 360
AREA(I) = (DAMAGE(I) + DAMAGE(I - 1)) / 2
TOTAREA = TOTAREA + AREA(I)
Next I
X = N * (1 + R) ^ (N - 1) * TOTAREA / 10 ^ (Z * S - 8.27)
SNR = 10
K = 1
Do
SN = SNR
B = 0.4 + 1094 / (SN + 1) ^ 5.19

SNR = -1 + (X / (PSI / 2.7) ^ (1 / B)) ^ (1 / 9.36)
K = K + 1
Form1.PICTURE2.Print SNR
Loop Until (Abs(SNR - SN) <= 0.0001) Or (K = 100)

If K = 100 Then
Form1.PICTURE2.Print "DID NOT CONVERGE; K = "; K
Form1.PICTURE2.Print "FINEL VALUE= "; SNR
Else: Form1.PICTURE2.Print "REQUIRED SN = "; SNR
End If
Case 3
Form1.PICTURE2.Cls

'..... PROCEDURE TO CHECK MISSING DATA
If (Form2.TxSL.Text = "") Or (Form2.TxTGR.Text = "") Or (Form2.TxTRAV.Text = "") Or (Form2.TxTRA
MP.Text = "") Or (Form2.TxTRSHF.Text = "") Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TXN.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxR.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If

```

```

Form2 . 4

If Form2.TxS.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxmRAV.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxmRAMP.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If (Form2.TxmRSHF.Text = "") Or (Form2.TxElAV.Text = "") Or (Form2.TxElAMP.Text = "") Or (Form2.
TxElSHF.Text = "") Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If

MINF = 1000000000
start = 7
PSI = Val(Form2.TxSL.Text)
Z = Val(Form2.TxR.Text)
S = Val(Form2.TxS.Text)
N = Val(Form2.TXN.Text)
R = Val(Form2.TxTGR.Text)
AVMR = Val(Form2.TxmRAV.Text)
AMPMR = Val(Form2.TxmRAMP.Text)
SHFMR = Val(Form2.TxmRSHF.Text)

AVTR = Val(Form2.TxTRAV.Text)
AMPTR = Val(Form2.TxTRAMP.Text)
SHFTR = Val(Form2.TxTRSHF.Text)

A3 = Val(Form2.TxElAV.Text)
B3 = Val(Form2.TxElAMP.Text)
C3 = Val(Form2.TxElSHF.Text)

For K = start To 100
SNP = K / 10
struc(K, 1) = SNP
For I = 0 To 360

E = A3 + B3 * Sin(3.14 / 6 * I / 30 + C3)
EMAX1 = A3 + B3
EMIN1 = A3 - B3

If EMIN1 <= 0 Then
48 MsgBox "NEGATIVE VALUES ENCOUNTERED! THE AMPLITUDE MAY NOT BE GREATER THAN THE AVERAGE",
GoTo 200
End If
AMAX = -1.821 + 0.17372 * Log(EMAX1)
AMIN = -1.821 + 0.17372 * Log(EMIN1)
If AMAX = AMIN Then
SNAMP = 0
Else
SNAMP = (AMAX - AMIN) * 3 / SNP
End If
SN = SNP * (1 + SNAMP * Sin(3.14 / 6 * I / 30 + C3))
If SN <= 0 Then

```

Form2 . 5

```

MsgBox "NEGATIVE VALUES ENCOUNTERED! THE AMPLITUDE MAY NOT BE GREATER THAN THE AVERAGE". 48
GoTo 200
End If

B = 0.4 + 1094 / (SN + 1) ^ 5.19
A = (SN + 1) ^ 9.36 * (PSI / 2.7) ^ (1 / B)
DAMAGE(I) = (AVTR + AMPTR * Sin(3.14 / 6 * I / 30 + SHFTR)) / (AVMR + AMPMR * Sin(3.14 / 6 *
I / 30 + SHFMR)) ^ 2.32
DAMAGE(I) = DAMAGE(I) / A
Next I
TOTAREA = 0
For I = 1 To 360
AREA(I) = (DAMAGE(I)) / 360
TOTAREA = TOTAREA + AREA(I)
Next I
Form1.PICTURE2.Cls
F = ((N * (1 + R) ^ (N - 1) * TOTAREA / 10 ^ (Z * S - 8.27)) - 1) ^ 2
Form1.PICTURE2.Print "Structural Number = "; SNP, "objective function = "; F
struc(K, 2) = F
If struc(K, 2) < MINF Then
MINF = struc(K, 2)
MININD = K
End If
If struc(K, 2) > struc(K - 1, 2) And K <> start Then
Form1.PICTURE2.Print "Search is over, solution is found"
GoTo 55
End If
Next K
55 Form1.PICTURE2.Print "REQUIRED SN= "; struc(MININD, 1)
Form1.PICTURE2.Print "OBJECTIVE FUNCTION = "; MINF
ANS$ = InputBox("Do you want to draw the Response Surface? Y/N")
If UCase$(ANS$) = "Y" Then
Form1.PICTURE3.Cls
Form1.PICTURE3.Scale (-2, 12000)-(12, -1000)
Form1.PICTURE3.Line (0, 10000)-(10, 0), , B
Form1.PICTURE3.CurrentX = 5
Form1.PICTURE3.CurrentY = -300
Form1.PICTURE3.Print "SN"

Form1.PICTURE3.CurrentX = -1
Form1.PICTURE3.CurrentY = -300
Form1.PICTURE3.Print "0"

Form1.PICTURE3.CurrentX = 10
Form1.PICTURE3.CurrentY = -300
Form1.PICTURE3.Print "10"

Form1.PICTURE3.CurrentX = -1.85
Form1.PICTURE3.CurrentY = 11000
Form1.PICTURE3.Print "10000"

Form1.PICTURE3.CurrentX = -1.85
Form1.PICTURE3.CurrentY = 8000
Form1.PICTURE3.Print "Obj."

Form1.PICTURE3.CurrentX = -1.85
Form1.PICTURE3.CurrentY = 7000
Form1.PICTURE3.Print "Func."

```

```

Form2 - 6

    For K = 10 To 100
        If struc(K, 2) <= 10000 Then Form1 Picture3 Circle (struc(K, 1), struc(K, 2)), 0.05, 5
    Next K
End If

Case 4
    ***** Program to calculate damage function due to fatigue

    H1 = Val(Form1.Text1.Text)
    H2 = Val(Form1.Text2.Text)
    E2 = Val(Form1.Text3.Text)
    AVMR = Val(Form2.TxMRAV.Text)
    AMPMR = Val(Form2.TxMRAMP.Text)
    SHFMR = Val(Form2.TxMRSHF.Text)

    AVTR = Val(Form2.TxTRAV.Text)
    AMPTR = Val(Form2.TxTRAMP.Text)
    SHPTR = Val(Form2.TxTRSHF.Text)

    A3 = Val(Form2.TxElAV.Text)
    B3 = Val(Form2.TxElAMP.Text)
    C3 = Val(Form2.TxElSHF.Text)

    If Form2.TxMRAV.Text = "" Then
        MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
        GoTo 200
    End If
    If Form2.TxMRAMP.Text = "" Then
        MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
        GoTo 200
    End If
    If (Form2.TxMRSHF.Text = "") Or (Form2.TxElAV.Text = "") Or (Form2.TxElAMP.Text = "") Or (Form2.
    TxElSHF.Text = "") Then
        MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
        GoTo 200
    End If
    If Form2.TxTRAV.Text = "" Then
        MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
        GoTo 200
    End If
    If Form2.TxMRAMP.Text = "" Then
        MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
        GoTo 200
    End If
    If (Form2.TxTRSHF.Text = "") Or (Form1.Text1.Text = "") Or (Form1.Text2.Text = "") Or (Form1 Tex
    t3.Text = "") Then
        MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
        GoTo 200
    End If

    For I = 1 To 24
        E1 = A3 + B3 * Sin(3.14 * I / 6 / 2 + C3)
        Mr = AVMR + AMPMR * Sin(3.14 * I / 6 / 2 + SHFMR)
        ESAL(I) = (AVTR + AMPTR * Sin(3.14 * I / 6 / 2 + SHPTR)) / 24

    Open "C:\SVPD\ALI.DAT" For Output As #1
    Print #1, "CALCULATING STRAINS"
    Print #1, "9000. 85. 0."
    Print #1, "3"
    Print #1, E1; Spc(3); ".35"; Spc(3); H1
    Print #1, E2; Spc(3); ".35"; Spc(3); H2

```

```

Form2 = 7

Print #1, Mr; Spc(3); ".4 0.0"
Print #1, "1 0.0"
Print #1, "3 0.0"; Spc(3); H1; Spc(3); (H1 + H2)
Close #1
Dim hInst As Integer
hInst = Shell("C:\SVPD\CHEVLAY2 C:\SVPD\ALI.DAT C:\SVPD\ALI.OUT", 6)

Do While IsInst(hInst)
    DoEvents
    Loop
Open "C:\SVPD\ALI.OUT" For Input As #2
For j = 1 To 25
Line Input #2, trash$
Next j
Line Input #2, DAT1$
Line Input #2, trash$
Line Input #2, trash$
Line Input #2, DAT2$
ET = Val(Mid$(DAT1$, 104, 8)) / 1000000
EC = Val(Mid$(DAT2$, 82, 9)) * -1 / 1000000
Close #2
DAMAGE1(I) = ET ^ (3.291) * E1 ^ (0.854) / 0.0796
DAMAGE2(I) = 10 ^ 9 * EC ^ (4.477) / 1.365

Next I
TOAREA1 = 0
TOAREA2 = 0
For I = 1 To 24
AREA1 = (ESAL(I) * DAMAGE1(I))
AREA2 = (ESAL(I) * DAMAGE2(I))
TOAREA1 = TOAREA1 + AREA1
TOAREA2 = TOAREA2 + AREA2
Next I
'..... NEWTON'S ALGORITHM
n1 = 30
k1 = 0
Do
N = n1
n1 = 1 / (1 + R) ^ (N - 1) / TOAREA1

