TRC9903

An Economic and Performance Evaluation of Pavements Constructed with Crushed Stone or Asphalt Stabilized Base Courses

Norman D. Dennis, Jr., Jason Dupree

Final Report

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Life Cycle Comparison of Stone versus Asphalt Treated Bases

RESEARCH

PROJECT BACKGROUND AND OBJECTIVES

The State of Arkansas Highway and Transportation Department (AHTD) uses either a crushed stone or asphalt treated base course in the construction of its flexible pavements. In general, it is recognized that pavement sections constructed with asphalt treated base courses are cheaper than pavement sections which utilize crushed stone as the base. However, designers are often reluctant to use asphalt treated bases because they fear the thinner pavement sections will not perform as well as the sections designed using crushed stone. Currently only anecdotal evidence exists to support this notion of inferior performance of asphalt treated bases. The purpose of this study was to compare the economic and physical performance of both types of pavement systems under identical, or at least similar, traffic loadings and similar subgrade conditions. A review of the pertinent literature has suggested that asphalt treated bases can successfully replace crushed stone bases, at least in the primary function of providing support for the overlying asphalt surface. It was the intent of this study to verify the performance of the two base course types for the design methods and construction practices encountered in Arkansas.

From a list of over 40 suggested locations only 14 sections of roadway met the criteria to be considered as acceptable companion sections. These 14 sites were geographically dispersed across the State of Arkansas, had sections of both crushed stone and asphalt treated base, were subjected to the same traffic loading and had similar subgrade conditions. Each companion site underwent a thorough field and laboratory investigation to establish layer thicknesses and material properties for both the paving materials and the subgrade soils. The primary pavement distress indicators; rutting, cracking and roughness along with traffic data were extracted from AHTD databases in order to determine current pavement serviceability. Construction documents were also consulted to determine cost of construction and the original design criteria for each companion section. Performance prediction equations were used to establish a target serviceability index for the traffic volumes actually experienced by each section. These target values were then compared to values established from actual field measurements. Initial construction costs and appropriate maintenance and repair costs were used to establish life cycle costs for the pavements systems constructed from each base type.

FINDINGS

While the results of this study produced no absolutes to categorize one base type as clearly superior or clearly inferior for each and every companion section, some general trends were observed.

- The evidence strongly supports the notion that sections using full depth asphalt are cheaper to build and cheaper to maintain on a life cycle cost basis. For the 14 sections investigated, those with asphalt treated based cost $144,200 (1990 dollars) per lane mile and those with crushed stone cost $196,700 per lane mile.
- Full depth sections tended to have better rutting resistance than sections using crushed stone.
- Full depth sections tended to have higher subgrade moisture contents than sections using crushed stone.
- Some degree of asphalt stripping was noted in more than 1/3 of the cores taken in the field. The cores exhibiting stripping were almost equally distributed between full depth asphalt sections and crushed stone sections. This high incidence of stripping could ameliorate the practice of using layer coefficients for binder courses higher than those suggested by AASHTO.
- Based on predicted serviceability, crushed stone sections appear, in general, to be performing a little better than the AASHTO design equations would predict, while the full depth sections, in general, tended to perform a little poorer.
- Virtually all of the crushed stone sections were constructed with a thicker section than specified in the construction drawings. Typically the increase in thickness was approximately 10 percent, but in some cases it was over 25 percent. By contrast the pavement sections using full depth asphalt were much more likely to be built to the same thickness as specified in the design. In some cases the as-built thickness was actually less than specified for the full depth sections.

Overall, it appears that both base course types are actually performing in accordance with predicted behavior. Both base course types should be considered in future designs with crushed stone being preferred in areas with poorly drained subgrades and full depth asphalt being preferred in areas where subgrades are more drainable.

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16. Abstract

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From a list of over 40 suggested locations only 14 sections of roadway met the criteria to be considered as acceptable companion sections. These 14 sites were geographically dispersed across the State of Arkansas, had sections of both crushed stone and asphalt treated base, were subjected to the same traffic loading and had similar subgrade conditions. Each companion site underwent a thorough field and laboratory investigation to establish layer thicknesses and material properties for both the paving materials and the subgrade soils. The primary pavement distress indicators; rutting, cracking and roughness along with traffic data were extracted from AHTD databases in order to determine current pavement serviceability. Construction documents were also consulted to determine cost of construction and the original design criteria for each companion section. Performance prediction equations were used to establish a target serviceability index for the traffic volumes actually experienced by each section. These target values were then compared to values established from actual field measurements. Initial construction costs and appropriate maintenance and repair costs were used to establish life cycle costs for the pavements systems constructed from each base type.

In many instances, the measured PSI of pavements using a crushed stone base were slightly better than would be predicted by the traffic loading experienced. On the other hand, the PSI for pavements using treated asphalt bases tended to be slightly lower than would be predicted by the traffic loading. It was also noted that pavement sections with crushed stone bases were far more likely to be constructed significantly thicker than the design called for, while treated asphalt sections were very likely to be constructed slightly thinner than specified in the design. While some differences in performance were noted between base course types, the overall conclusion of this study is that properly designed pavement sections using either base material type will perform in accordance with predictions made using the current AASHTO design equations

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AN ECONOMIC AND PERFORMANCE EVALUATION OF PAVEMENTS CONSTRUCTED WITH CRUSHED STONE OR ASPHALT STABILIZED BASE COURSES

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CHAPTER 1
INTRODUCTION

1.1 PROBLEM STATEMENT

Arkansas currently uses either a crushed stone or an asphalt treated base course in the design of flexible pavements. However, there is currently no formal guidance to determine when the use of one of these materials may be more effective. While initial construction costs is one of the main factors considered in the decision making process, other factors such as material availability and time constraints play a role. The material costs of asphalt treated base are higher compared to that of crushed stone base, but the resulting pavement section using an asphalt stabilized base is considerably thinner. Therefore, the total construction costs, including pavement and shoulder construction, are usually lower when using an asphalt stabilized base.

Since asphalt stabilized base is not always selected for construction, there must be some other criteria or factors considered when selecting the base course material for a flexible pavement. One possible factor is that there may be some question concerning the performance of pavements having an asphalt stabilized base compared to pavements with a crushed stone base. Some believe that pavements with an asphalt stabilized base perform inadequately. Unfortunately, this information is based on only limited examples where inadequate investigation was performed to determine if the poor performance was caused by factors related to the base course, subgrade, or construction techniques. Therefore, research is necessary to determine if the choice of an asphalt stabilized base instead of a crushed stone base affects the performance and life-cycle costs of a pavement.

Design engineers need to have some rational basis or model at their disposal when selecting which material to use as a base course in a flexible pavement design. This research is focused on developing criteria that will aid designers in the selection of a base course material.

1.2 BACKGROUND

The three major types of pavements in use today are rigid, flexible, and composite. Rigid pavements are constructed of Portland cement concrete (PCC) with or without a granular subbase course. Flexible pavements consist of an asphalt surface supported by either an unbound granular base course or a stabilized base course. A composite pavement uses both PCC and asphalt. This could mean that it has either a PCC surface supported by an asphalt base course or it is an asphalt overlay of an existing rigid pavement.

Flexible pavements can have either an unbound granular base course or a stabilized base course. The most common type of flexible pavement, often referred to as a conventional flexible pavement, has an asphalt surface (surface course and binder course) supported by an unbound granular base course, typically crushed stone. There may, or may not, be a subbase course consisting of a lower grade material. The other type of flexible pavement uses an asphalt surface (surface course and binder course) supported by a stabilized base course, typically asphalt stabilized. However, it could be stabilized with another material such as cement or lime, although lime is mostly used to stabilize a subgrade, not a granular base course. Full-depth asphalt pavements are a specific case in the category of flexible pavements with a stabilized base course. A full-depth asphalt pavement, conceived by the Asphalt Institute in 1960 (Huang, 1993), is one in which the asphalt surface course is supported by an asphalt binder course, which is placed directly on the prepared subgrade. What separates full-depth from a typical asphalt stabilized base course is that a full-depth pavement is designed so that the entire structure is hot-mix asphalt cement (HMAC). Full-depth pavements utilize an HMAC binder course as its base course, as opposed to an asphalt stabilized material. The binder course has better structural properties than an asphalt stabilized base. Therefore, the addition of an extra thickness of binder can "replace" a thicker section of asphalt stabilized base. Since full-depth pavements use an asphalt binder as their "base course", they fall into the more general category of flexible pavements using an asphalt stabilized base course.

Currently, the Arkansas State Highway and Transportation Department (AHTD) follows the *1993 American Association of State Highway Officials (AASHTO) Guide for the Design of Pavement Structures* when designing a pavement structure (AHTD, 1998). When designing a pavement, the Roadway Design Division of AHTD develops three alternatives, two using a crushed stone base course, and one using an asphalt stabilized base course design. Depending on the job (i.e. interstate), one of the crushed stone alternatives may be replaced with a rigid pavement design. An estimator then creates a cost estimate for each alternative based on historical unit costs, job location, material availability, etc. The three alternatives along with their cost estimates are then sent to the Roadway Design Engineer who makes the decision of which alternative to use. This decision takes into account factors such as costs, location, material availability, and recommendations from those involved, such as the Resident Engineer who will oversee the construction of the job. The selected alternative is then sent to the Assistant Chief Engineer for Design for approval. While there does not appear to be a specific standard used to select an alternative, pavements with an asphalt stabilized base course are usually selected for notch and widening jobs (i.e. the removal of a pavement's shoulders and construction of new lanes adjacent to the existing lanes) because of quicker construction time and easier maintenance of traffic. Pavements with a crushed stone base course usually are selected for jobs with a new alignment (Woods, 1999). It is the goal of this research project to develop some guidance in the selection process based on pavement performance and life-cycle cost analyses between Stone Base and asphalt stabilized pavements. This research will be based on pavement sections that have been designed and constructed in the state of Arkansas from the late 1970's to the present.

1.3 OBJECTIVES

The purpose of this research project is to compare the performance and economics of pavements using crushed stone base courses versus pavements using asphalt stabilized base courses. An attempt will be made to develop some criteria to aid in the selection of material for use as a base course in flexible pavement design. As part of this research program, pavement sections considered good companion sections will be sampled and tested. Pavements will be considered companion sections if one section of the pavement was constructed with a crushed stone base, and a corresponding section of the pavement was constructed with an asphalt stabilized base. Both sections should experience more or less the same traffic loading.

In addition to the sampling and testing of companion sections to determine material characteristics, an economic evaluation of their performance will be conducted. For the economic evaluation, a life-cycle cost analysis will be performed. To do a life-cycle cost analysis, it is necessary to have good cost records for the life of the pavement. Recommendations will be made in regard to record keeping along with procedures for conducting a life-cycle costs analysis.

The second phase of this research, which is not included in this report, will consist of an evaluation of the design procedures available for flexible pavements and the determination of whether or not these pavements are performing as designed.

If there is a deficiency in performance or high life-cycle costs of a pavement section, an attempt will be made to determine if the deficiency was related to the base course material or some other factor such as design or environment. The end result should give designers some guidance for making future decisions concerning whether to use an asphalt stabilized base or a crushed stone base.

CHAPTER 2
LITERATURE REVIEW

The main objective of this project is to develop criteria for deciding when to use an asphalt stabilized base course versus a crushed stone base course in the design of a flexible pavement section. This criteria should primarily involve choosing the material that will provide adequate performance at the lowest cost over the life of the pavement. To develop this criteria, it is important to know the basics of a flexible pavement design procedure and what the advantages and disadvantages of different base course materials are. It is also necessary to discuss the development and use of a life-cycle cost analysis.

2.1 FLEXIBLE PAVEMENT DESIGN CONSIDERATIONS

The AHTD uses the *1993 AASHTO Guide for the Design of Pavement Structures* as a basis for their flexible pavement design (AHTD, 1998). The AASHTO procedure was developed based on the results of the AASHO Road Test conducted in Ottowa, Illinois from 1958 to 1960 (Huang, 1993). From the results of this Road Test, a set of empirical performance equations were developed. These equations were then modified to allow their use in areas outside of Illinois. Based on inputs such as traffic (in the form of equivalent single axle loads), reliability, standard deviation, and subgrade resilient modulus, a required structural number (SN) is calculated.

The equivalent single axle load (ESAL) concept was developed to convert a stream of different vehicles (different axle loads and axle configurations) over a certain design period into a comparable number of passes of an 18-kip single axle load. Reliability and standard deviation take into account the variability of traffic estimates and the uncertainties of performance predictions. The use of reliability allows for some level of assurance that the pavement will perform adequately over its design life by establishing a separation between load and performance distributions. Subgrade resilient modulus is a measure of the support provided by the subgrade soil (AASHTO, 1993).

It is necessary to design a pavement cross-section that will provide the required SN. The SN of the pavement cross-section is determined using Equation 1, and is a function of the material properties and thicknesses for each layer in the pavement cross-section.

$$SN = a_1D_1 + a_2D_2m_3 + a_3D_3m_3 \quad \text{(AASHTO, 1993)} \tag{1}$$

where a_i = layer coefficient

In Arkansas…

= 0.44 for surface course

= 0.36 for asphalt stabilized base course

= 0.14 for crushed stone base course

D_i = layer thickness (inches)

m_i = layer drainage coefficient

Inspection of the layer coefficients used in Equation 1 reveals that the use of an asphalt stabilized base course instead of a crushed stone base course can reduce the required base thickness, resulting in an overall thinner pavement section.

2.1.1 THICKNESS EQUIVALENCIES

A comparable way to estimate the value of using an asphalt stabilized base versus a crushed stone base is to look at thickness equivalencies, also referred to as layer equivalencies. The basic concept of a thickness equivalency is to relate how many inches of a "standard material", usually a crushed stone base course, it would take to "equal" one inch of an alternative pavement layer (NAPA, 1987). There has been a lot of work done to develop thickness equivalencies for flexible pavement layers (NAPA, 1987; Majidzadeh, 1976; Terrel, 1968; Lettier, 1964; and Monismith, 1967). The thickness equivalency of a material, such as asphalt stabilized base, can be determined from lab testing or from field testing. One of the most extensive and reliable sources of data for use in thickness equivalency analysis is the AASHO Road Test (NAPA, 1987). According to the Road Test data, hot-mix asphalt (HMAC) surface and binder has an equivalency of 3.14. That is to say, one inch of HMAC provides the same support as 3.14 inches of a dense graded crushed stone base. This equivalency is calculated by dividing the layer coefficient of HMAC, 0.44, by the layer coefficient of crushed stone, 0.14. Using the same procedure, the thickness equivalency of asphalt stabilized base is calculated as 2.57. Based on that equivalency, asphalt stabilized base provides more than twice the support of a crushed stone base. Assuming crushed stone cost $12.00/ton and asphalt stabilized base cost $20.57/ton (AHTD, 1999), to get the same structural support (i.e. 1 inch of asphalt stabilized base or 2.57 inches of crushed stone base) it would cost $1.20/sq yd for crushed stone or $1.13/sq yd for asphalt stabilized base. The savings associated with the use of asphalt stabilized base are increased even more as a result of using less material to build up the shoulders due to the thinner pavement section. Although current AHTD procedures do not refer to the use of thickness equivalencies, they, in essence, are using them in the form of the layer coefficients.

When comparing the relative merits of asphalt stabilized base course to a crushed stone base course, it is important to realize the limitations of a specific thickness equivalency, and the resulting layer coefficient. Some of the factors affecting thickness equivalency include; wheel load and contact pressure, stiffness characteristics of the material along with the surrounding materials, layer thicknesses, and subgrade characteristics (Terrel, 1968). Work by Lettier and Metcalf (1964), using elastic layer theory to calculate compressive strains at the top of the subgrade and radial strains at the bottom of the asphalt layer, demonstrated that the layer equivalency of asphalt to crushed stone is dependant on the asphalt thickness and the subgrade stiffness. Their work showed that the equivalency ratio decreases as the subgrade stiffness increases (Lettier, 1964).

Because layer equivalencies are dependant on conditions relating to the overall pavement structure, a single thickness equivalency cannot be assigned to a material (Terrel, 1968). Therefore, the use of a single layer coefficient for a pavement material is one of the downfalls of the empirically based current AASHTO design procedure.

AHTD currently uses layer coefficients of 0.44 for AC (surface and binder), 0.14 for crushed stone base, and 0.36 for asphalt stabilized base (AHTD, 1998). These values are good estimates (AASHTO, 1993), however, they are affected by the properties of the material as it exists within the pavement structure, which may not always be the same. For example, the value of 0.14 used for a crushed stone base course is based on a material with an elastic modulus (E) of 30,000 psi (AASHTO, 1993). An elastic modulus of 30,000 psi is not representative of high quality base material; however, neither is it representative of poor quality material. Therefore, if it is thought that the base material might not be of adequate quality, testing should be done to determine the elastic modulus of the material so that the appropriate layer coefficient, as determined by Equation 2 or Figure 2.1.1 (a), below, will be used in the design of the pavement structure. Equation 2 and Figure 2.1.1 (a) give relationships for estimating the layer coefficient of a granular base course relative to it elastic modulus.

$$a_2 = 0.249 (\log E) - 0.977 \quad \text{(AASHTO, 1993)} \tag{2}$$

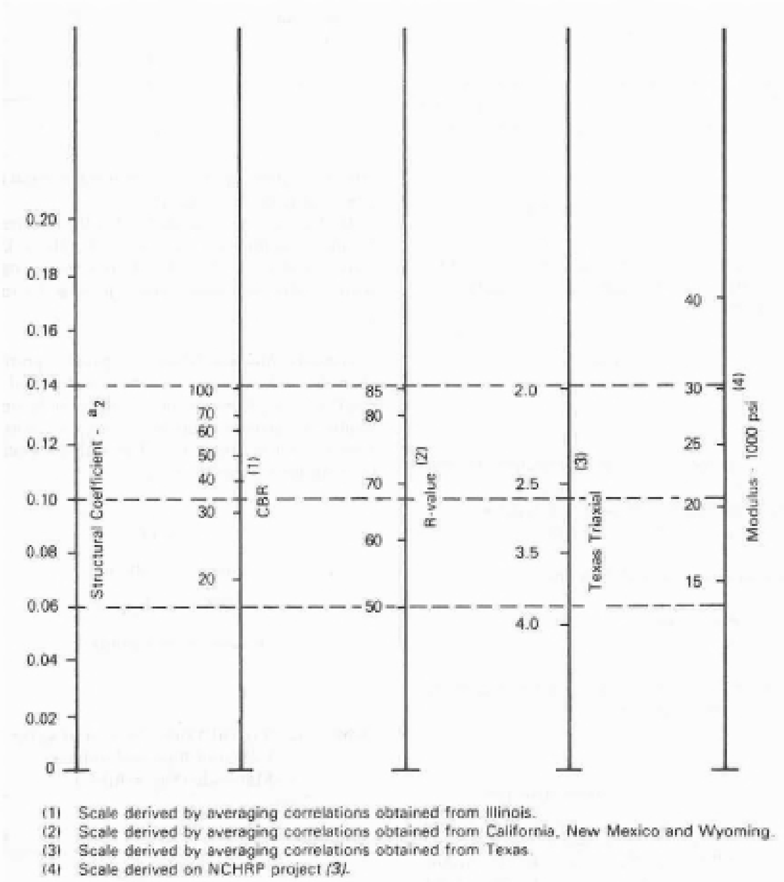

Figure 2.1.1 (a): Variation in Layer Coefficient for Granular Bases with Base Strength Parameter (AASHTO, 1993)

The AASHTO Design Guide contains a chart, Figure 2.1.1 (b), which estimates the layer coefficient of asphalt treated base course relative to either its Marshal stability or its elastic modulus. The AASHTO Design Guide also contains a chart, Figure 2.1.1 (c), for estimating the layer coefficient of asphalt surface course relative to its Elastic Modulus at 68°F. Equation 2, Figure 2.1.1 (a), Figure 2.1.1 (b), and Figure 2.1.1 (c) were derived from averaging correlations obtained from various states such as Illinois, California, New Mexico, Wyoming, and Texas (AASHTO, 1993). The correlations were developed by varying conditions and materials and calculating surface deflections, tensile strains on the asphalt, and compressive strains on the subgrade (Van Til, 1972).

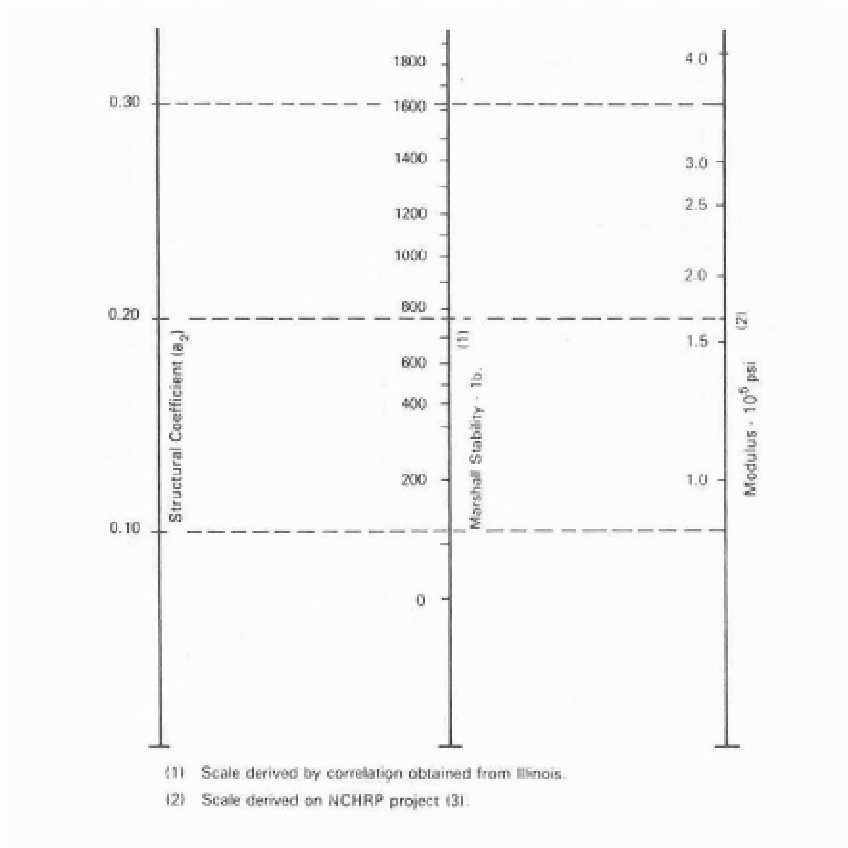

Figure 2.1.1 (b): Variation in Layer Coefficient for Asphalt-Treated Bases with Base Strength Parameter (AASHTO, 1993)

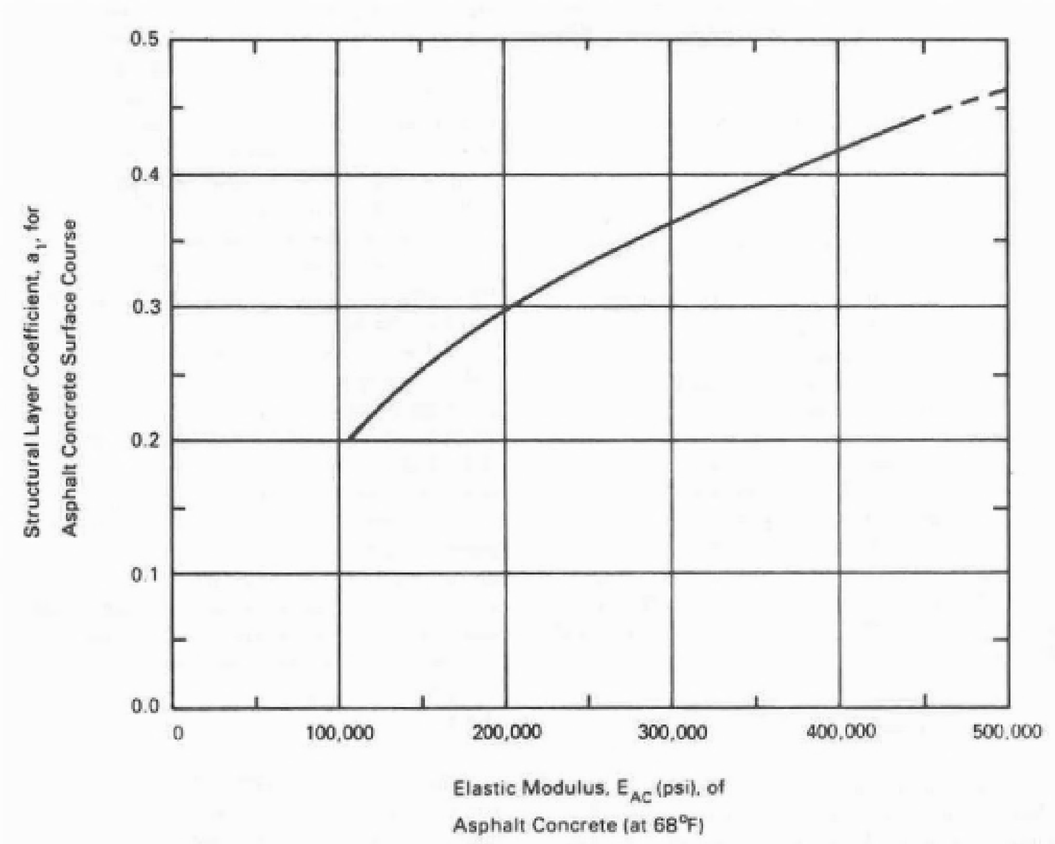

Figure 2.1.1 (c): Variation in Layer Coefficient for Dense-Graded Asphalt Concrete (surface and binder) based on the Elastic Modulus (AASHTO, 1993)

2.2 ASPHALT STABILIZED AND CRUSHED STONE BASE COURSE ATTRIBUTES

According to Huang (1993), the Asphalt Institute, which conceived the idea of full-depth asphalt pavement, claims the following advantages of using full-depth asphalt pavements:

1. The lack of a permeable granular layer minimizes the possibility of entrapping water
2. Overall construction time is reduced.
3. Traffic flow adjacent to widening jobs can usually be maintained.
4. Full-depth pavements are less susceptible to moisture.
5. Because full-depth paving uses thicker lifts, which retain heat better, paving seasons can be extended.

6. According to limited studies, there is little to no reduction in subgrade strength due to a build up of moisture contents under full-depth pavements unlike pavements with a granular base course.

The most controversial of these statements may be number 6. However, it has been verified by several independent studies (Shook, 1982 and Temple, 1987), which will be discussed later.

Possible reasons why some are skeptical of replacing a crushed stone base with a thinner asphalt stabilized base have to do with questions about whether or not an asphalt stabilized material can perform the "functions" that a crushed stone base performs. Hindermann (1968) describes some of these functions as providing drainage for the water accumulating from the surface and subgrade, cushioning the surface from any movements in the subgrade, and insulating the pavement from the effects of frost. Another function of the base course is to bridge weak areas of the subgrade. This is accomplished from the dissipation of stresses throughout the thickness of the base course layer. Although an asphalt stabilized base course is not as thick as a crushed stone base, it is still effective at reducing the stresses in the top of the subgrade.

One reason that some select a crushed stone base is that they believe that moisture is likely to accumulate in the subgrade immediately beneath a full-depth pavement (Hindermann, 1968). However, based on engineering experience, all of the questions regarding the ability of full-depth to perform the necessary functions are unfounded (Hindermann, 1968). Hindermann (1968) bases this statement on the performance of some long-serving full-depth pavements. The locations and construction dates of some of these pavements are: Omaha, Nebraska, 1889; Visalia, California, 1894; Los Angeles, California, 1905; and Kansas City, Missouri, 1956.

The following list is a summary of some of the major benefits of an asphalt stabilized base course. The subsequent pages will discuss these points further.

1. The amount of granular material required is reduced.
2. The use of full-depth results in an overall thinner pavement section.
3. Construction time is reduced.
4. Limited compaction will produce a stiff base course.
5. Reduced frost and moisture susceptibility.

In some areas, it is not economical to use large quantities of granular material. If good quality granular material is not readily available in a location near the roadway construction, then transportation costs of the granular material could be extremely high. The use of full-depth would reduce the amount of granular material required. In such areas, it is of major benefit to use full-depth construction.

Pavements with an asphalt stabilized base course have an overall thinner pavement section compared to pavements with a crushed stone base course. This is a major advantage when the construction of a roadway involves existing utilities. If the construction job involves matching an existing elevation, such as a curb and gutter, and there are existing utilities under the pavement, then using a thinner pavement section could allow pavement construction without relocation of the utilities. Whereas the use of a crushed stone base course might cause the pavement to be too thick, resulting in the lowering of existing utilities. I. C. van der Vyver (1989) describes the design and construction of a rehabilitation project for two heavy-duty urban pavement sections in which asphalt stabilized base was selected over crushed stone for the reasons just discussed, despite the crushed stone base course being the cheaper alternative. Thinner pavement sections also provide a large reduction in the amount of granular material necessary to build up pavement shoulders, which saves on construction costs.

The use of an asphalt stabilized base course accelerates construction time relative to a crushed stone base course. The Texas State Department of Highways and Public Transportation (TSDHPT) selected full-depth construction when increasing the capacity of Interstate 35 (McGennis, 1982). Interstate 35, north of Austin, Texas, was widened from four to six lanes with a ten-foot shoulder on the inside for a length of 5.7 miles. The main reason for selecting full-depth construction was accelerated construction times which allowed the road to be opened to traffic much sooner. TSDHPT officials estimated that the use of a full-depth pavement provided construction time savings between three to six months over the use of a conventional crushed stone base type pavement. Not only was the entire project completed sooner, but the existing four lanes were allowed to remain open during peak flow times to ease traffic flow. Another example in which an asphalt stabilized base course was selected over crushed stone to accelerate construction was an improvement along Hollywood Boulevard in Los Angeles, California (Pardee, 1972). They were able to excavate the failing asphalt and aggregate base, and lay down the new full-depth pavement with minimum interruption to the daily traffic user and local businesses.

Another benefit of using an asphalt stabilized base course is that limited compaction will produce a stiff base course. For a crushed stone base course to develop high stiffness, it must be compacted to high densities. During the construction process, it could be difficult to obtain high densities on the first layer of an untreated, granular base if the subgrade is soft. A stiff base course is needed to provide support and minimize rutting. Given current compaction procedures (i.e. vibratory and static steel wheel rolling), which apparently are more successful on asphalt stabilized material than unbound material, pavements with a treated base course show less rutting than pavements with an untreated base course (NAPA, 1987). It should be noted that this statement was taken from the National Asphalt Pavement Association, which may have a bias toward material containing asphalt.

The question of whether or not an asphalt stabilized base course will perform adequately relative to a crushed stone base course is answered by how well the asphalt stabilized base course performs the functions required in a flexible pavement, namely, to provide structural support for the surface course (AASHTO, 1993). According to Leykauf, theoretical studies have shown that an asphalt stabilized base can satisfactorily substitute for a crushed stone base relative to bearing capacity, insulating the subgrade from frost penetration, and providing adequate drainage (Leykauf, 1972).

An advantage of using an asphalt stabilized base relative to performance issues is reduced frost susceptibility. The main reason that crushed stone base courses are frost susceptible is that enough fines have to be present in the granular material so that the base course can be compacted and shaped (NAPA, 1987). If the base course contains too many fines it will be frost susceptible because of capillary rise of moisture into the base course. This would cause problems in the spring-thaw period when frost-susceptible materials loose strength. However, most materials that qualify for use in a base course in the State of Arkansas are not frost susceptible.

According to Vyver (1989), pavements using an asphalt stabilized base are far less susceptible to damage from moisture than pavements using a crushed stone base. An increase in moisture reduces the stiffness of an aggregate base course (Khosla, 1996). This loss of stiffness and strength results in a reduction in shear strength leading to significant pavement distress (Yoder, 1975). During the spring, when moisture contents are the highest, asphalt stabilized base courses maintain their stiffness and strength better than crushed stone base courses. The moisture susceptibility of granular material results in the deflections of Stone Base pavements being a function of seasonal changes in moisture content. On the other hand, Shook (1982) states that seasonal variations in deflection for full-depth sections are related to temperature changes, rather than moisture or frost. That is, full-depth pavements loose strength and deflect as a result of asphalt softening due to temperature increases, while Stone Base pavements loose strength and deflect due to increases in moisture.

The use of crushed stone as a base course does have some advantages. The first is lower material cost relative to an asphalt stabilized material. Another advantage is that the construction process when installing a crushed stone base is less complicated. The placement of hot-mix asphalt requires a lay-down machine with skilled operators, multiple dump trucks with drivers, a vibratory compactor, and a finish roller. The only equipment necessary for the placement of crushed stone is a grader, some dump trucks to unload the material, and a vibratory compactor. The use of crushed stone also allows multiple chances to get the final grade desired. It is also believed that the thicker base course helps to "bridge" soft spots in the subgrade by dissipating stresses before they reach the subgrade. Unlike asphaltic material, crushed stone material does not have to be hot to be placed and compacted. Therefore, construction seasons are extended. Another benefit of crushed stone is that contractors get multiple chances to achieve a good density. On the other hand, once the asphalt stabilized base is laid down, it begins to cool off, which limits the amount of time a contractor has for compaction. If they don't get the asphalt stabilized base course compacted on the first try it is too late.

2.3 PAVEMENT PERFORMANCE MEASURES

The performance of pavements are judged by their Present Serviceability Index (PSI). At the AASHO Road Test, the new flexible pavements had an average PSI of 4.2, where 5.0 is the PSI for a perfectly smooth pavement (Huang, 1993). A PSI of 1.5 is defined as the terminal PSI. Most flexible pavements are designed so that their useful lives end at a PSI of 2.5 (AHTD, 1998). For flexible pavements, factors such as cracking, patching, roughness, and rutting are measured and converted into the PSI for the pavement section using Equation 3.

$$PSI = 5.03 - 1.91 \log(1+SV) - 1.38 RD^2 - 0.01 (C+P)^{0.5} \quad \text{(AASHTO, 1993)} \qquad (3)$$

where: SV = Slope Variance, 10^6 x population variance of slopes measured at 1-ft intervals

RD = Rut Depth, inches

C = Cracking, linear feet per 1,000 ft^2

P = Patching, square feet per 1,000 ft^2

2.3.1 CRACKING AND PATCHING

Cracking of an asphalt pavement is typically the result of either fatigue failure under repeated traffic loading or shrinkage of the hot mix asphalt from daily temperature cycling (Huang, 1993). There are three levels of severity for defining cracking; class I, class II, and class III. Class I fatigue cracks consist of fine disconnected hairline cracks (HRB, 1962). Class I cracking is not considered when determining serviceability, only when the cracks develop into class II or III are they considered severe enough to be included. Class II cracking is commonly referred to as alligator cracking. Class III cracking occurs when the distress is serious enough to cause the fragments of pavement to rock under traffic. Patching is used to repair small areas of the pavement that have significant distress, such as cracking. Both of these factors are included in Equation 3. However, they are not easily obtainable on a large scale due to the tedious task of measuring and recording the data and usually do not have a significant impact on PSI. Therefore, most state agencies simply convert roughness into PSI (Huang, 1993)

2.3.2 ROUGHNESS AND RUTTING

Roughness is measured as the variation from grade, in meters per kilometer (inches per mile), along the longitudinal surface profile and is termed the International Roughness Index (IRI). IRI data is obtained by use of a mechanical profilometer. AHTD does not currently convert IRI to PSI. They use IRI measurements as an indicator of how rough the pavement is.

Based on the FHWA's *Highway Statistics 1994*, a pavement's condition can be evaluated based on the following range in IRI values. An IRI less than 0.95 m/km (60 in/mi) indicates very good pavement condition, 0.95 to 1.48 m/km (60 to 94 in/mi) is good, 1.50 to 1.88 m/km (95 to 119 in/mi) is fair, 1.89 to 2.69 m/km (120 to 170 in/mi) is mediocre, and greater than 2.68 m/km (170 in/mi) is poor (FHWA, 1995). It should be noted that these ranges in IRI should only be used as an indicator of pavement serviceability and should not form the basis for a final decision on how a pavement is performing.

Since it was found that roughness had the greatest impact on PSI, Hall (1999) developed equations to directly relate pavement roughness, as measured by IRI, to pavement serviceability, as measured by PSI. To develop this relationship, an equation was created based on the correlation between the slope variance (SV) of the pavement to PSI based on the results of the AASHO Road Test, as shown in Figure 2.3.2 (a). An equation was also developed relating SV to IRI, as shown in Figure 2.3.2 (b).

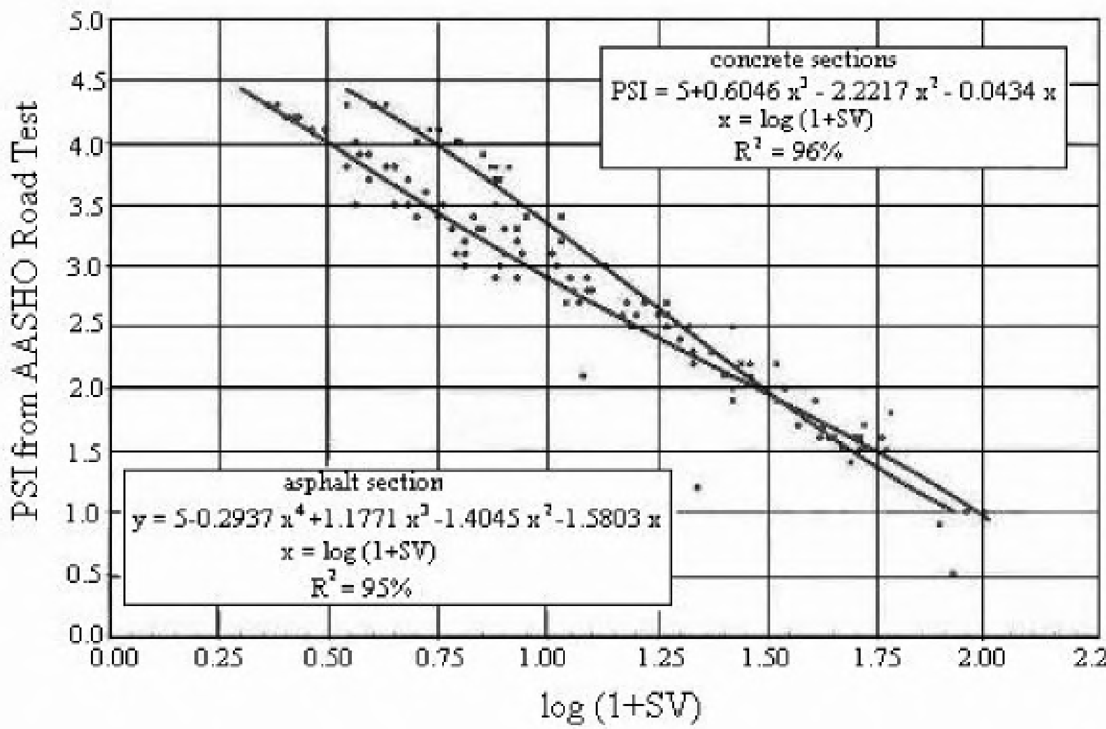

Figure 2.3.2 (a): PSI from AASHO Road Test Equations versus log (1+SV) (Hall, 1999)

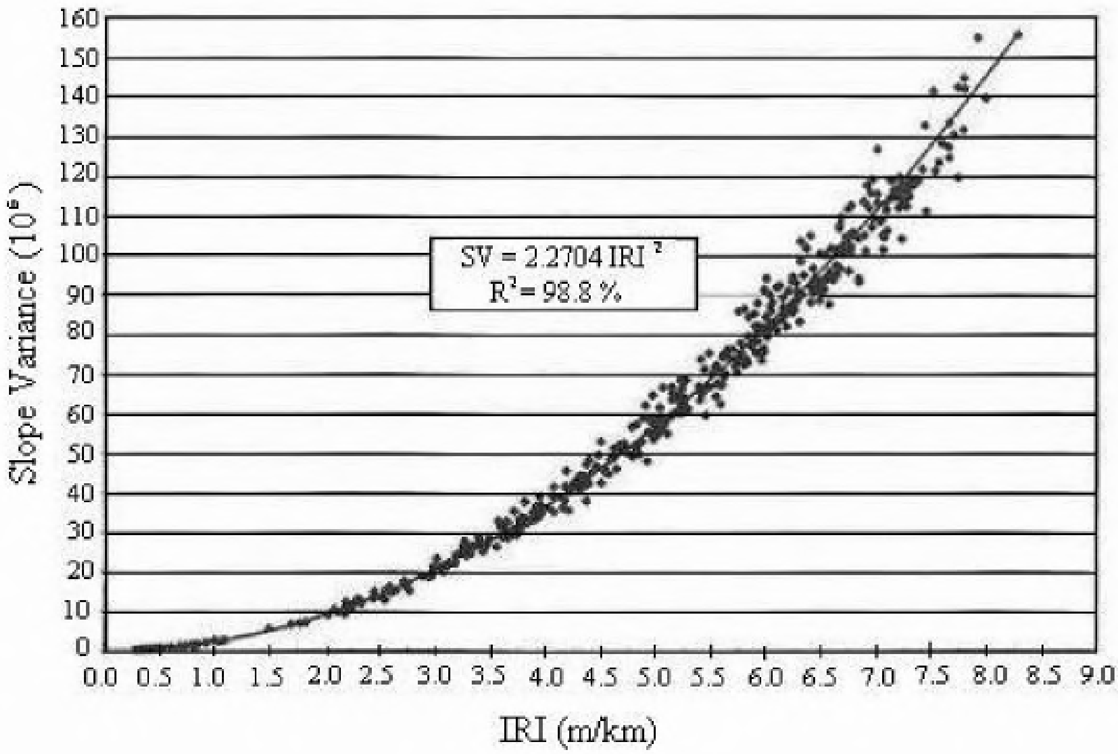

Figure 2.3.2 (b): Relationship of SV to IRI (Hall, 1999)

The two equations developed in Figures 2.3.2 (a) and (b) were combined to form Equation 4, which directly correlates IRI to PSI. It should be noted that Equation 4 is only applicable to asphalt pavements. However, Hall (1999) developed similar relationships for concrete pavements.