If n1 >= 1000 Then
Form1.PICTURE2.Print "PERFORMANCE LIFE BASED ON FATIGUE IS > 1000 YEARS!"
GoTo 40
End If
k1 = k1 + 1
Loop Until (Abs(n1 - N) <= 0.001) Or (k1 = 1000)
If k1 = 1000 Then
Form1.PICTURE2.Print "SOLUTION BASED ON FATIGUE WAS NOT ACHIEVED IN 1000 ITERATIONS!"
Form1.PICTURE2.Print "TRY DIFFERENT LAYER THICKNESS"
GoTo 40
End If
Form1.PICTURE2.Print "PERFORMANCE LIFE BASED ON FATIGUE IS: ", Format(n1, "##0 #"); " YEARS"
'..... NEWTON'S ALGORITHM
40 N2 = 30
k2 = 0
Do
N = N2
N2 = 1 / (1 + R) ^ (N - 1) / TOAREA2
k2 = k2 + 1
If N2 >= 1000 Then
Form1.PICTURE2.Print "PERFORMANCE LIFE BASED ON PERMANENT DEFORMATION IS > 1000 YEARS!"

```

```

Form2 - 8

    GoTo 200
End If
Loop Until (Abs(N2 - N) <= 0.001) Or (k2 = 1000)
If k2 = 1000 Then
    Form1.PICTURE2.Print "SOLUTION BASED ON PERMANENT DEFORMATION WAS NOT ACHIEVED IN 1000 ITERATI
ONS!"
    Form1.PICTURE2.Print "TRY DIFFERENT LAYER THICKNESSES"
    GoTo 200
End If

Form1.PICTURE2.Print "PERFORMANCE LIFE BASED ON PERMANENT DEFORMATION IS: "; Format(N2, "##0.##")
; " YEARS"
Close #1

Case 5
..... Program to calculate the equivalent layer moduli based on damage function due to f
atigue
..... IT IS ASSUMED THAT TRAFFIC AND THE ELASTIC MODULUS ARE GROWING (OR DECAYING) OVER Y
EARS
' FOR BOTH EC AND ET, THE EQUIVALENT MODULI ARE CALCULATED BASED ON LOG LOG REGRESSION
'This program will calculate the equivalent moduli for every year and for the overall life

N = 3 ' INPUT "Enter the number of pavement layers"; N

H1 = Val(Form1.Text6.Text)
H2 = Val(Form1.Text5.Text)

AVMR = Val(Form2.TxMRV.Text)
AMPVR = Val(Form2.TxMRAMP.Text)
SHFVR = Val(Form2.TxMRSHF.Text)

AVTR = Val(Form2.TxTRV.Text)
AMPTR = Val(Form2.TxTRAMP.Text)
SHFTR = Val(Form2.TxTRSHF.Text)
R = Val(Form2.TxTREXPO.Text)

A1 = Val(Form2.TxE1AV.Text)
B1 = Val(Form2.TxE1AMP.Text)
C1 = Val(Form2.TxE1SHF.Text)
DR = Val(Form2.TxE1D.Text)

A2 = Val(Form2.TxE2AV.Text)
B2 = Val(Form2.TxE2AMP.Text)
C2 = Val(Form2.TxE2SHF.Text)

If (Form2.TxMRV.Text = "") Or (Form2.TxE1D.Text = "") Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxMRAMP.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If (Form2.TxMRSHF.Text = "") Or (Form2.TxE1AV.Text = "") Or (Form2.TxE1AMP.Text = "") Or (Form2
TxE1SHF.Text = "") Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If Form2.TxTRV.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING PLEASE ENTER MISSING DATA", 48

```


Form2 - 9

```

GoTo 200
End If
If Form2.TxMRAMP.Text = "" Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If
If (Form2.TxTRSHF.Text = "") Or (Form1.Text5.Text = "") Or (Form1.Text6.Text = "") Or (Form2.TxT
REXPO.Text = "") Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If

If (Form2.TxE2AV.Text = "") Or (Form2.TxE2AMP.Text = "") Or (Form2.TxE2SHF.Text = "") Then
MsgBox "AT LEAST ONE REQUIRED VARIABLE IS MISSING. PLEASE ENTER MISSING DATA", 48
GoTo 200
End If

Form1.Picture1.Cls
Form1.Picture1.Visible = True
Form1.Picture1.FontSize = 9
I = 0
Do
I = I + 1
E = (2.718) ^ (-1 * DR * I / 12) * (A1 + B1 * Sin(3.14 * I / 6 + C3))

Mr = AVMR + AMPMR * Sin(3.14 * I / 6 + SHFMR)
E2 = A2 + B2 * Sin(3.14 * I / 6 + C2)

'If I > 12 Then
ESAL(I) = (1 + R) ^ (I / 12 - 1) * (AVTR + AMPTR * Sin(3.14 * I / 6 + SHFTR)) / 12
'Else
'ESAL(I) = (AVTR + AMPTR * Sin(3.14 * I / 6 + SHFTR)) / 12
'End If
WMR = Mr * ESAL(I)
WE2 = E2 * ESAL(I)
Open "C:\SVPD\ALI.DAT" For Output As #1
Print #1, "CALCULATING STRAINS"
Print #1, "9000. 85. 0."
Print #1, "3"
Print #1, E; Spc(3); ".35"; Spc(3); H1
Print #1, E2; Spc(3); ".35"; Spc(3); H2
Print #1, Mr; Spc(3); ".4 0.0"
Print #1, "1 0.0"
Print #1, "3 0.0"; Spc(3); H1; Spc(3); (H1 + H2)
Close #1

hInst = Shell("C:\SVPD\CHEVLAY2 C:\SVPD\ALI.DAT C:\SVPD\ALI.OUT", 6)

Do While IsInst(hInst)
DoEvents
Loop
Open "C:\SVPD\ALI.OUT" For Input As #2
For j = 1 To 25
Line Input #2, trash$
Next j
Line Input #2, DAT1$
Line Input #2, trash$
Line Input #2, trash$
Line Input #2, DAT2$
ET = Val(Mid$(DAT1$, 104, 8)) / 1000000

```

```

Form2 = 10

If ET < 0 Then
ET = 0
End If
EC = Val(Mid$(DAT2$, 82, 9)) * -1 / 1000000
If EC < 0 Then
EC = 0
End If
Close #2
DAMAGE1(I) = ET ^ (3.291) * E ^ (0.854) / 0.0796
DAMAGE2(I) = 10 ^ 9 * EC ^ (4.477) / 1.365

AREA1 = (ESAL(I) * DAMAGE1(I))
AREA2 = (ESAL(I) * DAMAGE2(I))
ESA = (ESAL(I))
TOTAREA1(I) = TOTAREA1(I - 1) + AREA1
TOTAREA2(I) = TOTAREA2(I - 1) + AREA2
TOTWMR(I) = TOTWMR(I - 1) + WMR
TOTWE2(I) = TOTWE2(I - 1) + WE2
TOTESAL(I) = TOTESAL(I - 1) + ESA
Loop Until ((TOTAREA1(I) - 1) > 0) Or ((TOTAREA2(I) - 1) > 0) Or (I >= 360)
MONTHS = I
If I >= 360 Then
Form1.Picture1.Print "PAVEMENT LIFE IS >30 YEARS"
End If
If (TOTAREA1(I) - 1) > 0 Then
Form1.Picture1.Print "FAILURE WILL BE DUE TO FATIGUE AFTER "; I / 12; " YEARS"
End If
If (TOTAREA2(I) - 1) > 0 Then
Form1.Picture1.Print "FAILURE WILL BE DUE TO PERMANENT DEFORMATION AFTER "; I / 12; " YEARS"
End If
If MONTHS < 6 Then
Form1.Picture1.Print "THIS STRUCTURE WILL NOT LAST LONG ENOUGH TO WORRY ABOUT ITS EQUIVALENT MOD  
ULI!!"
Form1.Picture1.Print "TRY INCREASING THE LAYER THICKNESSES."
GoTo 200
End If
For K = 12 To MONTHS Step 12
EQMR(K) = (TOTWMR(K) - TOTWMR(K - 12)) / (TOTESAL(K) - TOTESAL(K - 12))
EQE2(K) = (TOTWE2(K) - TOTWE2(K - 12)) / (TOTESAL(K) - TOTESAL(K - 12))
EQDAMAG(K) = (TOTAREA1(K) - TOTAREA1(K - 12)) / (TOTESAL(K) - TOTESAL(K - 12)) * 0.0796 'RIGHT S  
IDE OF EQUATION 3
EQDAMAG2(K) = (TOTAREA2(K) - TOTAREA2(K - 12)) / (TOTESAL(K) - TOTESAL(K - 12)) * 1.365 / 10 ^ 9
EMAX(K) = (A1 + B1) * (2.718) ^ (-1 * DR * (K / 12 - 1))
EMIN(K) = (A1 - B1) * (2.718) ^ (-1 * DR * K / 12)
EAV(K) = (EMAX(K) + EMIN(K)) / 2

' TO GET THE LEFT SIDE, WE NEED TO RUN CHEVRON THREE TIMES AND INTERPOLATE

Open "C:\SVPD\ALI1.DAT" For Output As #4
Print " CREATING A CHEVRON INPUT FILE"
Print #4, "CALCULATING STRAINS"
Print #4, "9000. "; "0. 5.91 " 'Change this block to reflect "
Print #4, N 'Layer Structure
Print #4, EMAX(K); Spc(3); " 35", Spc(3); H1
Print #4, EQE2(K); Spc(3); " 35"; Spc(3); H2
Print #4, EQMR(K); " 0.4 0 0"
Print #4, "1 0.0"
Print #4, "2 ", H1, H1 + H2
Print #4, "CALCULATING STRAINS"

```

Form2 - 11

```

Print #4, "9000. "; "0. 5.91 " 'Change this block to reflect .."
Print #4, N 'Layer Structure
Print #4, EAV(K); Spc(3); ".35"; Spc(3); H1
Print #4, EQE2(K); Spc(3); ".35"; Spc(3); H2
Print #4, EQMR(K); " .4 0"
Print #4, "1 0.0"
Print #4, "2 ", H1, H1 + H2
Print #4, "CALCULATING STRAINS"
Print #4, "9000. "; "0. 5.91 " 'Change this block to reflect .."
Print #4, N 'Layer Structure
Print #4, EMIN(K); Spc(3); ".35"; Spc(3); H1
Print #4, EQE2(K); Spc(3); ".35"; Spc(3); H2
Print #4, EQMR(K); " .4 0"
Print #4, "1 0.0"
Print #4, "2 ", H1, H1 + H2

```

Close #4

hInst = Shell("C:\SVPD\CHEVLAY2 C:\SVPD\ALI1.DAT C:\SVPD\ALI1.OUT", 6)