$PSI=5-0.2937x^4+1.1771x^3-1.4045x^2-1.5803x$ (Hall, 1999) (4)

where: $x = \log(1+2.2704(IRI)^2)$, IRI in m/km

(1 m/km = 63.36 in/mile)

However, Equation 4 should not be used when the IRI is outside the range of 0.5 to 5.0 m/km (31.7 to 317 in/mi) or the PSI is outside the range of 4.5 to 1.0 because of the lack of AASHO Road Test data on which to extrapolate.

Equation 4 determines how a pavement is currently performing based on roughness. To determine if the pavement is performing as it should, a comparison can be made to the expected PSI as calculated from the AASHTO Performance Equations as determined from the AASHO Road Test (AASHTO, 1993).

$$\log W = \log \rho + \frac{\log\frac{(p_i - p)}{(p_i - 1.5)}}{\beta} \tag{5}$$

where:

$$\log \rho = 5.93 + 9.36 \log(SN+1) + 4.33 \log(L2) - 4.79 \log(L1+L2) \tag{6}$$

$$\beta = 0.4 + \frac{0.081(L_1 + L_2)^{3.23}}{(SN+1)^{5.19} L_2^{3.23}} \tag{7}$$

SN = Structural Number

L_1 = Axle Load in kips

L_2 = 1 for single axle and 2 for tandem axle

Hall's equations (Hall, 1999) only considers roughness when determining PSI. However, a pavement could have a low IRI, indicating a smooth, well-performing pavement, and still have a consistent three-inch rut, indicating poor performance. Rutting can be accounted for by first using the equation in Figure 2.3.2 (b) to convert IRI into SV, and then using Equation 3 to determine PSI. However, when comparing the rutting between pavements with different base courses, an attempt should be made to only consider structural rutting, not rutting that occurs within the asphalt mix. Since cracking and patching have a low impact on PSI, they can be ignored when using this method.

2.4 CASE STUDIES

The following sections discuss some of the full-scale pavement tests that have addressed issues related to the use of various base course materials in flexible pavements. The full-scale experiments discussed include; the AASHO Road Test, the Ordway Colorado Experimental Base Project, research by the North Carolina Department of Transportation, and the Louisiana Experimental Base Project.

2.4.1 AASHO ROAD TEST

The specific purpose of the AASHO Road Test was not to compare pavements with an asphalt stabilized base course to pavements with a crushed stone base course. There was, however, work done on a special base experiment as part of the AASHO Road Test. This experiment compared four different types of base course materials; crushed stone, well-graded uncrushed gravel, cement-treated, and asphalt-treated (Benkelman, 1962). Performance measures, such as rut depth, were analyzed graphically to allow a comparison of performance for pavements consisting of the four types of base courses. For example, given a 76.2 mm (3 inch) surface, a 101.6 mm (4 inch) subbase, and 1,000,000 applications of an 18-kip single axle load, it was found that to maintain a Present Serviceability Index (PSI) of 2.5 it would require either 330.2 mm (13 inches) of a crushed stone base, 203.2 mm (8 inches) of a cement-treated base, or 152.4 mm (6 inches) of an asphalt-treated base (Benkelman, 1962). Based on this experiment, along with further analysis of the data obtained from the Road Test, the superiority of the different base courses were ranked as follows: (1) asphalt treated, (2) cement treated, (3) crushed stone, (4) gravel bases (Huang, 1993).

2.4.2 ORDWAY COLORADO EXPERIMENTAL BASE PROJECT

The Ordway Colorado Experimental Base Project was a full-scale field experiment which was opened to traffic in 1965 (Shook, 1982). The purpose of the project was to compare pavements consisting of various base courses, namely, full-depth hot-mix sand asphalt, full-depth asphalt concrete, and untreated material. The last measurements taken as part of this experiment were in September 1978. There were 20 different test sections studied as part of this research project. Of these 20, 7 were full-depth sections with base course thicknesses of 140, 178, and 216 mm (5.5, 7.0, and 8.5 inches). Four sections were Stone Base pavements with a base course thickness of 178 mm (7.0 inches) of untreated, granular base. The other 9 sections were full-depth pavements with either a low or high stability sand asphalt base course. All of the pavement sections had a uniform asphalt surface course 50 mm (2.0 inches) thick.

Ordway is located in southeast Colorado in the high plains where most of the soil is silty and frost susceptible. There were 2 soils used as subgrade material an A-7-6 (AASHTO Classification System) with a California Bearing Ratio (CBR) of 2.6 and an A-6 with a CBR of 3.4. The test sections were randomly placed between the two subgrade soils.

Several conclusions were drawn from the Ordway Colorado Experimental Base Project:

1. Pavements using an asphalt concrete base course showed the best resistance to rutting and all forms of cracking.
2. Fatigue or load-associated cracking, also referred to as alligator cracking, was much more prevalent in the untreated base course pavement section. Two percent of the full-depth pavement was found to have alligator cracking. In contrast, 30 percent of the Stone Base pavement was identified as having alligator cracking.
3. After twenty years in service, no appreciable difference can be found between the performance of the full-depth pavements and the stone base pavements. Present Serviceability Index values of between 1.6 and 1.9 were calculated for both pavement types.
4. Transverse cracking was much more prevalent in the full-depth pavement. Seventy percent of the full-depth pavement had transverse cracking. Thirty-eight percent of the stone base pavement had transverse cracking.
5. Longitudinal cracking was similar in both pavement sections. Both pavements had approximately 30 percent longitudinal cracks.
6. Deflection data was similar for both pavement sections.
7. Moisture contents in the subgrade were higher under the stone base pavement sections.

Based on a comparative analysis using the rut-depth and deflection measurements, the average layer coefficients for the asphalt concrete base and the untreated base at this project were 0.34 and 0.16, respectively. These coefficients were determined by first assuming that the coefficient for the asphalt treated base was 0.34. The coefficient for the untreated base was then determined to be 0.16 by dividing 0.34 by the average ratio of rut depth measurements and deflection measurements of the full-depth pavements to the stone base pavements. The determined coefficients from this research, which was concluded in 1978, were 0.34 and 0.16. By comparison, AHTD uses 0.36 and 0.14 (AHTD, 1998).

2.4.3 RESEARCH BY N.C. STATE'S CENTER FOR TRANSPORTATION ENGINEERING STUDIES

Khosla, et al (1996), discusses research funded by the North Carolina Department of Transportation (NCDOT) and conducted by the North Carolina State University's Center for Transportation Engineering Studies to compare the performance of different flexible pavement designs.

Twelve flexible pavement cross sections were studied in twenty-four separate locations along an approximately 12.1 km (7.5 mile) long portion of US 421 Bypass near Siler City, North Carolina. The test sections were constructed in the Fall of 1989 and the Spring and Summer of 1990. Pavement cross sections were all composed of a top course of 50.8 mm (2.0 inches) of asphalt surface. The sub-structure of the test sections consisted of one or more of the following materials: asphalt binder course, asphalt stabilized base course, granular base course, cement-treated base course, cement stabilized subbase, and/or lime stabilized subbase.

To analyze the design aspects and performance of the different pavement cross sections, moisture contents were recorded throughout the subgrade and temperature data was recorded for the subgrade and at different locations in the pavement structure. Pressure gauges were placed at the subgrade-base course interface and strain gauges were placed at the asphalt-base course interface. In pavement sections that were composed of stabilized subgrade material, the pressure gauges were placed below the stabilized layer. For pavement sections composed of several asphalt layers, the strain sensor was placed below the bottom asphalt layer.

Additionally, a multi-depth deflectometer, which is a linear variable differential transformer based instrument, was used to measure deflections at specific depths in the pavement section. Traffic measurements were made using weigh-in-motion devices. A study of the materials to be used in the test section - including resilient modulus tests of the subgrade, base, and asphalt types - was also included in the study.

As part of their research, a falling weight deflectometer (FWD) was used to obtain deflection measurements. The FWD creates a deflection in the pavement by dropping a weight onto a loading plate, 300 mm (11.8 inches) in diameter, which rests on the pavement surface. A load cell is used to measure the applied load. Deflection measurements are made using velocity transducers spaced at various distances away from the loading plate. The impact of the FWD creates a deflection basin in the pavement section. Based on the deflections at two sensors, one directly under the load and one at some distance away, a Surface Curvature Index (SCI) is calculated to describe the curvature of the deflection basin.

High SCI values mean that the pavement does not deflect significantly away from the applied load, indicating a stiff, well-performing pavement. From analyses made during the NCDOT research project, pavements with an aggregate base course showed higher SCI values when compared to full-depth pavements.

Based on predicted responses calculated using WES-5, a program based on multi-layered elastic theory, the following generalizations were presented:

1. Stresses at the top of the subgrade were generally greater than predicted for the aggregate base course sections and were significantly less than predicted for the full-depth asphalt sections.
2. In this study, based on actual stresses at the top of the subgrade, it appears that 101.6 mm (4.0 inches) of an asphalt stabilized base is equivalent to 203.2 mm (8.0 inches) of an aggregate base course. Also, 139.7 mm (5.5 inches) of an asphalt stabilized base course is approximately equivalent to 304.8 mm (12.0 inches) of an aggregate base course. This gives thickness equivalencies of asphalt concrete base as 2.00 and 2.18, compared to an equivalency of 2.57 as determined by the AASHO Road Test.
3. Pavement distress surveys of the pavement sections consistently rated the sections with asphalt treated base course better than sections with aggregate treated base course.
4. Fatigue cracking and rutting were more common/greater in the aggregate base course sections than they were in the asphalt stabilized base sections for the pavement sections with 101.6

mm (4.0 inches) of asphalt treated base course and 203.2 mm (8.0 inches) of aggregate base course, respectively. The data on longitudinal cracking was inconclusive for a comparison of these pavement sections.

5. Longitudinal cracking and fatigue cracking was more common in the aggregate base course sections than they were in the asphalt stabilized base sections for the pavement sections with 139.7 mm (5.5 inches) of asphalt treated base course and 304.8 mm (12.0 inches) of aggregate base course, respectively. Rutting was slightly less in the asphalt treated base course section.

2.4.4 LOUISIANA EXPERIMENTAL BASE PROJECT

The Louisiana Experimental Base Project consisted of the design and construction of eighteen full-scale flexible pavement test sections (Temple, 1987). The fourteen test sections and four control sections along U.S. Route 71 and U.S. Route 167 in central Louisiana were opened to traffic in August of 1976. The location of the project was between the low wetlands of south Louisiana and the slight hills in the northern part of Louisiana, providing a flat terrain with poor drainage.

The test sections were designed with various design lives (5, 10, and 15 years) and constructed with various base course materials (soil cement, stabilized sand clay gravel, and asphalt stabilized). The base course thicknesses ranged from 76.2 to 508 mm (3 to 20 inches), and surface thicknesses ranged from 88.9 to 139.7 mm (3.5 and 5.5 inches). The control sections consisted of 139.7 mm (5.5 inches) of surface course, 190.5 mm (7.5 inches) of asphalt stabilized base course, and 152.4 mm (6 inches) of soil-cement stabilized subbase. From 1976 through June of 1985, the sections used in this research project were subjected to 1.66 million ESAL's. Table 2.4.4 shows a summary of the fourteen test sections. While this project provides no direct comparison between full-depth pavements and pavements with a crushed stone base, it does provide some information about the performance of full-depth pavements.

Table 2.4.4: Summary of Test Sections at the Louisiana Experimental Base Project (after Temple, 1987)

Section #	Design Life (Years)	Layer Thicknesses (mm)			
		AC	Asphalt Stabilized Base	Soil-Cement Stabilized Base	Cement Stabilized Sand Clay Gravel
T-1	15	139.7	203.2		
T-2	10	139.7		228.6	
T-3	15	88.9	279.4		
T-4	15	88.9		508.0	
T-5	10	88.9	190.5		
T-6	15	139.7		406.4	
T-7	10	139.7	114.3		
T-8	10	88.9		381.0	
T-9	5	139.7		152.4	
T-10	5	88.9		304.8	
T-11	5	139.7	76.2		
T-12	5	139.7			152.4
T-13	5	88.9			254.0
T-14	5	88.9	152.4		

Note: 1 inch = 25.4 mm

Field data was collected at six-month intervals between 1976 and 1985. A weigh-in-motion detector made a detailed description of traffic during the course of the study. Falling Weight Deflectometer (FWD) measurements were made at 30.48-m (100-ft) intervals to characterize seasonal changes in deflection levels. Visual surveys were also made to note the occurrence of rutting and cracking in the pavement sections.

The sections with an asphalt stabilized base developed class I fatigue cracks over their entire lengths within seven years of construction. These fatigue cracks were confined to the wearing course and binder course, and were not found in the asphalt stabilized base course. This is contrary to the assumptions of elastic-layer theory, which states that fatigue cracks start at the bottom of the asphalt layer and work their way to the surface. One possible explanation is that stripping in the asphalt was the cause of the fatigue cracking. Stripping was detected in asphalt cores taken from the wheelpaths at the same location where the fatigue cracking occurred. Stripping was most likely confined to the wearing and binder course, and not in the asphalt stabilized material, because the aggregate used in the wearing and binder course was produced at a different plant than the remainder of the project. Stripping was also found in cores taken outside of the wheelpath at the same depth as stripping in the wheelpath, indicating that stripping most likely occurred before the fatigue cracking (Temple, 1987). Cores from test sections T-11 and T-14, both full-depth sections, showed no signs of stripping. These two test section generally performed better than the other full-depth sections. Test sections T-11 and T-14 showed no class II cracking and less rutting than the other full-depth sections, despite having thinner sections (and resulting lower structural numbers). The conclusion is that the elimination of stripping from the pavement section will have a greater impact on increased performance than increasing the pavement's structural capacity (Temple, 1987).

Observations of the test sections also showed that the full-depth pavements supported by a stiff, cement stabilized subbase (i.e. the control sections) showed less rutting than the full-depth pavements supported by an unstabilized subbase. The support provided by the subgrade is important, especially when protecting the pavement against distress, such as rutting. If the subgrade is weak, i.e. low shear strength, then under repeated loading the subgrade will compress and displace laterally, causing ruts to develop in the pavement structure. In addition to this study, Hopkins et al. (1994) also showed that the use of hydrated lime or cement increases the shear strength of certain soils and improves the bearing capacity of the pavement structure.

2.5 LIFE-CYCLE COST ANALYSIS

When selecting a pavement design from several alternatives, it is important to look at factors other than initial construction costs. While selecting the alternative with the lowest initial costs might appear to be advantageous, one of the more expensive initial designs might perform better, which would result in lower future costs, namely maintenance and rehabilitation costs. To select the most economic pavement alternative, it is important to compare all of the costs associated with each alternative over the life of the pavement. Such a process is referred to as a life-cycle costs analysis (LCCA). It is important to note that an LCCA should only be one of several factors used to make a decision on which alternative to select (AASHTO, 1993). Other factors, such as past performance of pavement sections in the area and constraints on time or equipment involved in the construction of the pavement should also be considered. An LCCA comparing several design alternatives will identify the alternative that will provide the best value, that is, the pavement that will adequately perform the necessary function for the lowest long-term cost (Walls, 1998).

When comparing design alternatives using an LCCA, it is only necessary to evaluate the costs that are unique to that design alternative. The costs that are common to every design alternative will cancel out and have no bearing on which alternative results in a lower life-cycle cost. An example of a cost that is common to all alternatives is design costs (Peterson, 1985). These costs include; site investigations, pavement design, plans, and specifications. Normally, the difference in design costs between alternatives is insignificant and therefore not included in an LCCA.

2.5.1 NET PRESENT WORTH

Net Present Worth (NPW) is the most accepted method for conducting an LCCA (Walls, 1998). Basically, the NPW method takes all costs and benefits associated with an alternative and calculates the equivalent worth of the alternative in the form of one cost at the present time. Using the NPW method, future costs and benefits are discounted to the present time by use of a discount rate. Once all of the costs are converted to present time, they are summed to determine the NPW. A useful tool when doing the NPW method, or any other analysis method, is to draw an expenditure flow diagram, as shown in Figure 2.5.1, which depicts each cost and the year in which occurs.

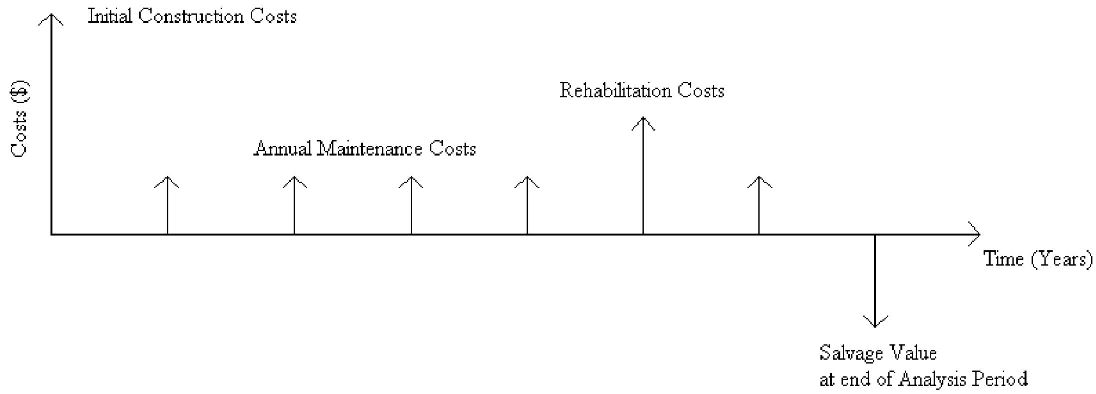

Figure 2.5.1: Expenditure Flow Diagram

This visualization helps determine at what time period each cost, or benefit, occurs. Costs are usually drawn pointing upward (positive) and benefits are drawn pointing downward (negative). All of the periodic costs and benefits that occur in the future are discounted to their present value by multiplying them by their present worth factor:

$$pwf_{i,n} = \frac{1}{(1+i)^n} \qquad \text{(AASHTO, 1993)} \qquad (8)$$

where: $pwf_{i,n}$ = present worth factor for a particular i and n

i = discount rate

n = number of years to when the cost occurs

Annual costs are converted to their present value by multiplying by the inverse of their critical recovery factor, which is defined by Equation 9.

$$crf_{i,n} = \frac{i(1+i)^n}{(1+i)^n - 1} \qquad \text{(AASHTO, 1993)} \qquad (9)$$

where: $crf_{i,n}$ = critical recovery factor for interest rate i and n years

Tables are also available to find the present worth factor, given a discount rate and number of years (Newnan, 1996). The NPW of a design alternative is then calculated as the sum of each cost, or benefit, multiplied by its present worth factor. Appendix A contains an example of a Net Present Worth Analysis.

2.5.2 EQUIVALENT UNIFORM ANNUAL COST

Another way to compare design alternatives in an LCCA is to calculate the Equivalent Uniform Annual Costs (EUAC) of each alternative. The EUAC method takes each cost of the alternative and spreads it out into equal payments over the analysis period. The EUAC of an alternative is calculated by summing all of the periodic costs that have been converted to annual costs. Converting a periodic cost to an annual cost is done by first converting a cost to its present worth, using Equation 8, and then multiplying the cost by its critical recovery factor, as determined by Equation 9. Appendix A contains an example of an Equivalent Uniform Annual Cost Analysis.

2.5.3 LCCA INPUTS

There are many factors that are involved in an LCCA. Some of these factors include the analysis period, construction costs, maintenance costs, user costs, salvage value, and discount/interest rates. Each factor will be discussed individually in the following sections.

2.5.3.1 Analysis Period

The analysis period is the time over which all initial and future costs associated with the alternative are to be evaluated (AASHTO, 1993). In general, the analysis period should always be longer than the design life to take into account at least one rehabilitation project. According to the Federal

Highway Administration's (FHWA) Final Policy Statement in September 1996, the analysis period for all pavement projects should be at least 35 years (Walls, 1998). When comparing several alternatives, an equal design life should be used for all alternatives, even if their design lives are different.

2.5.3.2 Initial Costs

The main factor affecting the initial costs of a design alternative is construction costs. It is usually assumed that the initial agency costs associated with the design process are equal for all alternatives and therefore have no impact on an LCCA (Walls, 1998). Construction costs associated with the design alternatives are relatively easy to obtain. They are simply a function of the pavement layer thicknesses along with the shoulder thickness and drainage system materials, current unit costs of the materials, and the length of the pavement in the project (AASHTO, 1993). Another factor affecting initial construction costs is related to the pavement geometry. A pavement with more travelling lanes, i.e. a wider paved surface, will cost more than the same pavement structure with fewer travelling lanes. Therefore, care should be taken so that all alternatives are judged on an equal basis. One way this can be accomplished is by comparing costs on a per lane-mile basis.

Based on a sensitivity analysis by Zimmerman (1997), initial costs have the greatest impact on the results of an LCCA. However, this might not be the case if the discount/interest rate used is extremely high. Zimmerman's sensitivity analysis was conducted by assuming some baseline for the inputs into an LCCA. Each input was then varied, in turn, while keeping all other inputs constant. For each variation the NPW was calculated. The change in NPW versus the change in each input was compared to see how much of an affect each input had on the outcome of the LCCA.

2.5.3.3 Maintenance Costs

Maintenance costs include all costs associated with keeping the pavement section at a desirable level of service (AASHTO, 1993). Maintenance costs should include the costs of routine maintenance to the pavement, shoulders, and drainage systems. Pavement rehabilitation costs should not be included. Routine maintenance entails such things as repairing potholes, patches, and thin overlays over a short distance. Other maintenance costs such as snow and ice removal do not need to be considered since they are not differentiable between pavement design alternatives. A sensitivity analysis conducted by Zimmerman (1997) determined that maintenance costs do not have a significant impact on the results of an LCCA. Walls and Smith (1998) also found that routine maintenance costs are generally small and have a negligible effect on a Net Present Worth analysis.

2.5.3.4 Rehabilitation Costs

Pavement rehabilitation costs are associated with work performed that increases the service life of the pavement, such as resurfacing over a substantial length. These costs are periodic (possibly occurring 2 or 3 times over a 35 year analysis period) and most likely occur from the middle to the end of the analysis period (Peterson, 1985).

2.5.3.5 User Costs

User costs are any cost incurred by the user of the pavement and involve travel time, vehicle operating costs, and accident costs (Walls, 1998). User costs are a function of the roughness, and resulting serviceability of the pavement. Under normal operating conditions, these costs are hard to differentiate among various alternatives so user costs in an LCCA are normally associated with work zone user costs. Work zone user costs are those costs associated with travel delays, vehicle operating costs, and accident costs as a direct result of a maintenance project on a highway. Work has been done (Walls, 1998; Uddin, 1985) to develop methodologies and procedures for obtaining user cost estimates. This work involved the development of computer programs to calculate user costs based on factors such as project traffic demand, directional hourly demand through the work zone, roadway capacity, queue dissipation rates, work zone capacity, user costs components, reduced speed delay, queue speed, queue lengths, and vehicle operating costs.

2.5.3.6 Salvage Value

A salvage value is used to represent the remaining serviceable life of a pavement at the end of the analysis period (Zimmerman, 1997). This is an important cost to consider when a major rehabilitation occurs at the end of the analysis period and the full value of the rehabilitation costs has not been accounted for. If a salvage value is not used to represent the pavement life that exceeds the analysis period (resulting from a rehabilitation), then the effect on an LCCA would be to increase the overall cost of the alternative, making it appear as if the alternative is not as economical as it actually is. If it is estimated that a major rehabilitation will occur toward the end of the analysis period, a salvage value, based on the remaining serviceable life, should be used in an LCCA. One possible way of determining the salvage value of the pavement is to determine what percentage of serviceable life is remaining at the end of the analysis period, based on either PSI or design ESAL's. The salvage value can then be assumed to be equal to that percentage of the cost of the rehabilitation project.

2.5.3.7 Discount Rate/Interest Rate

Discount rates and interest rates are used to transform costs occurring at different times in the analysis period to a specific time, usually to the beginning of the analysis period (Walls, 1998). It is important to distinguish between real and nominal discount rates. Real discount rates reflect the true time value of money with no inflation and nominal discount rates include inflation. Regardless of which discount rate is used, it is necessary to use real or nominal dollars, corresponding to the selected discount rate. The FHWA recommends the use of real discount rates, eliminating the need to estimate inflation (Walls, 1998). Because the discount rate has a significant influence in an LCCA, its selection should be based on historical trends over long periods of time. Analysis of such historical data, such as treasury bills or interest rates, suggest that approximately 4 percent is an adequate discount rate to use in an LCCA (Walls, 1998).

2.6 SUMMARY OF LITERATURE REVIEW

There were several important points made during the review of pertinent literature. The following is a brief summary of those points.

1. Current flexible pavement design procedures take into account the better structural properties of asphalt stabilized base material relative to crushed stone resulting in thinner pavement structures when using full-depth construction.
2. It has been shown that asphalt stabilized material can successfully replace crushed stone as a base course relative to the main function of a base course, namely, providing support for the asphalt surface.
3. The main advantages of using full-depth asphalt construction instead of a conventional stone base pavement structure involve quicker construction times, and better maintenance of traffic during construction.
4. Multiple experimental projects have shown that pavements with an asphalt stabilized base course have performed as well as, or better, than the stone base pavements.
5. A Life-Cycle Cost Analysis is an excellent way to determine which of several alternatives will be the most economical over the life of the pavement.
6. The two most likely LCCA procedures are a Net Present Worth analysis and a Uniform Equivalent Annual Cost analysis.

CHAPTER 3

SITE SELECTION AND EVALUATION

3.1 SITE SELECTION

The site selection process began with the identification of highways throughout the state of Arkansas that might qualify as good companion sections. For the purpose of this study, highways would qualify as good companion sections if they meet the following criteria; more or less the same traffic travels over both a conventional stone base pavement section and a full-depth asphalt pavement section. An example of a good companion section would be a highway that was widened from two to four lanes over a length of a few miles using a pavement section with a crushed stone base; then, within a few years, the widened section was extended several miles using full-depth asphalt construction. This would create a situation were the outside lanes of traffic would transition from traveling on a stone base pavement section to a full-depth pavement section. Another situation providing good companion sections would occur when an existing route consisting of a stone base pavement section was either relocated or realigned (such as a curvy section being straightened) using a full-depth pavement section.

After consulting with AHTD personnel in the Research and Roadway Design Departments along with some Resident Engineers, multiple locations were suggested as companion sections. AHTD construction job numbers were determined by using Route/Section/Log Mile books. Using these job numbers, construction plans were reviewed to verify whether or not the site should be sampled. Over half of the approximately 40 suggested locations failed to meet the companion criteria. The remaining 14 sites that appeared to qualify were investigated over the spring and summer of 1999. At these fourteen sites, there were a total of thirty-three locations investigated (i.e. some sites were investigated in multiple locations).

Figure 3.1 illustrates the geographic dispersion of the sites throughout the state. Each dot represents a sampling location.

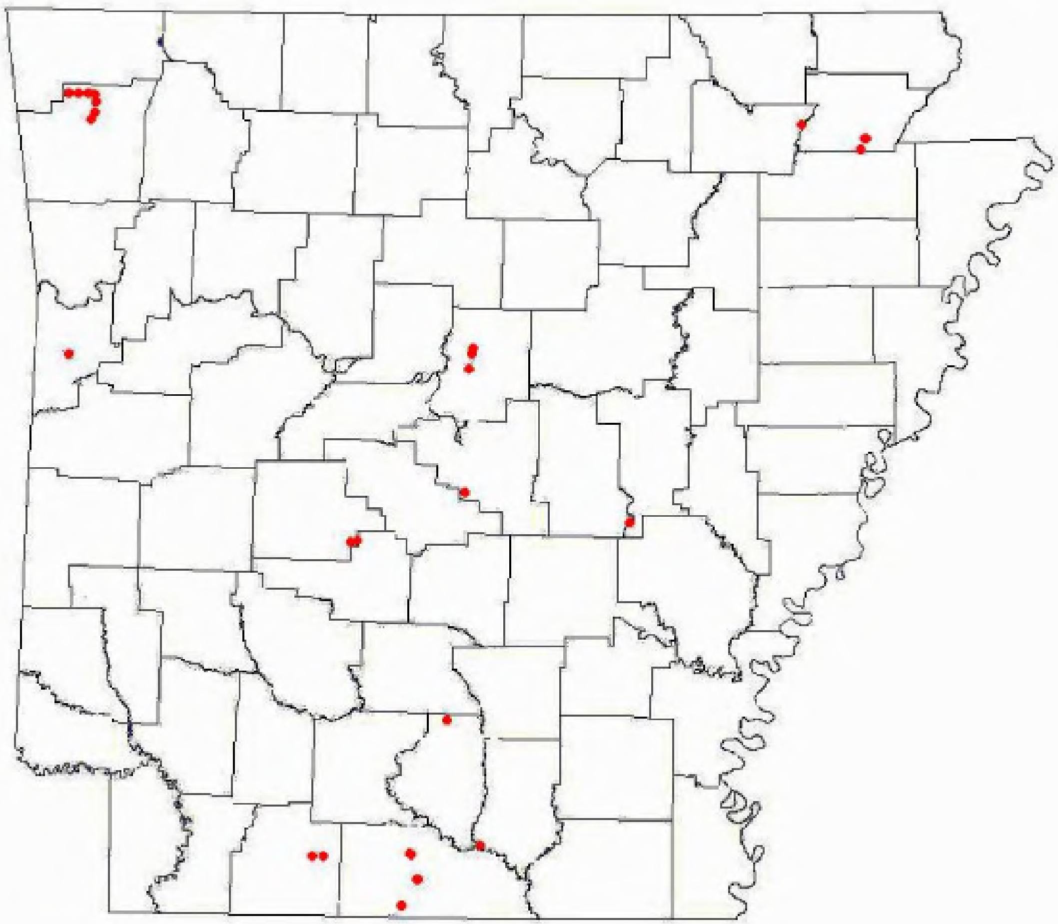

Figure 3.1: Statewide Map of Arkansas Showing Sampling Locations

During the sampling process, the actual cross-section of each pavement was determined. In some cases, the pavement that was sampled was different than the pavement section reflected on the construction plans. Most of these cases were a result of an older concrete pavement being located under the existing asphalt pavement. All of the sections that had either a concrete pavement below the asphalt pavement, or lacked a good comparison section of a different base course material, were rejected. Of the fourteen sites sampled, only six were determined to qualify under the selection criteria and included in the study. Table 3.1 contains location information for the sites selected as good companion sections.

Table 3.1: Information on the Selected Sites

Location	County	Route	Section	Log Mile
Hwy 82 #1	Columbia	82	4	11.03
Hwy 82 #2	Columbia	82	4	8.34
Hwy 79 #1	Calhoun	79	5	5.64
Hwy 79 #2	Calhoun	79	5	5.64
Hwy 49 #1	Greene	49	2	23.51
Hwy 49 #2	Greene	49	2	20.21
Hwy 270 #1	Garland	270	6	8.60
Hwy 270 #2	Garland	270	6	6.47
Hwy 65 #1	Faulkner	65	9	17.79
Hwy 65 #2	Faulkner	65	9	11.79
Hwy 65 #10	Faulkner	65	9	11.79
Hwy 65 #11	Faulkner	65	9	13.75
Hwy 65 #12	Faulkner	65	9	17.20
Hwy 412 #10	Washington	412	2	0.95
Hwy 412 #11	Washington	412	2	2.08
Hwy 412 #12	Washington	412	2	4.05
Hwy 412 #13	Washington	412	2	6.27
Hwy 412 #14	Washington	412	2	7.55
Hwy 412 #15	Washington	412	2	8.63

Appendix B contains detailed information about each site, such as location within the state and county, the type of pavement section, and where sampling occurred along the pavement cross-section. An attempt was made during site selection to include highways in each geographic area of the state. The following sections are a brief summary of each site and why it was, or was not, included in the study. The sites are arranged chronologically, based on sampling date, beginning with the earliest.

3.1.1 HIGHWAY 82

Highway 82 was sampled in Columbia County between Magnolia and El Dorado, approximately 8 miles east of Magnolia. This site was selected because it was a two-lane stone base pavement section that had been widened to three lanes in 1990 with full-depth asphalt. Highway 82 was sampled in two locations. The first was a section that had been widened in the eastbound direction. The second was a section that had been widened in the westbound direction. The main downfall of this site is that it provides a comparison between an inside lane that has a crushed stone base and an outside lane that has an asphalt stabilized base. This means that the traffic distribution is not identical for the two pavement types because heavier trucks use the outside (full-depth) lane to allow faster, lighter vehicles to pass on the inside (stone base) lane. However, this section of Highway 82 was considered an acceptable companion section and included in the study.

3.1.2 HIGHWAY 167

Highway 167 was sampled in Union County approximately 2 miles south of El Dorado. This site was selected because it was a two-lane stone base pavement section that was being widened from two to four lanes with full-depth asphalt. This would have allowed a good comparison. However, it was found that the widening job was still in progress and the new full-depth section had only been driven on during staged construction. It was for this reason that this section of Highway 167 was not included the study.

3.1.3 HIGHWAY 15

Highway 15 was sampled in Bradley County approximately 20 miles east of El Dorado. It was sampled because it was constructed with a crushed stone base course. After sampling, there did not appear to be a good companion section where the traffic loading could be assumed equal. Therefore, this section of Highway 15 was not included the study.

3.1.4 HIGHWAY 7 SPUR

Highway 7 Spur was sampled in Union County in El Dorado. It was selected for sampling because it consisted of a stone base pavement section that had been widened with full-depth asphalt. However, during sampling, it was discovered that the pavement was actually an asphalt overlay of an existing concrete pavement. Also, the full-depth section was located in a non-traveled lane as part of the widening for a bridge approach and was not currently used to carry any traffic. Therefore, this section of Highway 7 Spur was not included in the study.

3.1.5 HIGHWAY 79

Highway 79 was sampled in Calhoun County approximately 40 miles north of El Dorado. This site was selected because it was constructed with a crushed stone base course. It was sampled in two locations. Both locations were at the same log mile. The first location was the eastbound lanes of the divided highway and the second was the westbound lanes of the divided highway. There does not appear to be a good companion section for a direct comparison to full-depth asphalt. However, this section of Highway 79 was included in the study because it appeared to be a good representation of a stone base pavement section that had a reasonable service history.

3.1.6 OTTER CREEK ROAD

Otter Creek Road was sampled in Pulaski County in Little Rock. This site was selected because it was constructed with full-depth construction with the adjacent section being a stone base pavement. However, it was discovered that the adjacent section of Otter Creek Road was constructed with PCC. Therefore, Otter Creek Road was not included in the study.

3.1.7 HIGHWAY 165

Highway 165 was sampled in Lonoke County 5 miles east of Humnoke. This site was chosen because it represented a two-lane stone base pavement that was widened with full-depth asphalt. However, it was discovered during sampling that only the very outside of the existing lanes and the shoulders were full-depth. This situation does not allow the assumption that traffic distribution is equal for both the stone base and full-depth sections. Therefore, this section of Highway 165 was not included in the study. However, it should be noted that this was one of the first Superpave jobs in Arkansas and it showed severe signs of stripping.

3.1.8 HIGHWAY 49

Highway 49 was sampled in Greene County 5 miles south of Paragould. This site was sampled because it was a two-lane stone base pavement that was widened to four lanes with full-depth asphalt. Highway 49 was sampled in two locations. The first location was a portion of Highway 49 that was being widened on the west side of the existing lanes. The second location represented a portion of Highway 49 that was being widened on both sides of the existing lanes. Although there was not a portion of Highway 49 widened with a stone base pavement section, Highway 49 was considered a good companion section and included in the study for comparison between the inside lane, stone base section and the outside lane, full-depth section.

3.1.9 HIGHWAY 412 (#1-#2)

This section of Highway 412 was sampled in Lawrence County 20 miles west of Paragould. This site was selected because, based on construction plans, it represented a stone base pavement section that was widened with full-depth. However, the widened section was only for a bridge approach and had not experienced any traffic loading. It was also discovered that the stone base asphalt pavement was actually an overlay of a PCC pavement. Therefore, this section of Highway 412 was not included in the study.

3.1.10 HIGHWAY 270

Highway 270 was sampled in Garland County approximately 7 miles east of Hot Springs. This site was selected because it represented a stone base pavement that had been widened from two to four lanes with a stone base pavement in one section and full-depth in another section. Two locations were sampled. The first location represented a portion that was widened using a pavement with a crushed stone base. The second location represented a portion that was widened using a pavement with an asphalt stabilized base. This section of Highway 270 provides excellent companion sections where the same traffic loading travels over both types of pavements. Therefore, this section of Highway 270 was included in the study.

3.1.11 HIGHWAY 65

Highway 65 was sampled in Faulkner County approximately 2 miles south of Greenbrier. This site was selected because it represented a stone base pavement that had been widened from two to four lanes with a stone base pavement in some sections and full-depth in other sections. Highway 65 was sampled in 5 different locations. Two of the locations represented widening using a pavement with a crushed stone base. The other three locations represented widening using a pavement with an asphalt stabilized base. This section of Highway 65 provides excellent companion sections where the same traffic loading travels over both types of pavements. Therefore, this section of Highway 65 was included in the study.

3.1.12 HIGHWAY 71 (#1)

This section of Highway 71 was sampled in Sebastian County 15 miles south of Fort Smith. This site was selected because the existing divided highway was extended further south out of Fort Smith. Portions of the widening were constructed with full-depth, while the new lanes were constructed with a stone base pavement section. It was found during sampling, however, that the full-depth section was in the portion of Highway 71 where it was widening and dividing from 2 to 4 lanes. As a result, the full-depth section did not experience much loading and was in a difficult area to sample. Therefore, only a stone base pavement section was sampled. For this reason, this section of Highway 71 was not included in the study.

3.1.13 HIGHWAY 71 (#10-#13)

This section of Highway 71 Bypass was sampled in Washington County in Fayetteville. This site was chosen because it was constructed with full-depth asphalt. There were two major downfalls to this site. The first, there does not appear to be a good companion section. The second, some of the locations sampled were in a section of Highway 71 that was recently renamed Highway 540. As part of this renaming, the mile markers were changed. This created problems gathering design and performance information for the sampled sites because of log mile discrepancies. Therefore, this section of Highway 71 was not included in the study.

3.1.14 HIGHWAY 412 (#10-#15)

This section of Highway 412 was sampled in Washington County in Tonitown and Springdale. This site was selected because portions of Highway 412 were constructed with a stone base asphalt pavement and portions were widened with a full-depth asphalt pavement. A total of six locations were sampled; three of the sites represented construction and widening using a stone base pavement and the other three sites represented widening using a full-depth asphalt. This section of Highway 412 provides excellent companion sections where the same traffic loading travels over both types of pavements. Therefore, this section of Highway 412 was included in the study.

3.2 SAMPLING

Sampling along the pavement cross-section consisted of borings in the inside wheelpath, the center of the lane, and the outside wheelpath. At some locations, the shoulder was also sampled. Not all of these locations across the pavement were sampled at every location. Decisions were made on-site at each location to determine which spots along the cross-section would be sampled. An attempt was made when selecting the location of sampling to pick a section of the pavement that was showing signs of distress, namely, rutting and fatigue cracking to represent a worst case condition. This requirement had to be balanced with available site distance for the maintenance of traffic.

For each boring, the 4-inch diameter asphalt core, including asphalt stabilized base, where applicable, was inspected for stripping and then measured for thickness. Specific gravities, gradation, and resilient moduli were determined as part of phase two of this research. Figure 3.2 (a) shows the equipment used to obtain the asphalt cores.

Figure 3.2 (a): Asphalt Coring Equipment

Zip-Lock® (gallon size) bags were used to collect and transport samples of the granular base material for moisture content and grain size testing. Where possible, shelby tubes were pushed into the subgrade up to a depth of five feet in some locations. When the shelby tubes could not be pushed, due to a high gravel content in the subgrade, split spoon sampling was used and blow counts were recorded. Resilient Modulus tests were run on the shelby tube samples as part of phase two of this research. Figure 3.2 (b) shows the drill rig used to obtain bag samples by use of a solid stem auger, push shelby tubes, and perform standard penetration testing.

Figure 3.2 (b): Drill Rig Used for Sampling

Appendix C contains the field notes made during the sampling process at each site.

3.3 LABORATORY TESTING

Laboratory tests were performed on the asphalt cores, base course samples, and subgrade samples. For the purpose of this report, the main laboratory test of interest involves the moisture content of the subgrade.

3.3.1 MOISTURE CONTENTS

The first series of tests were moisture content determination on both the aggregate base course samples and the subgrade samples. The moisture content at the top of the subgrade was of interest because one of the assumed downfalls of using full-depth asphalt pavements is that it increases the moisture content directly beneath the asphalt. An increase in moisture content in the subgrade will reduce the stiffness of the subgrade. This reduction could possibly lead to distress, such as fatigue cracking and rutting. Table 3.3.1 (a) shows a summary of moisture contents in the top of the subgrade under both stone base and full-depth pavements. Detailed moisture content test results are located in Appendix D and in Appendix E.