```

Do While IsInst(hInst)
    DoEvents
Loop

```

```

Open "C:\SVPD\ALI1.OUT" For Input As #5
For I = 1 To 24
Line Input #5, trash$
Next I
Line Input #5, INP$(1)

```

```

Line Input #5, trash$
Line Input #5, trash$

```

```

Line Input #5, INP$(2)
For I = 29 To 58
Line Input #5, trash$
Next I
Line Input #5, INP$(3)
Line Input #5, trash$
Line Input #5, trash$

```

```

Line Input #5, INP$(4)
For I = 63 To 92
Line Input #5, trash$
Next I
Line Input #5, INP$(5)
Line Input #5, trash$
Line Input #5, trash$

```

```

Line Input #5, INP$(6)

```

```

ETC(1) = Val(Mid$(INP$(1), 104, 8)) / 1000000
ECC(1) = Val(Mid$(INP$(2), 83, 8)) / -1000000
ETC(2) = Val(Mid$(INP$(3), 104, 8)) / 1000000
ECC(2) = Val(Mid$(INP$(4), 83, 8)) / -1000000
ETC(3) = Val(Mid$(INP$(5), 104, 8)) / 1000000
ECC(3) = Val(Mid$(INP$(6), 83, 8)) / -1000000
For I = 1 To 3
If ECC(I) < 0 Then
ECC(I) = 10 ^ (-19)

```

Form2 - 12

End If
Next I

Close #5

.....LOG LOG REGRESSION

If (TOTAREA1(MONTHS) - 1) > 0 Then

X1 = Log(ETC(1) ^ (3.291) * EMAX(K) ^ (0.854))

X2 = Log(ETC(2) ^ (3.291) * EAV(K) ^ (0.854))

X3 = Log(ETC(3) ^ (3.291) * EMIN(K) ^ (0.854))

SigmaY = Log(EMAX(K)) + Log(EMIN(K)) + Log(EAV(K))

SigmaX = X1 + X2 + X3

SigmaXsq = (X1) ^ 2 + (X2) ^ 2 + (X3) ^ 2

SigmaXY = X1 * Log(EMAX(K)) + X2 * Log(EMIN(K)) + X3 * Log(EAV(K))

End If

If (TOTAREA2(MONTHS) - 1) > 0 Then

X1 = Log(ECC(1) ^ (4.477))

X2 = Log(ECC(2) ^ (4.477))

X3 = Log(ECC(3) ^ (4.477))

SigmaY = Log(EMAX(K)) + Log(EMIN(K)) + Log(EAV(K))

SigmaX = X1 + X2 + X3

SigmaXsq = (X1) ^ 2 + (X2) ^ 2 + (X3) ^ 2

SigmaXY = X1 * Log(EMAX(K)) + X2 * Log(EMIN(K)) + X3 * Log(EAV(K))

EQDAMAG(K) = EQDAMAG2(K)

End If

B = (3 * SigmaXY - SigmaX * SigmaY) / (3 * SigmaXsq - (SigmaX ^ 2))

A = (SigmaY - B * SigmaX) / 3

EEQ = 2.718 ^ A * EQDAMAG(K) ^ B

Form1.Picture1.Print "FOR THE YEAR # "; Format(K / 12, "##0.##"); ": THE EQ. Mr, E-BASE AND E-AC
= "; Format(EQMR(K), "#####.##"); Spc(2); Format(EQE2(K), "#####.##"); Spc(2); Format(EEQ, "###
#####.##"); " PSI"

Next K

.....calculate the equivalent values based on the whole pavement 1:
fe

K = MONTHS

EQMR(K) = TOTWMR(K) / TOTESAL(K)

EQE2(K) = TOTWE2(K) / TOTESAL(K)

EQDAMAG(K) = TOTAREA1(K) / TOTESAL(K) * 0.0796 'RIGHT SIDE OF EQUATION 3

EQDAMAG2(K) = TOTAREA2(K) / TOTESAL(K) * 1.365 / 10 ^ 9

EMAX(K) = (A1 + B1)

EMIN(K) = (A1 - B1) * (2.718) ^ (-1 * DR * K / 12)

EAV(K) = (EMAX(K) + EMIN(K)) / 2

' TO GET THE LEFT SIDE, WE NEED TO RUN CHEVRON THREE TIMES AND INTERPOLATE

Open "C:\SVPD\ALI1.DAT" For Output As #4

Print #4, "CALCULATING STRAINS"

Print #4, "9000 "; "0. 5.91 " 'Change this block to reflect .."

Print #4, N 'Layer Structure

Print #4, EMAX(K); Spc(3); ".35"; Spc(3); H1

Print #4, EQE2(K); Spc(3); ".35"; Spc(3); H2

Print #4, EQMR(K), " 0.4 0.0"

Print #4, "1 0 0"

Print #4, "2 ", H1, H1 + H2

Print #4, "CALCULATING STRAINS"

Print #4, "9000 "; "0. 5.91 " 'Change this block to reflect .."

Print #4, N 'Layer Structure

Print #4, EAV(K); Spc(3); ".35"; Spc(3); H1

```

Form2 - 13

Print #4, EQE2(K); Spc(3); ".35"; Spc(3); H2
Print #4, EQMR(K); " .4    0"
Print #4, "1  0.0"
Print #4, "2 ", H1, H1 + H2
Print #4, "CALCULATING STRAINS"
Print #4, "9000.    "; "0. 5.91 "
Print #4, N
Print #4, EMIN(K); Spc(3); ".35"; Spc(3); H1
Print #4, EQE2(K); Spc(3); ".35"; Spc(3); H2
Print #4, EQMR(K); " .4    0"
Print #4, "1  0.0"
Print #4, "2 ", H1, H1 + H2

Close #4

hInst = Shell("C:\SVPD\CHEVLAY2 C:\SVPD\ALI1.DAT C:\SVPD\ALI1.OUT", 6)

    Do While IsInst(hInst)
        DoEvents
    Loop

Open "C:\SVPD\ALI1.OUT" For Input As #5
For I = 1 To 24
Line Input #5, trash$
Next I
Line Input #5, INP$(1)

Line Input #5, trash$
Line Input #5, trash$

Line Input #5, INP$(2)
For I = 29 To 58
Line Input #5, trash$
Next I
Line Input #5, INP$(3)
Line Input #5, trash$
Line Input #5, trash$

Line Input #5, INP$(4)
For I = 63 To 92
Line Input #5, trash$
Next I
Line Input #5, INP$(5)
Line Input #5, trash$
Line Input #5, trash$

Line Input #5, INP$(6)