Table 3.3.1 (a): Summary of Moisture Contents in Top of Subgrade

Location	Sample #	Pavement Type	Moisture Content at Top of Subgrade, %
Hwy 82 #1	B-2, S-1	Full-Depth	12.87
	B-3, S-1	Full-Depth	14.40
	B-5, S-1	Stone Base	21.42

Hwy 82 #2	B-2, S-1	Full-Depth	16.69
	B-5, S-1	Stone Base	25.61
Hwy 79 #1	B-1, S-2	Stone Base	19.62
	B-2, S-1	Stone Base	7.75
	B-2, S-2	Stone Base	18.69
Hwy 79 #2	B-1, S-2	Stone Base	29.77
	B-3, S-2	Stone Base	29.15
	B-5, S-2	Stone Base	22.72
Hwy 49 #1	B-1, S-2	Stone Base	19.15
	B-2, S-2	Stone Base	20.67
Hwy 49 #2	B-1, S-1	Full-Depth	21.04
	B-3, S-2	Stone Base	21.58
	B-4, S-2	Stone Base	15.90
	B-7, S-1	Full-Depth	20.69
	B-8, S-2	Stone Base	13.49
Hwy 270 #1	B-1, S-2	Stone Base	11.41
	B-2, S-2	Stone Base	9.38
	B-3, S-2	Stone Base	9.62
	B-5, S-2	Stone Base	14.95
	B-6, S-1	Stone Base	10.00
	B-7, S-2	Stone Base	15.39
Hwy 270 #2	B-1, S-1	Full-Depth	19.97

	B-2, S-1	Full-Depth	21.93
	B-3, S-2	Full-Depth	20.96
	B-5, S-1	Full-Depth	9.73
Hwy 65 #1	B-5, S-2	Stone Base	12.73
	B-7, S-1	Stone Base	4.28
Hwy 65 #10	B-6, S-1	Stone Base	15.48
Hwy 65 #11	B-4, S-1	Stone Base	15.45
Hwy 65 #12	B-2, S-1	Full-Depth	8.44
Hwy 412 #10	B-1, S-2	Stone Base	30.09

Table 3.3.1 (a) (Continued): Summary of Moisture Contents in Top of Subgrade

Location	Sample #	Pavement Type	Moisture Content at Top of Subgrade, %
Hwy 412 #11	B-1, S-2	Stone Base	17.10
	B-2, S-2	Stone Base	17.86
Hwy 412 #12	B-1, S-1	Full-Depth	24.86
	B-2, S-1	Full-Depth	28.42
	B-3, S-1	Full-Depth	19.47
	B-4, S-1	Full-Depth	24.79
	B-5, S-1	Full-Depth	22.06
Hwy 412 #13	B-1, S-1	Full-Depth	11.60

	B-2, S-1	Full-Depth	15.64
	B-3, S-1	Full-Depth	18.00
	B-4, S-1	Full-Depth	16.31
	B-5, S-1	Full-Depth	19.07
Hwy 412 #14	B-1, S-1	Full-Depth	20.89
	B-2, S-1	Full-Depth	14.19
	B-3, S-1	Full-Depth	18.37
	B-4, S-1	Full-Depth	17.14
Hwy 412 #15	B-2, S-1	Full-Depth	21.07
	B-3, S-1	Full-Depth	20.43

When analyzing the data presented in Table 3.3.1 (a), it is important to realize that different subgrade materials often have a different optimum moisture content (OMC). It is therefore necessary to compare moisture contents relative to OMC. A relationship that correlates moisture content to OMC is the ratio of moisture content to plastic limit (PL). Plastic limit is typically three to five percent above OMC. For this correlation to be valid, it must be assumed that the subgrade material is placed at or near OMC. If the ratio of moisture content to PL is greater than one, the subgrade is clearly gaining water. On the other hand, the ratio of moisture content to PL is far less than one, the subgrade is drying out. Table 3.3.1 (b) contains the moisture content, PL obtained from Atterburg Limit testing, and the ratio of moisture content to PL for several of the sites included in this study.

Table 3.3.1 (b): Ratios of Moisture Content to Plastic Limit

Location	Sample	Pavement Type	Moisture Content, %	Plastic Limit, %	Ratio of Moisture

					Content to PL
Hwy 82 #1	B-5, S-1	Stone Base	21.42	19.0	1.127
Hwy 82 #2	B-2, S-1	Full-Depth	16.69	14.4	1.159
Hwy 82 #2	B-5, S-1	Stone Base	25.61	26.6	0.963
Hwy 79 #1	B-1, S-2	Stone Base	19.62	19.6	1.001
Hwy 79 #1	B-2, S-1	Stone Base	7.75	14.2	0.540
Hwy 270 #1	B-5, S-2	Stone Base	14.95	19.6	0.763
Hwy 270 #1	B-6, S-1	Stone Base	10.00	16.7	0.599
Hwy 270 #2	B-1, S-1	Full-Depth	19.97	17.5	1.141
Hwy 270 #2	B-3, S-2	Full-Depth	20.96	17.0	1.233
Hwy 65 #10	B-6, S-1	Stone Base	15.48	17.8	0.870
Hwy 65 #12	B-2, S-1	Full-Depth	8.44	17.4	0.485
Hwy 412 #11	B-1, S-2	Stone Base	17.10	18	0.950
Hwy 412 #12	B-4, S-1	Full-Depth	24.79	23	1.078

From the data presented in Table 3.3.1 (b), the average moisture content to plastic limit ratio for the full-depth sections is 1.005, while for the stone base sections the ratio is 0.838. These average ratios may be influenced by a skewed data point so each ratio will be compared on a site-by-site basis. Four of the above highways (82, 270, 65, and 412) provide a direct comparison between the moisture content to plastic limit ratio for stone base and full-depth sections. Of these four sites, one has a higher moisture content to plastic limit ratio for the stone base section, while the other three have a higher ratio for the full-depth sections. However, of these three sites, the difference in ratios between the two pavement types is small.

Overall, this data indicates that the subgrade material under the full-depth sections is gaining moisture once it is placed, while the subgrade under the stone base sections is becoming slightly drier. Based on this research, it appears that the use of full-depth results in an increase in moisture content of the subgrade. This increase could be the cause of the poor performance found in the full-depth pavements, which will be discussed in the following sections.

3.4 ROUGHNESS AND RUTTING

AHTD rutting and IRI data was obtained for each of the sites sampled. Appendix F contains the rutting and IRI data obtained from AHTD for the sites included in this study. Table 3.4 (a) shows a summary of current IRI measurements relative to pavement cross-section, averaged over a two mile span, for each location included in the study. The average IRI was obtained by using the higher IRI of the left and right wheelpath for each length increment measured and taking an average of the IRI measurements for a two-mile span. The PSI, based on Equation 4, and the pavement condition based on the scale provided in *Highway Statistics 1994* is also presented in Table 3.4 (a)

Table 3.4 (a): Summary of IRI Data

Location	Year Built	Average IRI (m/km)		Calculated PSI		Pavement Condition*
		Stone Base Sections	Full-Depth Sections	Stone Base Sections	Full-Depth Sections	
Hwy 82 #1	1990	1.83	1.81	3.03	3.05	F
Hwy 82 #2	1990	1.85	2.21	3.01	2.73	F/M
Hwy 79 #1	1991	1.39	N/A	3.47	N/A	G

& #2						
Hwy 49 #1	1999	**	2.41	**	2.60	M
Hwy 49 #2	1999	**	2.18	**	2.85	M
Hwy 270 #1	1984	3.08	N/A	2.22	N/A	P
Hwy 270 #2	1981	3.16	3.82	2.18	1.89	P
Hwy 65 #1	1987	1.34	N/A	3.53	N/A	G
Hwy 65 #2 & #10	1988	2.03	2.75	2.87	2.39	M/P
Hwy 65 #11	1988	1.54	2.22	3.31	2.73	F/M
Hwy 65 #12	1987	1.29	N/A	3.58	N/A	G
Hwy 412 #10	1994	1.38	N/A	3.49	N/A	G
Hwy 412 #11	1994	1.32	N/A	3.55	N/A	G
Hwy 412 #12	1994	1.32	1.11	3.54	3.81	G
Hwy 412 #13	1994	1.41	1.66	3.44	3.18	G/F
Hwy 412 #14	1987	1.72	2.03	3.12	2.87	F/M

Hwy 412 #15		2.34	N/A	2.64	N/A	M

Note: 1 m/km = 63.36 in/mi

* G = Good, F = Fair, M = Mediocre, and P = Poor

** IRI data not available for Highway 49 stone base lanes

From the information presented in Table 3.4 (a), it appears that full-depth pavements have a higher IRI and lower PSI, in general, which means that the full-depth pavements are rougher. The average PSI for the full-depth pavement sections is 2.81 and the average PSI for the stone base pavement sections is 3.13. This difference is not significant (0.50 or greater). It is highly unlikely that the average motorist could even feel a 0.32 difference in PSI. For seven of the eight sites that could be directly compared, the full-depth sections have a higher or equal IRI and lower PSI. At the location where the full-depth pavement has a higher PSI, the difference in PSI between stone base and full-depth is not significant. On the other hand, at the six locations where the stone base pavements are performing better, the difference in PSI is significant enough to conclude that the stone base pavements are performing better, relative to roughness, than the full-depth sections. Any conclusion from this data presumes that all of the pavement structures were constructed to the same initial smoothness.

It should be noted that the comparison of this data does not necessarily take into consideration either the age of the pavements or the traffic volumes carried by the pavements, both of which could have a considerable impact on PSI. Only for the locations with the same construction dates can age and traffic be presumed equal. Table 3.4 (a) simply compares the current state of each of the pavements.

Based on the calculated PSI, all of the pavements appear to be performing adequately. However, to confirm this, the calculated PSI should be compared to the expected PSI for each pavement. This will take into account the age of the pavements and the traffic volumes that they have carried. The expected PSI should be calculated using the AASHTO Performance Equations as determined from the AASHO Road Test (AASHTO, 1993). Appendix I contains detailed information on the calculation of ESAL's and expected PSI. Further discussion of traffic estimates and ESAL calculations are located in Section 3.6.

Table 3.4 (b) shows a summary comparing the current and expected serviceability indexes for the outside lanes of the pavements.

Table 3.4 (b): Summary of Current Versus Expected Serviceability Indexes

Location	Year Built	SN (using current AHTD Layer Coefficients)	Expected PSI (from AASHTO Equations)	Current PSI (from Equation 4)
Hwy 82 #1 (FD)	1990	5.5	3.70	3.05
Hwy 82 #2 (FD)	1990	5.5	3.70	2.73
Hwy 79 #1 & #2 (C)	1991	5.23	3.59	3.47
Hwy 49 #1 (FD)	1999	4.2	3.04	2.60
Hwy 49 #2 (FD)	1999	5.5	3.68	2.73
Hwy 270 #1 (C)	1984	4.25	2.03	2.22
Hwy 270 #2 (FD)	1981	5.3	3.24	1.89
Hwy 65 #1 (C)	1987	4.42	2.38	3.53
Hwy 65 #2 & #10 (FD)	1988	5.6	3.28	2.39
Hwy 65 #11 (FD)	1988	5.66	3.31	2.73
Hwy 65 #12 (C)	1987	4.42	2.38	3.58
Hwy 412 #10 (C)	1994	5.28	3.46	3.49
Hwy 412 #11 (C)	1994	5.28	3.46	3.55
Hwy 412 #12 (FD)	1994	6.1	3.65	3.81
Hwy 412 #13 (FD)	1994	6.5	3.72	3.18
Hwy 412 #14 (FD)	1987	5.3	2.96	2.87

Comparing the expected and current serviceability indexes as shown in Table 3.4 (b) reveals that a very specific trend has developed. Practically all of the stone base pavement sections have a current PSI, determined using Equation 4, that is higher than the expected PSI, determined from the AASHTO equations. On the other hand, almost all of the full-depth sections have current PSI's lower than expected. From this data, it is apparent that the full-depth sections are not performing as well as expected, while the stone base sections are performing better than expected.

It is also important to note the rut depths at these locations. IRI is a measure of smoothness, not rutting. Rutting, if severe, could have a significant impact on performance. Rutting should be accounted for when determining PSI. Table 3.4 (c) shows a summary of rut depth data provided by AHTD relative to pavement cross-section averaged over a two mile span for each location included in the study.

Table 3.4 (c): Summary of Rut Depth Data

Location	Year Construction Was Finished	Average Rut Depths (mm)	
		Stone Base Sections	Full-Depth Section
Hwy 82 #1	1990	6.8	5.3
Hwy 82 #2	1990	6.6	7.5
Hwy 79 #1 & #2	1991	5.2	N/A
Hwy 49 #1	1999	*	6.6
Hwy 49 #2	1999	*	7.8
Hwy 270 #1	1984	5.8	N/A
Hwy 270 #2	1981	5.8	5.3
Hwy 65 #1	1987	4.3	N/A
Hwy 65 #2 & #10	1988	7.7	8.1
Hwy 65 #11	1988	5.4	5.7
Hwy 65 #12	1987	4.2	N/A

Hwy 412 #10	1994	6.4	N/A
Hwy 412 #11	1994	6.3	N/A
Hwy 412 #12	1994	6.2	5.3
Hwy 412 #13	1994	5.3	4.7
Hwy 412 #14	1987	5.8	5.5
Hwy 412 #15		7.1	N/A

Note: 1 in = 25.4 mm

* Rut depth not available for Highway 49 stone base lanes

As can be seen in Table 3.4 (c), there does not appear to be any trend relative to rut depths and pavement type. The average rut depth for the stone base pavements is 5.9 mm (0.232 inches), while the average rut depth for the full-depth sections is 6.2 mm (0.244 inches). Of the eight locations that provided a direct comparison of rut depths in a stone base lane versus a full-depth lane, five of the locations have greater rut depths in the stone base lanes, compared to three locations where the rutting was more severe in the full-depth lanes.

It should also be noted that in most of these situations, the comparison is between an interior lane, which is the stone base section, and an outside lane, which is a full-depth section. Because most large, heavy vehicles use the outside lane so that faster, lighter vehicles may pass, it seems natural to assume that the rutting in the full-depth sections to have somewhat higher rut depths because of the heavier loading. For the pavements in this study, rut depths were virtually the same for both types of pavements. Based on the logic stated above, one might conclude that the full-depth pavements are providing a better resistance to rutting when compared to the stone base pavements.

AHTD does not currently have criteria which rates the quality of the pavement based on rut depth. However, the average rut depths for all of the locations seem to be acceptable. Based on Asphalt Institute design procedures, rut depths of 12.7 mm (0.5 inch) indicate failure (Huang, 1993). Although actual field rut depth measurements were not made at the time of sampling, the rutting at some of the locations, such as Highway 82, appeared to be more severe than the measurements obtained from AHTD. Figure 3.4 shows how severe the rutting was along Highway 82

Figure 3.4: Rutting Along Highway 82

Based on the information obtained, there does not appear to be any evidence that the use of either crushed stone or an asphalt stabilized material affects how much rutting will occur in a pavement section.

3.5 STRIPPING

A possible cause of poor pavement performance is stripping. Stripping occurs when the asphalt cement looses its adhesion to the aggregate, usually in the presence of water. During the sampling process, the asphalt cores were examined for stripping. Table G-1 contains a summary of which cores showed signs of stripping. Appendix G also contains pictures of the asphalt cores with markers showing where the stripping, if any, occurred. Table 3.5 shows a summary of stripping found relative to the type of pavement structure.

Table 3.5: Summary of Stripping in the Asphalt Cores

Location	Total # of Stone Base Section Cores	Percent of Stone Base Section Cores Showing Stripping	Total # of Full-Depth Section Cores	Percent of Full-Depth Section Cores Showing Stripping
Hwy 82	2	50%	6	83%
Hwy 79	*	*	*	*
Hwy 49	5	20%	5	0%
Hwy 270	8	63%	7	86%
Hwy 65	16	44%	12	67%
Hwy 412	8	0%	18	11%
For All Sites Included In Study	37	36%	42	38%

* No adequate field evaluation of stripping

Based on the cores taken and the field observations made, there is no evidence that stripping occurs more often in full-depth pavements than it does in stone base pavement sections. The percentage of cores showing stripping is basically the same for both pavement types. In fact, the overall percentage of cores, including sites not included in the study, showing signs of stripping is approximately 36 percent for stone base pavements and approximately 33 percent for full-depth sections. Therefore, there is no conclusion that the use of either one of these materials increases the pavement's probability of experiencing stripping, which leads to pavement distress. However, in the majority of the full-depth sections that showed signs of stripping, the stripping was typically located at the bottom of the core in the base course. This could greatly affect the ability of the base course to provide support. By definition, it is not possible for granular material to experience stripping. Therefore, in stone base sections the loss of support due to stripping in the base course is not possible. However, the moisture that would cause stripping in an asphaltic material can cause a loss of strength in a crushed stone base.

3.6 TRAFFIC

Traffic loading can also be a cause of poor performance. If the pavement structure was designed for a particular number of equivalent 18-kip single axle loads (ESAL's), and the traffic volumes have been greater than expected, a pavement will reach the end of its design life sooner than expected.

To confirm if the design traffic for the pavements in this study were accurate, they were compared to the actual traffic that each pavement has carried since construction. Both design and actual ESAL's were calculated using an Excel spreadsheet and ADT counts through the end of 1997, both provided by AHTD (Bennett, 1999). This spreadsheet automates the AASHTO procedure (AASHTO, 1993) based on the input of several variables. The first is the number of the axle distribution table to use, which is based on the functional class of the traffic. There are eight tables to choose from based on nine different functional classes. Next, a seed value for the structural number is required. Acceptable values are 4, 5, or 6.

To determine the effect of the seed SN on ESAL's, a sensitivity analysis was performed to evaluate the change in calculated ESAL's as a function of the seed SN used. Figure 3.6 is an example of part of the sensitivity analysis. ESAL's were calculated by assuming 20% trucks, a year 1 average daily traffic (ADT) of 5,000, and a year 20 ADT of 148,900. ESAL's were calculated using SN's of 4, 5, and 6. The curve on Figure 3.6 represents the calculated ESAL's normalized with the ESAL's for a SN of 4. Similar analyses were performed to verify that the overall results were the same for various percent trucks and functional classes of traffic. The graphs produced from those analyses followed similar trends. It was found that no significant change occurred between 5 and 6.

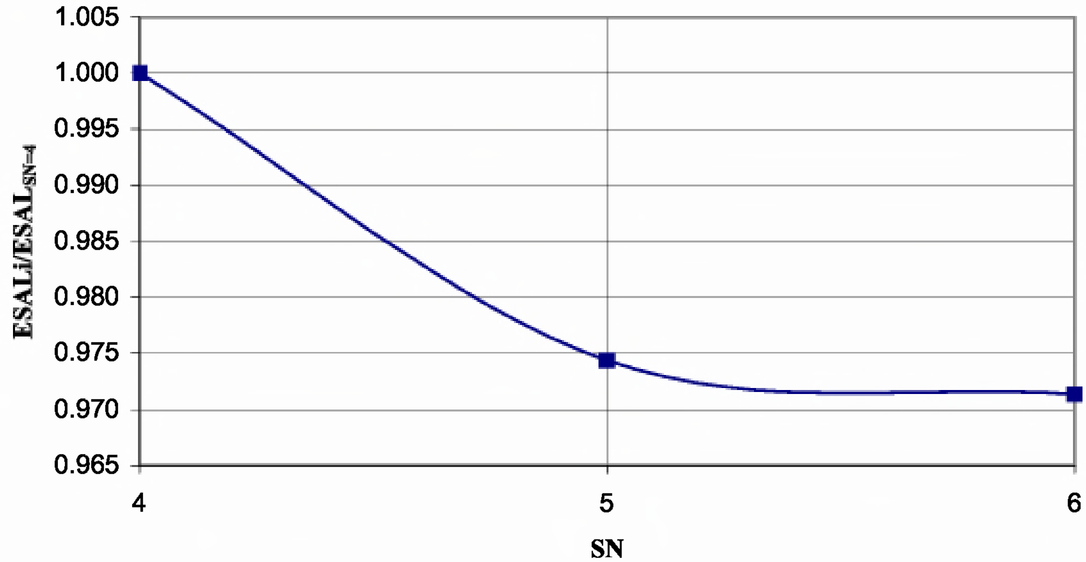

Figure 3.6: Results of Sensitivity Analysis

Once the axle distribution and seed SN are entered, the spreadsheet imports a weight table and the axle distribution table, which are based on AHTD data from around the state. Finally, the current and future traffic counts are entered. The spreadsheet then calculates a 24-hour ESAL based on current AASHTO procedures (AASHTO, 1993). This procedure takes the current year and design year ADT, and then multiplies the design traffic by the appropriate truck factors to calculate ESAL's. Based on the 24-hour ESAL and the design period for the pavement alternative, typically 20 years, the Roadway Design division calculates the design ESAL's for the pavement.

For each of the locations, AHTD traffic counts for average daily traffic (ADT) from 1986 through 1997 were obtained. For the majority of locations, a straight-line fit of the data resulted in a fairly good approximation of the ADT data. However, there were a few locations were the ADT growths were not linear. Using the ADT values for 1997, the ESAL's that the pavement had actually carried were calculated. The pavement's design ESAL's were also calculated based on original ADT estimates.

Once the design and actual ESAL's carried were calculated, along with the pavement's age, the percent of design loading for each pavement was calculated. For a good traffic estimate used in design, the age of the pavement (as a percent of its design life) should equal the percent of design ESAL's that the pavement has carried. For example, as of 1997, Highway 82 #1 was 8 years old with a 20 year design life, which means that 40 percent of its design life has been reached. The pavement was designed to carry 1,319,840 ESAL's. Based on ADT counts through 1997, the pavement has actually carried 534,944 ESAL's, or 40.5 percent of its design ESAL's. Therefore, the traffic estimates used for the design of this pavement appear to be accurate.

Appendix H contains the ADT counts for the pavements from 1986 through 1997. Appendix I contains the spreadsheets from the ESAL calculations. Table 3.6 is a summary of the ESAL calculations.

Table 3.6: Summary of ESAL Calculations

Location	Year Built	Design ESAL's	Actual ESAL's	Design Life Experienced, %	Design ESAL's Experienced, %
Hwy 82 #1 & #2	1990	1319840	534944	40	40.5
Hwy 79 #1 & #2	1991	2081960	591738	35	28.4
Hwy 49 #1	1999	2660120	576700	25	21.7
Hwy 49 #2	1999	3547800	508080	20	14.3
Hwy 270 #1	1984	2566680	2115540	75	82.4
Hwy 270 #2	1981	3036800	1971000	90	64.9
Hwy 65 #1 & #12	1987	3106880	1979614	65	63.7
Hwy 65 #2, #10, & #11	1988	4236920	2360820	55	55.7
Hwy 412 #10 & #11	1994	4625280	747520	20	16.2
Hwy 412 #12	1994	5057440	961848	20	19.0
Hwy 412 #13	1994	4610680	1061128	20	23.01

Hwy 412 #14	1987	5708600	3136518	55	54.9

The data presented in Table 3.6 seems to indicate that the design traffic volumes replicate actual traffic conditions very well. There was some concern that an excess of traffic not accounted for during the design phase of the pavements included in this study might have been the cause of the poor performance of some of these pavements. However, from the data presented in Table 3.6, it can be assumed that any of the poor performance found during this research should not be considered the result of bad traffic estimates made during the design of the pavements.

CHAPTER 4

ECONOMIC ANALYSIS

The economic analysis performed on these highways is slightly different than the life-cycle cost analysis described in Chapter 2. That LCCA described the process of estimating and analyzing costs to select which pavement alternative to construct. For that case, it is necessary to estimate initial construction costs, maintenance costs, and user costs, along with salvage values. The pavements compared as part of this research have already been constructed. As a result, actual costs, rather than estimated costs, associated with the pavement's life from construction to present day are used. User costs will not be included in the analysis since they would only have a minor impact, if any, and would be based on assumptions that may, or may not, be accurate. The economic analysis comparing the pavements in this research project will consist of initial construction costs, maintenance costs, and salvage values. Since the pavements were all constructed at different times, it is necessary to convert all costs to a common year. The pavements are also of different lengths. Therefore, all costs associated with the pavements will be analyzed on a per lane-mile basis. When deciding what discount rate to use, the historical trends in the discount rate of the U.S. Treasury Bills were looked at. During the 1980's, the discount rates were considerably higher compared to the 1990's. Therefore, two different discount rates will be used in the analysis: 9.0% for the 1980's and 4.5% for the 1990's. To compare these pavements, a Net Present Worth (NPW) analysis will be performed. However, to reduce the impact of the discount rate over large periods of time, all of the costs associated with the pavements will be compared using 1990 as the base year. This will minimize the impact of the assumed discount rate by shortening the length of time that the costs are moved. For example, if all of the costs were brought to 1999, pavements with construction costs occurring in the early 1980's would be greatly affected by the assumed discount rate. If the discount rate used was too high, the 1999 NPW of the pavement would be higher, resulting in the pavement appearing to be less economical. At the same time, the construction costs for the pavements constructed in the 1990's would not be as affected by the high discount rate of the 80's resulting in those sections appearing more economical.

4.1 CONSTRUCTION COSTS

For the sites included in this study, the initial construction costs were determined from AHTD records. These records included the construction plans and contract bid unit costs. All construction costs not associated with the roadway, such as guardrails, temporary erosion control, and signing, were excluded from the construction costs used in the economic analysis. The costs used include all costs associated with the construction of the pavement and shoulders, such as base material, paving materials, and shoulder material, including installation costs. Appendix J contains all of the materials, quantities, and unit costs used to determine construction costs for each of the locations. Table 4.1 (a) shows the initial construction costs per lane-mile for each of the pavement sections being analyzed.

Table 4.1 (a): Initial Construction Costs

Location	AHTD Job Number	Type of Construction	Year Built	Construction Costs ($)	Length of Project (miles)	Costs per Lane-Mile ($/lane-mile)
Hwy 82 #1 & #2	R70050	Full-Depth	1990	2,451,167	13.406	60,947
Hwy 79 #1 & #2	R70016	Stone Base	1991	3,207,354	3.171	252,866
Hwy 49 #1	R00081	Full-Depth	1999	2,404,652	3.52	170,785
Hwy 49 #2	R00071	Full-Depth	1999	4,153,243	5.171	200,795
Hwy 270 #1	60116	Stone Base	1984	1,927,812	3.375	142,801
Hwy 270 #2	60115	Full-Depth	1981	2,260,064	3.591	157,342

Hwy 65 #1 & #12	8827	Stone Base	1987	1,861,638	3.514	105,955
Hwy 65 #2, #10, & #11	R80010	Full-Depth	1988	1,427,253	2.959	96,469
Hwy 412 #10 & #11	1675	Stone Base	1994	9,402,240	11.717	200,611
Hwy 412 #12 & #13	40112	Full-Depth	1994	1,846,201	4.271	86,453
Hwy 412 #14	R40016	Full-Depth	1987	1,060,611	1.619	131,021

Table 4.1 (a) shows the construction costs per lane-mile for each of the locations. However, these jobs were not all built in the same year. The time value of money should be accounted for when comparing these costs. Therefore, it is necessary to compare all of the costs converted to the same year. Table 4.1 (b) shows a comparison of initial costs per lane-mile in 1990 dollars.

Table 4.1 (b): Initial Construction Costs Adjusted to 1990 Dollars

Location	Year Built	Design ADT	Type of Construction	Costs per Lane-Mile ($/lane-mile)	Costs in 1990 Dollars
Hwy 82 #1 & #2	1990	2,760	Full-Depth	60,947	60,947
Hwy 79 #1 & #2	1991	3,930	Stone Base	252,866	241,977
Hwy 49 #1	1999	7,525	Full-Depth	170,785	114,922
Hwy 49 #2	1999	10,000	Full-Depth	200,795	135,116
Hwy 270 #1	1984	6,650	Stone Base	142,801	239,492

Hwy 270 #2	1981	8,940	Full-Depth	157,342	341,730
Hwy 65 #1 & #12	1987	11,320	Stone Base	105,955	137,215
Hwy 65 #2, #10, & #11	1988	11,095	Full-Depth	96,469	114,615
Hwy 412 #10 & #11	1994	7,195	Stone Base	200,611	168,225
Hwy 412 #12 & #13	1994	8,950	Full-Depth	86,453	72,496
Hwy 412 #14	1987	10,425	Full-Depth	131,021	169,676

From the data in Table 4.1 (b), there are three locations where a direct comparison of construction costs can be made. For two of these sites, the construction costs for the full-depth sections were less expensive. Of the other, non-direct, comparison sites the full-depth pavements were also the less expensive alternative.

The construction costs used in this analysis were obtained by first calculating the quantities of all the materials of interest from the quantity sheets in the construction plans, and then using the bid unit costs to determine the total cost of the project. The materials used include the paving materials required to construct the new lanes and shoulders, along with the materials required to overlay the existing lanes.

In an effort to confirm the method used to determine construction costs, quantities were calculated using the design typical cross-section for a one-mile stretch of the outside lane and shoulder for Highway 270 #1 (stone base section) and Highway 270 #2 (full-depth section). Using this method, the construction costs, in 1990 dollars, for Highway 270 #1 was $188,360 and for Highway 270 #2 was $313,356. Both methods gave relatively the same costs, which indicates that the method used to determine initial costs is accurate for the purpose of this analysis. It should be noted that the higher initial costs for Highway 270 #2, the full-depth section, compared to Highway 270 #1, the stone base section, is the exception, rather than the rule.

Based on 1990 dollars, the average construction costs for the full-depth pavements was $144,214 per lane-mile, while the average construction costs for the stone base pavements was $196,727 per lane-mile. This information confirms the idea that full-depth pavements are cheaper to construct, at least as far as initial costs are concerned. It is important to note that not all of these pavements were designed with the same structural capacity, which could affect the construction costs. An attempt was made when selecting test sections to choose sections with similar design traffic, so that this problem could be avoided. The above costs show that full-depth pavements are less expensive to construct than stone base pavements. To normalize these costs with structural capacity, a comparison was made between the two pavement types based on construction costs per lane-mile per thousand ESAL's. Using the design ESAL's, located in Appendix I, it was found that the average costs for the stone base sections was $63,642, while only $37,544 for the full-depth sections. This provides further evidence that full-depth pavements are less expensive to construct.

The initial savings associated with full-depth pavements could be quite significant. For example, given the average construction costs, from Table 4.1 (b), and a five-mile, widening project consisting of two lanes of new construction and two lanes of overlay of the existing pavement, the total paving costs using a stone base pavement section would be $3,934,540, while a full-depth pavement would only cost $2,884,300, a savings of over one million dollars.

It is still necessary to determine the life-cycle costs for each of these pavements, as will be discussed later.

4.2 MAINTENANCE AND REHABILITATION COSTS

Maintenance costs for all of the pavements were obtained from AHTD Maintenance records. These records contain information on how much money is spent on each route and section of every highway in the State of Arkansas per year dating back to 1981. These maintenance records include all maintenance activities, including those unrelated to the pavement such as mowing, trash pick-up, and sign repair and replacement. A number is assigned to each type of maintenance function along with the costs spent on that function per year. The AHTD records, located on microfiche, contained a breakdown for how much was spent on each maintenance function for a particular section in a given year. The locations of interest were found for each year and all the costs associated with that route and section were hand-copied along with the appropriate maintenance function code.

Once the records were obtained for the sections of interest, all of the costs unrelated to flexible pavement maintenance were eliminated. It is interesting to note that once the maintenance costs that were not of interest were eliminated, the maintenance cost per year for a section of highway typically reduced by over 50 percent. This means that a lot of the maintenance costs for the highways in Arkansas are composed of items that are not directly related to pavement performance, such as mowing and litter pickup.

The costs were then divided by the length of the section to obtain the maintenance costs per mile for each section. However, AHTD maintenance records are only broken down into route and section. The current record keeping system averages the costs of maintenance jobs over the entire section. If a maintenance activity takes place on only a portion of the section, AHTD records will still show that the expense of that project affected the entire section. Therefore, the maintenance histories for the companion sections located on the same route and section are the same, no matter what the cross-section of the pavement is. Maintenance costs that could be affected by this situation include activities such as spot sealing, asphalt patching, and cold milling operations. Costs associated with maintenance functions such as overlays are less likely to be affected by this situation since they typically occur over a large section of pavement. Given current AHTD record keeping, it is difficult to differentiate between routine maintenance and rehabilitation work. For the purpose of this study, all work performed by AHTD will be considered maintenance. While none were found for the sites of interest, rehabilitation work is assumed to consist of major repairs listed by AHTD Job Numbers.

Table 4.2 shows the function codes along with a description of the maintenance activity and whether or not that function was included in the maintenance cost histories for this project.

Table 4.2: Maintenance Functions

Code	Activity Description	Included in Maintenance

		Histories
411	Surface Treatment Patching (Spot Sealing)	Yes
412	Asphalt Patching	Yes
413	Joint Repair and Crack Filling	Yes
414	Spot Surface Replacement (Asphalt)	Yes
415	Spot Surface Replacement (Concrete)	No
416	Gravel Surface Patching	Yes
417	Blade Non-Paved Surface	No
418	Blade Non-Paved Shoulders	No
419	Other Maintenance	Yes
429	Hauling Millings to Stockpiles	Yes
430	Cold Milling Operations	Yes
431	Mud Jacking and Under Seal	No
432	Seal Coat	Yes
433	Fog Coat	Yes
435	Asphalt Leveling	Yes
436	Restore Gravel Surface	No
437	Restore Non-Paved Shoulders	No
438	Relay Asphalt Surface	Yes
441	Clean and Repair Minor Drainage Structures	Yes
442	Clean and Reshape Ditches	No
443	Machine Ditches	No
444	Mowing	No
445	Spot Roadside Grooming	No
446	Litter Pickup	No
447	Permit Driveways	No
448	Adopt a Highway	No

461	Erosion Control and Repair	No
462	Chemical Vegetation Control – Spot	No
463	Chemical Vegetation Control – Broadcast	No
481	Structure Inspection	No
482	Bridge – Deck Repair	No
483	Bridge – Deck Sealing	No
484	Bridge – Joint Repair	No
486	Bridge – Superstructure Repair	No

Table 4.2 (Continued): Maintenance Functions

Code	Activity Description	Included in Maintenance Histories
488	Bridge – Substructure Repair	No
491	Bridge – Piling Repair/Replacement	No
493	Painting Structural Steel	No
494	Channel Work/Drift Removal	No
495	Bridge – Cleaning	No
496	Bridge – Approach Leveling/Maintenance	No
500	Bridge - Miscellaneous	No
511	Snow Removal and Ice Control	No
531	Paint Strips and Edge Markings	No
532	Paint Pavement Markings	No
533	Maintain Traffic Signs	No
534	Maintain Guard Rails, Posts, and Fences	No

535	Maintain Traffic Signals and Lighting Systems	No
536	Install and Maintain Mail Box Posts	No
537	Maintain Rest Areas, Parks, and Information Bureaus	No
561	Erecting New Signs	No
565	Unusual and Disaster Maintenance	Yes
576	Landscape and Scenic Enhancement	No
580	Salvage Operations	Yes
661/672	Betterment Projects	No

Given the current record keeping system, it is not possible to compare the maintenance histories of a stone base pavement versus a full-depth pavement if they are located on the same route and section. To be able to compare the maintenance histories given this scenario it would be necessary to keep maintenance records that are broken down into either route, section, log mile, or to include a code along with the maintenance function to differentiate what the pavement cross-section is. The maintenance cost histories for the pavements included in this research project are included in Appendix J.

4.3 SALVAGE VALUE

The salvage value used in the economic analysis was determined based on the remaining serviceable life of the pavement. It was assumed that all of the pavements started with an initial PSI of 4.2, as found at the AASHO Road Test (AASHTO, 1993), and that the pavement's useful life would end at a PSI of 2.5. This gives a total serviceable life equal to a change in PSI (ΔPSI) of 1.7. The current PSI of the pavement was calculated using Equation 4 and is summarized in Table 3.4 (a). Once the current PSI was determined, the remaining serviceable life was found by subtracting the current PSI from the assumed final PSI of 2.5. The percentage of serviceable life remaining was then determined based on the current serviceable life remaining and the total serviceable life. This assumes that the decline in serviceable life is a straight line. In actuality, the deterioration of the pavement accelerates as the PSI approaches its terminal value. However, for the purpose of determining salvage values for these pavements, it is assumed that the method used is acceptable.

The salvage value of each pavement was then estimated by determining the 1999 NPW of the initial construction costs, and then multiplying that value by the percentage of remaining serviceable life of the pavement. Initial construction costs were used because no major rehabilitation occurred toward the end of the analysis period for any of the pavement sections. Table 4.3, below, is a summary of the salvage values used in the economic analysis.

Table 4.3: Estimated Salvage Values

Location	Year Built	Initial Costs ($/lane-mile)	Current PSI	Serviceable Life Remaining, %	Salvage Value ($/lane-mile)
Hwy 82 #1	1990	60,947	3.05	32	13,124
Hwy 82 #2	1990	60,947	2.73	14	5,742
Hwy 79 #1 & #2	1991	241,977	3.47	57	92,812
Hwy 49 #1	1999	114,922	2.6	6	4,640
Hwy 49 #2	1999	135,116	2.73	14	12,729
Hwy 270 #1	1984	239,492	2.22	0	0
Hwy 270 #2	1981	341,730	1.89	0	0
Hwy 65 #1	1987	137,215	3.53	50	46,166
Hwy 65 #2 & #10	1988	114,615	2.39	0	0
Hwy 65 #11	1988	114,615	2.73	14	10,797
Hwy 65 #12	1987	137,215	3.58	64	59,093
Hwy 412 #10	1994	168,225	3.49	58	65,655

Hwy 412 #11	1994	168,225	3.55	62	70,183
Hwy 412 #12	1994	72,496	3.81	77	37,563
Hwy 412 #13	1994	72,496	3.18	40	19,513
Hwy 412 #14	1987	131,021	2.87	22	25,119

4.4 ECONOMIC ANALYSIS

A NPW analysis was performed for each location. A NPW analysis was selected instead of an EUAC analysis because the pavements were evaluated from their year of construction to 1999. If an EUAC method was used, then the construction costs of the pavements constructed within the past few years would not be distributed over as many years as the older pavements. This would result in the newer pavements appearing less economical. In a typical EUAC, used to select which alternative to construct, this problem is solved by using the same analysis period for all alternatives. However, this is an analysis of pavements that have already been constructed at different times, which limits the ability of using the same analysis period for all pavements. Differing analysis periods still create a problem when using a NPW analysis. However, the problem deals with the number of years when maintenance costs occur. The older pavements in this analysis have more maintenance costs contributing to their NPW. However, as can be seen in Table 4.4, maintenance costs had a minimal impact on this analysis. Therefore, it is felt that the NPW method is appropriate for this analysis.

Appendix K contains the tables created as part of the analysis. To perform the analysis, the costs associated with each pavement section for each year were determined (Sections 4.1, 4.2, and 4.3). Each cost was then converted to its 1990 value based on the present worth factor as determined by Equation 8. The sum of all the costs was then taken as the NPW for that pavement section. Table 4.4 shows the results of the analysis.

Table 4.4: Results of Economic Analysis

Location	Year Built	Type of Construction	NPW at 1990 ($/lane-mile)	Increase in NPW due to Maintenance Costs (%)
Hwy 82 #1	1990	Full-Depth Widening	53,826	3.28
Hwy 82 #2	1990	Full-Depth Widening	58,793	3.00
Hwy 79 #1 & #2	1991	Stone Base Pavement	180,821	0.72
Hwy 49 #1	1999	Full-Depth Widening	118,122	0.07
Hwy 49 #2	1999	Full-Depth Widening	126,628	0.06
Hwy 270 #1	1984	Stone Base Widening	244,336	2.02
Hwy 270 #2	1981	Full-Depth Widening	347,280	1.62
Hwy 65 #1	1987	Stone Base Widening	110,528	4.13

Table 4.4 (Continued): Results of Economic Analysis

Location	Year Built	Type of Construction	NPW at 1990 ($/lane-mile)	Increase in NPW due to Maintenance Costs (%)
Hwy 65 #2, #10	1988	Full-Depth Widening	118,797	3.65
Hwy 65 #11	1988	Full-Depth Widening	111,531	3.90
Hwy 65 #12	1987	Stone Base	101,830	4.49

		Widening		
Hwy 412 #10	1994	Stone Base Pavement	124,649	0.49
Hwy 412 #11	1994	Stone Base Pavement	121,602	0.50
Hwy 412 #12	1994	Full-Depth Widening	47,824	1.28
Hwy 412 #13	1994	Full-Depth Widening	59,970	1.02
Hwy 412 #14	1987	Full-Depth Widening	153,377	0.40

As can be seen in Table 4.4, maintenance costs have a low impact on the overall NPW of each location. Therefore, initial construction costs and salvage values have the greatest impact on the NPW of each of these pavement sections. Based on the NPW at 1990, the average value for the sections containing a stone base pavement structure is $147,294 while the average full-depth value is only $119,615. Along with an evaluation of the average NPW's, a comparison should be made of the sites where a direct comparison can be made between a stone base pavement and a full-depth pavement along the same highway. For two of the three highways that meet this criteria, the more economical pavement type is actually the stone base section. However, of these two highways, only Highway 270 showed a significant savings from the use of a stone base pavement section. Based on this information, the use of full-depth asphalt, in general, is more economical when compared to using a crushed stone base course.