ETC(1) = Val(Mid$(INP$(1), 104, 8)) / 1000000
ECC(1) = Val(Mid$(INP$(2), 83, 8)) / -1000000
ETC(2) = Val(Mid$(INP$(3), 104, 8)) / 1000000
ECC(2) = Val(Mid$(INP$(4), 83, 8)) / -1000000
ETC(3) = Val(Mid$(INP$(5), 104, 8)) / 1000000
ECC(3) = Val(Mid$(INP$(6), 83, 8)) / -1000000
For I = 1 To 3
If ECC(I) <= 0 Then
ECC(I) = 1E-19
End If
Next I

```

Form2 - 14

Close #5

.....LOG LOG REGRESSION

If (TOTAREA1(MONTHS) - 1) > 0 Then

X1 = Log(ETC(1) ^ (3.291) * EMAX(K) ^ (0.854))

X2 = Log(ETC(2) ^ (3.291) * EAV(K) ^ (0.854))

X3 = Log(ETC(3) ^ (3.291) * EMIN(K) ^ (0.854))

SigmaY = Log(EMAX(K)) + Log(EMIN(K)) + Log(EAV(K))

SigmaX = X1 + X2 + X3

SigmaXsq = (X1) ^ 2 + (X2) ^ 2 + (X3) ^ 2

SigmaXY = X1 * Log(EMAX(K)) + X2 * Log(EMIN(K)) + X3 * Log(EAV(K))

End If

If (TOTAREA2(MONTHS) - 1) > 0 Then

X1 = Log(ECC(1) ^ (4.477))

X2 = Log(ECC(2) ^ (4.477))

X3 = Log(ECC(3) ^ (4.477))

SigmaY = Log(EMAX(K)) + Log(EMIN(K)) + Log(EAV(K))

SigmaX = X1 + X2 + X3

SigmaXsq = (X1) ^ 2 + (X2) ^ 2 + (X3) ^ 2

SigmaXY = X1 * Log(EMAX(K)) + X2 * Log(EMIN(K)) + X3 * Log(EAV(K))

EQDAMAG(K) = EQDAMAG2(K)

End If

B = (3 * SigmaXY - SigmaX * SigmaY) / (3 * SigmaXsq - (SigmaX ^ 2))

A = (SigmaY - B * SigmaX) / 3

EEQ = 2.718 ^ A * EQDAMAG(K) ^ B

Form1.Picture1.Print

Form1.Picture1.Print "BASED ON THE WHOLE "; Format(K / 12, "##0.##"); " YEARS, THE EQ. Mr. E-BASE
AND E-AC = "; Format(EQMR(K), "#####.##"); Spc(2); Format(EQE2(K), "#####.##"); Spc(2); Forma
t(EEQ, "#####.##"); " PSI"

"AND EQ. AC MODULUS = "; Format(EEQ, "#####.##"); " PSI"

200 End Select

Form1.MousePointer = 0

For I = 1 To 10

Beep

Next

End Sub

APPENDIX D: DATA BASE FOR SVPD SENSITIVITY ANALYSIS (first 300 cases of 13,700)

data file: SVPD40.STA [13727 cases with 14 variables]

VARIABLE SPECIFICATIONS:

No	Name	Format	MD Code	Long Label
1	TOT_ESAL	8.1	-9999	= v1/1000000 ;TOTAL TRAFFIC IN 20 Y
2	MR_AV	8.0	-9999	AVERAGE VALUE OF THE SUBGRADE RESIL
3	MR_AMP	8.0	-9999	AMPLITUDE OF THE SBGRADE RESILIENT
4	MR_SHFT	8.3	-9999	=v4/pi ;SHIFT FACTOR OF THE SUBGRAD
5	TRAF_AMP	8.0	-9999	= V5/1000 ;AMPLITUDE OF THE TRAFFIC
6	TRAF_SHF	8.3	-9999	= v6/pi ;SHIFT FACTOR OF TRAFFIC
7	E1_AV	8.0	-9999	= v7/1000 ;AVERAGE VALUE OF THE ELA
8	E1_AMP	8.0	-9999	= v8/1000 ;AMPLITUDE OF THE ELASTIC
9	E1_SHFT	8.3	-9999	= v9/pi ;SHIFT ANGLE OF THE ELASTIC
10	SN_ASHTO	8.3	-9999	REQUIRED SN BASED ON AAHSTO
11	SN_SVPD	8.3	-9999	REQUIRED SN BASED ON SVPD
12	FACTOR	8.3	-9999	CORRECTION FACTOR = SN-SVPD/SN-AASH
13	OBJ_FUN	8.3	-9999	OBJECTICE FUNCTION
14	OVER_SHF	8.3	-9999	=8*abs (v6- (v4+v9)/2); oveall shif

	1 TOT_ESAL	2 MR_AV	3 MR_AMP	4 MR_SHFT	5 TRAF_AMP	6 TRAF_SHF	7 E1_AV
1	16.5	1000	0	1.000	0	1.000	100
2	16.5	1000	0	1.000	0	1.000	400
3	16.5	1000	0	1.000	0	1.000	400
4	16.5	1000	0	1.000	0	1.000	400
5	16.5	1000	0	1.000	0	1.000	400
6	16.5	1000	0	1.000	0	1.000	400
7	16.5	1000	0	1.000	0	1.000	700
8	16.5	1000	0	1.000	0	1.000	700
9	16.5	1000	0	1.000	0	1.000	700
10	16.5	1000	0	1.000	0	1.000	700
11	16.5	1000	0	1.000	0	1.000	700
12	16.5	1000	0	1.000	0	1.000	700
13	16.5	1000	0	1.000	0	1.000	700
14	16.5	1000	0	1.000	0	1.000	700
15	16.5	1000	0	1.000	0	1.000	700
16	16.5	1000	0	1.000	0	1.000	1000
17	16.5	1000	0	1.000	0	1.000	1000
18	16.5	1000	0	1.000	0	1.000	1000
19	16.5	1000	0	1.000	0	1.000	1000
20	16.5	1000	0	1.000	0	1.000	1000
21	16.5	1000	0	1.000	0	1.000	1000
22	16.5	1000	0	1.000	0	1.000	1000
23	16.5	1000	0	1.000	0	1.000	1000
24	16.5	1000	0	1.000	0	1.000	1000
25	16.5	1000	0	1.000	25	-.500	100
26	16.5	1000	0	1.000	25	-.500	400
27	16.5	1000	0	1.000	25	-.500	400
28	16.5	1000	0	1.000	25	-.500	400
29	16.5	1000	0	1.000	25	-.500	400
30	16.5	1000	0	1.000	25	-.500	400

	1 TOT_ESAL	2 MR_AV	3 MR_AMP	4 MR_SHFT	5 TRAF_AMP	6 TRAF_SHF	7 E1_AV
31	16.5	1000	0	1.000	25	-.500	700
32	16.5	1000	0	1.000	25	-.500	700
33	16.5	1000	0	1.000	25	-.500	700
34	16.5	1000	0	1.000	25	-.500	700
35	16.5	1000	0	1.000	25	-.500	700
36	16.5	1000	0	1.000	25	-.500	700
37	16.5	1000	0	1.000	25	-.500	700
38	16.5	1000	0	1.000	25	-.500	700
39	16.5	1000	0	1.000	25	-.500	700
40	16.5	1000	0	1.000	25	-.500	1000
41	16.5	1000	0	1.000	25	-.500	1000
42	16.5	1000	0	1.000	25	-.500	1000
43	16.5	1000	0	1.000	25	-.500	1000
44	16.5	1000	0	1.000	25	-.500	1000
45	16.5	1000	0	1.000	25	-.500	1000
46	16.5	1000	0	1.000	25	-.500	1000
47	16.5	1000	0	1.000	25	-.500	1000
48	16.5	1000	0	1.000	25	-.500	1000
49	16.5	1000	0	1.000	25	0.000	100
50	16.5	1000	0	1.000	25	0.000	400
51	16.5	1000	0	1.000	25	0.000	400
52	16.5	1000	0	1.000	25	0.000	400
53	16.5	1000	0	1.000	25	0.000	400
54	16.5	1000	0	1.000	25	0.000	400
55	16.5	1000	0	1.000	25	0.000	700
56	16.5	1000	0	1.000	25	0.000	700
57	16.5	1000	0	1.000	25	0.000	700
58	16.5	1000	0	1.000	25	0.000	700
59	16.5	1000	0	1.000	25	0.000	700
60	16.5	1000	0	1.000	25	0.000	700
61	16.5	1000	0	1.000	25	0.000	700
62	16.5	1000	0	1.000	25	0.000	700
63	16.5	1000	0	1.000	25	0.000	700
64	16.5	1000	0	1.000	25	0.000	1000
65	16.5	1000	0	1.000	25	0.000	1000
66	16.5	1000	0	1.000	25	0.000	1000
67	16.5	1000	0	1.000	25	0.000	1000
68	16.5	1000	0	1.000	25	0.000	1000
69	16.5	1000	0	1.000	25	0.000	1000
70	16.5	1000	0	1.000	25	0.000	1000
71	16.5	1000	0	1.000	25	0.000	1000
72	16.5	1000	0	1.000	25	0.000	1000
73	16.5	1000	0	1.000	25	.500	100
74	16.5	1000	0	1.000	25	.500	400
75	16.5	1000	0	1.000	25	.500	400
76	16.5	1000	0	1.000	25	.500	400
77	16.5	1000	0	1.000	25	.500	400
78	16.5	1000	0	1.000	25	.500	400
79	16.5	1000	0	1.000	25	.500	700
80	16.5	1000	0	1.000	25	.500	700
81	16.5	1000	0	1.000	25	.500	700
82	16.5	1000	0	1.000	25	.500	700
83	16.5	1000	0	1.000	25	.500	700
84	16.5	1000	0	1.000	25	.500	700
85	16.5	1000	0	1.000	25	.500	700

	1 TOT_ESAL	2 MR_AV	3 MR_AMP	4 MR_SHFT	5 TRAF_AMP	6 TRAF_SHF	7 EI_AV
86	16.5	1000	0	1.000	25	.500	700
87	16.5	1000	0	1.000	25	.500	700
88	16.5	1000	0	1.000	25	.500	1000
89	16.5	1000	0	1.000	25	.500	1000
90	16.5	1000	0	1.000	25	.500	1000
91	16.5	1000	0	1.000	25	.500	1000
92	16.5	1000	0	1.000	25	.500	1000
93	16.5	1000	0	1.000	25	.500	1000
94	16.5	1000	0	1.000	25	.500	1000
95	16.5	1000	0	1.000	25	.500	1000
96	16.5	1000	0	1.000	25	.500	1000
97	16.5	1000	0	1.000	25	1.000	100
98	16.5	1000	0	1.000	25	1.000	400
99	16.5	1000	0	1.000	25	1.000	400
100	16.5	1000	0	1.000	25	1.000	400
101	16.5	1000	0	1.000	25	1.000	400
102	16.5	1000	0	1.000	25	1.000	400
103	16.5	1000	0	1.000	25	1.000	700
104	16.5	1000	0	1.000	25	1.000	700
105	16.5	1000	0	1.000	25	1.000	700
106	16.5	1000	0	1.000	25	1.000	700
107	16.5	1000	0	1.000	25	1.000	700
108	16.5	1000	0	1.000	25	1.000	700
109	16.5	1000	0	1.000	25	1.000	700
110	16.5	1000	0	1.000	25	1.000	700
111	16.5	1000	0	1.000	25	1.000	700
112	16.5	1000	0	1.000	25	1.000	1000
113	16.5	1000	0	1.000	25	1.000	1000
114	16.5	1000	0	1.000	25	1.000	1000
115	16.5	1000	0	1.000	25	1.000	1000
116	16.5	1000	0	1.000	25	1.000	1000
117	16.5	1000	0	1.000	25	1.000	1000
118	16.5	1000	0	1.000	25	1.000	1000
119	16.5	1000	0	1.000	25	1.000	1000
120	16.5	1000	0	1.000	25	1.000	1000
121	16.5	1000	0	1.000	50	-.500	100
122	16.5	1000	0	1.000	50	-.500	400
123	16.5	1000	0	1.000	50	-.500	400
124	16.5	1000	0	1.000	50	-.500	400
125	16.5	1000	0	1.000	50	-.500	400
126	16.5	1000	0	1.000	50	-.500	400
127	16.5	1000	0	1.000	50	-.500	700
128	16.5	1000	0	1.000	50	-.500	700
129	16.5	1000	0	1.000	50	-.500	700
130	16.5	1000	0	1.000	50	-.500	700