A factor that should be considered when evaluating the results of this analysis is the maintenance costs used. Although it was shown that maintenance costs did not have a significant impact, if the records were specific to pavement type, then maybe the difference would be enough to affect the results of the analysis. Based on the numbers obtained in this study, maintenance costs specific to pavement type most likely would not change the overall results, but it could make the difference between the average NPW's of the two pavement types either closer together or farther apart.

The conclusion of this economic analysis is that full-depth pavements appear to be more economical, both in initial construction costs and total costs over the life of the pavement. However, a limitation of this analysis is that the costs used do not reflect any major rehabilitation projects, because none of these pavements have undergone a major rehabilitation. Rehabilitation costs have the potential to change, maybe drastically, the outcome of the economic analysis. Another life-cycle cost analysis should be performed once the pavements have undergone rehabilitation projects to confirm that full-depth pavements are more economical over the entire life of the pavement.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Based on the data and information obtained as part of this research, there are several conclusions:

1. There is evidence, based on the pavements in this study, that stone base pavements perform better than predicted from AASHTO performance equations. On the other hand, full-depth pavements appear to not be performing as well as predicted by the AASHTO performance equations.
2. From the moisture content data, it appears that the selection of a full-depth pavement section results in an increase in the moisture content of subgrade, possibly leading to poor performance. This increase in moisture content could be the result of full-depth being used primarily for notch and widening projects.
3. Given the information obtained regarding stripping of the asphalt cores, there does not appear to be any trend relating stripping with the type of pavement section. However, it should be noted that over one-third of all the cores sampled showed evidence of stripping, which indicates that stripping is a problem within the State of Arkansas.
4. From the roughness data, along with the resulting PSI's, obtained as part of this research, it appears that stone base pavements are performing better than full-depth pavements. However, it should be noted that there was no initial IRI data to determine the PSI immediately after construction for each pavement. It was assumed that all of the pavements had an initial PSI of 4.2.
5. Based on a life-cycle cost analysis, it appears that full-depth pavements are, in general, more economical over the life of the pavement compared to stone base pavements.

5.2 RECOMMENDATIONS

As part of this project, research was performed in an attempt to determine cost histories for each testing location. The process of determining maintenance cost histories was time consuming because the records were on microfiche and viewed with the use of a machine that was not hooked up to a printer. This process could be improved tremendously with the use of a computer database. This would allow searches to be performed almost instantaneously to locate and print maintenance cost histories for multiple sites. The use of a computerized database would also allow better analysis of the cost data so that trends in spending could be reviewed.

Maintenance records were obtained for an adequate time period; however, these records were not specific enough to allow for distinction between different locations in the same route and section or for different pavement types. Changes could be made to the record keeping system so that records indicate the exact location of the maintenance activity and on what type of pavement cross-section the maintenance is being performed. Such record keeping would allow for the determination of exactly how much money is required to maintain pavements that are constructed with a crushed stone base course versus pavements that are constructed with an asphalt stabilized base course.

The exact location of maintenance activities could easily be recorded with the use of a Global Positioning System (GPS). However, recording the type of pavement cross-section may not be as simple. Maintenance workers do not necessarily know what the pavement section is. If information, such as descriptions of the pavements around the state, were kept as part of a Geographic Information System (GIS), then after a maintenance activity is performed, the location of that activity, along with the costs, could be entered into the database. The GIS program could then match information involving maintenance histories relative to pavement type.

One of the objectives of this research was to develop new criteria to aid in base course material selection. However, there is no strong evidence that there is any new criteria which should be considered. However, there is evidence that of the current factors considered (i.e. costs, performance, project location, material availability, construction time constraints), historical performance should strongly be considered. Although the full-depth pavements, in general, were more economical, they were not performing as well as the stone base sections. When selecting which alternative to construct, performance versus costs should be carefully considered.

There is further research that could be of benefit for both future comparisons of pavement types and to AHTD in general. The main focus of this new research should be focused on improving AHTD record keeping systems so that historical costs associated with a pavement, both construction and maintenance related, are easier to obtain for a given location.

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APPENDIX A

NET PRESENT WORTH AND

EQUIVALENT UNIFORM ANNUAL COST EXAMPLES

NET PRESENT WORTH ANALYSIS EXAMPLE

The following example shows how a NPW analysis is used to evaluate two alternatives. For the purpose of this example, the alternatives are for two different types of equipment for use in a factory.

Alternative #1:

Analysis Period = 10 years

Initial Cost = $10,000

Annual Maintenance Costs = $1,000

Major Repair Costs at year 5 = $5,000

Salvage Value at year 10 = $4,000

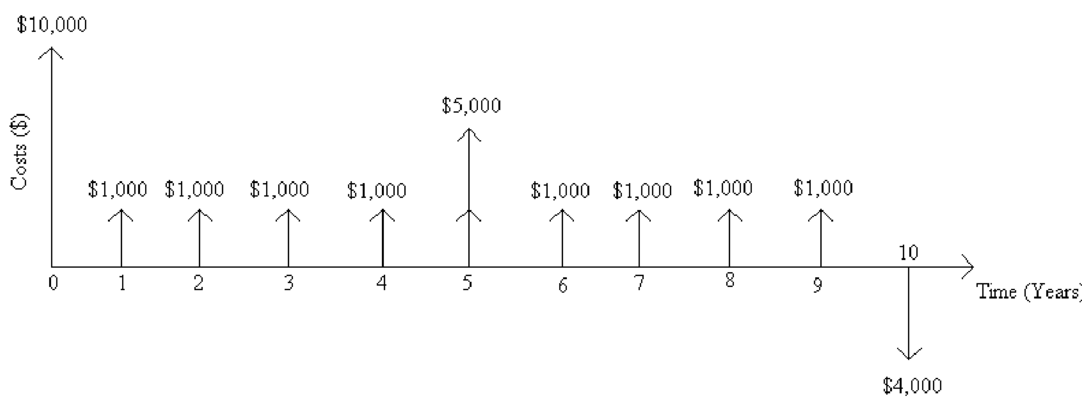


Figure A-1: Expenditure Flow Diagram for Alternative #1

$NPW_{\text{initial costs}} = \$10,000$

$NPW_{\text{annual maintenance}} = \$1,000[(1+i)^n-1]/[i(1+i)^n]$

$= \$1,000[(1.04)^9-1]/[0.04(1.04)^9] = \$1,000(7.435) = \$7,435$

$NPW_{\text{major repair}} = \$5,000[1/(1+i)^n] = \$5,000[1/(1.04)^5]$

$= \$5,000(0.8219) = \$4,110$

$NPW_{salvage\ value} = -\$4,000[1/(1+i)^n] = -\$4,000[1/(1.04)^{10}]$

$= -\$4,000(0.6756) = -\$2,702$

$NPW = \Sigma NPW_i = \$10,000 + \$7,435 + \$4,110 - \$2702 = \$18,843$

Alternative #2

Analysis Period = 10 years

Initial Cost = $15,000

Annual Maintenance Costs = $600

Major Repair Costs at year 5 = $2,000

Salvage Value at year 10 = $5,000

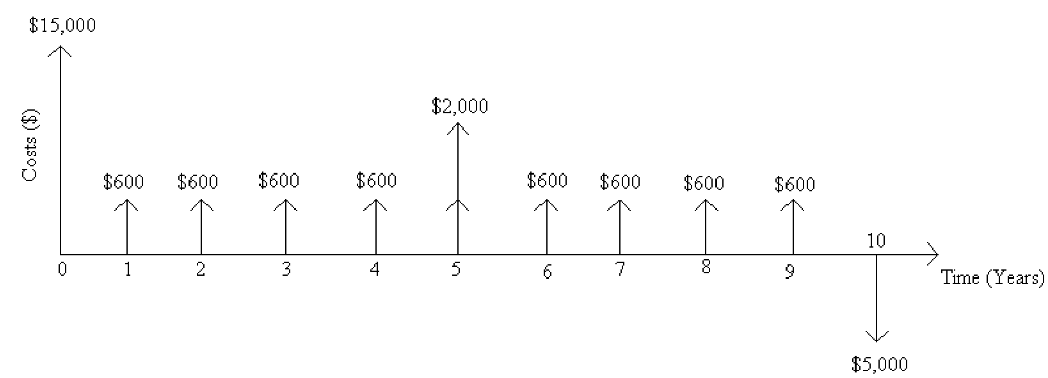


Figure A-2: Expenditure Flow Diagram for Alternative #2

$NPW_{initial\ costs} = \$15,000$

$NPW_{annual\ maintenance} = \$600[(1+i)^n-1]/[i(1+i)^n]$

$= \$600[(1.04)^9-1]/[0.04(1.04)^9] = \$600(7.435) = \$4,461$

$NPW_{major\ repair} = \$2,000[1/(1+i)^n] = \$2,000[1/(1.04)^5]$

$= \$2,000(0.8219) = \$1,644$

$NPW_{salvage\ value} = -\$5,000[1/(1+i)^n] = -\$5,000[1/(1.04)^{10}]$

$= -\$5,000(0.6756) = -\$3,378$

$NPW = \Sigma NPW_i = \$15,000 + \$4,461 + \$1,644 - \$3,378 = \$17,727$

When comparing the NPW of each alternative, it can be seen that although alternative #2 has a higher initial cost it has a lower NPW, which corresponds to a lower cost over the life of the equipment. Therefore, if the decision is based solely on economics, the factory should purchase the equipment in alternative #2.

EQUIVALENT UNIFORM ANNUAL COST ANALYSIS EXAMPLE

Consider the same alternatives as in the Net Present Worth Analysis Example. The two alternatives can also be compared by converting all costs to the present time and then spreading all of the costs of each alternative over the analysis period and summing them.

Alternative #1

$EUAC_{initial\ costs} = \$10,000[i(1+i)^n]/[(1+i)^n - 1]$

$= \$10,000[0.04(1.04)^{10}]/[(1.04)^{10}-1] = \$10,000(0.1233) = \$1,233$

$EUAC_{annual\ maintenance} = \$1,000[(1+i)^n-1]/[i(1+i)^n][[i(1+i)^n]/[(1+i)^n - 1]$

$= \$1,000[(1.04)^9-1]/[0.04(1.04)^9][0.04(1.04)^{10}]/[(1.04)^{10}-1]$

$= \$1,000(7.435)(0.1233) = \$917$

$EUAC_{major\ repair} = \$5,000[1/(1+i)^n]\ [i(1+i)^n]/[(1+i)^n - 1]$

$= \$5,000[1/(1.04)^5][0.04(1.04)^{10}]/[(1.04)^{10} - 1]$

$= \$5,000(0.8219)(0.1233) = \$507$

$EUAC_{salvage\ value} = -\$4,000[1/(1+i)^n][i(1+i)^n]/[(1+i)^n - 1]$

$= -\$4,000[1/(1.04)^{10}]\ [0.04(1.04)^{10}]/[(1.04)^{10}-1]$

$= \$4,000(0.6756)(0.1233) = \$\ 333$

$EUAC = \Sigma EUAC_i = \$1,233 + \$917 + \$507 - \$333 = \$2,324$

Alternative #2

$EUAC_{initial\ costs} = \$15,000[i(1+i)^n]/[(1+i)^n - 1]$

$= \$15,000[0.04(1.04)^{10}]/[(1.04)^{10}-1] = \$15,000(0.1233) = \$1,850$

$EUAC_{annual\ maintenance} = \$600[(1+i)^n-1]/[i(1+i)^n][[i(1+i)^n]/[(1+i)^n - 1]$

$= \$600[(1.04)^9-1]/[0.04(1.04)^9][0.04(1.04)^{10}]/[(1.04)^{10}-1]$

$= \$600(7.435)(0.1233) = \$550$

$EUAC_{major\ repair} = \$2,000[1/(1+i)^n]\ [i(1+i)^n]/[(1+i)^n - 1]$

$= \$2,000[1/(1.04)^5][0.04(1.04)^{10}]/[(1.04)^{10} - 1]$

$= \$2,000(0.8219)(0.1233) = \$203$

$EUAC_{salvage\ value} = -\$5,000[1/(1+i)^n][i(1+i)^n]/[(1+i)^n - 1]$

$= -\$5,000[1/(1.04)^{10}]\ [0.04(1.04)^{10}]/[(1.04)^{10}-1]$

$= \$5,000(0.6756)(0.1233) = \$417$

$EUAC = \Sigma EUAC_i = \$1,850 + \$550 + \$203 - \$417 = \$2,186$

When comparing the EUAC of each alternative, it can be seen that although alternative #2 has a higher initial cost it has a lower EUAC, which corresponds to a lower cost over the life of the equipment. Therefore, if the decision is based solely on economics, the factory should purchase the equipment in alternative #2.

APPENDIX B

SITE SUMMARIES

HIGHWAY 82

Highway 82
Between Magnolia and
El Dorado, Arkansas
Columbia County
May 24, 1999

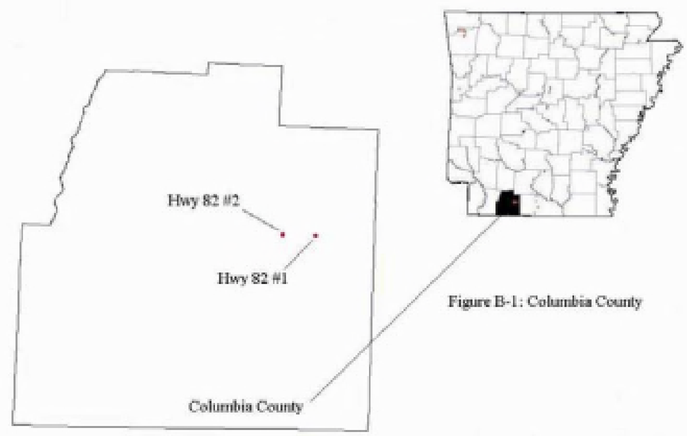


Figure B-1: Columbia County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The highway was widened to three lanes (alternating east and west bound) with full depth asphalt.
- Highway 82 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 5) that existed in original portion of Highway 82.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- Traffic distribution may not be assumed to be equal in the full depth asphalt widening sections and the crushed stone sections.

Highway 82 was sampled at section 4, log mile 11.03 (#1) and section 4, log mile 8.34 (#2). These log miles represent portions of Highway 82 that had been widened with full depth asphalt on the outside of the existing lanes. Location #1 was widened on the south side of the existing road. Location #2 was widened on the north side of the existing road.

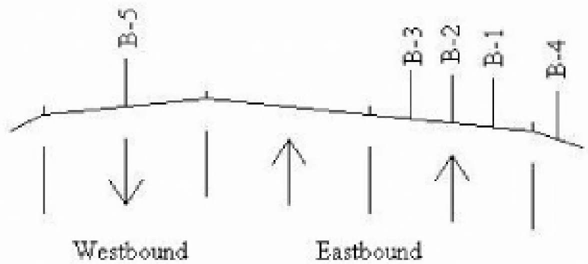


Figure B-2: Highway 82 #1 Borings

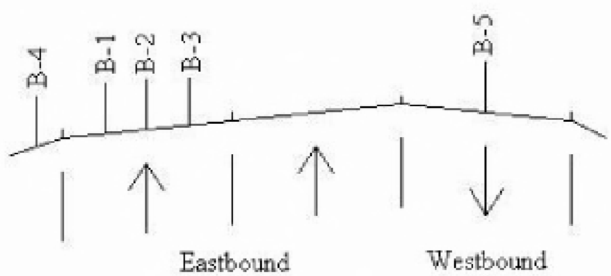


Figure B-3: Highway 82 #2 Borings

The widening job was built in 1990 under AHTD Job # R70050. The design year was 2009. The 1989 ADT was 2760. The expected 2009 ADT was 4100. The percent trucks from the cover sheet was 15.33%.

From AHTD traffic counts at Locations #1 and #2, the estimated 1989 ADT was 3000 and the 2009 expected ADT is 6000.

For Location #1, rutting data provided by AHTD from March 1, 1999 show a 0.118 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.134 inch rut in the left wheelpath and a 0.133 inch rut in the right wheelpath.

For Location #1, IRI data provided by AHTD from March 1, 1999 show a 63 inch/mile IRI in the left wheelpath and a 62 inch/mile IRI in the right wheelpath.

Averages for the 1 mile sections on either side of Location #1 show a 91 inch/mile IRI in the left wheelpath and a 100 inch/mile IRI in the right wheelpath.

For Location #2, rutting data provided by AHTD from March 1, 1999 show a 0.157 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #2 show a 0.145 inch rut in the left wheelpath and a 0.140 inch rut in the right wheelpath.

For Location #2, IRI data provided by AHTD from March 1, 1999 show a 72 inch/mile IRI in the left wheelpath and a 77 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #2 show a 93 inch/mile IRI in the left wheelpath and a 103 inch/mile IRI in the right wheelpath.

HIGHWAY 167

Highway 167
South of El Dorado,
Arkansas
Union County
May 25, 1999

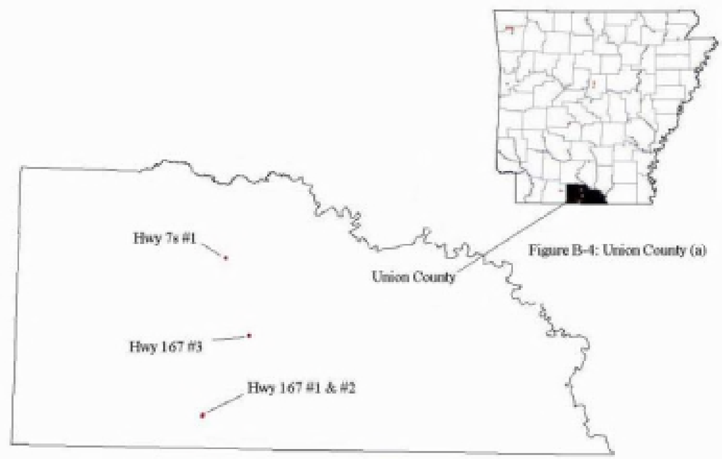


Figure B-4: Union County (a)

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The highway was in the process of being widened from two to four lanes with the added lanes composed of full depth asphalt.
- Highway 167 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 5) that existed in original portion of Highway 167.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- Some portions of the pavement section that were sampled had only been driven on during stage construction. Therefore no accurate traffic data is available for this portion of the highway.
- The full depth asphalt sections were recently completed.
- Portions of the alignment of the roadway were changed during construction of some of the four lane sections of the widening.

Highway 167 was sampled at section 1, log mile 3.44 (#1), section 1, log mile 3.42 (#2), and section 1, log mile 12.15 (#3). These log miles represent portions of Highway 167 that had been widened with full depth asphalt on the south bound portion outside of the existing lanes.

For Location #1, rutting data provided by AHTD from March 1, 1999 show a 0.118 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath.

Averages for the 1 mile sections on either side of Location #1 show a 0.129 inch rut in the left wheelpath and a 0.162 inch rut in the right wheelpath.

For Location #2, rutting data provided by AHTD from March 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #2show a 0.129 inch rut in the left wheelpath and a 0.162 inch rut in the right wheelpath.

For Location #3, rutting data provided by AHTD from March 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #3show a 0.129 inch rut in the left wheelpath and a 0.116 inch rut in the right wheelpath.

HIGHWAY 15

Highway 15
East of El Dorado, Arkansas
Bradley County
May 25, 1999

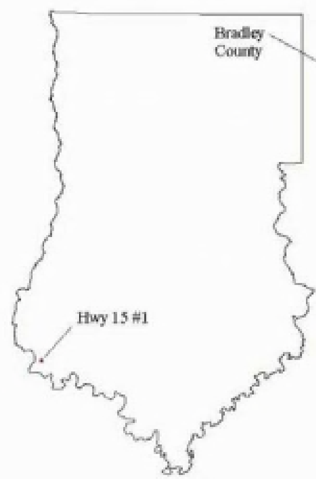



Figure B-5: Bradley County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- Hwy 15 was constructed with a crushed stone base course.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- Hwy 15 was constructed with a crushed stone base course. There does not appear to be a good companion section using full-depth asphalt construction.

Highway 15 was sampled at section 3, log mile 1.00. This location represents a portion of Highway 15 that was constructed with a crushed stone base course.

This was built under AHTD Job # R70071. The design year was 2011. The 1991 ADT was 630. The expected 2011 ADT was 1210. The percent trucks from the cover sheet was 19.71%. From a different AHTD database, the percent trucks is 49%.

For Location #1, rutting data provided by AHTD from March 1, 1999 show a 0.157 inch rut in the left wheelpath and a 0.079 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.124 inch rut in the left wheelpath and a 0.150 inch rut in the right wheelpath.

HIGHWAY 7 SPUR

Highway 7 spur
El Dorado, Arkansas
Union County
May 25, 1999

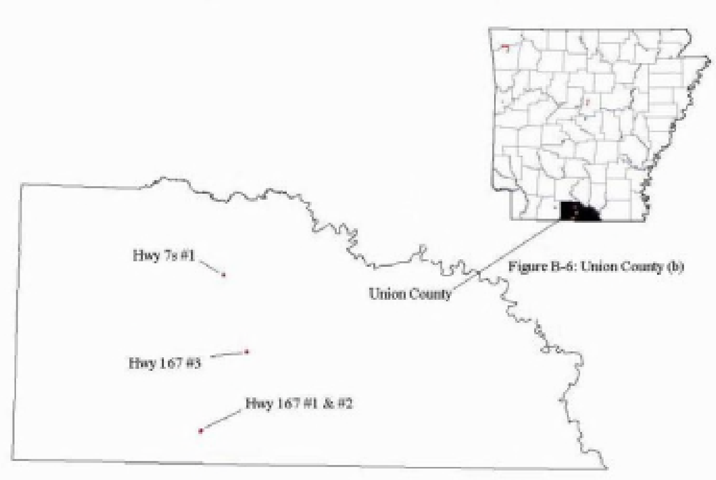


Figure B-6: Union County (b)

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- This section of Highway 7 spur was a bridge approach widened with full depth asphalt.
- Highway 7 spur allowed a direct comparison between the performance of full depth asphalt and a pavement section with crushed stone base course (class 5).

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- The original pavement section consisted of 5 inches of asphalt, approximately 1.0 feet of class 5 base course, and 6 inches of fill material on top of a concrete pavement. The presence of the concrete pavement below the existing pavement section does not meet our requirements for a suitable test section.

Highway 7 spur was sampled at section 2s, log mile 0.70. This log mile represents a portion of Highway 7 spur that had been widened for the bridge approach.

For Location #1, rutting data provided by AHTD from March 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.130 inch rut in the left wheelpath and a 0.136 inch rut in the right wheelpath.

HIGHWAY 79

Highway 79
Outside of El Dorado,
Arkansas
Calhoun County
May 26, 1999

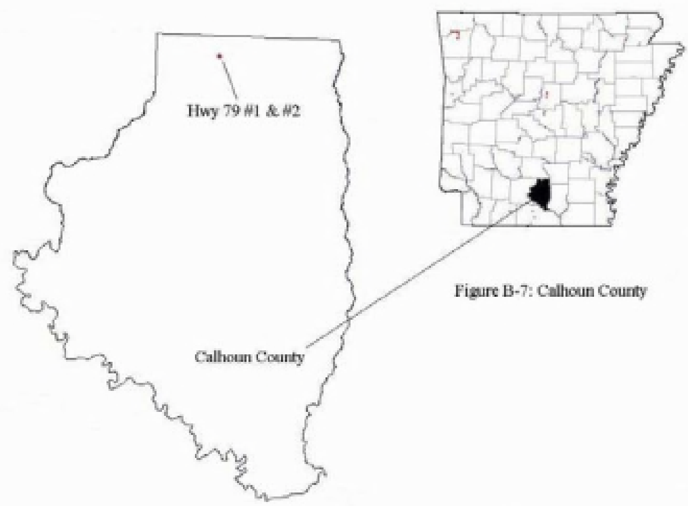


Figure B-7: Calhoun County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- This portion of Hwy 79 was constructed with a crushed stone base course

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- There does not appear to be a good companion section allowing a direct comparison between the performance of full-depth asphalt with a pavement section using a crushed stone base course.

Highway 79 was sampled at section 5, log mile 5.64 (#1 and #2). This log mile represents a portion of Highway 79 that was constructed with a crushed stone base course.

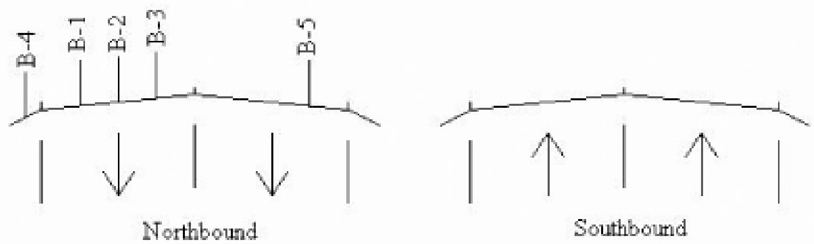


Figure B-8: Highway 79 #1 Borings

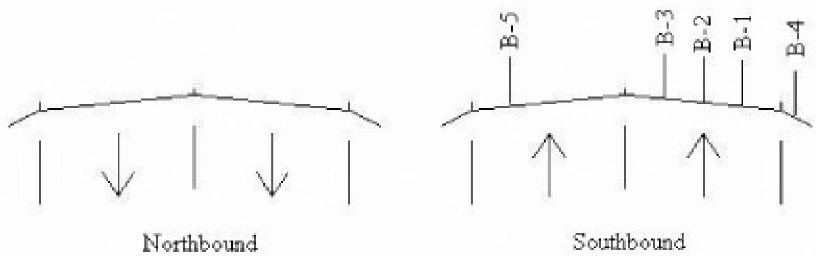


Figure B-9: Highway 79 #2 Borings

This job was built in 1991 under AHTD Job # R70016. The design year was 2010. The 1990 ADT was 3930. The expected 2010 ADT was 5955. The percent trucks from the cover sheet was 16.79%. From another AHTD database, the percent trucks was 16%.

From AHTD traffic counts, the estimated 1990 ADT was 3400 and the expected 2010 ADT is 5100.

For Locations #1 and #2, rutting data provided by AHTD from April 1, 1999 show a 0.096 inch rut in the left wheelpath and a 0.197 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Locations #1 and #2 show a 0.096 inch rut in the left wheelpath and a 0.130 inch rut in the right wheelpath.

For Locations #1 and #2, IRI data provided by AHTD from April 1, 1999 show a 67 inch/mile IRI in the left wheelpath and a 72 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Locations #1 and #2 show a 77 inch/mile IRI in the left wheelpath and a 81 inch/mile IRI in the right wheelpath.

OTTER CREEK ROAD

Otter Creek Road
Little Rock, Arkansas
Pulaski County
June 28, 1999

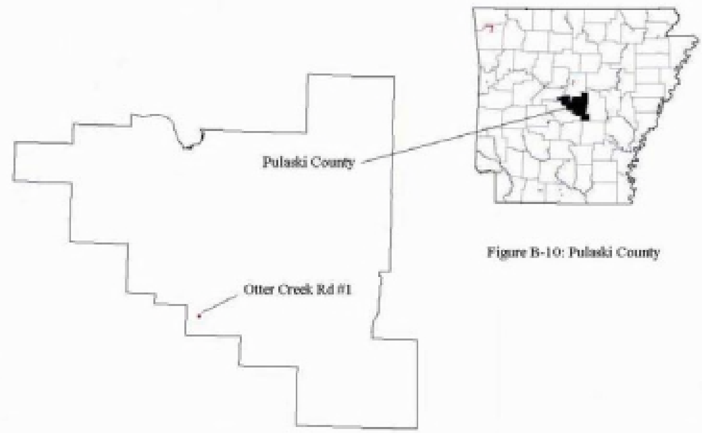


Figure B-10: Pulaski County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The sampled section of Otter Creek Road connecting the original Otter Creek Road to Highway 5 was constructed with full depth asphalt.
- The sampled section of Otter Creek Road would provide a direct comparison of a full depth asphalt section to the existing Otter Creek Road pavement section located to the east of the sampled site.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- The original section of Otter Creek Road was found to be composed of concrete. The comparison between full depth asphalt and concrete pavement sections is outside of the scope of this project.

Otter Creek Road is not a state highway and therefore has no section or log mile designation. The site sampled represents a portion of Otter Creek Road that had been constructed with full depth asphalt. Additionally, the section of Otter Creek Road sampled was bordered on the east and the west by box culverts.

HIGHWAY 165

Highway 165
East of Humnoke, Arkansas
Lonoke County
June 28, 1999

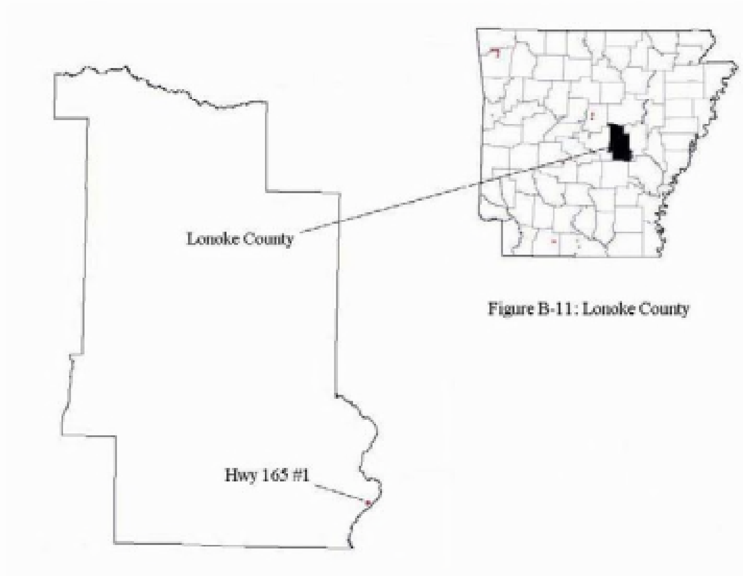


Figure B-11: Lonoke County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The highway was widened to four lanes with full depth asphalt.
- Highway 165 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 5) that existed in original portion of Highway 165.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- Traffic distribution may not be assumed to be equal in the full depth asphalt widening sections and the crushed stone sections because only the shoulders were widened leaving only a small portion of the lane as full-depth.

Highway 165 was sampled at section 8, log mile 0.44 (#1). This log mile represents a portion of Highway 165 that had been widened with full depth asphalt on the outside of the westbound lane.

The widening job was built under AHTD Job # R60119. The design year was 2014. The 1994 ADT was 2950. The expected 2014 ADT was 4200. The percent trucks from the cover sheet was 13.14%.

For Location #1, rutting data provided by AHTD from March 1, 1999 show a 0.039 inch rut in the left wheelpath and a 0.000 inch rut in the right wheelpath.

Averages for the 1 mile sections on either side of Location #1 show a 0.063 inch rut in the left wheelpath and a 0.036 inch rut in the right wheelpath.

HIGHWAY 49

Highway 49
South of Paragould, Arkansas
Greene County
June 29, 1999

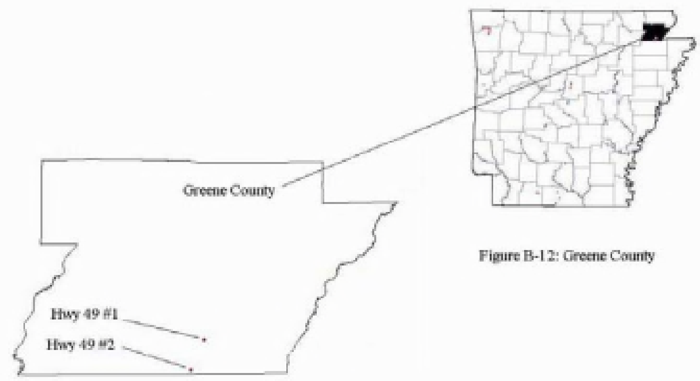


Figure B-12: Greene County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The highway was widened to four lanes with full depth asphalt.
- Highway 49 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 7) that existed in original portion of Highway 49.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- Traffic distribution may not be assumed to be equal in the full depth asphalt widening sections and the crushed stone sections.
- The full depth asphalt sections and the original crushed stone base course sections were not completed at the same time.

Highway 49 was sampled at section 2, log mile 23.51 (#1) and section 2, log mile 20.21 (#2). Location #1 represented a portion of Highway 49 that was in the process of being widened on the west side of the existing road. Location #2 represented a portion of Highway 49 that had been widened with full depth asphalt on the outside of the existing lanes.

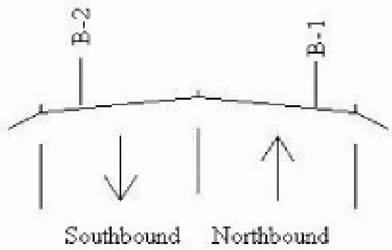


Figure B-13: Highway 49 #1 Borings

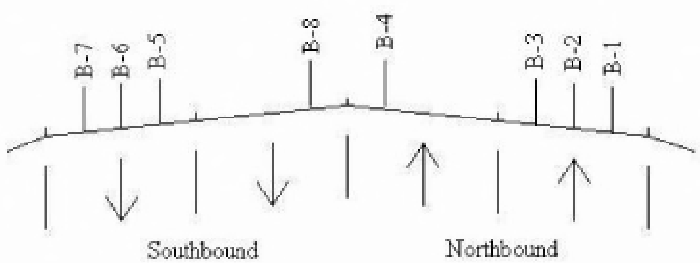


Figure B-14: Highway 49 #2 Borings

Location #1 was built under AHTD Job # R00081. The design year was 2014. The 1992 ADT was 7525. The expected 2014 ADT was 11750. The percent trucks from the cover sheet was 11%.

From AHTD traffic counts at Location #1, the estimated 1992 ADT was 7000 and the expected 2014 ADT is 13500.

Location #2 was built under AHTD Job # R00071. The design year was 2013. The 1993 ADT was 10000. The expected 2013 ADT was 15700. The percent trucks from the cover sheet was 5.84%.

From AHTD traffic counts at Location #2, the estimated 1993 ADT was 7500 and the expected 2013 ADT is 12200.

For Location #1, rutting data provided by AHTD from March 1, 1999 show a 0.236 inch rut in the left wheelpath and a 0.276 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.201 inch rut in the left wheelpath and a 0.239 inch rut in the right wheelpath.

For Location #1, IRI data provided by AHTD from March 1, 1999 show a 219 inch/mile IRI in the left wheelpath and a 103 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 150 inch/mile IRI in the left wheelpath and a 104 inch/mile IRI in the right wheelpath.

For Location #2, rutting data provided by AHTD from March 1, 1999 show a 0.157 inch rut in the left wheelpath and a 0.354 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #2 show a 0.216 inch rut in the left wheelpath and a 0.292 inch rut in the right wheelpath.

For Location #2, IRI data provided by AHTD from March 1, 1999 show a 306 inch/mile IRI in the left wheelpath and a 159 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #2 show a 136 inch/mile IRI in the left wheelpath and a 97 inch/mile IRI in the right wheelpath.

HIGHWAY 412 (#1-#2)

Highway 412
West of Paragould, Arkansas
Lawrence County
June 30, 1999

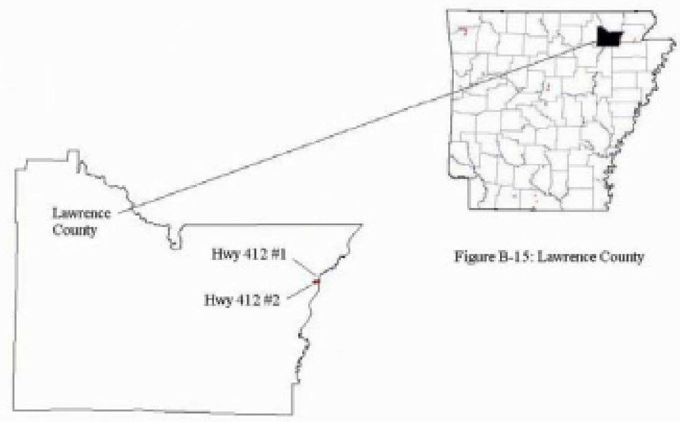


Figure B-15: Lawrence County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The highway was widened to four lanes with full depth asphalt on the westbound lanes as part of the bridge approaches.
- Highway 412 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 7) that existed in original portion of Highway 82.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- It was found that the existing pavement section consisted of an asphalt surface, asphalt sand, asphalt, and class 7 base, all overlaying an original concrete pavement. This section falls outside of the scope of this project.

Highway 412 was sampled at section 7, log mile 7.61 (#1) and section 7, log mile 7.28 (#2). Location #1 represents a portion of Highway 412 that had been widened with full depth asphalt on the north side of the existing lanes. Location #2 represented a portion of Highway 412 that had not been widened.

For Location #1, rutting data provided by AHTD from April 1, 1994 show a 0.276 inch rut in the left wheelpath and a 0.315 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.259 inch rut in the left wheelpath and a 0.290 inch rut in the right wheelpath.

For Location #2, rutting data provided by AHTD from April 1, 1994 show a 0.276 inch rut in the left wheelpath and a 0.276 inch rut in the right wheelpath.

Averages for the 1 mile sections on either side of Location #2 show a 0.259 inch rut in the left wheelpath and a 0.301 inch rut in the right wheelpath.

HIGHWAY 270

Highway 270
East of Hot Springs,
Arkansas
Garland County
July 6, 1999

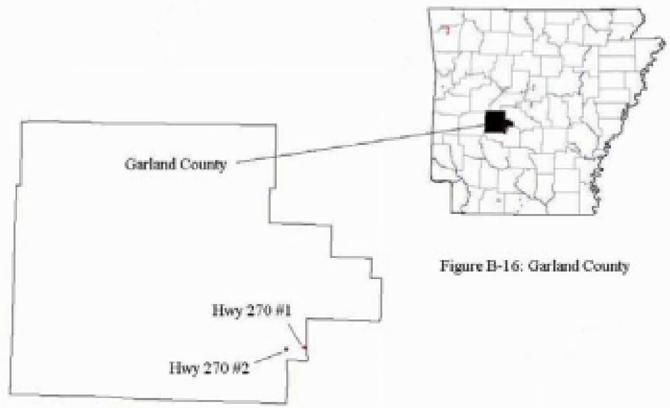


Figure B-16: Garland County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The highway was widened to four lanes using full depth asphalt in some portions and crushed stone base in other sections.
- Highway 270 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 5) that existed in original portion of Highway 270.
- Traffic distribution may be assumed to be equal in the full depth asphalt widening sections and the crushed stone widening sections.

There were no items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course.

Highway 270 was sampled at section 6, log mile 8.6 (#1) and section 6, log mile 6.47 (#2). Location #1 represents a portion of Highway 270 that had been widened with crushed stone base on the outside of the existing lanes. Location #2 represents a portion of Highway 270 that had been widened with full depth asphalt on the outside of the existing lanes.

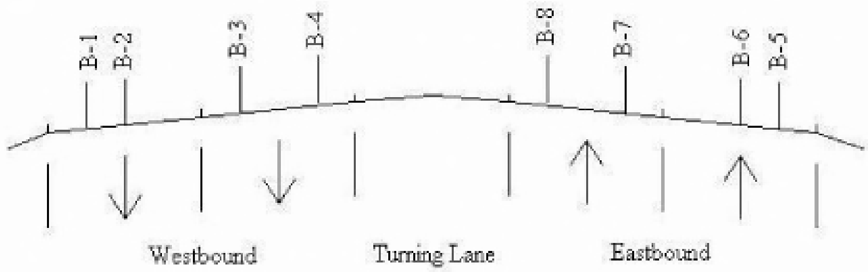


Figure B-17: Highway 270 #1 Borings

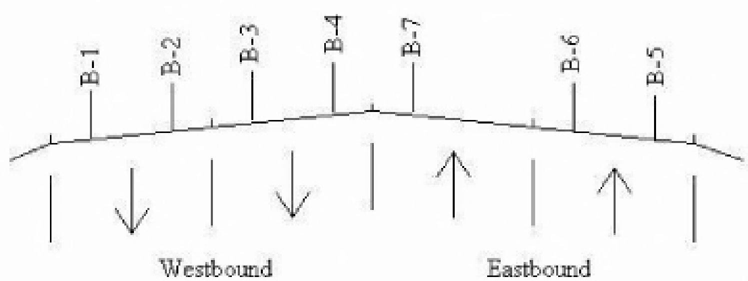


Figure B-18: Highway 270 #2 Borings

Location #1 was built in 1984 under AHTD Job # 60116. The design year was 2002. The 1982 ADT was 6650. The expected 2002 ADT was 10400. The percent trucks from the cover sheet was 12%.

From AHTD traffic counts at Location #1, the estimated 1982 ADT was 4200 and the expected 2002 ADT is 14200.

Location #2 was built in 1981 under AHTD Job # 60115. The design year was 1999. The 1979 ADT was 8940. The expected 1999 ADT was 18560. The percent trucks from the cover sheet was 8.8%.

From AHTD traffic counts at Location #2, the estimated 1979 ADT was 8200 and the expected 1999 ADT is 11000.

For Location #1, rutting data provided by AHTD from March 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.129 inch rut in the left wheelpath and a 0.116 inch rut in the right wheelpath.

For Location #1, IRI data provided by AHTD from March 1, 1999 show a 61 inch/mile IRI in the left wheelpath and a 87 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 121 inch/mile IRI in the left wheelpath and a 155 inch/mile IRI in the right wheelpath.

For Location #2, rutting data provided by AHTD from March 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.079 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #2 show a 0.126 inch rut in the left wheelpath and a 0.171 inch rut in the right wheelpath.

For Location #2, IRI data provided by AHTD from March 1, 1999 show a 214 inch/mile IRI in the left wheelpath and a 267 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #2 show a 181 inch/mile IRI in the left wheelpath and a 225 inch/mile IRI in the right wheelpath.

HIGHWAY 65

Highway 65
South of Greenbrier,
Arkansas
Faulkner County
July 7, 1999 and
August 9, 1999

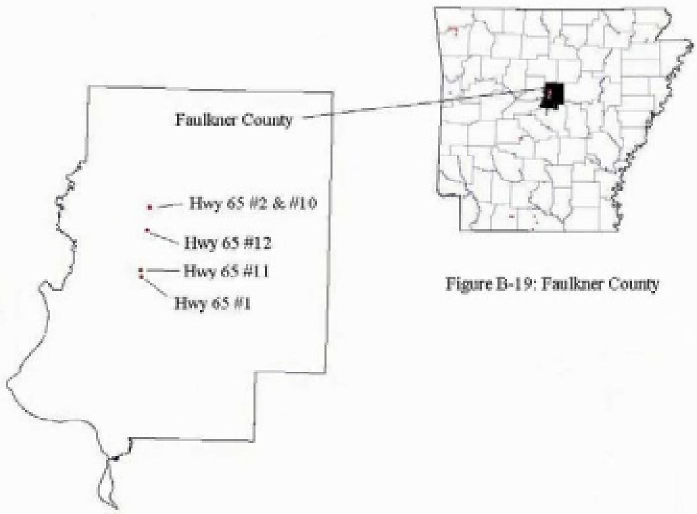


Figure B-19: Faulkner County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The highway was widened to four lanes using full depth asphalt in some portions and crushed stone base in other sections.
- Highway 65 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 7) that existed in original portion of Highway 65.
- Traffic distribution may be assumed to be equal in the full depth asphalt widening sections and the crushed stone widening sections.

There were no items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course.

Highway 65 was sampled at section 9, log mile 17.79 (#1), section 9, log mile 11.79 (#2 and #10), section 9, log mile 13.75 (#11), and section 9, log mile 17.2 (#12). Locations #1 and #11 represent a portion of Hwy 65 that was constructed using a crushed stone base course. Locations #2, #10, and #12 represent portions of Hwy 65 that were widened using full-depth asphalt.

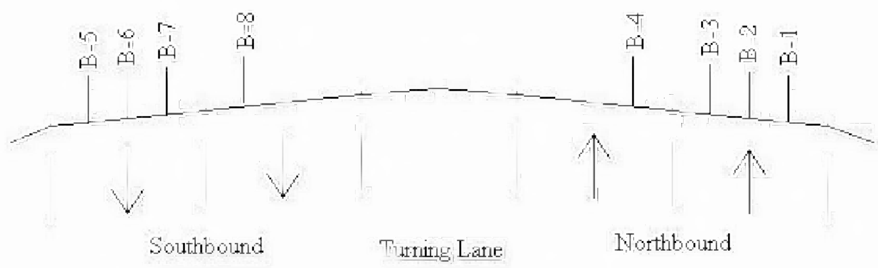


Figure B-20: Highway 65 #1 Borings

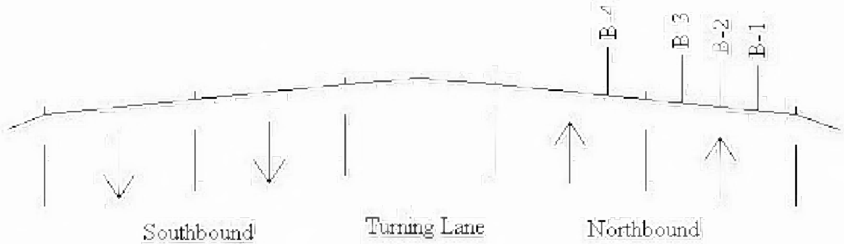


Figure B-21: Highway 65 #2 Borings

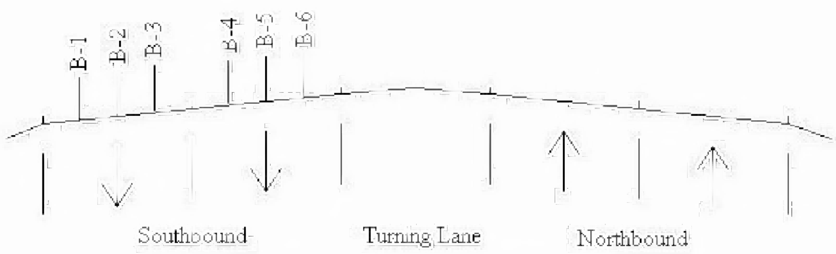


Figure B-22: Highway 65 #10 Borings

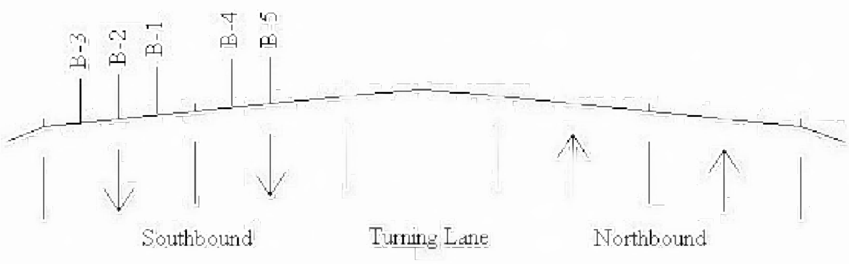


Figure B-23: Highway 65 #11 Borings

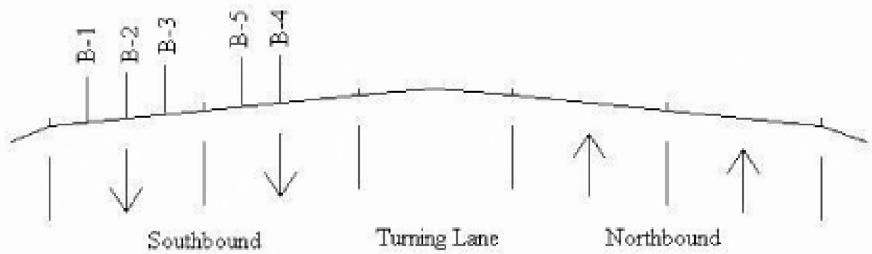


Figure B-24: Highway 65 #12 Borings

Locations #1 and #12 were built in 1987 under AHTD Job # 8827. The design year was 2004. The 1984 ADT was 11320. The expected 2004 ADT was 19600. The percent trucks from the cover sheet was 8%. From another AHTD database, the percent trucks is 17%.

From AHTD traffic counts at Locations #1 and #12, the estimated 1984 ADT was 17000 and the expected 2004 ADT is 21000.

Locations #2, #10, and #11 were built in 1988 under AHTD Job # R80010. The design year was 2006. The 1986 ADT was 11095. The expected 2006 ADT was 18750. The percent trucks from the cover sheet was 11%. From another AHTD database, the percent trucks is 17%.

From AHTD traffic counts at Locations #2, #10, and #11 the estimated 1986 ADT was 11000 and the expected 2006 ADT is 26000.

For Location #1, rutting data provided by AHTD from July 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.095 inch rut in the left wheelpath and a 0.126 inch rut in the right wheelpath.

For Location #1, IRI data provided by AHTD from July 1, 1999 show a 68 inch/mile IRI in the left wheelpath and a 77 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 71 inch/mile IRI in the left wheelpath and a 93 inch/mile IRI in the right wheelpath.

For Locations #2 and #10, rutting data provided by AHTD from July 1, 1999 show a 0.236 inch rut in the left wheelpath and a 0.433 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Locations #2 and

#10 show a 0.075 inch rut in the left wheelpath and a 0.227 inch rut in the right wheelpath.

For Locations #2 and #10, IRI data provided by AHTD from July 1, 1999 show a 141 inch/mile IRI in the left wheelpath and a 214 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Locations #2 and #10 show a 102 inch/mile IRI in the left wheelpath and a 121 inch/mile IRI in the right wheelpath.

For Location #11, rutting data provided by AHTD from July 1, 1999 show a 0.039 inch rut in the left wheelpath and a 0.236 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #11 show a 0.083 inch rut in the left wheelpath and a 0.205 inch rut in the right wheelpath.

For Location #11, IRI data provided by AHTD from July 1, 1999 show a 172 inch/mile IRI in the left wheelpath and a 262 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #11 show a 93 inch/mile IRI in the left wheelpath and a 136 inch/mile IRI in the right wheelpath.

For Location #12, rutting data provided by AHTD from July 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.157 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #12 show a 0.096 inch rut in the left wheelpath and a 0.125 inch rut in the right wheelpath.

For Location #12, IRI data provided by AHTD from July 1, 1999 show a 91 inch/mile IRI in the left wheelpath and a 95 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #12 show a 69 inch/mile IRI in the left wheelpath and a 83 inch/mile IRI in the right wheelpath.

HIGHWAY 71 (#1)

Highway 71
South of Fort Smith,
Arkansas
Sebastian County
July 8, 1999

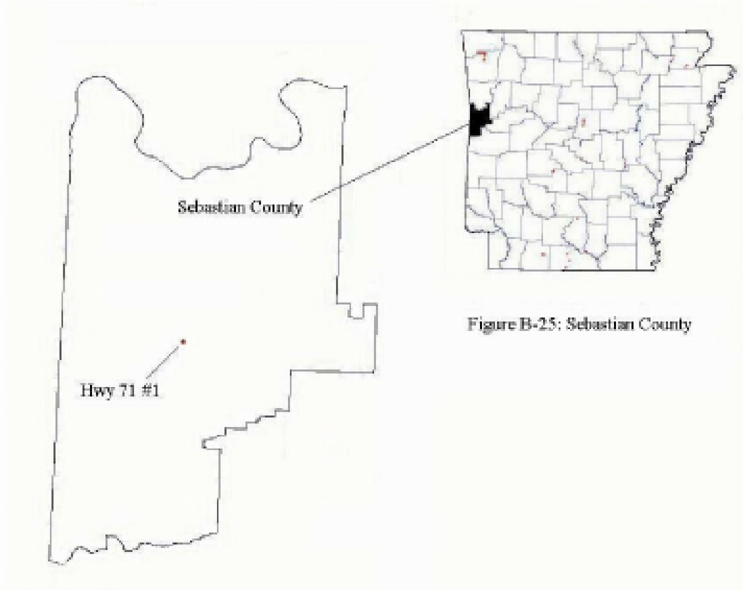


Figure B-25: Sebastian County

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- The divided highway was extended to four lanes further south out of Fort Smith. Portions of the widening were done with full depth asphalt. The new lanes were constructed with crushed stone base.
- Highway 71 allowed a direct comparison between the performance of full depth asphalt and a pavement section using crushed stone base course (class 7) that existed in original portion of Highway 71.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- It was found that the full depth asphalt section was in a bad location to sample and most likely would not have been useful because it had not seen acceptable traffic loading.
- Traffic distribution may not be assumed to be equal in the full depth asphalt widening sections and the crushed stone sections.

Highway 71 was sampled at section 13, log mile 7.84 (#1). This location represents a portion of Highway 71 that had been constructed with crushed stone base.

This location was built under AHTD Job # 40103. The design year was 2014. The 1994 ADT was 8100. The expected 2014 ADT was 11600. The percent trucks from the cover sheet was 10%.

For Location #1, rutting data provided by AHTD from August 1, 1999 show a 0.118 inch rut in the left wheelpath and a 0.197 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #1 show a 0.092 inch rut in the left wheelpath and a 0.146 inch rut in the right wheelpath.

HIGHWAY 71 (#10-#13)

Highway 71
Fayetteville, Arkansas
Washington County
August 16, 1999

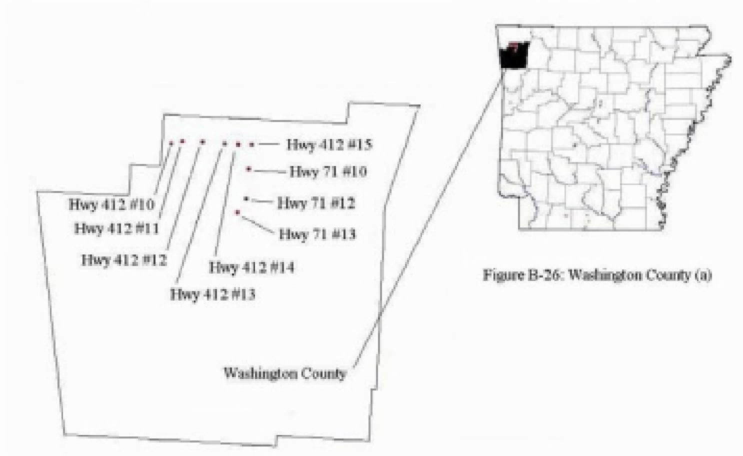


Figure B-26: Washington County (a)

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- This portion of Hwy 71 was constructed with full-depth asphalt.

Items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course include:

- There does not appear to be a good companion section allowing for a direct comparison of full-depth asphalt with a pavement section using a crushed stone base course.
- Some of the sites sampled are on what is now Highway 540, so the exact location is not known.

Highway 71 was sampled at section 17, log mile 6.99 (#10), section ____, log mile ____ (#11), (Hwy 540) section 4, log mile 65.33 (#12), and (Hwy 540) section 4, log mile 63.83 (#13). All 4 locations represent portions of Hwy 71 that were constructed with full-depth asphalt.

Location #10 was built under AHTD Job # 4892. The design year was 2003. The 1983 ADT was 19600. The expected 2003 ADT was 42300. The percent trucks from the cover sheet was 18%. From a different AHTD database, the percent trucks is 11%.

Location #11 was built under AHTD Job # ____. The design year was ____. The ____ ADT was ____. The expected ____ ADT was ____. The percent trucks from the cover sheet was ______%.

Location #12 was built under AHTD Job # ____. The design year was ____. The ____ ADT was ____. The expected ____ ADT was ____. The percent trucks from the cover sheet was ____%.

Location #13 was built under AHTD Job # ____. The design year was ____. The ____ ADT was ____. The expected ____ ADT was ____. The percent trucks from the cover sheet was ____%.

For Location #10, rutting data provided by AHTD from August 1, 1999 show a 0.157 inch rut in the left wheelpath and a 0.157 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #10 show a 0.181 inch rut in the left wheelpath and a 0.189 inch rut in the right wheelpath.

HIGHWAY 412 (#10-#15)

Highway 412
Fayetteville, Arkansas
Washington County
August 17, 1999

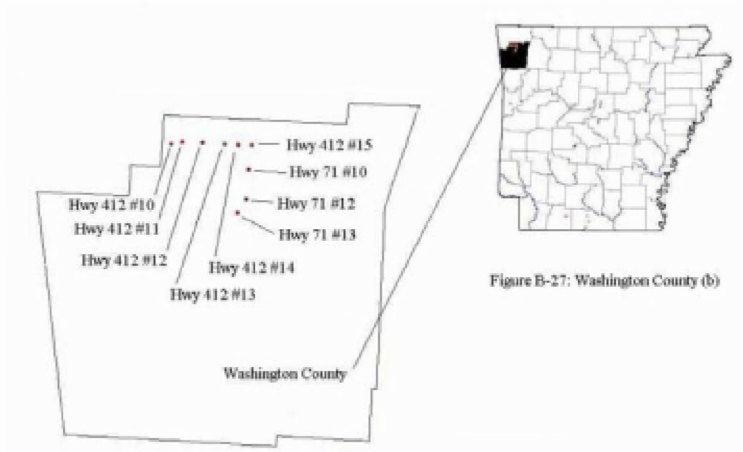


Figure B-27: Washington County (b)

General site conditions

This site was chosen for on-site evaluation for the following reasons:

- Portions of Hwy 412 were constructed with a crushed stone base course.
- Portions of Hwy 412 were widened with full-depth asphalt.
- This section of Hwy 412 allows a direct comparison between the performance of full-depth asphalt and a pavement using a crushed stone base course.

There were no items that were present at these sampling locations that may not allow for an absolute comparison between full depth asphalt and crushed stone base course.

Highway 412 was sampled at section 2, log mile 0.95 (#10), section 2, log mile 2.08 (#11), section 2, log mile 4.05(#12), section 2, log mile 6.27 (#13), section 2, log mile 7.55 (#14), and section 2, log mile 8.63 (#15).

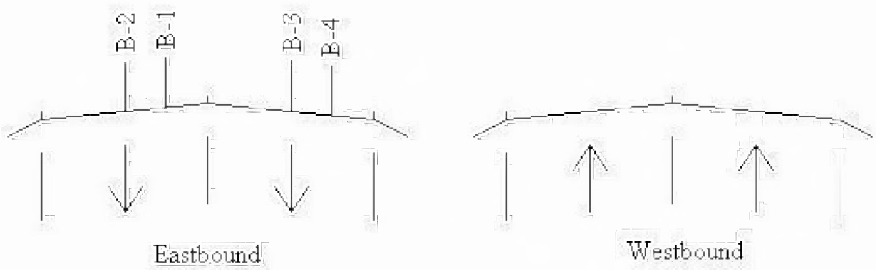


Figure B-28: Highway 412 #10 Borings

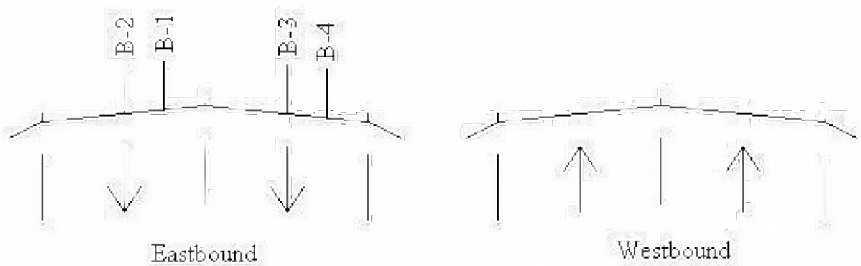


Figure B-29: Highway 412 #1. Borings

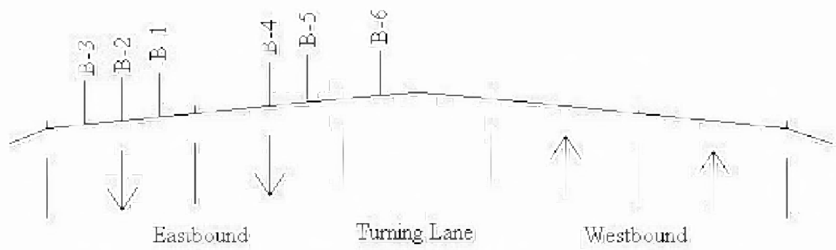


Figure B-30: Highway 412 #12 Borings

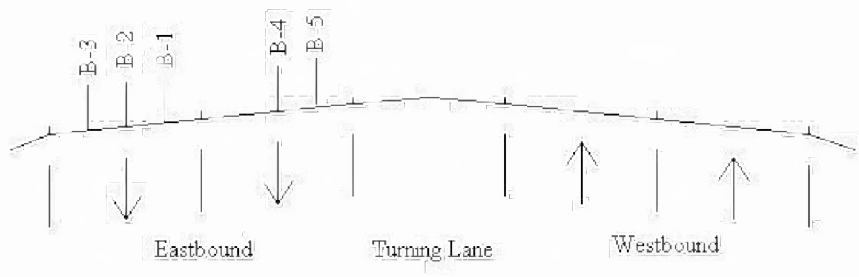


Figure B-31. Highway 412 #13 Borings

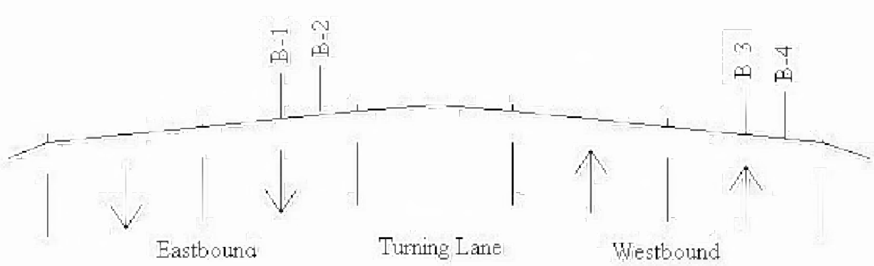


Figure B-32: Highway 412 #14 Borings

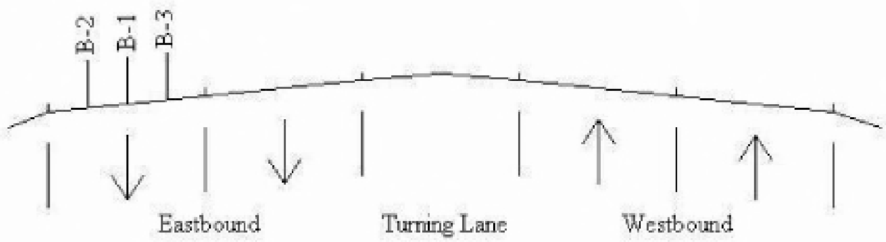


Figure B-33: Highway 412 #15 Borings

Locations #10 and #11 represent a portion of Hwy 412 that is divided and the eastbound direction was constructed with a crushed stone base course. Locations #12, #13, and #14 represent portions of Hwy 412 that were widened on the outsides of the existing lanes with full-depth asphalt. Location #15 represents a portion of Hwy 412 that was constructed with a crushed stone base and showed severe rutting.

Locations #10 and #11 were built in 1994 under AHTD Job # 1675. The design year was 2013. The 1993 ADT was 7195. The expected 2013 ADT was 12225. The percent trucks from the cover sheet was 19%. From a different AHTD database, the percent trucks is 17%.

From AHTD traffic counts at Locations #10 and #11, the estimated 1993 ADT was 7000 and the expected 2013 ADT is 13200.

Locations #12 and #13 were built in 1994 under AHTD Job # 40112. The design year was 2013. The 1993 ADT was 8950. The expected 2013 ADT was 14040. The percent trucks from the cover sheet was 16%. From a different AHTD database, the percent trucks is 17%.

From AHTD traffic counts at Locations #12 and #13, the estimated 1993 ADT was 10000 and the expected 2013 ADT is 20000.

Location #14 was built in 1987 under AHTD Job # R40016. The design year was 2006. The 1986 ADT was 10425. The expected 2006 ADT was 18035. The percent trucks from the cover sheet was 18%. From a different AHTD database, the percent trucks is 17%.

From AHTD traffic counts at Location #14, the estimated 1986 ADT was 10000 and the expected 2006 ADT is 24000.

Location #15 was built under AHTD Job # ____. The design year was ____. The ____ ADT was ____. The expected ____ ADT was ____. The percent trucks from the cover sheet was ____%.

For Location #10, rutting data provided by AHTD from August 1, 1999 show a 0.118 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #10 show a 0.107 inch rut in the left wheelpath and a 0.129 inch rut in the right wheelpath.

For Location #10, IRI data provided by AHTD from August 1, 1999 show a 84 inch/mile IRI in the left wheelpath and a 68 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #10 show a 82 inch/mile IRI in the left wheelpath and a 76 inch/mile IRI in the right wheelpath.

For Location #11, rutting data provided by AHTD from August 1, 1999 show a 0.118 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #11 show a 0.108 inch rut in the left wheelpath and a 0.127 inch rut in the right wheelpath.

For Location #11, IRI data provided by AHTD from August 1, 1999 show a 84 inch/mile IRI in the left wheelpath and a 63 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #11 show a 76 inch/mile IRI in the left wheelpath and a 72 inch/mile IRI in the right wheelpath.

For Location #12, rutting data provided by AHTD from August 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #12 show a 0.090 inch rut in the left wheelpath and a 0.131 inch rut in the right wheelpath.

For Location #12, IRI data provided by AHTD from August 1, 1999 show a 54 inch/mile IRI in the left wheelpath and a 72 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #12 show a 63 inch/mile IRI in the left wheelpath and a 63 inch/mile IRI in the right wheelpath.

For Location #13, rutting data provided by AHTD from August 1, 1999 show a 0.079 inch rut in the left wheelpath and a 0.118 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #13 show a 0.105 inch rut in the left wheelpath and a 0.145 inch rut in the right wheelpath.

For Location #13, IRI data provided by AHTD from August 1, 1999 show a 76 inch/mile IRI in the left wheelpath and a 70 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #13 show a 87 inch/mile IRI in the left wheelpath and a 99 inch/mile IRI in the right wheelpath.

For Location #14, rutting data provided by AHTD from August 1, 1999 show a 0.157 inch rut in the left wheelpath and a 0.157 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #14 show a 0.134 inch rut in the left wheelpath and a 0.217 inch rut in the right wheelpath.

For Location #14, IRI data provided by AHTD from August 1, 1999 show a 70 inch/mile IRI in the left wheelpath and a 73 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #14 show a 102 inch/mile IRI in the left wheelpath and a 107 inch/mile IRI in the right wheelpath.

For Location #15, rutting data provided by AHTD from August 1, 1999 show a 0.787 inch rut in the left wheelpath and a 0.394 inch rut in the right wheelpath. Averages for the 1 mile sections on either side of Location #15 show a 0.175 inch rut in the left wheelpath and a 0.252 inch rut in the right wheelpath.

For Location #15, IRI data provided by AHTD from August 1, 1999 show a 413 inch/mile IRI in the left wheelpath and a 282 inch/mile IRI in the right wheelpath. Averages for the 1 mile sections on either side of Location #15 show a 118 inch/mile IRI in the left wheelpath and a 127 inch/mile IRI in the right wheelpath.

APPENDIX C

SITES AND SAMPLES

Table C-1: Test Site Information for Highway 82

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/24/1999	Highway 82 Section 4	1	11.03	Columbia	2 lanes Eastbound, 1 lane Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Eastbound, outside lane, outside wheelpath	None				
B-2	Eastbound, outside lane, center of lane	1	1'-3'	1.75	Shelby Tube	Subgrade
		2	3'-5'	1.5	Shelby Tube	Subgrade
B-3	Eastbound, outside lane, inside wheelpath	1	1'-1.5'	N/A	Bag	Subgrade
B-4	Eastbound, off of shoulder	1	0.5'-3'	N/A	Bag	Subgrade
B-5	Westbound, center of lane	1	2'-4'	1.5	Shelby Tube	Subgrade

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/24/1999	Highway 82 Section 4	2	8.34	Columbia	1 lane Eastbound, 2 lanes Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Westbound, outside lane, outside wheelpath	None				
B-2	Westbound, outside lane, center of lane	1	1'-3'	2-2.75	Shelby Tube	Subgrade
		2	3'-5'	4.5+	Shelby Tube	Subgrade
B-3	Westbound, outside lane, inside wheelpath	None				
B-4	Westbound, off of shoulder	1	0.5'-4'	N/A	Bag	Subgrade
		2	4'-6'	N/A	Bag	Subgrade
		3	0.5'-4'	N/A	Bag	Subgrade
		4	4'-6'	N/A	Bag	Subgrade
B-5	Eastbound, center of lane	1	2'-4'	4-4.5	Shelby Tube	Subgrade

Table C-2: Test Site Information for Highway 167

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/25/1999	Highway 167 Section 1	1	3.44	Union	1 lane Northbound, 1 lane Eastbound, 2 lanes for staged construction	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Northbound, right lane of staged construction, wheelpath	1	9"-1.5'	N/A	Bag	Base
		2	1.5'-3.5'	4.5+	Shelby Tube	Subgrade
		3	3.5'-5'	4.5+	Shelby Tube	Subgrade
B-2	Northbound, left lane of staged construction, center of lane	1	14"-28"	N/A	Bag	Base

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/25/1999	Highway 167 Section 1	2	3.42	Union	2 lanes Northbound, 2 lanes Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, inside wheelpath	1	14"-3.5'	4.5+	Shelby Tube	Subgrade

Table C-2 (Continued): Test Site Information for Highway 167

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/25/1999	Highway 167 Section 1	3	12.15	Union	2 lanes Northbound, 2 lanes Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, outside wheelpath	1	1'-2'	N/A	Bag	Base
		2	3'-5'	N/A	Bag	Subgrade
		3	5'-6.5'	N/A	Bag	Subgrade
		4	6.5'-7'	N/A	Bag	Subgrade
		5	6.5'-7'	N/A	Bag	Subgrade
B-2	Southbound, outside lane, center of lane	None				
B-3	Southbound, outside lane, inside wheelpath	1	1'-3'	N/A	Bag	Base
		2	3'-5'	2-3	Shelby Tube	Subgrade
B-4	Southbound, inside lane, center of lane	1		N/A	Bag	Subgrade
		2		N/A	Bag	Subgrade

Table C-3: Test Site Information for Highway 15

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/25/1999	Highway 15 Section 3	1	1.00	Bradley	1 lane Northbound, 1 lane Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, center of lane, 6" asphalt	1	0.5'-1.5'	N/A	Bag	Base
		2	1.5'-3.5'	4.5+	Shelby Tube	Subgrade
B-2	Northbound, center of lane, 6" asphalt, 14" base	1	0.5'-2'	N/A	Bag	Base
		2	2'-4'	4.5+	Shelby Tube	Subgrade

Table C-4: Test Site Information for Highway 7 Spur

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/25/1999	Highway 7s Section 2s	1	0.70	Union	1 lane Northbound, 1 lane Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Northbound, outside wheelpath, 5" asphalt, base, concrete pavement	1	0.5'-1.5'	N/A	Bag	Base
		2	1.5'-2'	3.75	Shelby Tube	Subgrade

Table C-5: Test Site Information for Highway 79

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
5/26/1999	Highway 79 Section 5	1	5.64	Calhoun	2 lanes Northbound, 2 lanes Southbound (divided by median)	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Northbound, outside lane, outside wheelpath, 7" asphalt	None				
B-2	Northbound, outside lane, center of lane, 7.5" asphalt, 18" base	1	0.5'-2'	N/A	Bag	Base
		2	2'-4'	1.0	Shelby Tube	Subgrade
		3	4'-6	1.0	Shelby Tube	Subgrade
B-3	Northbound, outside lane, inside wheelpath, 7.5" asphalt	None				
B-4	Northbound, outside lane, off of shoulder	None				
B-5	Northbound, inside lane, inside wheelpath, 7" asphalt, 19.5" base	1	7"-2'	N/A	Bag	Base
		2	2'-4'		Shelby Tube	Subgrade

Table C-5 (Continued): Test Site Information for Highway 79

Date Sampled	**Route and Section**	**Location #**	**Log Mile**	**County**	**Description of Location**	
5/26/1999	Highway 79 Section 5	2	5.64	Calhoun	2 lanes Northbound, 2 lanes Southbound (divided by median)	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, outside wheelpath, 7.5" asphalt, 20.5" base	1	7.5"-2'	N/A	Bag	Base
		2	2'-4'	4-4.5	Shelby Tube	Subgrade
B-2	Southbound, outside lane, center of lane, 7.5" asphalt	None				
B-3	Southbound, outside lane, inside wheelpath, 7.5" asphalt, 15" base	1	7.5"-1.5'	N/A	Bag	Base
		2	1.5'-3.5'	4.5+	Shelby Tube	Subgrade
		3	3.5'-5.5'	3.0	Shelby Tube	Subgrade
B-4	Southbound, outside lane, shoulder, 7.5" asphalt	None				
B-5	Southbound, inside lane, inside wheelpath, 7" asphalt, 16.5" base	1	7"-2'	N/A	Bag	Base
		2	2'-4'	4.5+	Shelby Tube	Subgrade

Table C-6: Test Site Information for Otter Creek Road

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
6/28/1999	Otter Creek Road	1	N/A	Pulaski	1 lane Eastbound, 1 lane Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Eastbound, center of lane, 10" asphalt (full-depth)	1	1'-3'		Shelby Tube	Subgrade
		2	3'-5'		Shelby Tube	Subgrade
		3	5'-5.5'	N/A	Bag	Subgrade
B-2	Eastbound, outside wheelpath, 10" asphalt (full-depth)	1	1'-3'	4.5+	Shelby Tube	Subgrade

Table C-7: Test Site Information for Highway 165

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
6/28/1999	Highway 165 Section 8	1	0.44	Lonoke	1 lane Eastbound, 1 lane Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Eastbound, inside wheelpath, 9" asphalt (stripped), 10" base	1	10"-11"	N/A	Bag	Base
		2	19"-3'	N/A	Bag	Subgrade
B-2	Eastbound, outside wheelpath, 12" asphalt, 10" base	1	3'-5'		Shelby Tube	Subgrade
B-3	Westbound, outside wheelpath, 14" asphalt (bottom 4" stripped) (full-depth)	1	2'-4'	1.0	Shelby Tube	Subgrade
		2	4'-6'	3.5	Shelby Tube	Subgrade
B-4	Westbound, inside wheelpath, 11" asphalt (stripped at top), 6" base	None				

Table C-8: Test Site Information for Highway 49

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
6/29/1999	Highway 49 Section 2	1	23.51	Greene	1 lane Northbound, 1 lane Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Northbound, outside wheelpath 4.75" asphalt, 10" class 7 base	1	4.75"-15"	N/A	Bag	Base
		2	2'-4'	4.5+	Shelby Tube	Subgrade
		3	4'-5.5'	4.5+	Shelby Tube	Subgrade
B-2	Southbound, outside wheelpath, 5" asphalt, 10" class 7 base	1	5"-15"	N/A	Bag	Base
		2	1.5'-3.5'	1.5	Shelby Tube	Subgrade
		3	3.5'-5.5'	4.5+	Shelby Tube	Subgrade

Table C-8 (Continued): Test Site Information for Highway 49

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
6/29/1999	Highway 49 Section 2	2	20.21	Greene	2 lanes Northbound, 2 lanes Southbound	
Description of Boreholes						
Borehole Location		Sample #	Depth	PR	Sample Type	Material Type
B-1	Northbound, outside lane, outside wheelpath, 11.5" asphalt (full-depth)	1	1'-3'	1.0	Shelby Tube	Subgrade
		2	3'-5'	3.0	Shelby Tube	Subgrade
B-2	Northbound, outside lane, center of lane, 11.5" asphalt (full-depth)	None				
B-3	Northbound, outside lane, inside wheelpath, 11.5" asphalt, 12.5" base	1	1'-2'	N/A	Bag	Base
		2	3'-5'	0.5	Shelby Tube	Subgrade
		3	5'-7'	2.0	Shelby Tube	Subgrade
B-4	Northbound, inside lane, inside wheelpath, 12" asphalt	1	1'-2'	N/A	Bag	Base
		2	2'-3.5'	2.0	Shelby Tube	Subgrade
B-5	Southbound, outside lane, inside wheelpath, 13" asphalt (full-depth)	None				
B-6	Southbound, outside lane, center of lane, 13" asphalt (full-depth)	None				
B-7	Southbound, outside lane, outside wheelpath, 12" asphalt (full-depth)	1	1'-3'	3.0	Shelby Tube	Subgrade
		2	3'-5'	1.5	Shelby Tube	Subgrade
B-8	Southbound, inside lane, inside wheelpath, 13" asphalt (bottom 1.5" stripped), 9.5" base	1	1'-2'	N/A	Bag	Base
		2	2'-3.5'		Shelby Tube	Subgrade

Table C-9: Test Site Information for Highway 412 (#1-#2)

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
6/30/1999	Highway 412 Section 7	1	7.61	Lawrence	2 lanes Westbound, 2 lanes Eastbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Westbound, outside lane, outside wheelpath, 11.75" asphalt (full-depth)	1	1'-3'	2.0	Shelby Tube	Subgrade
B-2	Westbound, outside lane, center of lane, 12" asphalt (full-depth)	None				
B-3	Westbound, outside lane, inside wheelpath, 12 1/8" asphalt (full-depth)	None				
B-4	Westbound, inside lane, inside wheelpath, 13.75" asphalt (full-depth)	1	1'-3'	4.5+	Shelby Tube	Subgrade

Table C-9 (Continued): Test Site Information for Highway 412 (#1-#2)

Date Sampled	**Route and Section**	**Location #**	**Log Mile**	**County**	**Description of Location**	
6/30/1999	Highway 412 Section 7	2	7.28	Lawrence	1 lane Eastbound, 1 lane Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Westbound, inside wheelpath, 2.5" asphalt (stripped), 2.5" asphalt sand, 2" asphalt, 6" class 7 base, concrete pavement	None				
B-2	Westbound, center of lane, 2.5" asphalt (stripped), 2.5" asphalt sand, 2" asphalt, 6.25" class 7 base, 7.25" concrete pavement	1				Asphalt Sand
		2	2'-4'	1.5	Shelby Tube	Subgrade
		3	4'-6'	1.0	Shelby Tube	Subgrade
B-3	Westbound, outside wheelpath, 2.75" asphalt (stripped), 2.75" asphalt sand, 2.5" asphalt, concrete pavement	None				

Table C-10: Test Site Information for Highway 270

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
7/6/1999	Highway 270 Section 6	1	8.6	Garland	2 lanes Eastbound, turning lane, 2 lanes Westbound	
Description of Boreholes						
Borehole Location		Sample #	Depth	PR	Sample Type	Material Type
B-1	Westbound, outside lane, outside wheelpath, 7.5" asphalt, 14" class 5 base	1	7.5"-22"	N/A	Bag	Base
		2	2'-3'	N/A	Bag	Subgrade
		3	3'-5'	N/A	Bag	Subgrade
B-2	Westbound, center of lane, 7.25" asphalt, 14" class 5 base	1	7.25"-22"	N/A	Bag	Base
		2	2'-3'	N/A	Bag	Subgrade
		3	3'-5'	N/A	Bag	Subgrade
B-3	Westbound, inside lane, outside wheelpath, 6.25" asphalt (bottom 1.5" stripped), 15" base	1	6.25"-2'	N/A	Bag	Base
		2	2'-3'	N/A	Bag	Subgrade
		3	3'-4'	N/A	Bag	Subgrade
B-4	Westbound, inside lane, inside wheelpath, 6.75" asphalt (bottom 2" stripped), 15" base	None				
B-5	Eastbound, outside lane, outside wheelpath, 7" asphalt (stripping at 2.5"), 16" base	1	7"-2'	N/A	Bag	Base
		2	2'-5'	N/A	Bag	Subgrade
B-6	Eastbound, outside lane, center of lane, 7.25" asphalt (stripping from 3" to bottom)	1	8"-2'	N/A	Bag	Base
		2	2'-3'	N/A	Bag	Subgrade
		3	3'-5'	N/A	Bag	Subgrade
B-7	Eastbound, inside lane, outside wheelpath, 6" asphalt (bottom 3.5" stripped)	1	6"-22"	N/A	Bag	Base
		2	2'-4'	N/A	Bag	Subgrade
B-8	Eastbound, inside lane, inside wheelpath, 6.75" asphalt	None				

Table C-10 (Continued): Test Site Information for Highway 270

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
7/6/1999	Highway 270 Section 6	2	6.47	Garland	2 lanes Eastbound, 2 lanes Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Westbound, outside lane, outside wheelpath, 11.75" asphalt (stripping from 3" to 9") (full-depth)	1	1'-2'	N/A	Bag	Subgrade
		2	2'-4'	N/A	Bag	Subgrade
B2	Westbound, outside lane, inside wheelpath, 14" asphalt (full-depth)	1	14"-2'	N/A	Bag	Subgrade
		2	2'-4'	N/A	Bag	Subgrade
		3	4'-5'	N/A	Bag	Subgrade
B-3	Westbound, inside lane, outside wheelpath, 12" asphalt (some stripping 1.5"-8") (severe stripping bottom 4") (full-depth)	1	1'-2'	N/A	Bag	Old Asphalt?
		2	2'-3'	N/A	Bag	Subgrade
		3	3'-4'	N/A	Bag	Subgrade
B-4	Westbound, inside lane, inside wheelpath, 13" asphalt (some stripping 1.5"-9") (severe stripping 9"-13") (full-depth)	None				
B-5	Eastbound, outside lane, outside wheelpath, 15" asphalt (some stripping 5"-11") (stripping from 11"-15") (full-depth)	1	1'-2'	N/A	Bag	Subgrade
		2	2'-5'	N/A	Bag	Subgrade
B-6	Eastbound, outside lane, inside wheelpath, 14.5" asphalt (stripping worsens from 1.5"-14.5") (full-depth)	None				
B-7	Eastbound, inside lane, outside wheelpath, Unknown depth of asphalt (8" recovered) (stripping throughout)	None				