131	16.5	1000	0	1.000	50	-.500	700
132	16.5	1000	0	1.000	50	-.500	700
133	16.5	1000	0	1.000	50	-.500	700
134	16.5	1000	0	1.000	50	-.500	700
135	16.5	1000	0	1.000	50	-.500	700
136	16.5	1000	0	1.000	50	-.500	1000
137	16.5	1000	0	1.000	50	-.500	1000
138	16.5	1000	0	1.000	50	-.500	1000
139	16.5	1000	0	1.000	50	-.500	1000
140	16.5	1000	0	1.000	50	-.500	1000

	1 TOT_ESAL	2 MR_AV	3 MR_AMP	4 MR_SHFT	5 TRAF_AMP	6 TRAF_SHF	7 E1_AV
141	16.5	1000	0	1.000	50	-.500	1000
142	16.5	1000	0	1.000	50	-.500	1000
143	16.5	1000	0	1.000	50	-.500	1000
144	16.5	1000	0	1.000	50	-.500	1000
145	16.5	1000	0	1.000	50	0.000	100
146	16.5	1000	0	1.000	50	0.000	400
147	16.5	1000	0	1.000	50	0.000	400
148	16.5	1000	0	1.000	50	0.000	400
149	16.5	1000	0	1.000	50	0.000	400
150	16.5	1000	0	1.000	50	0.000	400
151	16.5	1000	0	1.000	50	0.000	700
152	16.5	1000	0	1.000	50	0.000	700
153	16.5	1000	0	1.000	50	0.000	700
154	16.5	1000	0	1.000	50	0.000	700
155	16.5	1000	0	1.000	50	0.000	700
156	16.5	1000	0	1.000	50	0.000	700
157	16.5	1000	0	1.000	50	0.000	700
158	16.5	1000	0	1.000	50	0.000	700
159	16.5	1000	0	1.000	50	0.000	700
160	16.5	1000	0	1.000	50	0.000	1000
161	16.5	1000	0	1.000	50	0.000	1000
162	16.5	1000	0	1.000	50	0.000	1000
163	16.5	1000	0	1.000	50	0.000	1000
164	16.5	1000	0	1.000	50	0.000	1000
165	16.5	1000	0	1.000	50	0.000	1000
166	16.5	1000	0	1.000	50	0.000	1000
167	16.5	1000	0	1.000	50	0.000	1000
168	16.5	1000	0	1.000	50	0.000	1000
169	16.5	1000	0	1.000	50	.500	100
170	16.5	1000	0	1.000	50	.500	400
171	16.5	1000	0	1.000	50	.500	400
172	16.5	1000	0	1.000	50	.500	400
173	16.5	1000	0	1.000	50	.500	400
174	16.5	1000	0	1.000	50	.500	400
175	16.5	1000	0	1.000	50	.500	700
176	16.5	1000	0	1.000	50	.500	700
177	16.5	1000	0	1.000	50	.500	700
178	16.5	1000	0	1.000	50	.500	700
179	16.5	1000	0	1.000	50	.500	700
180	16.5	1000	0	1.000	50	.500	700
181	16.5	1000	0	1.000	50	.500	700
182	16.5	1000	0	1.000	50	.500	700
183	16.5	1000	0	1.000	50	.500	700
184	16.5	1000	0	1.000	50	.500	1000
185	16.5	1000	0	1.000	50	.500	1000
186	16.5	1000	0	1.000	50	.500	1000
187	16.5	1000	0	1.000	50	.500	1000
188	16.5	1000	0	1.000	50	.500	1000
189	16.5	1000	0	1.000	50	.500	1000
190	16.5	1000	0	1.000	50	.500	1000
191	16.5	1000	0	1.000	50	.500	1000
192	16.5	1000	0	1.000	50	.500	1000
193	16.5	1000	0	1.000	50	1.000	100
194	16.5	1000	0	1.000	50	1.000	400
195	16.5	1000	0	1.000	50	1.000	400

	1 TOT_ESAL	2 MR_AV	3 MR_AMP	4 MR_SHFT	5 TRAF_AMP	6 TRAF_SHF	7 EI_AV
196	16.5	1000	0	1.000	50	1.000	400
197	16.5	1000	0	1.000	50	1.000	400
198	16.5	1000	0	1.000	50	1.000	400
199	16.5	1000	0	1.000	50	1.000	700
200	16.5	1000	0	1.000	50	1.000	700
201	16.5	1000	0	1.000	50	1.000	700
202	16.5	1000	0	1.000	50	1.000	700
203	16.5	1000	0	1.000	50	1.000	700
204	16.5	1000	0	1.000	50	1.000	700
205	16.5	1000	0	1.000	50	1.000	700
206	16.5	1000	0	1.000	50	1.000	700
207	16.5	1000	0	1.000	50	1.000	700
208	16.5	1000	0	1.000	50	1.000	1000
209	16.5	1000	0	1.000	50	1.000	1000
210	16.5	1000	0	1.000	50	1.000	1000
211	16.5	1000	0	1.000	50	1.000	1000
212	16.5	1000	0	1.000	50	1.000	1000
213	16.5	1000	0	1.000	50	1.000	1000
214	16.5	1000	0	1.000	50	1.000	1000
215	16.5	1000	0	1.000	50	1.000	1000
216	16.5	1000	0	1.000	50	1.000	1000
217	16.5	1000	700	-.500	0	1.000	100
218	16.5	1000	700	-.500	0	1.000	400
219	16.5	1000	700	-.500	0	1.000	400
220	16.5	1000	700	-.500	0	1.000	400
221	16.5	1000	700	-.500	0	1.000	400
222	16.5	1000	700	-.500	0	1.000	400
223	16.5	1000	700	-.500	0	1.000	700
224	16.5	1000	700	-.500	0	1.000	700
225	16.5	1000	700	-.500	0	1.000	700
226	16.5	1000	700	-.500	0	1.000	700
227	16.5	1000	700	-.500	0	1.000	700
228	16.5	1000	700	-.500	0	1.000	700
229	16.5	1000	700	-.500	0	1.000	700
230	16.5	1000	700	-.500	0	1.000	700
231	16.5	1000	700	-.500	0	1.000	700
232	16.5	1000	700	-.500	0	1.000	1000
233	16.5	1000	700	-.500	0	1.000	1000
234	16.5	1000	700	-.500	0	1.000	1000
235	16.5	1000	700	-.500	0	1.000	1000
236	16.5	1000	700	-.500	0	1.000	1000
237	16.5	1000	700	-.500	0	1.000	1000
238	16.5	1000	700	-.500	0	1.000	1000
239	16.5	1000	700	-.500	0	1.000	1000
240	16.5	1000	700	-.500	0	1.000	1000
241	16.5	1000	700	-.500	25	-.500	100
242	16.5	1000	700	-.500	25	-.500	400
243	16.5	1000	700	-.500	25	-.500	400
244	16.5	1000	700	-.500	25	-.500	400
245	16.5	1000	700	-.500	25	-.500	400
246	16.5	1000	700	-.500	25	-.500	400
247	16.5	1000	700	-.500	25	-.500	700
248	16.5	1000	700	-.500	25	-.500	700
249	16.5	1000	700	-.500	25	-.500	700
250	16.5	1000	700	-.500	25	-.500	700

	1 TOT_ESAL	2 MR_AV	3 MR_AMP	4 MR_SHFT	5 TRAF_AMP	6 TRAF_SHF	7 EI_AV
251	16.5	1000	700	-.500	25	-.500	700
252	16.5	1000	700	-.500	25	-.500	700
253	16.5	1000	700	-.500	25	-.500	700
254	16.5	1000	700	-.500	25	-.500	700
255	16.5	1000	700	-.500	25	-.500	700
256	16.5	1000	700	-.500	25	-.500	1000
257	16.5	1000	700	-.500	25	-.500	1000
258	16.5	1000	700	-.500	25	-.500	1000
259	16.5	1000	700	-.500	25	-.500	1000
260	16.5	1000	700	-.500	25	-.500	1000
261	16.5	1000	700	-.500	25	-.500	1000
262	16.5	1000	700	-.500	25	-.500	1000
263	16.5	1000	700	-.500	25	-.500	1000
264	16.5	1000	700	-.500	25	-.500	1000
265	16.5	1000	700	-.500	25	0.000	100
266	16.5	1000	700	-.500	25	0.000	400
267	16.5	1000	700	-.500	25	0.000	400
268	16.5	1000	700	-.500	25	0.000	400
269	16.5	1000	700	-.500	25	0.000	400
270	16.5	1000	700	-.500	25	0.000	400
271	16.5	1000	700	-.500	25	0.000	700
272	16.5	1000	700	-.500	25	0.000	700
273	16.5	1000	700	-.500	25	0.000	700
274	16.5	1000	700	-.500	25	0.000	700
275	16.5	1000	700	-.500	25	0.000	700
276	16.5	1000	700	-.500	25	0.000	700
277	16.5	1000	700	-.500	25	0.000	700
278	16.5	1000	700	-.500	25	0.000	700
279	16.5	1000	700	-.500	25	0.000	700
280	16.5	1000	700	-.500	25	0.000	1000
281	16.5	1000	700	-.500	25	0.000	1000
282	16.5	1000	700	-.500	25	0.000	1000
283	16.5	1000	700	-.500	25	0.000	1000
284	16.5	1000	700	-.500	25	0.000	1000
285	16.5	1000	700	-.500	25	0.000	1000
286	16.5	1000	700	-.500	25	0.000	1000
287	16.5	1000	700	-.500	25	0.000	1000
288	16.5	1000	700	-.500	25	0.000	1000
289	16.5	1000	700	-.500	25	.500	100
290	16.5	1000	700	-.500	25	.500	400
291	16.5	1000	700	-.500	25	.500	400
292	16.5	1000	700	-.500	25	.500	400
293	16.5	1000	700	-.500	25	.500	400
294	16.5	1000	700	-.500	25	.500	400
295	16.5	1000	700	-.500	25	.500	700
296	16.5	1000	700	-.500	25	.500	700
297	16.5	1000	700	-.500	25	.500	700
298	16.5	1000	700	-.500	25	.500	700
299	16.5	1000	700	-.500	25	.500	700
300	16.5	1000	700	-.500	25	.500	700

	8 El_AMP	9 El_SHFT	10 SN_ASHTO	11 SN_SVPD	12 FACTOR	13 OBJ_FUN	14 OVER_SHF
1	0	1.000	9.297	9.300	1.000	.000	0.000
2	0	1.000	9.297	9.300	1.000	.000	0.000
3	300	-.500	9.297	9.500	1.022	.001	6.000
4	300	0.000	9.297	9.500	1.022	.001	4.000
5	300	.500	9.297	9.500	1.022	.001	2.000
6	300	1.000	9.297	9.500	1.022	.001	0.000
7	0	1.000	9.297	9.300	1.000	.000	0.000
8	300	-.500	9.297	9.400	1.011	.002	6.000
9	300	0.000	9.297	9.400	1.011	.002	4.000
10	300	.500	9.297	9.400	1.011	.002	2.000
11	300	1.000	9.297	9.400	1.011	.002	0.000
12	600	-.500	9.297	9.700	1.043	.000	6.000
13	600	0.000	9.297	9.700	1.043	.000	4.000
14	600	.500	9.297	9.700	1.043	.000	2.000
15	600	1.000	9.297	9.700	1.043	.000	0.000
16	0	1.000	9.297	9.300	1.000	.000	0.000
17	300	-.500	9.297	9.300	1.000	.000	6.000
18	300	0.000	9.297	9.300	1.000	.000	4.000
19	300	.500	9.297	9.300	1.000	.000	2.000
20	300	1.000	9.297	9.300	1.000	.000	0.000