Table C-11: Test Site Information for Highway 65

<table>
<tr><th>Date Sampled</th><th>Route and Section</th><th>Location #</th><th>Log Mile</th><th>County</th><th colspan="2">Description of Location</th></tr>
<tr><td>7/7/1999</td><td>Highway 65 Section 9</td><td>1</td><td>17.79</td><td>Faulkner</td><td colspan="2">2 lanes Northbound,
turning lane,
2 lanes Southbound</td></tr>
<tr><th colspan="7">Description of Boreholes</th></tr>
<tr><th colspan="2">Borehole Location</th><th>Sample #</th><th>Depth</th><th>PR</th><th>Sample Type</th><th>Material Type</th></tr>
<tr><td>B-1</td><td>Northbound, outside lane, outside wheelpath,
13" asphalt, 12" base</td><td>1</td><td>13"-2'</td><td>N/A</td><td>Bag</td><td>Base</td></tr>
<tr><td>B-2</td><td>Northbound, outside lane, center of lane,
14.5" asphalt (possible stripping at bottom),
8" base</td><td>1</td><td>14.5"-22"</td><td>N/A</td><td>Bag</td><td>Base</td></tr>
<tr><td>B-3</td><td>Northbound, outside lane, inside wheelpath,
11.5" asphalt</td><td colspan="5">None</td></tr>
<tr><td>B-4</td><td>Northbound, inside lane, outside wheelpath,
12" asphalt</td><td colspan="5">None</td></tr>
<tr><td rowspan="3">B-5</td><td rowspan="3">Southbound, outside lane, outside wheelpath,
9" asphalt, 10" base</td><td>1</td><td>9"-1.5'</td><td>N/A</td><td>Bag</td><td>Base</td></tr>
<tr><td>2</td><td>1.5'-2.5'</td><td>N/A</td><td>Bag</td><td>Subgrade</td></tr>
<tr><td>3</td><td>2.5'-4'</td><td>N/A</td><td>Bag</td><td>Subgrade
(5-11-14)</td></tr>
<tr><td>B-6</td><td>Southbound, outside lane, center of lane,
9.75" asphalt (stripping at bottom 1"),
8" base</td><td colspan="5">None</td></tr>
<tr><td rowspan="2">B-7</td><td rowspan="2">Southbound, outside lane, inside wheelpath,
11.5" asphalt, 6" base</td><td>1</td><td>1.5'-2.5'</td><td>N/A</td><td>Bag</td><td>Subgrade</td></tr>
<tr><td>2</td><td>3.5'-5.5'</td><td>N/A</td><td>Bag</td><td>Subgrade</td></tr>
<tr><td>B-8</td><td>Southbound, inside lane, outside wheelpath,
19" asphalt (bottom 2.5" stripped)</td><td colspan="5">None</td></tr>
</table>

Table C-11 (Continued): Test Site Information for Highway 65

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
7/7/1999	Highway 65 Section 9	2	11.79	Faulkner	2 lanes Northbound, turning lane, 2 lanes Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Northbound, outside lane, outside wheelpath, 14" asphalt (moderate raveling) (stripping at 6.5" and 9.5") (full-depth)	None				
B-2	Northbound, outside lane, center of lane, 14.5" asphalt (moderate raveling) (stripping at 6.5" and 10") (full-depth)	1	2'-3.5'		Shelby Tube	Subgrade
		2	3.5'-5'	N/A	Bag	Subgrade
B-3	Northbound, outside lane, inside wheelpath, 14" asphalt (moderate raveling) (full-depth)	None				
B-4	Northbound, inside lane, outside wheelpath, 14.25" asphalt (full-depth)	None				

Table C-11 (Continued): Test Site Information for Highway 65

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/9/1999	Highway 65 Section 9	10	11.79	Faulkner	2 lanes Northbound, turning lane, 2 lanes Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, outside wheelpath, 15" asphalt (full-depth) (no stripping, minor raveling)	None				
B-2	Southbound, outside lane, center of lane, 14.75" asphalt (full-depth) (minor raveling)	1	2'-5'	N/A	Bag	Subgrade
B-3	Southbound, outside lane, inside wheelpath, 13.75" asphalt (full-depth) (stripping & softening in bottom 0.5")	None				
B-4	Southbound, inside lane, 5" west of crack in outside wheelpath, 10.75" asphalt recovered (full-depth) (bottom stripped)	None				
B-5	Southbound, inside lane, 2" east of crack in outside wheelpath, 10.75" asphalt recovered (full-depth) (bottom stripped)	None				
B-6	Southbound, inside lane, center of lane, 14.75" asphalt (broke at 3.5"), ~3" of aggregate base course	1	2'-5'	N/A	Bag	Subgrade

Table C-11 (Continued): Test Site Information for Highway 65

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/9/1999	Highway 65 Section 9	11	13.75	Faulkner	2 lanes Northbound, turning lane, 2 lanes Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, inside wheelpath, 9.5" asphalt (broke at 5.5"), class 7 base	None				
B-2	Southbound, outside lane, center of lane, 10" asphalt (minor stripping at bottom 1"), 9" of class7 base	None				
B-3	Southbound, outside lane, outside wheelpath, 9.5" asphalt (minor stripping in bottom 0.5"), 9" of class 7 base	None				
B-4	Southbound, inside lane, outside wheelpath, 9.75" asphalt (some stripping in bottom 0.5"), 10" of class 7 base	1	2'-5'	N/A	Bucket	Subgrade
B-5	Southbound, inside lane, center of lane, 9.75" asphalt (broke at 5.5") (stripping at 5.5")	None				

Table C-11 (Continued): Test Site Information for Highway 65

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/9/1999	Highway 65 Section 9	12	17.2	Faulkner	2 lanes Northbound, turning lane, 2 lanes Southbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, outside wheelpath, 14.5" asphalt (full-depth) (broke at 10") (some stripping at 10") (major raveling)	None				
B-2	Southbound, outside lane, center of lane, 14.34" asphalt (full-depth) (broke at 8.5") (stripping at 8.5") (some softening at bottom, major raveling)	1	2'-5'	N/A	Bag	Subgrade
B-3	Southbound, inside lane, inside wheelpath, 14.5" asphalt (full-depth) (very minor stripping in bottom 5", major raveling)	None				
B-4	Southbound, inside lane, center of lane, 14.5" asphalt (broke at 2" and 9.5") (stripping at breaks and from 7.5"-9.5", major raveling), 2" to 4" of gravel below asphalt	None				
B-5	Southbound, inside lane, outside wheelpath, 14.5" asphalt (very minor stripping in bottom, major raveling), 2" to 4" of gravel below asphalt	None				

Table C-12: Test Site Information for Highway 71 (#1)

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location
7/8/1999	Highway 71 Section 13	1	7.84	Sebastian	2 lanes Northbound, 2 lanes Southbound (divided by median)

Description of Boreholes

Borehole Location		Sample #	Depth	PR	Sample Type	Material Type
B-1	Southbound, outside lane, outside wheelpath, 13" asphalt, 8" base	1	13"-21"	N/A	Bag	Base
		2	2'-4'	N/A	Bag	Subgrade
B-2	Southbound, outside lane, center of lane, 13" asphalt (stripping at bottom 0.5", 8" base	1	2.5'-3.5'	2.5	Shelby Tube	Subgrade
B-3	Southbound, inside lane, center of lane, 13" asphalt, 8" base	1	2'-4'	N/A	Bag	Subgrade
B-4	Southbound, inside lane, inside wheelpath, 13.5" asphalt, 10" base	1	2'-3'	2.0	Shelby Tube	Subgrade
B-5	Northbound, outside lane, outside wheelpath, 9.75" asphalt, 10" base	1	10"-20"	N/A	Bag	Base
		2	2'-3'	N/A	Bag	Subgrade
		3	3'-4'	N/A	Bag	Subgrade
B-6	Northbound, outside lane, center of lane, 9.75" asphalt	None				
B-7	Northbound, inside lane, center of lane, 10.5" asphalt	None				
B-8	Northbound, inside lane, inside wheelpath, 10.75" asphalt, 10" base	1	2'-3.5'	N/A	Bag	Subgrade (6-9-11)

Table C-13: Test Site Information for Highway 71 (#10-#13)

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/16/1999	Highway 71 Section 17	10	6.99	Washington	2 lanes Northbound, 2 lanes Southbound (divided by median)	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, inside wheelpath, 16" asphalt (full-depth)(voids at 8") (no stripping)	None				
B-2	Southbound, outside lane, center of lane, 16.5" asphalt (full-depth)	1	1.5'-2.5'	N/A	Bag	Subgrade
		2	2.5'-5'	N/A	Bag	Subgrade
B-3	Southbound, outside lane, outside wheelpath, 16" asphalt (full-depth)	1	1.5'-5'	N/A	Bag	Subgrade
		2	1.5'-5'	N/A	Bag	Subgrade

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/16/1999	Highway 71 Section 17	11		Washington	2 lanes Northbound, 2 lanes Southbound (divided by median)	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Southbound, outside lane, inside wheelpath, 17" asphalt (full-depth)	None				
B-2	Southbound, outside lane, center of lane, 17" asphalt (full-depth)	1	1.5'-3'	N/A	Bag	Subgrade
		2	3'-5'	N/A	Bag	Subgrade
B-3	Southbound, outside lane, outside wheelpath, 16.25" asphalt (full-depth)	1	1.5'-3'	N/A	Bag	Subgrade
		2	3'-5'	N/A	Bag	Subgrade

Table C-13 (Continued): Test Site Information for Highway 71 (#10-#13)

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/16/1999	Highway 71 (540) Section 4	12	65.33	Washington	2 lanes Northbound, 2 lanes Southbound (divided by median)	
Description of Boreholes						
Borehole Location		Sample #	Depth	PR	Sample Type	Material Type
B-1	Southbound, outside lane, inside wheelpath, 18" asphalt (full-depth)	None				
B-2	Southbound, outside lane, center of lane, 18" asphalt (full-depth)	1	1.5'-2.5'	N/A	Bag	Subgrade
B-3	Southbound, outside lane, outside wheelpath, 17.25" asphalt (full-depth)	None				
B-4	Southbound, outside lane, shoulder, 1.5" asphalt	None				

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/16/1999	Highway 71 (540) Section 4	13	63.83	Washington	2 lanes Northbound, 2 lanes Southbound (divided by median)	
Description of Boreholes						
Borehole Location		Sample #	Depth	PR	Sample Type	Material Type
B-1	Southbound, outside lane, center of lane, (16" asphalt recovered) (full-depth)	1	16"-5'	N/A	Bag	Subgrade
B-2	Southbound, outside lane, outside wheelpath, 18" asphalt (full-depth) (slight stripping on bottom .25")	2	1.5'-5'	N/A	Bag	Subgrade

Table C-14: Test Site Information for Highway 412 (#10-#15)

<table>
<tr><th>Date Sampled</th><th>Route and Section</th><th>Location #</th><th>Log Mile</th><th>County</th><th colspan="2">Description of Location</th></tr>
<tr><td>8/17/1999</td><td>Highway 412 Section 2</td><td>10</td><td>0.95</td><td>Washington</td><td colspan="2">2 lanes Eastbound,
2 lanes Westbound
(divided by median)</td></tr>
<tr><th colspan="7">Description of Boreholes</th></tr>
<tr><th colspan="2">Borehole Location</th><th>Sample #</th><th>Depth</th><th>PR</th><th>Sample Type</th><th>Material Type</th></tr>
<tr><td rowspan="2">B-1</td><td rowspan="2">Eastbound, outside lane, inside wheelpath,
11" asphalt (no stripping), 12" base</td><td>1</td><td>1'-2'</td><td>N/A</td><td>Bag</td><td>Base</td></tr>
<tr><td>2</td><td>2'-3.5'</td><td>N/A</td><td>Split Spoon</td><td>Subgrade
(7-6-9)</td></tr>
<tr><td rowspan="2">B-2</td><td rowspan="2">Eastbound, outside lane, center of lane,
11.25" asphalt, 11.5" base</td><td>1</td><td>11.25"-23"</td><td>N/A</td><td>Bag</td><td>Base</td></tr>
<tr><td>2</td><td>2'-3.5'</td><td>N/A</td><td>Split Spoon</td><td>Subgrade
(8-8-8)</td></tr>
<tr><td>B-3</td><td>Eastbound, inside lane, center of lane,
11" asphalt, 11" base</td><td colspan="5">None</td></tr>
<tr><td>B-4</td><td>Eastbound, inside lane, inside wheelpath
10.75" asphalt, ?" base</td><td colspan="5">None</td></tr>
</table>

<table>
<tr><th>Date Sampled</th><th>Route and Section</th><th>Location #</th><th>Log Mile</th><th>County</th><th colspan="2">Description of Location</th></tr>
<tr><td>8/17/1999</td><td>Highway 412 Section 2</td><td>11</td><td>2.08</td><td>Washington</td><td colspan="2">2 lanes Eastbound.
2 lanes Westbound
(divided by median)</td></tr>
<tr><th colspan="7">Description of Boreholes</th></tr>
<tr><th colspan="2">Borehole Location</th><th>Sample #</th><th>Depth</th><th>PR</th><th>Sample Type</th><th>Material Type</th></tr>
<tr><td rowspan="2">B-1</td><td rowspan="2">Eastbound, outside lane, inside wheelpath,
11.5" asphalt, 11" base</td><td>1</td><td>11.5"-22.5"</td><td>N/A</td><td>Bag</td><td>Base</td></tr>
<tr><td>2</td><td>2'-3.5'</td><td>N/A</td><td>Split Spoon</td><td>Subgrade
(13-30-28)</td></tr>
<tr><td rowspan="2">B-2</td><td rowspan="2">Eastbound, outside lane, center of lane,
11.5" asphalt, 11" base</td><td>1</td><td>11.5"-2'</td><td>N/A</td><td>Bag</td><td>Base</td></tr>
<tr><td>2</td><td>2'-3.5'</td><td>N/A</td><td>Split Spoon</td><td>Subgrade
(13-25-21)</td></tr>
<tr><td>B-3</td><td>Eastbound, inside lane, center of lane,
11.25" asphalt, 11" base</td><td colspan="5">None</td></tr>
<tr><td>B-4</td><td>Eastbound, inside lane, inside wheelpath
10.25" asphalt, ?" base</td><td colspan="5">None</td></tr>
</table>

Table C-14 (Continued): Test Site Information for Highway 412 (#10-#15)

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/17/1999	Highway 412 Section 2	12	4.05	Washington	2 lanes Eastbound, turning lane, 2 lanes Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Eastbound, outside lane, inside wheelpath, 13.75" asphalt (full-depth)	1	14"-32"	N/A	Split Spoon	Subgrade (8-10-12)
B-2	Eastbound, outside lane, center of lane, 14" asphalt (full-depth)	1	14"-32"	N/A	Split Spoon	Subgrade (7-14-13)
B-3	Eastbound, outside lane, outside lane, 14" asphalt (full-depth)	1	14"-32"	N/A	Split Spoon	Subgrade (9-11-12)
B-4	Eastbound, inside lane, center of lane, 13.5" asphalt (full-depth)	1	14"-32"	N/A	Split Spoon	Subgade (7-11-8)
B-5	Eastbound, inside lane, inside wheelpath, 13.5" asphalt (full-depth)	1	14"-32"	N/A	Split Spoon	Subgrade (8-10-10)
B-6	Turning lane, 13" asphalt (full-depth)	None				

Table C-14 (Continued): Test Site Information for Highway 412 (#10-#15)

Date Sampled	**Route and Section**	**Location #**	**Log Mile**	**County**	**Description of Location**	
8/17/1999	Highway 412 Section 2	13	6.27	Washington	2 lanes Eastbound, turning lane, 2 lanes Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Eastbound, outside lane, inside wheelpath, 15" asphalt (voids at bottom, minor stripping)	1	15"-363"	N/A	Split Spoon	Subgrade (14-13-9)
B-2	Eastbound, outside lane, center of lane, 15.5" asphalt (full-depth)	1	15.5"-33.5"	N/A	Split Spoon	Subgade (10-9-7)
B-3	Eastbound, outside lane, outside wheelpath, 15" asphalt (full-depth)	1	15"-33"	N/A	Split Spoon	Subgrade (11-8-2)
B-4	Eastound, inside lane, center of lane, 15.25" asphalt (full-depth)	1	15"-33"	N/A	Split Spoon	Subgrade (11-7-6)
B-5	Eastbound, inside lane, inside wheelpath, 16.25" asphalt (full-depth) (bottom 2.5" softened with modertae stripping)	1	16"-34"	N/A	Split Spoon	Subgrade (7-6-5)

Table C-14 (Continued): Test Site Information for Highway 412 (#10-#15)

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/17/1999	Highway 412 Section 2	14	7.55	Washington	2 lanes Eastbound, turning lane, 2 lanes Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Eastbound, inside lane, center of lane, 12.5" asphalt (full-depth)	1	1'-2.5'	N/A	Split Spoon	Subgrade (6-4-3)
B-2	Eastbound, inside lane, inside wheelpath, 12.5" asphalt (full-depth)	1	1'-1.5'	N/A	Split Spoon	Subgrade (6-5-3)
		2	1.5'-2.5'	N/A	Split Spoon	Subgrade (6-5-3)
B-3	Westbound, outisde lane, center of lane, 12.25" asphalt (full-depth) (broke at 8.75")	1	1'-2.5'	N/A	Split Spoon	Subgrade (9-8-7)
B-4	Westbound, outside lane, outside wheelpath, 13" asphalt (full-depth) (broke at 9")	1	13"-25"	N/A	Split Spoon	Subgrade (8-6-6)

Table C-14 (Continued): Test Site Information for Highway 412 (#10-#15)

Date Sampled	Route and Section	Location #	Log Mile	County	Description of Location	
8/17/1999	Highway 412 Section 2	15	8.63	Washington	2 lanes Eastbound, turning lane, 2 lanes Westbound	
Description of Boreholes						
Borehole Location		**Sample #**	**Depth**	**PR**	**Sample Type**	**Material Type**
B-1	Eastbound, outside lane, center of lane, 10.5" asphalt, 4" base	1	15"-33"	N/A	Split Spoon	Subgrade (5-5-5)
B-2	Eastbound, outside lane, outside wheelpath, 11" asphalt (full-depth) (broke at 7.25")	1	1'-2.5'	N/A	Split Spoon	Subgrade (4-4-4)
B-3	Eastbound, outside lane, inside wheelpath, 10.5" asphalt (full-depth)	1	1'-2.5'	N/A	Split Spoon	Subgrade (4-8-8)

APPENDIX D

MOISTURE CONTENTS FROM BAG SAMPLES

Table D-1: Summary of Moisture Contents from Bag Samples

Location	Boring #	Sample #	Depth	MC, %
Hwy 82 - #1	3	1	1'-1.5'	14.40
Hwy 82 - #2	4	1	.5'-4'	11.93
	4	2	4'-6'	23.69
Hwy 167 - #1	1	1	9"-1.5'	6.98
	2	1	14"-28"	15.18
Hwy 167 - #3	1	1	1'-2'	6.13
	1	2	3'-5'	10.05
	1	5	6.5'-7'	20.07
	3	1	1'-3'	6.73
	4	1		13.74
	4	2		3.43
Hwy 15 - #1	1	1	.5'-1.5'	6.09
	2	1	.5'-2'	7.59
Hwy 7s - #1	1	1	.5'-1.5'	14.05
Hwy 79 - #1	2	1	.5'-2'	7.75
	5	1	7"-2'	7.78
Hwy 79 - #2	1	1	7.5"-2'	5.94
	3	1	7.5"-1.5'	5.84
	5	1	7"-2'	9.86
Otter Creek Rd	1	3	5'-5.5'	17.44
Hwy 165 - #1	1	1	10"-11"	6.82
	1	2	10"-3'	15.08
Hwy 49 - #1	1	1	4.75"-15"	4.74
	2	1	5"-15"	2.44
Hwy 49 - #2	3	1	1'-2'	6.39
	4	1	1'-2'	5.06
	8	1	1'-2'	8.53
Hwy 270 - #1	1	1	7.5"-22"	4.67
	1	2	2'-3'	11.41
	1	3	3'-5'	15.23
	2	1	7.25"-22"	5.51
	2	2	2'-3'	9.38
	2	3	3'-5'	13.50
	3	1	6.25"-2'	5.96
	3	2	2'-3'	9.62
	3	3	3'-4'	14.09
	5	1	7"-2'	6.88
	5	2	2'-5'	14.95
	6	1	8"-2'	5.66
	6	2	2'-3'	10.00
	6	3	3'-5'	8.63
	7	1	6"-22"	5.69
	7	2	2'-4'	15.39
Hwy 270 - #2	1	1	1'-2'	19.97
	1	2	2'-4'	17.34
	2	1	14"-2'	21.93
	2	2	2'-4'	21.44
	2	3	4'-5'	19.86
	3	1	1'-2'	9.77
	3	2	2'-3'	20.96
	3	3	3'-4'	21.59
	5	1	1'-2'	9.73
	5	2	2'5'	19.15

Table D-1 (Continued): Summary of Moisture Contents from Bag Samples

Location	Boring #	Sample #	Depth	MC, %
Hwy 65 - #1	1	1	13"-2'	7.43
	2	1	14.5"-22"	17.98
	5	1	9"-1.5'	17.24
	5	2	1.5'-2.5'	12.73
	5	3	2.5'-4'	11.31
	7	1	1.5'-2.5'	4.28
	7	2	3.5'-5.5'	20.18
Hwy 65 - #10	6	1		15.45
Hwy 65 - #11	4	1		8.98
Hwy 65 #12	2	1		8.44
Hwy 71 - #1	1	1	13"-21"	6.33
	1	2	2'-4'	11.69
	3	1	2'-4'	13.84
	5	1	10"-20"	4.13
	5	2	2'-3'	10.25
	5	3	3'-4'	12.50
	8	1	2'-3.5'	11.99
Hwy 71 - #2	BULK			15.35
Hwy 71 - #10	2	1	1.5'-2.5'	30.48
	2	2	2.5'-5'	23.95
	3	1	1.5'-5'	36.44
	3	2	1.5'-5'	35.80
Hwy 71 - #11	2	1	1.5'-3'	35.22
	2	2	3'-5'	13.30
	3	1	1.5'-3'	35.90
	3	2	3'-5'	10.94
Hwy 71 - #12	2	1	1.5'-2.5'	36.83
	2	2		28.46
	3	1		36.45
	3	2		35.07
Hwy 71 - #13	2	1	1.5'-5'	30.34
	2	2		29.78
Hwy 412 - #10	1	1	1'-2'	3.03
	1	2	2'-3.5'	30.09
	2	1	11.25"-23"	4.48
Hwy 412 - #11	1	1	11.5"-22.5"	30.20
	1	2	2'-3.5'	17.10
	2	1	11.5"-2'	6.50
	2	2	2'-3.5'	17.86
Hwy 412 - #12	1	1	14"-32"	24.86
	2	1	14"-32"	28.42
	3	1	14"-32"	19.47
	4	1	14"-32"	24.79
	5	1	14"-32"	22.06
Hwy 412 - #13	1	1	15"-33"	11.60
	2	1	15.5"-33.5"	15.64
	3	1	15"-33"	18.00
	4	1	15"-33"	16.31
	5	1	16"34"	19.07
Hwy 412 - #14	1	1	1'-2.5'	20.98
	2	1	1'-1.5'	14.19
	2	2	1.5'-2.5'	24.27
	3	1	1'-2.5'	18.37
	4	1	13"-2.5'	17.14
Hwy 412 - #15	1	1	15"-33"	16.09
	2	1	1'-2.5'	21.07
	3	1	1'-2.5'	20.43

Table D-2: Moisture Contents from Bag Samples for Highway 82

Hwy 82 #1, B-3, S-1	Container #	31
	Mass of cup + wet soil	60.71
	Mass of cup + dry soil	55.05
	Mass of cup	15.3
	Mass of dry soil, Ms	39.75
	Mass of water, Mw	5.66
	Water Content, w%	14.24
	Container #	83
	Mass of cup + wet soil	59.07
	Mass of cup + dry soil	53.51
	Mass of cup	15.3
	Mass of dry soil, Ms	38.21
	Mass of water, Mw	5.56
	Water Content, w%	14.55
	Avg. w%	14.40

Hwy 82 #2, B-4, S-1	Container #	133
	Mass of cup + wet soil	66.71
	Mass of cup + dry soil	60.96
	Mass of cup	10.95
	Mass of dry soil, Ms	50.01
	Mass of water, Mw	5.75
	Water Content, w%	11.50
	Container #	131
	Mass of cup + wet soil	65.65
	Mass of cup + dry soil	60.1
	Mass of cup	15.21
	Mass of dry soil, Ms	44.89
	Mass of water, Mw	5.55
	Water Content, w%	12.36
	Avg. w%	11.93

Hwy 82 #2, B-4, S-2	Container #	140
	Mass of cup + wet soil	57.8
	Mass of cup + dry soil	49
	Mass of cup	10.99
	Mass of dry soil, Ms	38.01
	Mass of water, Mw	8.8
	Water Content, w%	23.15
	Container #	xx
	Mass of cup + wet soil	65.97
	Mass of cup + dry soil	56.47
	Mass of cup	17.25
	Mass of dry soil, Ms	39.22
	Mass of water, Mw	9.5
	Water Content, w%	24.22
	Avg. w%	23.69

Table D-3: Moisture Contents from Bag Samples for Highway 167

Hwy 167 #1, B-1, S-1	Container #	54
	Mass of cup + wet soil	40.71
	Mass of cup + dry soil	39.05
	Mass of cup	15.54
	Mass of dry soil, Ms	23.51
	Mass of water, Mw	1.66
	Water Content, w%	7.06
	Container #	55
	Mass of cup + wet soil	57.18
	Mass of cup + dry soil	54.48
	Mass of cup	15.37
	Mass of dry soil, Ms	39.11
	Mass of water, Mw	2.7
	Water Content, w%	6.90
	Avg. w%	6.98

Hwy 167 #1, B-2, S-1	Container #	56
	Mass of cup + wet soil	54.94
	Mass of cup + dry soil	49.69
	Mass of cup	15.33
	Mass of dry soil, Ms	34.36
	Mass of water, Mw	5.25
	Water Content, w%	15.28
	Container #	57
	Mass of cup + wet soil	54.86
	Mass of cup + dry soil	49.68
	Mass of cup	15.35
	Mass of dry soil, Ms	34.33
	Mass of water, Mw	5.18
	Water Content, w%	15.09
	Avg. w%	15.18

Hwy 167 #3, B-1, S-1	Container #	58
	Mass of cup + wet soil	54.59
	Mass of cup + dry soil	52.18
	Mass of cup	15.32
	Mass of dry soil, Ms	36.86
	Mass of water, Mw	2.41
	Water Content, w%	6.54
	Container #	59
	Mass of cup + wet soil	47.77
	Mass of cup + dry soil	46
	Mass of cup	15.02
	Mass of dry soil, Ms	30.98
	Mass of water, Mw	1.77
	Water Content, w%	5.71
	Avg. w%	6.13

Hwy 167 #3, B-1, S-2	Container #	60
	Mass of cup + wet soil	43.72
	Mass of cup + dry soil	40.8
	Mass of cup	10.88
	Mass of dry soil, Ms	29.92
	Mass of water, Mw	2.92
	Water Content, w%	9.76
	Container #	61
	Mass of cup + wet soil	56.42
	Mass of cup + dry soil	51.32
	Mass of cup	1.97
	Mass of dry soil, Ms	49.35
	Mass of water, Mw	5.1
	Water Content, w%	10.33
	Avg. w%	10.05

Hwy 167 #3, B-1, S-5	Container #	62
	Mass of cup + wet soil	45.13
	Mass of cup + dry soil	39.44
	Mass of cup	15.84
	Mass of dry soil, Ms	23.6
	Mass of water, Mw	5.69
	Water Content, w%	24.11
	Container #	63
	Mass of cup + wet soil	51.49
	Mass of cup + dry soil	46.54
	Mass of cup	15.66
	Mass of dry soil, Ms	30.88
	Mass of water, Mw	4.95
	Water Content, w%	16.03
	Avg. w%	20.07

Hwy 167 #3, B-3, S-1	Container #	64
	Mass of cup + wet soil	59.23
	Mass of cup + dry soil	56.54
	Mass of cup	15.36
	Mass of dry soil, Ms	41.18
	Mass of water, Mw	2.69
	Water Content, w%	6.53
	Container #	65
	Mass of cup + wet soil	58.49
	Mass of cup + dry soil	55.66
	Mass of cup	14.78
	Mass of dry soil, Ms	40.88
	Mass of water, Mw	2.83
	Water Content, w%	6.92
	Avg. w%	6.73

Table D-3 (Continued): Moisture Contents from Bag Samples for Highway 167

Hwy 167 #3, B-4, S-1	Container #	224
	Mass of cup + wet soil	63.28
	Mass of cup + dry soil	56.98
	Mass of cup	12.09
	Mass of dry soil, Ms	44.89
	Mass of water, Mw	6.3
	Water Content, w%	14.03
	Container #	4 (18)
	Mass of cup + wet soil	70.12
	Mass of cup + dry soil	63.02
	Mass of cup	10.2
	Mass of dry soil, Ms	52.82
	Mass of water, Mw	7.1
	Water Content, w%	13.44
	Avg. w%	13.74

Hwy 167 #3, B-4, S-2	Container #	106
	Mass of cup + wet soil	53.75
	Mass of cup + dry soil	49.99
	Mass of cup	15.49
	Mass of dry soil, Ms	34.5
	Mass of water, Mw	3.76
	Water Content, w%	10.90
	Container #	LL
	Mass of cup + wet soil	66.43
	Mass of cup + dry soil	63.7
	Mass of cup	17.91
	Mass of dry soil, Ms	45.79
	Mass of water, Mw	2.73
	Water Content, w%	5.96
	Avg. w%	8.43

Table D-4: Moisture Contents from Bag Samples for Highway 15

Hwy 15 #1 B-1, S-1	Container #	50
	Mass of cup + wet soil	63.11
	Mass of cup + dry soil	60.56
	Mass of cup	15.18
	Mass of dry soil, Ms	45.38
	Mass of water, Mw	2.55
	Water Content, w%	5.62
	Container #	51
	Mass of cup + wet soil	49.33
	Mass of cup + dry soil	47.19
	Mass of cup	14.53
	Mass of dry soil, Ms	32.66
	Mass of water, Mw	2.14
	Water Content, w%	6.55
	Avg. w%	6.09

Hwy 15 #1, B-2, S-1	Container #	52
	Mass of cup + wet soil	68.77
	Mass of cup + dry soil	64.9
	Mass of cup	17.84
	Mass of dry soil, Ms	47.06
	Mass of water, Mw	3.87
	Water Content, w%	8.22
	Container #	53
	Mass of cup + wet soil	59.5
	Mass of cup + dry soil	56.79
	Mass of cup	17.86
	Mass of dry soil, Ms	38.93
	Mass of water, Mw	2.71
	Water Content, w%	6.96
	Avg. w%	7.59

Table D-5: Moisture Contents from Bag Samples for Highway 7 Spur

Hwy 7s #1, B-1, S-1	Container #	#6
	Mass of cup + wet soil	171.03
	Mass of cup + dry soil	154.21
	Mass of cup	39.9
	Mass of dry soil, Ms	114.31
	Mass of water, Mw	16.82
	Water Content, w%	14.71
	Container #	105
	Mass of cup + wet soil	170.92
	Mass of cup + dry soil	153.17
	Mass of cup	20.53
	Mass of dry soil, Ms	132.64
	Mass of water, Mw	17.75
	Water Content, w%	13.38
	Avg. w%	14.05

Table D-6: Moisture Contents from Bag Samples for Highway 79

Hwy 79 #1, B-2, S-1	Container #	15
	Mass of cup + wet soil	63.31
	Mass of cup + dry soil	59.27
	Mass of cup	10.1
	Mass of dry soil, Ms	49.17
	Mass of water, Mw	4.04
	Water Content, w%	8.22
	Container #	210
	Mass of cup + wet soil	67.39
	Mass of cup + dry soil	63.68
	Mass of cup	12.75
	Mass of dry soil, Ms	50.93
	Mass of water, Mw	3.71
	Water Content, w%	7.28
	Avg. w%	7.75

Hwy 79 #1, B-5, S-1	Container #	249
	Mass of cup + wet soil	63.76
	Mass of cup + dry soil	59.96
	Mass of cup	12.54
	Mass of dry soil, Ms	47.42
	Mass of water, Mw	3.8
	Water Content, w%	8.01
	Container #	242
	Mass of cup + wet soil	71.16
	Mass of cup + dry soil	67.11
	Mass of cup	13.47
	Mass of dry soil, Ms	53.64
	Mass of water, Mw	4.05
	Water Content, w%	7.55
	Avg. w%	7.78

Hwy 79 #2, B-1, S-1	Container #	133
	Mass of cup + wet soil	61.9
	Mass of cup + dry soil	59
	Mass of cup	12.25
	Mass of dry soil, Ms	46.75
	Mass of water, Mw	2.9
	Water Content, w%	6.20
	Container #	146
	Mass of cup + wet soil	65.98
	Mass of cup + dry soil	63.11
	Mass of cup	12.51
	Mass of dry soil, Ms	50.6
	Mass of water, Mw	2.87
	Water Content, w%	5.67
	Avg. w%	5.94

Hwy 79 #2, B-3, S-1	Container #	24
	Mass of cup + wet soil	65.51
	Mass of cup + dry soil	62.41
	Mass of cup	10.12
	Mass of dry soil, Ms	52.29
	Mass of water, Mw	3.1
	Water Content, w%	5.93
	Container #	610
	Mass of cup + wet soil	71.88
	Mass of cup + dry soil	68.68
	Mass of cup	13.06
	Mass of dry soil, Ms	55.62
	Mass of water, Mw	3.2
	Water Content, w%	5.75
	Avg. w%	5.84

Hwy 79 #2, B-5, S-1	Container #	166
	Mass of cup + wet soil	183.29
	Mass of cup + dry soil	168.23
	Mass of cup	23.56
	Mass of dry soil, Ms	144.67
	Mass of water, Mw	15.06
	Water Content, w%	10.41
	Container #	117A
	Mass of cup + wet soil	161.41
	Mass of cup + dry soil	149.67
	Mass of cup	23.59
	Mass of dry soil, Ms	126.08
	Mass of water, Mw	11.74
	Water Content, w%	9.31
	Avg. w%	9.86

Table D-7: Moisture Contents from Bag Samples for Otter Creek Road

Otter Creek Rd #1, B-1, S-3	Container #	17
	Mass of cup + wet soil	47.5
	Mass of cup + dry soil	42.67
	Mass of cup	15.24
	Mass of dry soil, Ms	27.43
	Mass of water, Mw	4.83
	Water Content, w%	17.61
	Container #	8
	Mass of cup + wet soil	50.05
	Mass of cup + dry soil	44.91
	Mass of cup	15.14
	Mass of dry soil, Ms	29.77
	Mass of water, Mw	5.14
	Water Content, w%	17.27
	Avg. w%	17.44

Table D-8: Moisture Contents from Bag Samples for Highway 165

Hwy 165 #1, B-1, S-1	Container #	56
	Mass of cup + wet soil	49.33
	Mass of cup + dry soil	47.41
	Mass of cup	15.34
	Mass of dry soil, Ms	32.07
	Mass of water, Mw	1.92
	Water Content, w%	5.99
	Container #	62
	Mass of cup + wet soil	37.82
	Mass of cup + dry soil	36.26
	Mass of cup	15.85
	Mass of dry soil, Ms	20.41
	Mass of water, Mw	1.56
	Water Content, w%	7.64
	Avg. w%	6.82

Hwy 165 #1, B-1, S-2	Container #	127
	Mass of cup + wet soil	36.77
	Mass of cup + dry soil	34.12
	Mass of cup	15.2
	Mass of dry soil, Ms	18.92
	Mass of water, Mw	2.65
	Water Content, w%	14.01
	Container #	60
	Mass of cup + wet soil	40
	Mass of cup + dry soil	35.95
	Mass of cup	10.89
	Mass of dry soil, Ms	25.06
	Mass of water, Mw	4.05
	Water Content, w%	16.16
	Avg. w%	15.08

Table D-9: Moisture Contents from Bag Samples for Highway 49

Hwy 49 #1, B-1, S-1	Container #	44
	Mass of cup + wet soil	47.69
	Mass of cup + dry soil	46.43
	Mass of cup	15.3
	Mass of dry soil, Ms	31.13
	Mass of water, Mw	1.26
	Water Content, w%	4.05
	Container #	72
	Mass of cup + wet soil	45.44
	Mass of cup + dry soil	43.67
	Mass of cup	11.12
	Mass of dry soil, Ms	32.55
	Mass of water, Mw	1.77
	Water Content, w%	5.44
	Avg. w%	4.74

Hwy 49 #1, B-2, S-1	Container #	54
	Mass of cup + wet soil	55.93
	Mass of cup + dry soil	54.98
	Mass of cup	15.55
	Mass of dry soil, Ms	39.43
	Mass of water, Mw	0.95
	Water Content, w%	2.41
	Container #	141
	Mass of cup + wet soil	62.09
	Mass of cup + dry soil	60.96
	Mass of cup	15.36
	Mass of dry soil, Ms	45.6
	Mass of water, Mw	1.13
	Water Content, w%	2.48
	Avg. w%	2.44

Table D-9 (Continued): Moisture Contents from Bag Samples for Highway 49

Sample		
Hwy 49 #2, B-3, S-1	Container #	132
	Mass of cup + wet soil	59.96
	Mass of cup + dry soil	57.15
	Mass of cup	15.36
	Mass of dry soil, Ms	41.79
	Mass of water, Mw	2.81
	Water Content, w%	6.72
	Container #	65
	Mass of cup + wet soil	56.35
	Mass of cup + dry soil	53.98
	Mass of cup	14.78
	Mass of dry soil, Ms	39.2
	Mass of water, Mw	2.37
	Water Content, w%	6.05
	Avg. w%	6.39

Sample		
Hwy 49 #2, B-4, S-1	Container #	63
	Mass of cup + wet soil	57.36
	Mass of cup + dry soil	55.23
	Mass of cup	15.67
	Mass of dry soil, Ms	39.56
	Mass of water, Mw	2.13
	Water Content, w%	5.38
	Container #	59
	Mass of cup + wet soil	57.49
	Mass of cup + dry soil	55.57
	Mass of cup	15.04
	Mass of dry soil, Ms	40.53
	Mass of water, Mw	1.92
	Water Content, w%	4.74
	Avg. w%	5.06

Sample		
Hwy 49 #2, B-8, S-1	Container #	18
	Mass of cup + wet soil	61.98
	Mass of cup + dry soil	58.03
	Mass of cup	15.62
	Mass of dry soil, Ms	42.41
	Mass of water, Mw	3.95
	Water Content, w%	9.31
	Container #	64
	Mass of cup + wet soil	57.44
	Mass of cup + dry soil	54.41
	Mass of cup	15.34
	Mass of dry soil, Ms	39.07
	Mass of water, Mw	3.03
	Water Content, w%	7.76
	Avg. w%	8.53

Table D-10: Moisture Contents from Bag Samples for Highway 270

Sample		
Hwy 270 #1, B-1, S-1	Container #	52
	Mass of cup + wet soil	74.1
	Mass of cup + dry soil	71.57
	Mass of cup	17.88
	Mass of dry soil, Ms	53.69
	Mass of water, Mw	2.53
	Water Content, w%	4.71
	Container #	B7
	Mass of cup + wet soil	73.19
	Mass of cup + dry soil	70.74
	Mass of cup	17.8
	Mass of dry soil, Ms	52.94
	Mass of water, Mw	2.45
	Water Content, w%	4.63
	Avg. w%	4.67

Sample		
Hwy 270 #1, B-1, S-2	Container #	H-L
	Mass of cup + wet soil	92.27
	Mass of cup + dry soil	84.25
	Mass of cup	17.25
	Mass of dry soil, Ms	67
	Mass of water, Mw	8.02
	Water Content, w%	11.97
	Container #	GALE
	Mass of cup + wet soil	79.22
	Mass of cup + dry soil	73.24
	Mass of cup	18.11
	Mass of dry soil, Ms	55.13
	Mass of water, Mw	5.98
	Water Content, w%	10.85
	Avg. w%	11.41

Table D-10 (Continued): Moisture Contents from Bag Samples for Highway 270

Hwy 270 #1, B-1, S-3	Container #	166
	Mass of cup + wet soil	138
	Mass of cup + dry soil	122.9
	Mass of cup	23.57
	Mass of dry soil, Ms	99.33
	Mass of water, Mw	15.1
	Water Content, w%	15.20
	Container #	242
	Mass of cup + wet soil	57.22
	Mass of cup + dry soil	51.43
	Mass of cup	13.47
	Mass of dry soil, Ms	37.96
	Mass of water, Mw	5.79
	Water Content, w%	15.25
	Avg. w%	15.23

Hwy 270 #1, B-2, S-1	Container #	100
	Mass of cup + wet soil	66.88
	Mass of cup + dry soil	63.94
	Mass of cup	10.07
	Mass of dry soil, Ms	53.87
	Mass of water, Mw	2.94
	Water Content, w%	5.46
	Container #	4
	Mass of cup + wet soil	63.72
	Mass of cup + dry soil	60.9
	Mass of cup	10.21
	Mass of dry soil, Ms	50.69
	Mass of water, Mw	2.82
	Water Content, w%	5.56
	Avg. w%	5.51

Hwy 270 #1, B-2, S-2	Container #	99
	Mass of cup + wet soil	61.65
	Mass of cup + dry soil	57.76
	Mass of cup	11.06
	Mass of dry soil, Ms	46.7
	Mass of water, Mw	3.89
	Water Content, w%	8.33
	Container #	199
	Mass of cup + wet soil	62.99
	Mass of cup + dry soil	58.2
	Mass of cup	12.27
	Mass of dry soil, Ms	45.93
	Mass of water, Mw	4.79
	Water Content, w%	10.43
	Avg. w%	9.38

Hwy 270 #1, B-2, S-3	Container #	146
	Mass of cup + wet soil	64.99
	Mass of cup + dry soil	58.86
	Mass of cup	12.52
	Mass of dry soil, Ms	46.34
	Mass of water, Mw	6.13
	Water Content, w%	13.23
	Container #	212
	Mass of cup + wet soil	72.63
	Mass of cup + dry soil	65.33
	Mass of cup	12.32
	Mass of dry soil, Ms	53.01
	Mass of water, Mw	7.3
	Water Content, w%	13.77
	Avg. w%	13.50

Hwy 270 #1, B-3, S-1	Container #	53
	Mass of cup + wet soil	74.6
	Mass of cup + dry soil	71.4
	Mass of cup	17.89
	Mass of dry soil, Ms	53.51
	Mass of water, Mw	3.2
	Water Content, w%	5.98
	Container #	O#
	Mass of cup + wet soil	74.32
	Mass of cup + dry soil	71.16
	Mass of cup	17.96
	Mass of dry soil, Ms	53.2
	Mass of water, Mw	3.16
	Water Content, w%	5.94
	Avg. w%	5.96

Hwy 270 #1, B-3, S-2	Container #	246
	Mass of cup + wet soil	73.73
	Mass of cup + dry soil	68.25
	Mass of cup	12.68
	Mass of dry soil, Ms	55.57
	Mass of water, Mw	5.48
	Water Content, w%	9.86
	Container #	12
	Mass of cup + wet soil	58.72
	Mass of cup + dry soil	55
	Mass of cup	15.31
	Mass of dry soil, Ms	39.69
	Mass of water, Mw	3.72
	Water Content, w%	9.37
	Avg. w%	9.62

Table D-10 (Continued): Moisture Contents from Bag Samples for Highway 270

	Container #	5
	Mass of cup + wet soil	76.04
	Mass of cup + dry soil	69.03
	Mass of cup	18.07
	Mass of dry soil, Ms	50.96
	Mass of water, Mw	7.01
Hwy 270 #1,	Water Content, w%	13.76
B-3,	Container #	P-6
S-3	Mass of cup + wet soil	60.94
	Mass of cup + dry soil	55.56
	Mass of cup	18.28
	Mass of dry soil, Ms	37.28
	Mass of water, Mw	5.38
	Water Content, w%	14.43
	Avg. w%	14.09

	Container #	4
	Mass of cup + wet soil	91.52
	Mass of cup + dry soil	87.02
	Mass of cup	20.5
	Mass of dry soil, Ms	66.52
	Mass of water, Mw	4.5
Hwy 270 #1,	Water Content, w%	6.76
B-5,	Container #	12
S-1	Mass of cup + wet soil	83.02
	Mass of cup + dry soil	78.78
	Mass of cup	18.24
	Mass of dry soil, Ms	60.54
	Mass of water, Mw	4.24
	Water Content, w%	7.00
	Avg. w%	6.88

	Container #	340
	Mass of cup + wet soil	69.08
	Mass of cup + dry soil	62.61
	Mass of cup	18.41
	Mass of dry soil, Ms	44.2
	Mass of water, Mw	6.47
Hwy 270 #1,	Water Content, w%	14.64
B-5,	Container #	348
S-2	Mass of cup + wet soil	78.63
	Mass of cup + dry soil	70.66
	Mass of cup	18.45
	Mass of dry soil, Ms	52.21
	Mass of water, Mw	7.97
	Water Content, w%	15.27
	Avg. w%	14.95

	Container #	24
	Mass of cup + wet soil	66.47
	Mass of cup + dry soil	63.28
	Mass of cup	10.1
	Mass of dry soil, Ms	53.18
	Mass of water, Mw	3.19
Hwy 270 #1,	Water Content, w%	6.00
B-6,	Container #	145
S-1	Mass of cup + wet soil	63.66
	Mass of cup + dry soil	61.05
	Mass of cup	12.07
	Mass of dry soil, Ms	48.98
	Mass of water, Mw	2.61
	Water Content, w%	5.33
	Avg. w%	5.66

	Container #	209
	Mass of cup + wet soil	82.02
	Mass of cup + dry soil	75.68
	Mass of cup	12.67
	Mass of dry soil, Ms	63.01
	Mass of water, Mw	6.34
Hwy 270 #1,	Water Content, w%	10.06
B-6,	Container #	28
S-2	Mass of cup + wet soil	59.86
	Mass of cup + dry soil	55.35
	Mass of cup	10.01
	Mass of dry soil, Ms	45.34
	Mass of water, Mw	4.51
	Water Content, w%	9.95
	Avg. w%	10.00

	Container #	BB
	Mass of cup + wet soil	84.5
	Mass of cup + dry soil	79.3
	Mass of cup	18.01
	Mass of dry soil, Ms	61.29
	Mass of water, Mw	5.2
Hwy 270 #1,	Water Content, w%	8.48
B-6,	Container #	2AE
S-3	Mass of cup + wet soil	75.46
	Mass of cup + dry soil	70.83
	Mass of cup	18.06
	Mass of dry soil, Ms	52.77
	Mass of water, Mw	4.63
	Water Content, w%	8.77
	Avg. w%	8.63

Table D-10 (Continued): Moisture Contents from Bag Samples for Highway 270

Hwy 270 #1, B-7, S-1	Container #	214
	Mass of cup + wet soil	61.74
	Mass of cup + dry soil	58.99
	Mass of cup	9.6
	Mass of dry soil, Ms	49.39
	Mass of water, Mw	2.75
	Water Content, w%	5.57
	Container #	224
	Mass of cup + wet soil	62.48
	Mass of cup + dry soil	59.71
	Mass of cup	12.08
	Mass of dry soil, Ms	47.63
	Mass of water, Mw	2.77
	Water Content, w%	5.82
	Avg. w%	5.69

Hwy 270 #1, B-7, S-2	Container #	140
	Mass of cup + wet soil	63.8
	Mass of cup + dry soil	57.32
	Mass of cup	12.71
	Mass of dry soil, Ms	44.61
	Mass of water, Mw	6.48
	Water Content, w%	14.53
	Container #	62
	Mass of cup + wet soil	59.95
	Mass of cup + dry soil	53.11
	Mass of cup	11.01
	Mass of dry soil, Ms	42.1
	Mass of water, Mw	6.84
	Water Content, w%	16.25
	Avg. w%	15.39

Hwy 270 #2, B-1, S-1	Container #	58
	Mass of cup + wet soil	70.76
	Mass of cup + dry soil	61.51
	Mass of cup	15.35
	Mass of dry soil, Ms	46.16
	Mass of water, Mw	9.25
	Water Content, w%	20.04
	Container #	TAH5
	Mass of cup + wet soil	68.88
	Mass of cup + dry soil	60.02
	Mass of cup	15.48
	Mass of dry soil, Ms	44.54
	Mass of water, Mw	8.86
	Water Content, w%	19.89
	Avg. w%	19.97

Hwy 270 #2, B-1, S-2	Container #	11
	Mass of cup + wet soil	59.07
	Mass of cup + dry soil	52.05
	Mass of cup	12.04
	Mass of dry soil, Ms	40.01
	Mass of water, Mw	7.02
	Water Content, w%	17.55
	Container #	86
	Mass of cup + wet soil	64.96
	Mass of cup + dry soil	57.69
	Mass of cup	15.24
	Mass of dry soil, Ms	42.45
	Mass of water, Mw	7.27
	Water Content, w%	17.13
	Avg. w%	17.34

Hwy 270 #2, B-2, S-1	Container #	140
	Mass of cup + wet soil	70.47
	Mass of cup + dry soil	60.94
	Mass of cup	11.01
	Mass of dry soil, Ms	49.93
	Mass of water, Mw	9.53
	Water Content, w%	19.09
	Container #	51
	Mass of cup + wet soil	67.12
	Mass of cup + dry soil	56.68
	Mass of cup	14.54
	Mass of dry soil, Ms	42.14
	Mass of water, Mw	10.44
	Water Content, w%	24.77
	Avg. w%	21.93

Hwy 270 #2, B-2, S-2	Container #	68
	Mass of cup + wet soil	58.15
	Mass of cup + dry soil	50.5
	Mass of cup	15.66
	Mass of dry soil, Ms	34.84
	Mass of water, Mw	7.65
	Water Content, w%	21.96
	Container #	26
	Mass of cup + wet soil	53.21
	Mass of cup + dry soil	45.87
	Mass of cup	10.79
	Mass of dry soil, Ms	35.08
	Mass of water, Mw	7.34
	Water Content, w%	20.92
	Avg. w%	21.44

Table D-10 (Continued): Moisture Contents from Bag Samples for Highway 270

Hwy 270 #2, B-2, S-3	Container #	102
	Mass of cup + wet soil	42.24
	Mass of cup + dry soil	37.36
	Mass of cup	15.28
	Mass of dry soil, Ms	22.08
	Mass of water, Mw	4.88
	Water Content, w%	22.10
	Container #	50
	Mass of cup + wet soil	57.18
	Mass of cup + dry soil	50.89
	Mass of cup	15.18
	Mass of dry soil, Ms	35.71
	Mass of water, Mw	6.29
	Water Content, w%	17.61
	Avg. w%	19.86

Hwy 270 #2, B-3, S-1	Container #	85
	Mass of cup + wet soil	64.71
	Mass of cup + dry soil	58.94
	Mass of cup	15.18
	Mass of dry soil, Ms	43.76
	Mass of water, Mw	5.77
	Water Content, w%	13.19
	Container #	108
	Mass of cup + wet soil	66.57
	Mass of cup + dry soil	63.51
	Mass of cup	15.34
	Mass of dry soil, Ms	48.17
	Mass of water, Mw	3.06
	Water Content, w%	6.35
	Avg. w%	9.77

Hwy 270 #2, B-3, S-2	Container #	133
	Mass of cup + wet soil	57.58
	Mass of cup + dry soil	49.31
	Mass of cup	10.94
	Mass of dry soil, Ms	38.37
	Mass of water, Mw	8.27
	Water Content, w%	21.55
	Container #	33A
	Mass of cup + wet soil	73.57
	Mass of cup + dry soil	64.19
	Mass of cup	18.15
	Mass of dry soil, Ms	46.04
	Mass of water, Mw	9.38
	Water Content, w%	20.37
	Avg. w%	20.96

Hwy 270 #2, B-3, S-3	Container #	3
	Mass of cup + wet soil	80
	Mass of cup + dry soil	68.92
	Mass of cup	20.33
	Mass of dry soil, Ms	48.59
	Mass of water, Mw	11.08
	Water Content, w%	22.80
	Container #	B5
	Mass of cup + wet soil	73.57
	Mass of cup + dry soil	64.19
	Mass of cup	18.15
	Mass of dry soil, Ms	46.04
	Mass of water, Mw	9.38
	Water Content, w%	20.37
	Avg. w%	21.59

Hwy 270 #2, B-5, S-1	Container #	20
	Mass of cup + wet soil	54.32
	Mass of cup + dry soil	50.59
	Mass of cup	15.1
	Mass of dry soil, Ms	35.49
	Mass of water, Mw	3.73
	Water Content, w%	10.51
	Container #	55
	Mass of cup + wet soil	64.86
	Mass of cup + dry soil	60.8
	Mass of cup	15.39
	Mass of dry soil, Ms	45.41
	Mass of water, Mw	4.06
	Water Content, w%	8.94
	Avg. w%	9.73

Hwy 270 #2, B-5, S-2	Container #	146
	Mass of cup + wet soil	53.06
	Mass of cup + dry soil	46.14
	Mass of cup	11.15
	Mass of dry soil, Ms	34.99
	Mass of water, Mw	6.92
	Water Content, w%	19.78
	Container #	21
	Mass of cup + wet soil	62.7
	Mass of cup + dry soil	54.86
	Mass of cup	12.54
	Mass of dry soil, Ms	42.32
	Mass of water, Mw	7.84
	Water Content, w%	18.53
	Avg. w%	19.15

Table D-11: Moisture Contents from Bag Samples for Highway 65

Hwy 65 #1, B-1, S-1	Container #	15
	Mass of cup + wet soil	69.48
	Mass of cup + dry soil	65.99
	Mass of cup	10.1
	Mass of dry soil, Ms	55.89
	Mass of water, Mw	3.49
	Water Content, w%	6.24
	Container #	B6
	Mass of cup + wet soil	71.63
	Mass of cup + dry soil	67.36
	Mass of cup	17.8
	Mass of dry soil, Ms	49.56
	Mass of water, Mw	4.27
	Water Content, w%	8.62
	Avg. w%	7.43

Hwy 65 #1, B-2, S-1	Container #	HBJ 2A
	Mass of cup + wet soil	65.2
	Mass of cup + dry soil	57.91
	Mass of cup	17.82
	Mass of dry soil, Ms	40.09
	Mass of water, Mw	7.29
	Water Content, w%	18.18
	Container #	ELK
	Mass of cup + wet soil	59.07
	Mass of cup + dry soil	52.88
	Mass of cup	18.06
	Mass of dry soil, Ms	34.82
	Mass of water, Mw	6.19
	Water Content, w%	17.78
	Avg. w%	17.98

Hwy 65 #1, B-5, S-1	Container #	B25
	Mass of cup + wet soil	98.5
	Mass of cup + dry soil	85.72
	Mass of cup	10.14
	Mass of dry soil, Ms	75.58
	Mass of water, Mw	12.78
	Water Content, w%	16.91
	Container #	133
	Mass of cup + wet soil	69.11
	Mass of cup + dry soil	60.61
	Mass of cup	12.24
	Mass of dry soil, Ms	48.37
	Mass of water, Mw	8.5
	Water Content, w%	17.57
	Avg. w%	17.24

Hwy 65 #1, B-7, S-2	Container #	S
	Mass of cup + wet soil	74.4
	Mass of cup + dry soil	64.03
	Mass of cup	13.78
	Mass of dry soil, Ms	50.25
	Mass of water, Mw	10.37
	Water Content, w%	20.64
	Container #	G-7
	Mass of cup + wet soil	99.61
	Mass of cup + dry soil	86.5
	Mass of cup	20.04
	Mass of dry soil, Ms	66.46
	Mass of water, Mw	13.11
	Water Content, w%	19.73
	Avg. w%	20.18

Hwy 65 #1, B-5, S-2	Container #	H-4
	Mass of cup + wet soil	77.97
	Mass of cup + dry soil	71.75
	Mass of cup	18.07
	Mass of dry soil, Ms	53.68
	Mass of water, Mw	6.22
	Water Content, w%	11.59
	Container #	T4
	Mass of cup + wet soil	99.14
	Mass of cup + dry soil	89.8
	Mass of cup	22.47
	Mass of dry soil, Ms	67.33
	Mass of water, Mw	9.34
	Water Content, w%	13.87
	Avg. w%	12.73

Hwy 65 #1, B-7, S-1	Container #	48
	Mass of cup + wet soil	74.86
	Mass of cup + dry soil	72.75
	Mass of cup	15.3
	Mass of dry soil, Ms	57.45
	Mass of water, Mw	2.11
	Water Content, w%	3.67
	Container #	91
	Mass of cup + wet soil	64.71
	Mass of cup + dry soil	62.2
	Mass of cup	10.94
	Mass of dry soil, Ms	51.26
	Mass of water, Mw	2.51
	Water Content, w%	4.90
	Avg. w%	4.28

Table D-11 (Continued): Moisture Contents from Bag Samples for Highway 65

Hwy 65 #1, B-5, S-3	Container #	BB-2
	Mass of cup + wet soil	56.85
	Mass of cup + dry soil	52.35
	Mass of cup	13.87
	Mass of dry soil, Ms	38.48
	Mass of water, Mw	4.5
	Water Content, w%	11.69
	Container #	H-6
	Mass of cup + wet soil	65.41
	Mass of cup + dry soil	60.77
	Mass of cup	18.33
	Mass of dry soil, Ms	42.44
	Mass of water, Mw	4.64
	Water Content, w%	10.93
	Avg. w%	11.31

Hwy 65 #10, B-6, S-1	Container #	30
	Mass of cup + wet soil	67.92
	Mass of cup + dry soil	60.82
	Mass of cup	15.12
	Mass of dry soil, Ms	45.7
	Mass of water, Mw	7.1
	Water Content, w%	15.54
	Container #	10
	Mass of cup + wet soil	133.66
	Mass of cup + dry soil	119
	Mass of cup	23.6
	Mass of dry soil, Ms	95.4
	Mass of water, Mw	14.66
	Water Content, w%	15.37
	Avg. w%	15.45

Hwy 65 #10, B-7, S-1	Container #	153
	Mass of cup + wet soil	146.99
	Mass of cup + dry soil	131.28
	Mass of cup	31.84
	Mass of dry soil, Ms	99.44
	Mass of water, Mw	15.71
	Water Content, w%	15.80
	Container #	135
	Mass of cup + wet soil	53.34
	Mass of cup + dry soil	47.73
	Mass of cup	12.58
	Mass of dry soil, Ms	35.15
	Mass of water, Mw	5.61
	Water Content, w%	15.96
	Avg. w%	15.88

Hwy 65 #11, B-4, S-1	Container #	156
	Mass of cup + wet soil	148.14
	Mass of cup + dry soil	138.51
	Mass of cup	32.03
	Mass of dry soil, Ms	106.48
	Mass of water, Mw	9.63
	Water Content, w%	9.04
	Container #	13
	Mass of cup + wet soil	48.95
	Mass of cup + dry soil	45.8
	Mass of cup	10.11
	Mass of dry soil, Ms	35.69
	Mass of water, Mw	3.15
	Water Content, w%	8.83
	Avg. w%	8.93

Hwy 65 #12, B-2, S-1	Container #	3A
	Mass of cup + wet soil	68.37
	Mass of cup + dry soil	64.43
	Mass of cup	12.47
	Mass of dry soil, Ms	51.96
	Mass of water, Mw	3.94
	Water Content, w%	7.58
	Container #	3F
	Mass of cup + wet soil	57.95
	Mass of cup + dry soil	54.07
	Mass of cup	12.35
	Mass of dry soil, Ms	41.72
	Mass of water, Mw	3.88
	Water Content, w%	9.30
	Avg. w%	8.44

Table D-12: Moisture Contents from Bag Samples for Highway 71 (#1)

Hwy 71 #1, B-1, S-1	Container #	610
	Mass of cup + wet soil	73.45
	Mass of cup + dry soil	69.86
	Mass of cup	13.05
	Mass of dry soil, Ms	56.81
	Mass of water, Mw	3.59
	Water Content, w%	6.32
	Container #	B10
	Mass of cup + wet soil	83.87
	Mass of cup + dry soil	79.93
	Mass of cup	17.84
	Mass of dry soil, Ms	62.09
	Mass of water, Mw	3.94
	Water Content, w%	6.35
	Avg. w%	6.33

Hwy 71 #1, B-1, S-2	Container #	6 VII
	Mass of cup + wet soil	71.55
	Mass of cup + dry soil	66.71
	Mass of cup	18.14
	Mass of dry soil, Ms	48.57
	Mass of water, Mw	4.84
	Water Content, w%	9.96
	Container #	KBJ 3B
	Mass of cup + wet soil	84.8
	Mass of cup + dry soil	76.87
	Mass of cup	17.76
	Mass of dry soil, Ms	59.11
	Mass of water, Mw	7.93
	Water Content, w%	13.42
	Avg. w%	11.69

Hwy 71 #1, B-3, S-1	Container #	11
	Mass of cup + wet soil	60.36
	Mass of cup + dry soil	54.51
	Mass of cup	12.79
	Mass of dry soil, Ms	41.72
	Mass of water, Mw	5.85
	Water Content, w%	14.02
	Container #	#1A
	Mass of cup + wet soil	77.14
	Mass of cup + dry soil	70.02
	Mass of cup	17.9
	Mass of dry soil, Ms	52.12
	Mass of water, Mw	7.12
	Water Content, w%	13.66
	Avg. w%	13.84

Hwy 71 #1, B-5, S-1	Container #	+
	Mass of cup + wet soil	121.26
	Mass of cup + dry soil	116.94
	Mass of cup	16.73
	Mass of dry soil, Ms	100.21
	Mass of water, Mw	4.32
	Water Content, w%	4.31
	Container #	#1
	Mass of cup + wet soil	80.03
	Mass of cup + dry soil	77.46
	Mass of cup	12.53
	Mass of dry soil, Ms	64.93
	Mass of water, Mw	2.57
	Water Content, w%	3.96
	Avg. w%	4.13

Hwy 71 #1, B-5, S-2	Container #	CAT
	Mass of cup + wet soil	89.7
	Mass of cup + dry soil	82.32
	Mass of cup	13.81
	Mass of dry soil, Ms	68.51
	Mass of water, Mw	7.38
	Water Content, w%	10.77
	Container #	DOG
	Mass of cup + wet soil	108.13
	Mass of cup + dry soil	100.33
	Mass of cup	20.11
	Mass of dry soil, Ms	80.22
	Mass of water, Mw	7.8
	Water Content, w%	9.72
	Avg. w%	10.25

Hwy 71 #1, B-5, S-3	Container #	-2
	Mass of cup + wet soil	66.57
	Mass of cup + dry soil	61.29
	Mass of cup	18.35
	Mass of dry soil, Ms	42.94
	Mass of water, Mw	5.28
	Water Content, w%	12.30
	Container #	-3
	Mass of cup + wet soil	61.46
	Mass of cup + dry soil	56.6
	Mass of cup	18.32
	Mass of dry soil, Ms	38.28
	Mass of water, Mw	4.86
	Water Content, w%	12.70
	Avg. w%	12.50

Table D-12 (Continued): Moisture Contents from Bag Samples for Highway 71 (#1)

Hwy 71 #1, B-8, S-1	Container #	EX
	Mass of cup + wet soil	62.73
	Mass of cup + dry soil	57.55
	Mass of cup	18.03
	Mass of dry soil, Ms	39.52
	Mass of water, Mw	5.18
	Water Content, w%	13.11
	Container #	EY
	Mass of cup + wet soil	55.06
	Mass of cup + dry soil	51.46
	Mass of cup	18.35
	Mass of dry soil, Ms	33.11
	Mass of water, Mw	3.6
	Water Content, w%	10.87
	Avg. w%	11.99

Hwy 71 #1, Bulk	Container #	KBJ 1B
	Mass of cup + wet soil	79.09
	Mass of cup + dry soil	70.9
	Mass of cup	18.08
	Mass of dry soil, Ms	52.82
	Mass of water, Mw	8.19
	Water Content, w%	15.51
	Container #	RAT
	Mass of cup + wet soil	70.55
	Mass of cup + dry soil	62.87
	Mass of cup	12.3
	Mass of dry soil, Ms	50.57
	Mass of water, Mw	7.68
	Water Content, w%	15.19
	Avg. w%	15.35

Table D-13: Moisture Contents from Bag Samples for Highway 71 (#10-#13)

Hwy 71 #10, B-2, S-1	Container #	102
	Mass of cup + wet soil	64.32
	Mass of cup + dry soil	51.74
	Mass of cup	11.08
	Mass of dry soil, Ms	40.66
	Mass of water, Mw	12.58
	Water Content, w%	30.94
	Container #	43
	Mass of cup + wet soil	77.37
	Mass of cup + dry soil	62.05
	Mass of cup	11.01
	Mass of dry soil, Ms	51.04
	Mass of water, Mw	15.32
	Water Content, w%	30.02
	Avg. w%	30.48

Hwy 71 #10, B-2, S-2	Container #	87
	Mass of cup + wet soil	49.17
	Mass of cup + dry soil	41.82
	Mass of cup	11.04
	Mass of dry soil, Ms	30.78
	Mass of water, Mw	7.35
	Water Content, w%	23.88
	Container #	141
	Mass of cup + wet soil	63.26
	Mass of cup + dry soil	53.15
	Mass of cup	11.06
	Mass of dry soil, Ms	42.09
	Mass of water, Mw	10.11
	Water Content, w%	24.02
	Avg. w%	23.95

Hwy 71 #10, B-3, S-1	Container #	132
	Mass of cup + wet soil	50.51
	Mass of cup + dry soil	41.71
	Mass of cup	11.06
	Mass of dry soil, Ms	30.65
	Mass of water, Mw	8.8
	Water Content, w%	28.71
	Container #	12
	Mass of cup + wet soil	43.17
	Mass of cup + dry soil	33.31
	Mass of cup	10.99
	Mass of dry soil, Ms	22.32
	Mass of water, Mw	9.86
	Water Content, w%	44.18
	Avg. w%	36.44

Hwy 71 #10, B-3, S-2	Container #	62
	Mass of cup + wet soil	53.64
	Mass of cup + dry soil	40.02
	Mass of cup	11
	Mass of dry soil, Ms	29.02
	Mass of water, Mw	13.62
	Water Content, w%	46.93
	Container #	S
	Mass of cup + wet soil	64.79
	Mass of cup + dry soil	54.7
	Mass of cup	13.78
	Mass of dry soil, Ms	40.92
	Mass of water, Mw	10.09
	Water Content, w%	24.66
	Avg. w%	35.80

Table D-13 (Continued): Moisture Contents from Bag Samples for Highway 71 (#10-#13)

Hwy 71 #11, B-2, S-1	Container #	40
	Mass of cup + wet soil	62.56
	Mass of cup + dry soil	48.86
	Mass of cup	10.95
	Mass of dry soil, Ms	37.91
	Mass of water, Mw	13.7
	Water Content, w%	36.14
	Container #	113
	Mass of cup + wet soil	43.83
	Mass of cup + dry soil	35.44
	Mass of cup	10.98
	Mass of dry soil, Ms	24.46
	Mass of water, Mw	8.39
	Water Content, w%	34.30
	Avg. w%	35.22

Hwy 71 #10, B-2, S-2	Container #	135
	Mass of cup + wet soil	61.1
	Mass of cup + dry soil	55.41
	Mass of cup	11
	Mass of dry soil, Ms	44.41
	Mass of water, Mw	5.69
	Water Content, w%	12.81
	Container #	MILL5
	Mass of cup + wet soil	68.35
	Mass of cup + dry soil	61.6
	Mass of cup	12.61
	Mass of dry soil, Ms	48.99
	Mass of water, Mw	6.75
	Water Content, w%	13.78
	Avg. w%	13.30

Hwy 71 #11, B-3, S-1	Container #	111
	Mass of cup + wet soil	58.45
	Mass of cup + dry soil	45.6
	Mass of cup	11.21
	Mass of dry soil, Ms	34.39
	Mass of water, Mw	12.85
	Water Content, w%	37.37
	Container #	264
	Mass of cup + wet soil	64.69
	Mass of cup + dry soil	53.08
	Mass of cup	19.36
	Mass of dry soil, Ms	33.72
	Mass of water, Mw	11.61
	Water Content, w%	34.43
	Avg. w%	35.90

Hwy 71 #11, B-3, S-2	Container #	TAH1
	Mass of cup + wet soil	62.6
	Mass of cup + dry soil	57.78
	Mass of cup	11.14
	Mass of dry soil, Ms	46.64
	Mass of water, Mw	4.82
	Water Content, w%	10.33
	Container #	110
	Mass of cup + wet soil	56.85
	Mass of cup + dry soil	52.09
	Mass of cup	10.89
	Mass of dry soil, Ms	41.2
	Mass of water, Mw	4.76
	Water Content, w%	11.55
	Avg. w%	10.94

Hwy 71 #12, B-2, S-1	Container #	KBJ3
	Mass of cup + wet soil	50.09
	Mass of cup + dry soil	41.26
	Mass of cup	17.85
	Mass of dry soil, Ms	23.41
	Mass of water, Mw	8.83
	Water Content, w%	37.72
	Container #	5A
	Mass of cup + wet soil	44
	Mass of cup + dry soil	35.71
	Mass of cup	12.65
	Mass of dry soil, Ms	23.06
	Mass of water, Mw	8.29
	Water Content, w%	35.95
	Avg. w%	36.83

Hwy 71 #12, B-2, B-2	Container #	5B
	Mass of cup + wet soil	64.06
	Mass of cup + dry soil	52.83
	Mass of cup	14.01
	Mass of dry soil, Ms	38.82
	Mass of water, Mw	11.23
	Water Content, w%	28.93
	Container #	#8
	Mass of cup + wet soil	51.08
	Mass of cup + dry soil	43.85
	Mass of cup	18.02
	Mass of dry soil, Ms	25.83
	Mass of water, Mw	7.23
	Water Content, w%	27.99
	Avg. w%	28.46

Table D-13 (Continued): Moisture Contents from Bag Samples for Highway 71 (#10-#13)

Hwy 71 #12, B-3, S-1	Container #	B6
	Mass of cup + wet soil	40.62
	Mass of cup + dry soil	33.02
	Mass of cup	12.18
	Mass of dry soil, Ms	20.84
	Mass of water, Mw	7.6
	Water Content, w%	36.47
	Container #	340
	Mass of cup + wet soil	54.58
	Mass of cup + dry soil	43.38
	Mass of cup	12.64
	Mass of dry soil, Ms	30.74
	Mass of water, Mw	11.2
	Water Content, w%	36.43
	Avg. w%	36.45

Hwy 71 #12, B-3, S-2	Container #	104
	Mass of cup + wet soil	44.57
	Mass of cup + dry soil	36.72
	Mass of cup	15.66
	Mass of dry soil, Ms	21.06
	Mass of water, Mw	7.85
	Water Content, w%	37.27
	Container #	54CW
	Mass of cup + wet soil	34.65
	Mass of cup + dry soil	29.14
	Mass of cup	12.37
	Mass of dry soil, Ms	16.77
	Mass of water, Mw	5.51
	Water Content, w%	32.86
	Avg. w%	35.07

Hwy 71 #13, B-2, S-1	Container #	115
	Mass of cup + wet soil	65.22
	Mass of cup + dry soil	52.61
	Mass of cup	11.29
	Mass of dry soil, Ms	41.32
	Mass of water, Mw	12.61
	Water Content, w%	30.52
	Container #	62
	Mass of cup + wet soil	94.5
	Mass of cup + dry soil	75.16
	Mass of cup	11.02
	Mass of dry soil, Ms	64.14
	Mass of water, Mw	19.34
	Water Content, w%	30.15
	Avg. w%	30.34

Hwy 71 #13, B-2, S-2	Container #	68
	Mass of cup + wet soil	86
	Mass of cup + dry soil	69.76
	Mass of cup	15.9
	Mass of dry soil, Ms	53.86
	Mass of water, Mw	16.24
	Water Content, w%	30.15
	Container #	133
	Mass of cup + wet soil	60.49
	Mass of cup + dry soil	49.23
	Mass of cup	10.94
	Mass of dry soil, Ms	38.29
	Mass of water, Mw	11.26
	Water Content, w%	29.41
	Avg. w%	29.78

Table D-14: Moisture Contents from Bag Samples for Highway 412 (#10-#15)

Hwy 412 #10, B-1, S-1	Container #	101
	Mass of cup + wet soil	61.69
	Mass of cup + dry soil	60.19
	Mass of cup	11.02
	Mass of dry soil, Ms	49.17
	Mass of water, Mw	1.5
	Water Content, w%	3.05
	Container #	80
	Mass of cup + wet soil	72.5
	Mass of cup + dry soil	70.71
	Mass of cup	11.21
	Mass of dry soil, Ms	59.5
	Mass of water, Mw	1.79
	Water Content, w%	3.01
	Avg. w%	3.03

Hwy 412 #10, B-1, S-2	Container #	TAH6
	Mass of cup + wet soil	46.41
	Mass of cup + dry soil	39.35
	Mass of cup	15.63
	Mass of dry soil, Ms	23.72
	Mass of water, Mw	7.06
	Water Content, w%	29.76
	Container #	#1C
	Mass of cup + wet soil	46.71
	Mass of cup + dry soil	38.35
	Mass of cup	10.86
	Mass of dry soil, Ms	27.49
	Mass of water, Mw	8.36
	Water Content, w%	30.41
	Avg. w%	30.09

Table D-14 (Continued): Moisture Contents from Bag Samples for Highway 412 (#10-#15)

Hwy 412 #10, B-2, S-1	Container #	107
	Mass of cup + wet soil	60.17
	Mass of cup + dry soil	58.07
	Mass of cup	11.04
	Mass of dry soil, Ms	47.03
	Mass of water, Mw	2.1
	Water Content, w%	4.47
	Container #	55
	Mass of cup + wet soil	50.62
	Mass of cup + dry soil	48.9
	Mass of cup	10.6
	Mass of dry soil, Ms	38.3
	Mass of water, Mw	1.72
	Water Content, w%	4.49
	Avg. w%	4.48

Hwy 412 #11, B-1, S-1	Container #	199
	Mass of cup + wet soil	63.41
	Mass of cup + dry soil	62.05
	Mass of cup	12.26
	Mass of dry soil, Ms	49.79
	Mass of water, Mw	1.36
	Water Content, w%	2.73
	Container #	44
	Mass of cup + wet soil	64.28
	Mass of cup + dry soil	62.71
	Mass of cup	15.31
	Mass of dry soil, Ms	47.4
	Mass of water, Mw	1.57
	Water Content, w%	3.31
	Avg. w%	3.02

Hwy 412 #11, B-1, S-2	Container #	JK
	Mass of cup + wet soil	50.32
	Mass of cup + dry soil	44.38
	Mass of cup	18.12
	Mass of dry soil, Ms	26.26
	Mass of water, Mw	5.94
	Water Content, w%	22.62
	Container #	B25
	Mass of cup + wet soil	59.3
	Mass of cup + dry soil	54.2
	Mass of cup	10.16
	Mass of dry soil, Ms	44.04
	Mass of water, Mw	5.1
	Water Content, w%	11.58
	Avg. w%	17.10

Hwy 412 #11, B-2, S-1	Container #	-3
	Mass of cup + wet soil	67.65
	Mass of cup + dry soil	64.56
	Mass of cup	12.7
	Mass of dry soil, Ms	51.86
	Mass of water, Mw	3.09
	Water Content, w%	5.96
	Container #	4
	Mass of cup + wet soil	94.07
	Mass of cup + dry soil	89.23
	Mass of cup	20.52
	Mass of dry soil, Ms	68.71
	Mass of water, Mw	4.84
	Water Content, w%	7.04
	Avg. w%	6.50

Hwy 412 #11, B-2, S-2	Container #	105
	Mass of cup + wet soil	49.84
	Mass of cup + dry soil	45.79
	Mass of cup	10.86
	Mass of dry soil, Ms	34.93
	Mass of water, Mw	4.05
	Water Content, w%	11.59
	Container #	45
	Mass of cup + wet soil	44.67
	Mass of cup + dry soil	38.11
	Mass of cup	10.92
	Mass of dry soil, Ms	27.19
	Mass of water, Mw	6.56
	Water Content, w%	24.13
	Avg. w%	17.86

Hwy 412 #12, B-1, S-1	Container #	24
	Mass of cup + wet soil	39.75
	Mass of cup + dry soil	33.91
	Mass of cup	10.95
	Mass of dry soil, Ms	22.96
	Mass of water, Mw	5.84
	Water Content, w%	25.44
	Container #	X
	Mass of cup + wet soil	64.88
	Mass of cup + dry soil	54.9
	Mass of cup	13.82
	Mass of dry soil, Ms	41.08
	Mass of water, Mw	9.98
	Water Content, w%	24.29
	Avg. w%	24.86

Table D-14 (Continued): Moisture Contents from Bag Samples for Highway 412 (#10-#15)

Hwy 412 #12, B-2, S-1	Container #	DOG
	Mass of cup + wet soil	65.59
	Mass of cup + dry soil	55.77
	Mass of cup	20.13
	Mass of dry soil, Ms	35.64
	Mass of water, Mw	9.82
	Water Content, w%	27.55
	Container #	CAT
	Mass of cup + wet soil	55.01
	Mass of cup + dry soil	45.68
	Mass of cup	13.82
	Mass of dry soil, Ms	31.86
	Mass of water, Mw	9.33
	Water Content, w%	29.28
	Avg. w%	28.42

Hwy 412 #12, B-3, S-1	Container #	RED24%
	Mass of cup + wet soil	56.47
	Mass of cup + dry soil	49.76
	Mass of cup	12.51
	Mass of dry soil, Ms	37.25
	Mass of water, Mw	6.71
	Water Content, w%	18.01
	Container #	3
	Mass of cup + wet soil	74.8
	Mass of cup + dry soil	65.37
	Mass of cup	20.29
	Mass of dry soil, Ms	45.08
	Mass of water, Mw	9.43
	Water Content, w%	20.92
	Avg. w%	19.47

Hwy 412 #12, B-4, S-1	Container #	F5
	Mass of cup + wet soil	55.99
	Mass of cup + dry soil	45.24
	Mass of cup	12.48
	Mass of dry soil, Ms	32.76
	Mass of water, Mw	10.75
	Water Content, w%	32.81
	Container #	6
	Mass of cup + wet soil	60.2
	Mass of cup + dry soil	53.36
	Mass of cup	12.58
	Mass of dry soil, Ms	40.78
	Mass of water, Mw	6.84
	Water Content, w%	16.77
	Avg. w%	24.79

Hwy 412 #12, B-5, S-1	Container #	BB2
	Mass of cup + wet soil	69.66
	Mass of cup + dry soil	61.31
	Mass of cup	13.87
	Mass of dry soil, Ms	47.44
	Mass of water, Mw	8.35
	Water Content, w%	17.60
	Container #	-2
	Mass of cup + wet soil	48.57
	Mass of cup + dry soil	41.03
	Mass of cup	12.6
	Mass of dry soil, Ms	28.43
	Mass of water, Mw	7.54
	Water Content, w%	26.52
	Avg. w%	22.06

Hwy 412 #13, B-1, S-1	Container #	BB-4L
	Mass of cup + wet soil	52.77
	Mass of cup + dry soil	48.53
	Mass of cup	18.29
	Mass of dry soil, Ms	30.24
	Mass of water, Mw	4.24
	Water Content, w%	14.02
	Container #	64
	Mass of cup + wet soil	54.2
	Mass of cup + dry soil	50.56
	Mass of cup	10.89
	Mass of dry soil, Ms	39.67
	Mass of water, Mw	3.64
	Water Content, w%	9.18
	Avg. w%	11.60

Hwy 412 #13, B-2, S-1	Container #	ELK
	Mass of cup + wet soil	67.96
	Mass of cup + dry soil	60.05
	Mass of cup	12.49
	Mass of dry soil, Ms	47.56
	Mass of water, Mw	7.91
	Water Content, w%	16.63
	Container #	85
	Mass of cup + wet soil	72.3
	Mass of cup + dry soil	65
	Mass of cup	15.19
	Mass of dry soil, Ms	49.81
	Mass of water, Mw	7.3
	Water Content, w%	14.66
	Avg. w%	15.64

Table D-14 (Continued): Moisture Contents from Bag Samples for Highway 412 (#10-#15)

Hwy 412 #13, B-3, S-1	Container #	17
	Mass of cup + wet soil	72.94
	Mass of cup + dry soil	63.83
	Mass of cup	15.24
	Mass of dry soil, Ms	48.59
	Mass of water, Mw	9.11
	Water Content, w%	18.75
	Container #	127
	Mass of cup + wet soil	65.11
	Mass of cup + dry soil	57.77
	Mass of cup	15.21
	Mass of dry soil, Ms	42.56
	Mass of water, Mw	7.34
	Water Content, w%	17.25
	Avg. w%	18.00

Hwy 412 #13, B-4, S-1	Container #	B7
	Mass of cup + wet soil	55.36
	Mass of cup + dry soil	49.42
	Mass of cup	12.12
	Mass of dry soil, Ms	37.3
	Mass of water, Mw	5.94
	Water Content, w%	15.92
	Container #	112
	Mass of cup + wet soil	63.03
	Mass of cup + dry soil	56.21
	Mass of cup	15.35
	Mass of dry soil, Ms	40.86
	Mass of water, Mw	6.82
	Water Content, w%	16.69
	Avg. w%	16.31

Hwy 412 #13, B-5, S-1	Container #	140
	Mass of cup + wet soil	55.86
	Mass of cup + dry soil	49.55
	Mass of cup	11.02
	Mass of dry soil, Ms	38.53
	Mass of water, Mw	6.31
	Water Content, w%	16.38
	Container #	20
	Mass of cup + wet soil	43.61
	Mass of cup + dry soil	38.52
	Mass of cup	15.13
	Mass of dry soil, Ms	23.39
	Mass of water, Mw	5.09
	Water Content, w%	21.76
	Avg. w%	19.07

Hwy 412 #14, B-1, S-1	Container #	146
	Mass of cup + wet soil	45
	Mass of cup + dry soil	39.01
	Mass of cup	11.15
	Mass of dry soil, Ms	27.86
	Mass of water, Mw	5.99
	Water Content, w%	21.50
	Container #	99
	Mass of cup + wet soil	51.26
	Mass of cup + dry soil	44.43
	Mass of cup	11.06
	Mass of dry soil, Ms	33.37
	Mass of water, Mw	6.83
	Water Content, w%	20.47
	Avg. w%	20.98

Hwy 412 #14, B-2, S-1	Container #	33
	Mass of cup + wet soil	49.53
	Mass of cup + dry soil	43.93
	Mass of cup	10.99
	Mass of dry soil, Ms	32.94
	Mass of water, Mw	5.6
	Water Content, w%	17.00
	Container #	18
	Mass of cup + wet soil	61.05
	Mass of cup + dry soil	56.37
	Mass of cup	15.21
	Mass of dry soil, Ms	41.16
	Mass of water, Mw	4.68
	Water Content, w%	11.37
	Avg. w%	14.19

Hwy 412 #14, B-2, S-2	Container #	G-7
	Mass of cup + wet soil	82.53
	Mass of cup + dry soil	70.34
	Mass of cup	20.03
	Mass of dry soil, Ms	50.31
	Mass of water, Mw	12.19
	Water Content, w%	24.23
	Container #	145
	Mass of cup + wet soil	51.14
	Mass of cup + dry soil	43.5
	Mass of cup	12.08
	Mass of dry soil, Ms	31.42
	Mass of water, Mw	7.64
	Water Content, w%	24.32
	Avg. w%	24.27

Table D-14 (Continued): Moisture Contents from Bag Samples for Highway 412 (#10-#15)