21	600	-.500	9.297	9.400	1.011	.000	6.000
22	600	0.000	9.297	9.400	1.011	.000	4.000
23	600	.500	9.297	9.400	1.011	.000	2.000
24	600	1.000	9.297	9.400	1.011	.000	0.000
25	0	1.000	9.297	9.300	1.000	.000	12.000
26	0	1.000	9.297	9.300	1.000	.000	12.000
27	300	-.500	9.297	9.400	1.011	.001	6.000
28	300	0.000	9.297	9.500	1.022	.001	8.000
29	300	.500	9.297	9.700	1.043	.000	10.000
30	300	1.000	9.297	9.500	1.022	.001	12.000
31	0	1.000	9.297	9.300	1.000	.000	12.000
32	300	-.500	9.297	9.300	1.000	.001	6.000
33	300	0.000	9.297	9.400	1.011	.002	8.000
34	300	.500	9.297	9.400	1.011	.001	10.000
35	300	1.000	9.297	9.400	1.011	.002	12.000
36	600	-.500	9.297	9.500	1.022	.000	6.000
37	600	0.000	9.297	9.700	1.043	.000	8.000
38	600	.500	9.297	9.900	1.065	.000	10.000
39	600	1.000	9.297	9.700	1.043	.000	12.000
40	0	1.000	9.297	9.300	1.000	.000	12.000
41	300	-.500	9.297	9.300	1.000	.001	6.000
42	300	0.000	9.297	9.300	1.000	.000	8.000
43	300	.500	9.297	9.400	1.011	.000	10.000
44	300	1.000	9.297	9.300	1.000	.000	12.000
45	600	-.500	9.297	9.300	1.000	.000	6.000
46	600	0.000	9.297	9.400	1.011	.000	8.000
47	600	.500	9.297	9.500	1.022	.001	10.000
48	600	1.000	9.297	9.400	1.011	.000	12.000
49	0	1.000	9.297	9.300	1.000	.000	8.000
50	0	1.000	9.297	9.300	1.000	.000	8.000
51	300	-.500	9.297	9.500	1.022	.001	2.000
52	300	0.000	9.297	9.400	1.011	.001	4.000
53	300	.500	9.297	9.500	1.022	.001	6.000
54	300	1.000	9.297	9.700	1.043	.000	8.000
55	0	1.000	9.297	9.300	1.000	.000	8.000

	8	9	10	11	12	13	14
	E1_AMP	E1_SHFT	SN_ASHTO	SN_SVPD	FACTOR	OBJ_FUN	OVER_SHF
56	300	-.500	9.297	9.400	1.011	.002	2.000
57	300	0.000	9.297	9.300	1.000	.001	4.000
58	300	.500	9.297	9.400	1.011	.002	6.000
59	300	1.000	9.297	9.400	1.011	.001	8.000
60	600	-.500	9.297	9.700	1.043	.000	2.000
61	600	0.000	9.297	9.500	1.022	.000	4.000
62	600	.500	9.297	9.700	1.043	.000	6.000
63	600	1.000	9.297	9.900	1.065	.000	8.000
64	0	1.000	9.297	9.300	1.000	.000	8.000
65	300	-.500	9.297	9.300	1.000	.000	2.000
66	300	0.000	9.297	9.300	1.000	.001	4.000
67	300	.500	9.297	9.300	1.000	.000	6.000
68	300	1.000	9.297	9.400	1.011	.000	8.000
69	600	-.500	9.297	9.400	1.011	.000	2.000
70	600	0.000	9.297	9.300	1.000	.000	4.000
71	600	.500	9.297	9.400	1.011	.000	6.000
72	600	1.000	9.297	9.500	1.022	.001	8.000
73	0	1.000	9.297	9.300	1.000	.000	4.000
74	0	1.000	9.297	9.300	1.000	.000	4.000
75	300	-.500	9.297	9.700	1.043	.000	2.000
76	300	0.000	9.297	9.500	1.022	.001	.000
77	300	.500	9.297	9.400	1.011	.001	2.000
78	300	1.000	9.297	9.500	1.022	.001	4.000
79	0	1.000	9.297	9.300	1.000	.000	4.000
80	300	-.500	9.297	9.400	1.011	.001	2.000
81	300	0.000	9.297	9.400	1.011	.002	.000
82	300	.500	9.297	9.300	1.000	.001	2.000
83	300	1.000	9.297	9.400	1.011	.002	4.000
84	600	-.500	9.297	9.900	1.065	.000	2.000
85	600	0.000	9.297	9.700	1.043	.000	.000
86	600	.500	9.297	9.500	1.022	.000	2.000
87	600	1.000	9.297	9.700	1.043	.000	4.000
88	0	1.000	9.297	9.300	1.000	.000	4.000
89	300	-.500	9.297	9.400	1.011	.000	2.000
90	300	0.000	9.297	9.300	1.000	.000	.000
91	300	.500	9.297	9.300	1.000	.001	2.000
92	300	1.000	9.297	9.300	1.000	.000	4.000
93	600	-.500	9.297	9.500	1.022	.001	2.000
94	600	0.000	9.297	9.400	1.011	.000	.000
95	600	.500	9.297	9.300	1.000	.000	2.000
96	600	1.000	9.297	9.400	1.011	.000	4.000
97	0	1.000	9.297	9.300	1.000	.000	0.000
98	0	1.000	9.297	9.300	1.000	.000	0.000
99	300	-.500	9.297	9.500	1.022	.001	6.000
100	300	0.000	9.297	9.700	1.043	.000	4.000
101	300	.500	9.297	9.500	1.022	.001	2.000
102	300	1.000	9.297	9.400	1.011	.001	0.000
103	0	1.000	9.297	9.300	1.000	.000	0.000
104	300	-.500	9.297	9.400	1.011	.002	6.000
105	300	0.000	9.297	9.400	1.011	.001	4.000
106	300	.500	9.297	9.400	1.011	.002	2.000
107	300	1.000	9.297	9.300	1.000	.001	0.000
108	600	-.500	9.297	9.700	1.043	.000	6.000
109	600	0.000	9.297	9.900	1.065	.000	4.000
110	600	.500	9.297	9.700	1.043	.000	2.000

	8 EI_AMP	9 EI_SHFT	10 SN_ASHTO	11 SN_SVPD	12 FACTOR	13 OBJ_FUN	14 OVER_SHF
111	600	1.000	9.297	9.500	1.022	.000	0.000
112	0	1.000	9.297	9.300	1.000	.000	0.000
113	300	-.500	9.297	9.300	1.000	.000	6.000
114	300	0.000	9.297	9.400	1.011	.000	4.000
115	300	.500	9.297	9.300	1.000	.000	2.000
116	300	1.000	9.297	9.300	1.000	.001	0.000
117	600	-.500	9.297	9.400	1.011	.000	6.000
118	600	0.000	9.297	9.500	1.022	.001	4.000
119	600	.500	9.297	9.400	1.011	.000	2.000
120	600	1.000	9.297	9.300	1.000	.000	0.000
121	0	1.000	9.297	9.300	1.000	.000	12.000
122	0	1.000	9.297	9.300	1.000	.000	12.000
123	300	-.500	9.297	9.100	.979	.002	6.000
124	300	0.000	9.297	9.500	1.022	.001	8.000
125	300	.500	9.297	9.800	1.054	.000	10.000
126	300	1.000	9.297	9.500	1.022	.001	12.000
127	0	1.000	9.297	9.300	1.000	.000	12.000
128	300	-.500	9.297	9.200	.990	.001	6.000
129	300	0.000	9.297	9.400	1.011	.002	8.000
130	300	.500	9.297	9.500	1.022	.000	10.000
131	300	1.000	9.297	9.400	1.011	.002	12.000
132	600	-.500	9.297	9.200	.990	.000	6.000
133	600	0.000	9.297	9.700	1.043	.000	8.000
134	600	.500	9.297	10.000	1.076	.001	10.000
135	600	1.000	9.297	9.700	1.043	.000	12.000
136	0	1.000	9.297	9.300	1.000	.000	12.000
137	300	-.500	9.297	9.200	.990	.000	6.000
138	300	0.000	9.297	9.300	1.000	.000	8.000
139	300	.500	9.297	9.400	1.011	.001	10.000
140	300	1.000	9.297	9.300	1.000	.000	12.000
141	600	-.500	9.297	9.100	.979	.001	6.000
142	600	0.000	9.297	9.400	1.011	.000	8.000
143	600	.500	9.297	9.600	1.033	.002	10.000
144	600	1.000	9.297	9.400	1.011	.000	12.000
145	0	1.000	9.297	9.300	1.000	.000	8.000
146	0	1.000	9.297	9.300	1.000	.000	8.000
147	300	-.500	9.297	9.500	1.022	.001	2.000
148	300	0.000	9.297	9.100	.979	.002	4.000
149	300	.500	9.297	9.500	1.022	.001	6.000
150	300	1.000	9.297	9.800	1.054	.000	8.000
151	0	1.000	9.297	9.300	1.000	.000	8.000
152	300	-.500	9.297	9.400	1.011	.002	2.000
153	300	0.000	9.297	9.200	.990	.001	4.000
154	300	.500	9.297	9.400	1.011	.002	6.000
155	300	1.000	9.297	9.500	1.022	.000	8.000
156	600	-.500	9.297	9.700	1.043	.000	2.000
157	600	0.000	9.297	9.200	.990	.000	4.000
158	600	.500	9.297	9.700	1.043	.000	6.000
159	600	1.000	9.297	10.000	1.076	.001	8.000
160	0	1.000	9.297	9.300	1.000	.000	8.000
161	300	-.500	9.297	9.300	1.000	.000	2.000
162	300	0.000	9.297	9.200	.990	.000	4.000
163	300	.500	9.297	9.300	1.000	.000	6.000
164	300	1.000	9.297	9.400	1.011	.001	8.000
165	600	-.500	9.297	9.400	1.011	.000	2.000

	8 E1_AMP	9 E1_SHFT	10 SN_ASHTO	11 SN_SVPD	12 FACTOR	13 OBJ_FUN	14 OVER_SHF
166	600	0.000	9.297	9.100	.979	.001	4.000
167	600	.500	9.297	9.400	1.011	.000	6.000
168	600	1.000	9.297	9.600	1.033	.002	8.000
169	0	1.000	9.297	9.300	1.000	.000	4.000
170	0	1.000	9.297	9.300	1.000	.000	4.000
171	300	-.500	9.297	9.800	1.054	.000	2.000
172	300	0.000	9.297	9.500	1.022	.001	.000
173	300	.500	9.297	9.100	.979	.002	2.000
174	300	1.000	9.297	9.500	1.022	.001	4.000
175	0	1.000	9.297	9.300	1.000	.000	4.000
176	300	-.500	9.297	9.500	1.022	.000	2.000
177	300	0.000	9.297	9.400	1.011	.002	.000
178	300	.500	9.297	9.200	.990	.001	2.000
179	300	1.000	9.297	9.400	1.011	.002	4.000
180	600	-.500	9.297	10.000	1.076	.001	2.000
181	600	0.000	9.297	9.700	1.043	.000	.000
182	600	.500	9.297	9.200	.990	.000	2.000
183	600	1.000	9.297	9.700	1.043	.000	4.000
184	0	1.000	9.297	9.300	1.000	.000	4.000
185	300	-.500	9.297	9.400	1.011	.001	2.000
186	300	0.000	9.297	9.300	1.000	.000	.000
187	300	.500	9.297	9.200	.990	.000	2.000
188	300	1.000	9.297	9.300	1.000	.000	4.000
189	600	-.500	9.297	9.600	1.033	.002	2.000
190	600	0.000	9.297	9.400	1.011	.000	.000
191	600	.500	9.297	9.100	.979	.001	2.000
192	600	1.000	9.297	9.400	1.011	.000	4.000
193	0	1.000	9.297	9.300	1.000	.000	0.000
194	0	1.000	9.297	9.300	1.000	.000	0.000
195	300	-.500	9.297	9.500	1.022	.001	6.000
196	300	0.000	9.297	9.800	1.054	.000	4.000
197	300	.500	9.297	9.500	1.022	.001	2.000
198	300	1.000	9.297	9.100	.979	.002	0.000
199	0	1.000	9.297	9.300	1.000	.000	0.000
200	300	-.500	9.297	9.400	1.011	.002	6.000
201	300	0.000	9.297	9.500	1.022	.000	4.000
202	300	.500	9.297	9.400	1.011	.002	2.000
203	300	1.000	9.297	9.200	.990	.001	0.000
204	600	-.500	9.297	9.700	1.043	.000	6.000
205	600	0.000	9.297	10.000	1.076	.001	4.000
206	600	.500	9.297	9.700	1.043	.000	2.000
207	600	1.000	9.297	9.200	.990	.000	0.000
208	0	1.000	9.297	9.300	1.000	.000	0.000
209	300	-.500	9.297	9.300	1.000	.000	6.000
210	300	0.000	9.297	9.400	1.011	.001	4.000
211	300	.500	9.297	9.300	1.000	.000	2.000
212	300	1.000	9.297	9.200	.990	.000	0.000
213	600	-.500	9.297	9.400	1.011	.000	6.000
214	600	0.000	9.297	9.600	1.033	.002	4.000
215	600	.500	9.297	9.400	1.011	.000	2.000
216	600	1.000	9.297	9.100	.979	.001	0.000
217	0	1.000	10.813	10.800	.999	.000	6.000
218	0	1.000	10.813	10.800	.999	.000	6.000
219	300	-.500	10.813	11.600	1.073	.001	12.000
220	300	0.000	10.813	10.900	1.008	.001	10.000

	8	9	10	11	12	13	14
	E1_AMP	E1_SHFT	SN_ASHTO	SN_SVPD	FACTOR	OBJ_FUN	OVER_SHF
221	300	.500	10.813	10.100	.934	.001	8.000
222	300	1.000	10.813	10.900	1.008	.001	6.000
223	0	1.000	10.813	10.800	.999	.000	6.000
224	300	-.500	10.813	11.200	1.036	.000	12.000
225	300	0.000	10.813	10.800	.999	.001	10.000
226	300	.500	10.813	10.500	.971	.001	8.000
227	300	1.000	10.813	10.800	.999	.001	6.000
228	600	-.500	10.813	11.900	1.100	.000	12.000
229	600	0.000	10.813	11.000	1.017	.000	10.000
230	600	.500	10.813	10.000	.925	.000	8.000
231	600	1.000	10.813	11.000	1.017	.000	6.000
232	0	1.000	10.813	10.800	.999	.000	6.000
233	300	-.500	10.813	11.100	1.026	.001	12.000
234	300	0.000	10.813	10.800	.999	.000	10.000
235	300	.500	10.813	10.600	.980	.000	8.000
236	300	1.000	10.813	10.800	.999	.000	6.000
237	600	-.500	10.813	11.400	1.054	.000	12.000
238	600	0.000	10.813	10.900	1.008	.000	10.000
239	600	.500	10.813	10.300	.953	.000	8.000
240	600	1.000	10.813	10.900	1.008	.000	6.000
241	0	1.000	10.813	10.400	.962	.000	6.000
242	0	1.000	10.813	10.400	.962	.000	6.000
243	300	-.500	10.813	11.200	1.036	.000	0.000
244	300	0.000	10.813	10.500	.971	.002	2.000
245	300	.500	10.813	9.900	.916	.000	4.000
246	300	1.000	10.813	10.500	.971	.002	6.000
247	0	1.000	10.813	10.400	.962	.000	6.000
248	300	-.500	10.813	10.800	.999	.001	0.000
249	300	0.000	10.813	10.400	.962	.001	2.000
250	300	.500	10.813	10.100	.934	.000	4.000
251	300	1.000	10.813	10.400	.962	.001	6.000
252	600	-.500	10.813	11.400	1.054	.002	0.000
253	600	0.000	10.813	10.600	.980	.002	2.000
254	600	.500	10.813	9.800	.906	.000	4.000
255	600	1.000	10.813	10.600	.980	.002	6.000
256	0	1.000	10.813	10.400	.962	.000	6.000
257	300	-.500	10.813	10.600	.980	.001	0.000
258	300	0.000	10.813	10.400	.962	.000	2.000
259	300	.500	10.813	10.200	.943	.000	4.000
260	300	1.000	10.813	10.400	.962	.000	6.000
261	600	-.500	10.813	10.900	1.008	.001	0.000
262	600	0.000	10.813	10.500	.971	.000	2.000
263	600	.500	10.813	10.000	.925	.000	4.000
264	600	1.000	10.813	10.500	.971	.000	6.000
265	0	1.000	10.813	10.800	.999	.000	2.000
266	0	1.000	10.813	10.800	.999	.000	2.000
267	300	-.500	10.813	11.600	1.073	.001	4.000
268	300	0.000	10.813	10.800	.999	.001	2.000
269	300	.500	10.813	10.100	.934	.001	0.000
270	300	1.000	10.813	11.000	1.017	.000	2.000
271	0	1.000	10.813	10.800	.999	.000	2.000
272	300	-.500	10.813	11.200	1.036	.000	4.000
273	300	0.000	10.813	10.800	.999	.000	2.000
274	300	.500	10.813	10.500	.971	.001	0.000
275	300	1.000	10.813	10.900	1.008	.000	2.000

	8 E1_AMP	9 E1_SHFT	10 SN_ASHTO	11 SN_SVPD	12 FACTOR	13 OBJ_FUN	14 OVER_SHF
276	600	-.500	10.813	11.900	1.100	.000	4.000
277	600	0.000	10.813	10.900	1.008	.000	2.000
278	600	.500	10.813	10.000	.925	.000	0.000
279	600	1.000	10.813	11.100	1.026	.001	2.000
280	0	1.000	10.813	10.800	.999	.000	2.000
281	300	-.500	10.813	11.100	1.026	.001	4.000
282	300	0.000	10.813	10.800	.999	.000	2.000
283	300	.500	10.813	10.600	.980	.000	0.000
284	300	1.000	10.813	10.900	1.008	.001	2.000
285	600	-.500	10.813	11.400	1.054	.000	4.000
286	600	0.000	10.813	10.800	.999	.000	2.000
287	600	.500	10.813	10.300	.953	.000	0.000
288	600	1.000	10.813	10.900	1.008	.001	2.000
289	0	1.000	10.813	11.100	1.026	.000	2.000
290	0	1.000	10.813	11.100	1.026	.000	2.000
291	300	-.500	10.813	12.000	1.110	.000	8.000
292	300	0.000	10.813	11.200	1.036	.001	6.000
293	300	.500	10.813	10.400	.962	.000	4.000
294	300	1.000	10.813	11.200	1.036	.001	2.000
295	0	1.000	10.813	11.100	1.026	.000	2.000
296	300	-.500	10.813	11.500	1.063	.000	8.000
297	300	0.000	10.813	11.100	1.026	.001	6.000
298	300	.500	10.813	10.800	.999	.001	4.000
299	300	1.000	10.813	11.100	1.026	.001	2.000
300	600	-.500	10.813	12.300	1.137	.001	8.000

REFERENCES

1. American Association of State Highway and Transportation Officials, AASHTO Guide for Design of Pavement Structures, Washington D.C., 1993.
2. LTPP Seasonal Monitoring Program: Instrumentation Installation and Data Collection Guidelines, FHWA-RD-94-110, April 1994
3. Integrated Model of the Climatic Effects on Pavements, Publication # FHWA-RD-90-033, November 1993.
4. B. J. Dempsey, W. A. Herlach and A. J. Patel, The Climatic-Material-Structural Pavement Analysis Program. Final report, Federal Highway Administration, Washington DC. Publication # FHWA/RD-84/115, Vol. 3, February 1985.
5. N. S. Matter and O. T. Farouki, Detailed Study on the Climatic and Seasonal Variation Effects on Pavements in Northern Ireland, proceedings of the fourth International Conference of Bearing Capacity, Minnesota, July 1994.
6. H. F. Southgate and R. C. Deen, Temperature Distribution within Asphalt Pavements and its Relationship to Pavement Deflection, Highway Research Record # 291, pp. 116-131, 1969.
7. E. Ehrola, J. Belt and T. Rynanen, Influence of Temperature on the Deflection of Asphalt Pavements, Proceedings, 3rd International Conference on Bearing Capacity of Roads and Airfields, Vol. 1, pp. 281-289, Trondheim, Norway, July 1990.
8. Shell International Petroleum Company Ltd., Shell Pavement Design Manual, London 1978.
9. A. A. Shaat, Evaluation of Highway and Airport Pavement Life Based on Nondestructive Structural Assessment Techniques, Ph.D. Thesis Submitted to the Queen's University of Belfast, May 1989.
10. B. Bergstedt, Temperature Correction of Falling Weight Deflectometer, Proceedings of the third International Conference on Bearing Capacity of Highways and Airfields, Volume 1, pp 291-304, Trondheim, Norway, July 1990.
11. C. K. Kennedy and N. W. Lister, Prediction of Pavement Performance and the Design of Overlays, TRRL Laboratory Report 833, 1978.
12. S. S. Bandyopadhyay, Flexible Pavement Evaluation and Overlay Design, Journal of Transportation Engineering, ASCE, Vol. 108, No. 6, pp.526-529, 1982.

13. Y. Richard Kim et al, New Temperature Correction Procedure for FWD Deflection of Flexible Pavements, proceedings of the fourth International Conference of Bearing Capacity, Minnesota, July 1994.
14. Y. Richard Kim et al, Temperature Correction of Deflections and Back-Calculated Moduli, Transportation Research Board, 74th Annual Meeting, January 1995.
15. Susanne Baltzer and Jan Jansen, Temperature Correction of Asphalt-Moduli for FWD- Measurements, proceedings of the fourth International Conference of Bearing Capacity, Minnesota, July 1994.
16. Lynne H. Irwin. Instruction Guide for Back-Calculation and Use of MODCOMP3 Version 3.6, CLRP Publication # 93-6, August 1993.
17. R. N. Stubstad, S Baltzer, E.O. Lukanen and H.J. Ertman-Larsen, Prediction of AC Mat Temperatures for Routine Load/Deflection Measurements, proceedings of the fourth International Conference of Bearing Capacity, Minnesota, July 1994.
18. R. B. Smith and J. W. Hewitt, Seasonal Variation in Pavement Deflection Measurements in the Sydney Metropolitan Area, Australian Road Research Report, Vol. 14, No. 3, pp. 133-141, September 1984.
19. J. Medina and L. Motta, Experimental Data on Climatic Factors in Pavement and Overlay Design, Second International Symposium on Pavement Evaluation and Overlay Design, The Brazilian Pavement Association, September 1989.
20. A. M. Carson, A. F. Lowe, and M. S. Snaith, Factors Affecting Measured Deflection in Shropshire, Proceedings of the third International Conference on Bearing Capacity of Highways and Airfields, Volume 1, pp 281-290, Trondheim, Norway, July 1990.
21. A. A. Shaat, M. A. Kamal, and N. S. Matter, Relationship Between Climatic Conditions and the Structural Parameters of Flexible Pavements, Proceedings the seventh International Conference on Asphalt Pavements, Nottingham, Vol. 3, pp. 326-340, August 1992.
22. H. S. Liang and R. L. Lytton, Rainfall Estimation for Pavement Analysis and Design, Presented at the 68th Annual TRB Meeting. Washington DC, January 1989.
23. S. J. Liu and R. L. Lytton, Environmental Effects on Pavement Drainage, Vol. IV, Federal Highway Administration Report No. FHWA-DTFH-61-87-C-00057, Washington DC, 1985.
24. G. L. Guymon, R. L. Berg and T. C. Johnston, Mathematical Model of Frost Heave and Thaw Settlement in Pavements. Report: U. S. Army Cold Regions Research and Engineering Laboratory, New Hampshire 1986.

25. J. G. Mason, C.W Ollayos, G. L. Guymon, and R. L. Berg, User's Guide for the Mathematical Model of Frost Heave and Thaw Settlement in Pavement, U. S. Army Cold Regions Research and Engineering Laboratory, New Hampshire 1986
26. G. L. Guymon, T. V. Hromadka II and R. L. Berg, A One Dimensional Frost Heave Model Based Upon Simulation of Simultaneous Heat and Water Flux, Cold Region Science and Technology, Vol. 3, pp. 253-262, Elsevier Amsterdam, 1980.
27. G. L. Guymon, T. V. Hromadka II, T. C. Johnston and R. L. Berg, Results of Mathematical Model of Frost Heave, TRB, Transportation Research Record 809, pp. 1-6, Washington DC, 1981.
28. G. L. Guymon, M. E. Harr, T. V. Hromadka II and R. L. Berg, A Probabilistic Deterministic Analysis of One Dimensional Ice Segregation in a Freezing Soil Column, Cold Region Science and Technology, Vol. 5, pp. 127-140, Elsevier Amsterdam, 1981.
29. A. Casagrande and W. L. Shannon, Base Course Drainage for Airport Pavement, Proceedings of the American Society of Civil Engineers, Vol. 77, June 1951.
30. S. J. Liu, J. K. Jeyapalan and R. L. Lytton, Characteristics of Base and Subgrade Drainage Pavements, Subgrade Moisture, Soil Properties Foundations, Tunnel Reinforcement, TRB, Transportation Research Record 945 pp. 1-9.
31. J. A. Haynes and E. J. Yoder, Effect of Repeated Loadings on Gravel and Crushed Stone Base Materials in the AASHO Road Test, Highway Research Record 319, pp. 82-96, 1963.
32. G. R. Martin and D. V. Toan, Effect of Base Course Saturation on Pavement, Proceedings of Road Symposium, Vol. 2, pp. 486- 491, 1972.
33. S. H. Carpenter, M. I. Darter and B. J. Dempsey, A Pavement Moisture Accelerated Distress (MAD) Identification System, Vol. II, FHWA Report No. FHWA-RD-81-080, 1981.
34. K. R. Gabriel and J. Neumann, A Markove Chain Model for Daily Rainfall Occurrence at Tel Aviv, J. Roy, Met. Soc, 88, pp. 90-95, 1962.
35. R. W. Katz, Computing Probabilities Associated with the Markove Chain Model for Precipitation, Journal of Applied Meteorology 13, pp. 953-054, 1974.
36. E. J. Yoder and M. W. Witczak, Principles of Pavement Design, Second Edition, Wiley Interscience Publication, New York, pp. 270, 1975.
37. Haiping Zhou, Gary Elkins, Pavement Response to Seasonal Variations, proceedings of the fourth International Conference of Bearing Capacity, Minnesota, July 1994.

38. Long-Term Pavement Performance Information Management Systems, Users Guide. Publication # FHWA-RD-93-094, July 1993.
39. D.G. Fredlund and H. Rahardjo. Soil Mechanics for Unsaturated Soils. John Wiley & Sons, Inc., New York, 1993, pp. 16-27, 117, 346-371.
40. Ganesh Thadkamalla and K.P. George. Characterization of Subgrade Soils at Simulated Field Moisture, paper presented at the 74th annual TRB meeting, January 1995.
41. A. T. Corey. Measurement of Water and Air Permeability in Unsaturated Soil. Proceedings, Soil Science Society of America, vol. 21, No. 1, 1957.
42. E. L. Matyas. Air and Water Permeability of Compacted Soils. Permeability and Capillary of Soils, ASTM, STP 417, 1967.
43. Stevens, J. Applied Multivariate Statistics for Social Sciences, Hillsdale, NJ: Erlbaum, 1986.
44. Cooley, W. W., & Lohnes, P. R. Multivariate Data Analysis, New York, Wiley, 1971.
45. Lawley, D. N., & Maxwell, A. E. Factor Analysis as a Statistical Method. New York, American Elsevier, 1971.
46. R. H. McCuen. Microcomputer Application in Statistical Hydrology. Prentice Hall, NJ, 1992, pp. 195-197.
47. Govert T. H. Sweere. Unbound Granular Bases for Roads, Ph.D. Dissertation Submitted to "University Delft", Netherland, September 1990. pp. 235-254.
48. Miner, M. A., Cumulative Damage in Fatigue, Transactions of ASME, Vol. 67, pp. A159-A164, 1945.
49. Van Til, C. J., B. F. McCullough, B. A. Vallergera, and R. G. Hicks. Evaluation of AASHTO Interim Guides for Design of Pavement Structures, NCHRP 128, Highway Research Board, 1972.
50. Kooperman, S., G. Tiller and M. Tseng. ELSYM5 Interactive Microcomputer Version, User's Manual, report No. FHWA-TS-87-206, 1986.
51. Raad, L. and J. L. Figueroa. Load Response of Transportation Support Systems, Transportation Engineering Journal, ACSE, vol. 106, No TE1, pp 111-128.

52. Harichandran, R. S., G. Y. Baladi, and M. Yeh. Development of a Computer Program for Design of Pavement Systems Consisting of Bound and Unbound Materials, Department of Civil and Environmental Engineering, Michigan State University, 1989.
53. Yang H. Huang. Pavement Analysis and Design, Printice Hall, NJ, 1993.
54. J. Michelow. Analysis of Stresses and Displacements in an n-Layered Elastic System Under a Load Uniformly Distributed on a Circular Area, Chevron Research Corporation, Richmond, California, September 1963. Software is modified by Lynne H. Irwin November 1991.
55. Research and Development of the Asphalt Institute's Thickness Design Manual (MS-1), 9th ed., Research Report 82-2, Asphalt Institute, 1982