Hwy 412 #14, B-3, S-1	Container #	224
	Mass of cup + wet soil	51.53
	Mass of cup + dry soil	44.42
	Mass of cup	12.08
	Mass of dry soil, Ms	32.34
	Mass of water, Mw	7.11
	Water Content, w%	21.99
	Container #	16
	Mass of cup + wet soil	137.45
	Mass of cup + dry soil	124.91
	Mass of cup	39.91
	Mass of dry soil, Ms	85
	Mass of water, Mw	12.54
	Water Content, w%	14.75
	Avg. w%	18.37

Hwy 412 #14, B-4, S-1	Container #	93
	Mass of cup + wet soil	58.08
	Mass of cup + dry soil	52.79
	Mass of cup	15.85
	Mass of dry soil, Ms	36.94
	Mass of water, Mw	5.29
	Water Content, w%	14.32
	Container #	63
	Mass of cup + wet soil	52.94
	Mass of cup + dry soil	46.68
	Mass of cup	15.33
	Mass of dry soil, Ms	31.35
	Mass of water, Mw	6.26
	Water Content, w%	19.97
	Avg. w%	17.14

Hwy 412 #15, B-1, S-1	Container #	22
	Mass of cup + wet soil	49.77
	Mass of cup + dry soil	44.39
	Mass of cup	11
	Mass of dry soil, Ms	33.39
	Mass of water, Mw	5.38
	Water Content, w%	16.11
	Container #	134
	Mass of cup + wet soil	48.23
	Mass of cup + dry soil	43.6
	Mass of cup	14.78
	Mass of dry soil, Ms	28.82
	Mass of water, Mw	4.63
	Water Content, w%	16.07
	Avg. w%	16.09

Hwy 412 #15, B-2, S-1	Container #	214
	Mass of cup + wet soil	60.7
	Mass of cup + dry soil	52.15
	Mass of cup	9.59
	Mass of dry soil, Ms	42.56
	Mass of water, Mw	8.55
	Water Content, w%	20.09
	Container #	#1
	Mass of cup + wet soil	67.53
	Mass of cup + dry soil	57.59
	Mass of cup	12.52
	Mass of dry soil, Ms	45.07
	Mass of water, Mw	9.94
	Water Content, w%	22.05
	Avg. w%	21.07

Hwy 412 #15, B-3, S-1	Container #	84
	Mass of cup + wet soil	51.26
	Mass of cup + dry soil	45.53
	Mass of cup	16.21
	Mass of dry soil, Ms	29.32
	Mass of water, Mw	5.73
	Water Content, w%	19.54
	Container #	108
	Mass of cup + wet soil	48.41
	Mass of cup + dry soil	42.6
	Mass of cup	15.34
	Mass of dry soil, Ms	27.26
	Mass of water, Mw	5.81
	Water Content, w%	21.31
	Avg. w%	20.43

APPENDIX E

MOISTURE CONTENTS FROM RESILIENT MODULUS AND TRIAXIAL SAMPLES

Table E-1: Summary of Moisture Contents from Resilient Modulus and Triaxial Samples

Location	Boring #	Sample #	Depth	MC, %
Hwy 82 - #1	2	1	1.5'-2'	12.87
	2	1	2'-2.5'	15.68
	2	1	2.5'-3'	13.65
	2	2	3'-3.5'	18.21
	2	2	4'-4.5'	32.56
	5	1	2'-2.5'	21.42
	5	1	2.5'-3'	16.75
	5	1	3.5'-4'	28.96
Hwy 82 - #2	2	1	1'-1.5'	16.69
	2	1	1.5'-2'	17.08
	2	1	2.5'-3'	15.44
	2	2	3'-3.5'	21.57
	2	2	3.5'-4'	22.15
	5	1	1.5'-2'	25.61
	5	1	2'-3.5'	27.01
Hwy 167 - #3	3	2	3'-3.5'	14.17
	3	2	3.5'-4'	16.65
	3	2	4'-5'	17.98
Hwy 7s - #1	1	1	1.5'-2'	14.84
Hwy 79 - #1	1	2	2'-2.5'	19.62
	1	2	3'-3.5'	17.03
	2	1	2.5'-3'	18.69
Hwy 79 - #2	1	2	2'-2.5'	29.77
	1	2	3'-3.5'	18.97
	2	2	?	20.98
	3	2	2.5'-3'	29.15
	3	3	4'-5'	16.27
	4	3	4'-4.5'	21.67
	4	3	4.5'-5'	22.88
	4	3	5'-5.5'	22.65
	5	2	2.5'-3'	22.72
	5	2	3'-3.5'	21.92
Hwy 165 - #1	2	1	3'	19.75
	2	1	3'	20.34
	2	1	4'	23.17
	2	1	5'	19.51
	2	1	5'	20.8
	3	1	2'-3'	19.33
	3	1	3'-3.5'	19.57
	3	2	4'-4.5'	19.75
	3	2	4.5'-5'	28.08

Table E-1 (Continued): Summary of Moisture Contents from Resilient Modulus and Triaxial Samples

Location	Boring #	Sample #	Depth	MC, %
Hwy 49 - #1	1	2	2'-2.5'	19.15
	1	2	2.5'-3'	20.22
	1	2	3'-3.5'	17.29
	1	3	4.5'	19.03
	1	3	5'	16.61
	1	3	5.5'	15.32
	2	3	4'-4.5'	23.95
	2	2	1.5'-2'	20.67
	2	2	2.5'-3'	24.48
	2	3	3.5'-4'	24.61
Hwy 49 - #2	1	1	1.5'-2'	21.04
	1	1	2'-2.5'	21.19
	1	1	2.5'-3'	21.87
	1	2	3.5'-4'	20.56
	1	2	4'-4.5'	20.73
	3	2	3.5'-4'	21.58
	3	2	4'-4.5'	22.45
	3	2	4.5'-5'	27.11
	3	3	5'-5.5'	27.27
	3	3	6'-6.5'	27.59
	4	2	2.5'-3'	15.9
	4	2	3'-3.5'	21.56
	7	1	1'-1.5'	20.69
	7	1	1.5'-2'	21.8
	7	1	3'	22.33
	8	2	2'-2.5'	13.49
	8	2	2.5'-3'	21.44
	8	2	3'-3.5'	26.78
Hwy 412 - #1	1	1	1'-1.5'	16.62
	1	1	2'	19.67
	1	1	3'	16.25
	1	2	3'-3.5'	18.4
	1	2	3.5'-4'	19.02
	1	2	4'-4.5'	15.49
	4	1	1.5'-2'	15.18
	4	1	3'	14.93
Hwy 412 - #2	2	2	2'-2.5'	13.78
	2	2	2.5'-3'	20.13
	2	2	3'-3.5'	24.85
	2	3	4'-4.5'	21.42
	2	3	4.5'-5'	26.35
	2	3	5'-5.5'	26.65

Table E-2: Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 82

Sample:	Hwy 82 #1, B-2, S-1
Depth	1.5'-2
Container #	133
Mass of cup + wet soil	49.94
Mass of cup + dry soil	45.49
Mass of cup	10.91
Mass of dry soil, Ms	34.58
Mass of water, Mw	4.45
Moisture Content	12.87

Sample:	Hwy 82 #1, B-2, S-1
Depth	2'-2.5'
Container #	TAH5
Mass of cup + wet soil	48
Mass of cup + dry soil	43.59
Mass of cup	15.46
Mass of dry soil, Ms	28.13
Mass of water, Mw	4.41
Moisture Content	15.68

Sample:	Hwy 82 #1, B-2, S-1
Depth	2.5'-3'
Container #	#1
Mass of cup + wet soil	74.77
Mass of cup + dry soil	67.6
Mass of cup	15.08
Mass of dry soil, Ms	52.52
Mass of water, Mw	7.17
Moisture Content	13.65

Sample:	Hwy 82 #1, B-2, S-2
Depth	3'-3.5'
Container #	86
Mass of cup + wet soil	73.14
Mass of cup + dry soil	64.22
Mass of cup	15.24
Mass of dry soil, Ms	48.98
Mass of water, Mw	8.92
Moisture Content	18.21

Table E-2 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 82

Sample:	Hwy 82 #1, B-2, S-2
Depth	4'-4.5'
Container #	134
Mass of cup + wet soil	50.45
Mass of cup + dry soil	41.66
Mass of cup	14.66
Mass of dry soil, Ms	27
Mass of water, Mw	8.79
Moisture Content	32.56

Sample:	Hwy 82 #1, B-5, S-1
Depth	2'-2.5'
Container #	85
Mass of cup + wet soil	49.11
Mass of cup + dry soil	43.13
Mass of cup	15.21
Mass of dry soil, Ms	27.92
Mass of water, Mw	5.98
Moisture Content	21.42

Sample:	Hwy 82 #1, B-5, S-1
Depth	2.5'-3'
Container #	59
Mass of cup + wet soil	69.02
Mass of cup + dry soil	61.27
Mass of cup	15
Mass of dry soil, Ms	46.27
Mass of water, Mw	7.75
Moisture Content	16.75

Sample:	Hwy 82 #1, B-5, S-1
Depth	3.5'-4'
Container #	57
Mass of cup + wet soil	59.19
Mass of cup + dry soil	49.34
Mass of cup	15.33
Mass of dry soil, Ms	34.01
Mass of water, Mw	9.85
Moisture Content	28.96

Table E-2 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 82

Sample:	Hwy 82 #2, B-2, S-1
Depth	1'-1.5'
Container #	54
Mass of cup + wet soil	72.41
Mass of cup + dry soil	64.28
Mass of cup	15.56
Mass of dry soil, Ms	48.72
Mass of water, Mw	8.13
Moisture Content	16.69

Sample:	Hwy 82 #2, B-2, S-1
Depth	1.5'-2'
Container #	63
Mass of cup + wet soil	58
Mass of cup + dry soil	51.82
Mass of cup	15.64
Mass of dry soil, Ms	36.18
Mass of water, Mw	6.18
Moisture Content	17.08

Sample:	Hwy 82 #2, B-2, S-1
Depth	2.5'-3'
Container #	18
Mass of cup + wet soil	63.78
Mass of cup + dry soil	57.34
Mass of cup	15.62
Mass of dry soil, Ms	41.72
Mass of water, Mw	6.44
Moisture Content	15.44

Sample:	Hwy 82 #2, B-2, S-2
Depth	3'-3.5'
Container #	132
Mass of cup + wet soil	63.37
Mass of cup + dry soil	54.85
Mass of cup	15.35
Mass of dry soil, Ms	39.5
Mass of water, Mw	8.52
Moisture Content	21.57

Table E-2 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 82

Sample:	Hwy 82 #2, B-2, S-2
Depth	3.5'-4'
Container #	52
Mass of cup + wet soil	81.79
Mass of cup + dry soil	70.2
Mass of cup	17.88
Mass of dry soil, Ms	52.32
Mass of water, Mw	11.59
Moisture Content	22.15

Sample:	Hwy 82 #2, B-5, S-1
Depth	1.5'-2'
Container #	58
Mass of cup + wet soil	72.21
Mass of cup + dry soil	60.61
Mass of cup	15.31
Mass of dry soil, Ms	45.3
Mass of water, Mw	11.6
Moisture Content	25.61

Sample:	Hwy 82 #2, B-5, S-1
Depth	2'-3.5'
Container #	64
Mass of cup + wet soil	57.01
Mass of cup + dry soil	47.2
Mass of cup	10.88
Mass of dry soil, Ms	36.32
Mass of water, Mw	9.81
Moisture Content	27.01

Table E-3: Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 167

Sample:	Hwy 167 #3, B-3, S-2
Depth	3'-3.5'
Container #	18
Mass of cup + wet soil	34.4
Mass of cup + dry soil	32.07
Mass of cup	15.63
Mass of dry soil, Ms	16.44
Mass of water, Mw	2.33
Moisture Content	14.17

Table E-3 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 167

Sample:	Hwy 167 #3, B-3, S-2
Depth	3.5'-4'
Container #	133
Mass of cup + wet soil	32.32
Mass of cup + dry soil	29.27
Mass of cup	10.95
Mass of dry soil, Ms	18.32
Mass of water, Mw	3.05
Moisture Content	16.65

Sample:	Hwy 167 #3, B-3, S-2
Depth	4'-5'
Container #	85
Mass of cup + wet soil	39.8
Mass of cup + dry soil	36.05
Mass of cup	15.19
Mass of dry soil, Ms	20.86
Mass of water, Mw	3.75
Moisture Content	17.98

Table E-4: Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 7 Spur

Sample:	Hwy 7s #1, B-1, S-1
Depth	1.5'-2'
Container #	64
Mass of cup + wet soil	64.69
Mass of cup + dry soil	58.31
Mass of cup	15.31
Mass of dry soil, Ms	43
Mass of water, Mw	6.38
Moisture Content	14.84

Table E-5: Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 79

Sample:	Hwy 79 #1, B-1, S-2
Depth	2'-2.5'
Container #	54
Mass of cup + wet soil	52.48
Mass of cup + dry soil	46.41
Mass of cup	15.48
Mass of dry soil, Ms	30.93
Mass of water, Mw	6.07
Moisture Content	19.62

Table E-5 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 79

Sample:	Hwy 79 #1, B-1, S-2
Depth	3'-3.5'
Container #	#1
Mass of cup + wet soil	68.24
Mass of cup + dry soil	60.51
Mass of cup	15.13
Mass of dry soil, Ms	45.38
Mass of water, Mw	7.73
Moisture Content	17.03

Sample:	Hwy 79 #1, B-2, S-1
Depth	2.5'-3'
Container #	44
Mass of cup + wet soil	75.72
Mass of cup + dry soil	66.2
Mass of cup	15.26
Mass of dry soil, Ms	50.94
Mass of water, Mw	9.52
Moisture Content	18.69

Sample:	Hwy 79 #2, B-1, S-2
Depth	2'-2.5'
Container #	64
Mass of cup + wet soil	75.98
Mass of cup + dry soil	62.07
Mass of cup	15.35
Mass of dry soil, Ms	46.72
Mass of water, Mw	13.91
Moisture Content	29.77

Sample:	Hwy 79 #2, B-1, S-2
Depth	3'-3.5'
Container #	50
Mass of cup + wet soil	62.8
Mass of cup + dry soil	55.2
Mass of cup	15.14
Mass of dry soil, Ms	40.06
Mass of water, Mw	7.6
Moisture Content	18.97

Table E-5 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 79

Sample:	Hwy 79 #2, B-2, S-2
Depth	?
Container #	65
Mass of cup + wet soil	59.4
Mass of cup + dry soil	51.66
Mass of cup	14.77
Mass of dry soil, Ms	36.89
Mass of water, Mw	7.74
Moisture Content	20.98

Sample:	Hwy 79 #2, B-3, S-2
Depth	2.5'-3'
Container #	63
Mass of cup + wet soil	58.72
Mass of cup + dry soil	49.01
Mass of cup	15.7
Mass of dry soil, Ms	33.31
Mass of water, Mw	9.71
Moisture Content	29.15

Sample:	Hwy 79 #2, B-3, S-3
Depth	4'-5'
Container #	101
Mass of cup + wet soil	72.34
Mass of cup + dry soil	64.36
Mass of cup	15.32
Mass of dry soil, Ms	49.04
Mass of water, Mw	7.98
Moisture Content	16.27

Sample:	Hwy 79 #2, B-5, S-2
Depth	2.5'-3'
Container #	72
Mass of cup + wet soil	77.71
Mass of cup + dry soil	65.38
Mass of cup	11.11
Mass of dry soil, Ms	54.27
Mass of water, Mw	12.33
Moisture Content	22.72

Table E-5 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 79

Sample:	Hwy 79 #2, B-5, S-2
Depth	3'-3.5'
Container #	133
Mass of cup + wet soil	74.55
Mass of cup + dry soil	63.12
Mass of cup	10.97
Mass of dry soil, Ms	52.15
Mass of water, Mw	11.43
Moisture Content	21.92

Sample:	Hwy 79 #2, B-4, S-3
Depth	4'-4.5'
Container #	101
Mass of cup + wet soil	57.29
Mass of cup + dry soil	49.82
Mass of cup	15.35
Mass of dry soil, Ms	34.47
Mass of water, Mw	7.47
Moisture Content	21.67

Sample:	Hwy 79 #2, B-4, S-3
Depth	4.5'-5'
Container #	86
Mass of cup + wet soil	57.96
Mass of cup + dry soil	50
Mass of cup	15.21
Mass of dry soil, Ms	34.79
Mass of water, Mw	7.96
Moisture Content	22.88

Sample:	Hwy 79 #2, B-4, S-3
Depth	5'-5.5'
Container #	65
Mass of cup + wet soil	65.9
Mass of cup + dry soil	56.46
Mass of cup	14.78
Mass of dry soil, Ms	41.68
Mass of water, Mw	9.44
Moisture Content	22.65

Table E-6: Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy165

Sample:	Hwy 165 #1, B-2, S-1
Depth	3'
Container #	#8
Mass of cup + wet soil	82.13
Mass of cup + dry soil	71.56
Mass of cup	18.03
Mass of dry soil, Ms	53.53
Mass of water, Mw	10.57
Moisture Content	19.75

Sample:	Hwy 165 #1, B-2, S-1
Depth	3'
Container #	54CW
Mass of cup + wet soil	84.83
Mass of cup + dry soil	72.58
Mass of cup	12.36
Mass of dry soil, Ms	60.22
Mass of water, Mw	12.25
Moisture Content	20.34

Sample:	Hwy 165 #1, B-2, S-1
Depth	4'
Container #	54CW
Mass of cup + wet soil	55.11
Mass of cup + dry soil	47.07
Mass of cup	12.37
Mass of dry soil, Ms	34.7
Mass of water, Mw	8.04
Moisture Content	23.17

Sample:	Hwy 165 #1, B-2, S-1
Depth	5'
Container #	6
Mass of cup + wet soil	68.9
Mass of cup + dry soil	60.64
Mass of cup	18.3
Mass of dry soil, Ms	42.34
Mass of water, Mw	8.26
Moisture Content	19.51

Table E-6 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy165

Sample:	Hwy 165 #1, B-2, S-1
Depth	5'
Container #	MB
Mass of cup + wet soil	85.72
Mass of cup + dry soil	73.35
Mass of cup	13.87
Mass of dry soil, Ms	59.48
Mass of water, Mw	12.37
Moisture Content	20.80

Sample:	Hwy 165 #1, B-3, S-1
Depth	2'-3'
Container #	X
Mass of cup + wet soil	77.39
Mass of cup + dry soil	68.11
Mass of cup	20.1
Mass of dry soil, Ms	48.01
Mass of water, Mw	9.28
Moisture Content	19.33

Sample:	Hwy 165 #1, B-3, S-1
Depth	3'-3.5'
Container #	B1
Mass of cup + wet soil	72.48
Mass of cup + dry soil	62.64
Mass of cup	12.37
Mass of dry soil, Ms	50.27
Mass of water, Mw	9.84
Moisture Content	19.57

Sample:	Hwy 165 #1, B-3, S-2
Depth	4'-4.5'
Container #	62
Mass of cup + wet soil	97.15
Mass of cup + dry soil	82.95
Mass of cup	11.04
Mass of dry soil, Ms	71.91
Mass of water, Mw	14.2
Moisture Content	19.75

Table E-6 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy165

Sample:	Hwy 165 #1, B-3, S-2
Depth	4.5'-5'
Container #	#8
Mass of cup + wet soil	80.98
Mass of cup + dry soil	67.17
Mass of cup	17.99
Mass of dry soil, Ms	49.18
Mass of water, Mw	13.81
Moisture Content	28.08

Table E-7: Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #1, B-1, S-2
Depth	2'-2.5'
Container #	RED 24%
Mass of cup + wet soil	71.55
Mass of cup + dry soil	62.07
Mass of cup	12.56
Mass of dry soil, Ms	49.51
Mass of water, Mw	9.48
Moisture Content	19.15

Sample:	Hwy 49 #1, B-1, S-2
Depth	2.5'-3'
Container #	KC
Mass of cup + wet soil	68.1
Mass of cup + dry soil	58.99
Mass of cup	13.94
Mass of dry soil, Ms	45.05
Mass of water, Mw	9.11
Moisture Content	20.22

Sample:	Hwy 49 #1, B-1, S-2
Depth	3'-3.5'
Container #	135
Mass of cup + wet soil	66.56
Mass of cup + dry soil	58.6
Mass of cup	12.56
Mass of dry soil, Ms	46.04
Mass of water, Mw	7.96
Moisture Content	17.29

Table E-7 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #1, B-1, S-3
Depth	4.5'
Container #	222
Mass of cup + wet soil	46.59
Mass of cup + dry soil	41.16
Mass of cup	12.62
Mass of dry soil, Ms	28.54
Mass of water, Mw	5.43
Moisture Content	19.03

Sample:	Hwy 49 #1, B-1, S-3
Depth	5'
Container #	80
Mass of cup + wet soil	44.56
Mass of cup + dry soil	39.81
Mass of cup	11.21
Mass of dry soil, Ms	28.6
Mass of water, Mw	4.75
Moisture Content	16.61

Sample:	Hwy 49 #1, B-1, S-3
Depth	5.5'
Container #	5B
Mass of cup + wet soil	74.14
Mass of cup + dry soil	66.15
Mass of cup	13.99
Mass of dry soil, Ms	52.16
Mass of water, Mw	7.99
Moisture Content	15.32

Sample:	Hwy 49 #1, B-2, S-3
Depth	4'-4.5'
Container #	JK
Mass of cup + wet soil	66.47
Mass of cup + dry soil	57.13
Mass of cup	18.14
Mass of dry soil, Ms	38.99
Mass of water, Mw	9.34
Moisture Content	23.95

Table E-7 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #1, B-2, S-2
Depth	1.5'-2'
Container #	BB 4L
Mass of cup + wet soil	59.09
Mass of cup + dry soil	52.09
Mass of cup	18.23
Mass of dry soil, Ms	33.86
Mass of water, Mw	7
Moisture Content	20.67

Sample:	Hwy 49 #1, B-2, S-2
Depth	2.5'-3'
Container #	MILL5
Mass of cup + wet soil	61.95
Mass of cup + dry soil	52.23
Mass of cup	12.52
Mass of dry soil, Ms	39.71
Mass of water, Mw	9.72
Moisture Content	24.48

Sample:	Hwy 49 #1, B-2, S-3
Depth	3.5'-4'
Container #	6
Mass of cup + wet soil	85.06
Mass of cup + dry soil	71.88
Mass of cup	18.32
Mass of dry soil, Ms	53.56
Mass of water, Mw	13.18
Moisture Content	24.61

Sample:	Hwy 49 #2, B-1, S-1
Depth	1'-1.5'
Container #	18
Mass of cup + wet soil	75.45
Mass of cup + dry soil	63.58
Mass of cup	10.11
Mass of dry soil, Ms	53.47
Mass of water, Mw	11.87
Moisture Content	22.20

Table E-7 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #2, B-1, S-1
Depth	1.5'-2'
Container #	BB6-1
Mass of cup + wet soil	81.85
Mass of cup + dry soil	70.03
Mass of cup	13.85
Mass of dry soil, Ms	56.18
Mass of water, Mw	11.82
Moisture Content	21.04

Sample:	Hwy 49 #2, B-1, S-1
Depth	2'-2.5'
Container #	104A
Mass of cup + wet soil	70.05
Mass of cup + dry soil	60.21
Mass of cup	13.78
Mass of dry soil, Ms	46.43
Mass of water, Mw	9.84
Moisture Content	21.19

Sample:	Hwy 49 #2, B-1, S-1
Depth	2.5'-3'
Container #	3F
Mass of cup + wet soil	64.85
Mass of cup + dry soil	55.42
Mass of cup	12.31
Mass of dry soil, Ms	43.11
Mass of water, Mw	9.43
Moisture Content	21.87

Sample:	Hwy 49 #2, B-1, S-2
Depth	3.5'-4'
Container #	135
Mass of cup + wet soil	64.74
Mass of cup + dry soil	55.84
Mass of cup	12.56
Mass of dry soil, Ms	43.28
Mass of water, Mw	8.9
Moisture Content	20.56

Table E-7 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #2, B-1, S-2
Depth	4'-4.5'
Container #	86
Mass of cup + wet soil	63.53
Mass of cup + dry soil	55.24
Mass of cup	15.24
Mass of dry soil, Ms	40
Mass of water, Mw	8.29
Moisture Content	20.73

Sample:	Hwy 49 #2, B-3, S-2
Depth	3.5'-4'
Container #	5A
Mass of cup + wet soil	63.12
Mass of cup + dry soil	54.15
Mass of cup	12.59
Mass of dry soil, Ms	41.56
Mass of water, Mw	8.97
Moisture Content	21.58

Sample:	Hwy 49 #2, B-3, S-2
Depth	4'-4.5'
Container #	Red 24%
Mass of cup + wet soil	85.19
Mass of cup + dry soil	71.86
Mass of cup	12.48
Mass of dry soil, Ms	59.38
Mass of water, Mw	13.33
Moisture Content	22.45

Sample:	Hwy 49 #2, B-3, S-2
Depth	4.5'-5'
Container #	115
Mass of cup + wet soil	58.6
Mass of cup + dry soil	48.51
Mass of cup	11.29
Mass of dry soil, Ms	37.22
Mass of water, Mw	10.09
Moisture Content	27.11

Table E-7 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #2, B-3, S-3
Depth	5'-5.5'
Container #	CWL4
Mass of cup + wet soil	82.86
Mass of cup + dry soil	68.69
Mass of cup	16.73
Mass of dry soil, Ms	51.96
Mass of water, Mw	14.17
Moisture Content	27.27

Sample:	Hwy 49 #2, B-3, S-3
Depth	6'-6.5'
Container #	KC
Mass of cup + wet soil	106.29
Mass of cup + dry soil	86.3
Mass of cup	13.85
Mass of dry soil, Ms	72.45
Mass of water, Mw	19.99
Moisture Content	27.59

Sample:	Hwy 49 #2, B-4, S-2
Depth	2.5'-3'
Container #	DSW4
Mass of cup + wet soil	131.55
Mass of cup + dry soil	116.95
Mass of cup	25.1
Mass of dry soil, Ms	91.85
Mass of water, Mw	14.6
Moisture Content	15.90

Sample:	Hwy 49 #2, B-4, S-2
Depth	3'-3.5'
Container #	BB 5-2
Mass of cup + wet soil	76.88
Mass of cup + dry soil	65.75
Mass of cup	14.12
Mass of dry soil, Ms	51.63
Mass of water, Mw	11.13
Moisture Content	21.56

Table E-7 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #2, B-7, S-1
Depth	1'-1.5'
Container #	5A
Mass of cup + wet soil	76.54
Mass of cup + dry soil	65.6
Mass of cup	12.72
Mass of dry soil, Ms	52.88
Mass of water, Mw	10.94
Moisture Content	20.69

Sample:	Hwy 49 #2, B-7, S-1
Depth	1.5'-2'
Container #	CWL4
Mass of cup + wet soil	89.56
Mass of cup + dry soil	76.52
Mass of cup	16.71
Mass of dry soil, Ms	59.81
Mass of water, Mw	13.04
Moisture Content	21.80

Sample:	Hwy 49 #2, B-7, S-1
Depth	3'
Container #	104A
Mass of cup + wet soil	86.87
Mass of cup + dry soil	73.53
Mass of cup	13.8
Mass of dry soil, Ms	59.73
Mass of water, Mw	13.34
Moisture Content	22.33

Sample:	Hwy 49 #2, B-8, S-2
Depth	2'-2.5'
Container #	3A
Mass of cup + wet soil	58.67
Mass of cup + dry soil	53.18
Mass of cup	12.47
Mass of dry soil, Ms	40.71
Mass of water, Mw	5.49
Moisture Content	13.49

Table E-7 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 49

Sample:	Hwy 49 #2, B-8, S-2
Depth	2.5'-3'
Container #	MILL5
Mass of cup + wet soil	79.29
Mass of cup + dry soil	67.51
Mass of cup	12.56
Mass of dry soil, Ms	54.95
Mass of water, Mw	11.78
Moisture Content	21.44

Sample:	Hwy 49 #2, B-8, S-2
Depth	3'-3.5'
Container #	DSWA
Mass of cup + wet soil	76.62
Mass of cup + dry soil	65.74
Mass of cup	25.11
Mass of dry soil, Ms	40.63
Mass of water, Mw	10.88
Moisture Content	26.78

Table E-8: Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 412 (#1-#2)

Sample:	Hwy 412 #1, B-1, S-1
Depth	1'-1.5'
Container #	X
Mass of cup + wet soil	95.52
Mass of cup + dry soil	84.77
Mass of cup	20.09
Mass of dry soil, Ms	64.68
Mass of water, Mw	10.75
Moisture Content	16.62

Sample:	Hwy 412 #1, B-1, S-1
Depth	2'
Container #	BB4-7
Mass of cup + wet soil	77.19
Mass of cup + dry soil	67.5
Mass of cup	18.24
Mass of dry soil, Ms	49.26
Mass of water, Mw	9.69
Moisture Content	19.67

Table E-8 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 412 (#1-#2)

Sample:	Hwy 412 #1, B-1, S-1
Depth	3'
Container #	BB5-2
Mass of cup + wet soil	90.13
Mass of cup + dry soil	79.51
Mass of cup	14.17
Mass of dry soil, Ms	65.34
Mass of water, Mw	10.62
Moisture Content	16.25

Sample:	Hwy 412 #1, B-1, S-2
Depth	3'-3.5'
Container #	A-1
Mass of cup + wet soil	86.79
Mass of cup + dry soil	75.23
Mass of cup	12.4
Mass of dry soil, Ms	62.83
Mass of water, Mw	11.56
Moisture Content	18.40

Sample:	Hwy 412 #1, B-1, S-2
Depth	3.5'-4'
Container #	115
Mass of cup + wet soil	50.54
Mass of cup + dry soil	44.27
Mass of cup	11.31
Mass of dry soil, Ms	32.96
Mass of water, Mw	6.27
Moisture Content	19.02

Sample:	Hwy 412 #1, B-1, S-2
Depth	4'-4.5'
Container #	3F
Mass of cup + wet soil	61.55
Mass of cup + dry soil	54.95
Mass of cup	12.33
Mass of dry soil, Ms	42.62
Mass of water, Mw	6.6
Moisture Content	15.49

Table E-8 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 412 (#1-#2)

Sample:	Hwy 412 #1, B-4, S-1
Depth	1.5'-2'
Container #	177A
Mass of cup + wet soil	137.08
Mass of cup + dry soil	122.13
Mass of cup	23.62
Mass of dry soil, Ms	98.51
Mass of water, Mw	14.95
Moisture Content	15.18

Sample:	Hwy 412 #1, B-4, S-1
Depth	3'
Container #	62
Mass of cup + wet soil	58.46
Mass of cup + dry soil	52.3
Mass of cup	11.03
Mass of dry soil, Ms	41.27
Mass of water, Mw	6.16
Moisture Content	14.93

Sample:	Hwy 412 #2, B-2, S-2
Depth	2'-2.5'
Container #	177A
Mass of cup + wet soil	142.71
Mass of cup + dry soil	128.28
Mass of cup	23.6
Mass of dry soil, Ms	104.68
Mass of water, Mw	14.43
Moisture Content	13.78

Sample:	Hwy 412 #2, B-2, S-2
Depth	2.5'-3'
Container #	3A
Mass of cup + wet soil	60.06
Mass of cup + dry soil	52.08
Mass of cup	12.44
Mass of dry soil, Ms	39.64
Mass of water, Mw	7.98
Moisture Content	20.13

Table E-8 (Continued): Moisture Contents from Resilient Modulus and Triaxial Samples for Highwy 412 (#1-#2)

Sample:	Hwy 412 #2, B-2, S-2
Depth	3'-3.5'
Container #	A1
Mass of cup + wet soil	53.09
Mass of cup + dry soil	44.99
Mass of cup	12.39
Mass of dry soil, Ms	32.6
Mass of water, Mw	8.1
Moisture Content	24.85

Sample:	Hwy 412 #2, B-2, S-3
Depth	4'-4.5'
Container #	80
Mass of cup + wet soil	59.38
Mass of cup + dry soil	50.88
Mass of cup	11.19
Mass of dry soil, Ms	39.69
Mass of water, Mw	8.5
Moisture Content	21.42

Sample:	Hwy 412 #2, B-2, S-3
Depth	4.5'-5'
Container #	86
Mass of cup + wet soil	82.85
Mass of cup + dry soil	68.75
Mass of cup	15.23
Mass of dry soil, Ms	53.52
Mass of water, Mw	14.1
Moisture Content	26.35

Sample:	Hwy 412 #2, B-2, S-3
Depth	5'-5.5'
Container #	5B
Mass of cup + wet soil	79.85
Mass of cup + dry soil	65.99
Mass of cup	13.99
Mass of dry soil, Ms	52
Mass of water, Mw	13.86
Moisture Content	26.65

Table F-1: Highway 82 #1 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
10.00	10.02	89.97	0.315
10.02	10.04	147.00	0.197
10.04	10.05	181.84	0.236
10.05	10.07	169.80	0.276
10.07	10.08	247.74	0.276
10.08	10.10	186.91	0.315
10.10	10.11	126.72	0.276
10.11	10.13	169.17	0.354
10.13	10.14	152.06	0.276
10.14	10.16	215.42	0.354
10.16	10.17	166.64	0.354
10.17	10.19	133.06	0.354
10.19	10.21	157.77	0.315
10.21	10.22	112.15	0.354
10.22	10.24	119.75	0.354
10.24	10.25	114.05	0.433
10.25	10.27	148.26	0.354
10.27	10.28	106.44	0.394
10.28	10.30	114.05	0.472
10.30	10.31	119.12	0.394
10.31	10.33	92.51	0.433
10.33	10.35	105.18	0.433
10.35	10.36	135.59	0.315
10.36	10.38	123.55	0.354
10.38	10.39	285.12	0.276
10.39	10.41	332.01	0.197
10.41	10.42	212.89	0.354
10.42	10.44	247.74	0.236
10.44	10.45	188.81	0.197
10.45	10.47	145.09	0.157
10.47	10.49	186.28	0.197
10.49	10.50	103.91	0.157
10.50	10.52	192.61	0.197
10.52	10.53	182.48	0.236
10.53	10.55	169.17	0.433
10.55	10.56	150.80	0.394
10.56	10.58	110.88	0.394
10.58	10.59	118.48	0.394
10.59	10.61	126.72	0.354
10.61	10.63	115.95	0.433
10.63	10.64	125.45	0.354
10.64	10.66	88.07	0.315
10.66	10.67	156.50	0.236
10.67	10.69	155.23	0.236
10.69	10.70	114.05	0.236
10.70	10.72	106.44	0.354
10.72	10.73	93.77	0.354
10.73	10.75	79.83	0.276
10.75	10.77	127.99	0.236
10.77	10.78	127.99	0.236
10.78	10.80	129.89	0.157
10.80	10.81	117.22	0.315
10.81	10.83	247.10	0.276
10.83	10.84	141.29	0.197
10.84	10.86	108.35	0.276
10.86	10.87	71.60	0.276
10.87	10.89	74.76	0.276
10.89	10.91	65.89	0.276
10.91	10.92	103.28	0.276
10.92	10.94	84.90	0.197
10.94	10.95	78.57	0.157
10.95	10.97	96.94	0.157
10.97	10.98	80.47	0.236
10.98	11.00	112.15	0.236
11.00	11.01	84.27	0.197
11.01	11.03	79.20	0.236
11.03	11.04	65.89	0.236
11.04	11.06	71.60	0.236
11.06	11.08	94.41	0.276
11.08	11.09	86.80	0.236
11.09	11.11	67.16	0.236
11.11	11.12	70.33	0.276
11.12	11.14	148.26	0.236
11.14	11.15	77.30	0.236
11.15	11.17	76.03	0.236
11.17	11.18	77.93	0.276
11.18	11.20	83.00	0.276
11.20	11.22	78.57	0.276
11.22	11.23	93.77	0.157
11.23	11.25	79.20	0.236
11.25	11.26	92.51	0.276
11.26	11.28	93.14	0.197
11.28	11.29	88.70	0.236
11.29	11.31	87.44	0.197
11.31	11.32	70.33	0.197
11.32	11.34	88.70	0.197
11.34	11.36	100.74	0.236
11.36	11.37	86.80	0.315
11.37	11.39	93.77	0.157
11.39	11.40	78.57	0.197
11.40	11.42	85.54	0.197
11.42	11.43	102.64	0.276
11.43	11.45	63.99	0.197
11.45	11.46	93.14	0.236
11.46	11.48	88.07	0.276
11.48	11.50	90.60	0.236
11.50	11.51	110.25	0.276
11.51	11.53	102.01	0.236
11.53	11.54	84.27	0.276
11.54	11.56	60.19	0.236
11.56	11.57	130.52	0.276
11.57	11.59	67.80	0.157
11.59	11.60	100.74	0.276
11.60	11.62	107.08	0.236
11.62	11.64	87.44	0.236
11.64	11.65	80.47	0.157
11.65	11.67	133.69	0.354
11.67	11.68	167.27	0.197
11.68	11.70	96.94	0.197
11.70	11.71	90.60	0.276
11.71	11.73	98.21	0.236
11.73	11.74	70.96	0.276
11.74	11.76	84.27	0.315
11.76	11.77	122.92	0.276
11.77	11.79	84.27	0.315
11.79	11.81	77.30	0.236
11.81	11.82	87.44	0.315
11.82	11.84	95.67	0.315
11.84	11.85	82.37	0.315
11.85	11.87	65.26	0.236
11.87	11.88	73.50	0.157
11.88	11.90	89.97	0.197
11.90	11.91	63.99	0.197
11.91	11.93	87.44	0.236
11.93	11.95	139.39	0.197
11.95	11.96	136.22	0.157
11.96	11.98	80.47	0.197
11.98	11.99	132.42	0.157
11.99	12.01	164.10	0.157

Table F-2: Highway 82 #1 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
10.00	10.02	70.33	0.433
10.02	10.04	133.06	0.394
10.04	10.05	145.73	0.354
10.05	10.07	114.68	0.276
10.07	10.08	146.36	0.236
10.08	10.10	157.13	0.354
10.10	10.11	129.25	0.315
10.11	10.13	172.97	0.394
10.13	10.14	164.10	0.354
10.14	10.16	243.94	0.276
10.16	10.17	199.58	0.197
10.17	10.19	178.04	0.236
10.19	10.21	202.12	0.157
10.21	10.22	154.60	0.197
10.22	10.24	150.80	0.197
10.24	10.25	147.00	0.236
10.25	10.27	198.95	0.157
10.27	10.28	126.09	0.394
10.28	10.30	110.88	0.433
10.30	10.31	123.55	0.394
10.31	10.33	84.90	0.276
10.33	10.35	140.66	0.315
10.35	10.36	181.21	0.197
10.36	10.38	162.84	0.236
10.38	10.39	281.32	0.197
10.39	10.41	346.58	0.197
10.41	10.42	210.99	0.197
10.42	10.44	250.27	0.197
10.44	10.45	167.27	0.236
10.45	10.47	159.03	0.157
10.47	10.49	185.64	0.276
10.49	10.50	138.76	0.276
10.50	10.52	148.90	0.276
10.52	10.53	195.78	0.433
10.53	10.55	149.53	0.315
10.55	10.56	152.70	0.315
10.56	10.58	110.25	0.354
10.58	10.59	93.14	0.276
10.59	10.61	121.65	0.315
10.61	10.63	124.82	0.236
10.63	10.64	148.26	0.157
10.64	10.66	102.64	0.354
10.66	10.67	161.57	0.236
10.67	10.69	145.09	0.197
10.69	10.70	134.96	0.315
10.70	10.72	106.44	0.315
10.72	10.73	110.88	0.276
10.73	10.75	106.44	0.276
10.75	10.77	117.85	0.236
10.77	10.78	152.70	0.236
10.78	10.80	106.44	0.157
10.80	10.81	148.26	0.276
10.81	10.83	339.61	0.315
10.83	10.84	177.41	0.551
10.84	10.86	143.19	0.157
10.86	10.87	93.14	0.236
10.87	10.89	62.73	0.197
10.89	10.91	62.73	0.118
10.91	10.92	113.41	0.157
10.92	10.94	76.67	0.236
10.94	10.95	67.16	0.118
10.95	10.97	114.68	0.157
10.97	10.98	78.57	0.157
10.98	11.00	89.34	0.236
11.00	11.01	80.47	0.118
11.01	11.03	59.56	0.118
11.03	11.04	95.04	0.157
11.04	11.06	62.09	0.157
11.06	11.08	86.17	0.197
11.08	11.09	88.70	0.157
11.09	11.11	68.43	0.118
11.11	11.12	72.86	0.118
11.12	11.14	110.25	0.157
11.14	11.15	67.16	0.118
11.15	11.17	59.56	0.157
11.17	11.18	69.70	0.118
11.18	11.20	70.96	0.118
11.20	11.22	84.90	0.118
11.22	11.23	70.96	0.118
11.23	11.25	59.56	0.157
11.25	11.26	56.39	0.197
11.26	11.28	86.17	0.197
11.28	11.29	70.96	0.236
11.29	11.31	65.26	0.157
11.31	11.32	68.43	0.236
11.32	11.34	75.40	0.118
11.34	11.36	83.64	0.157
11.36	11.37	68.43	0.118
11.37	11.39	77.93	0.118
11.39	11.40	65.89	0.157
11.40	11.42	74.76	0.118
11.42	11.43	90.60	0.118
11.43	11.45	70.33	0.118
11.45	11.46	76.67	0.118
11.46	11.48	70.33	0.118
11.48	11.50	117.22	0.157
11.50	11.51	90.60	0.118
11.51	11.53	67.80	0.157
11.53	11.54	67.16	0.118
11.54	11.56	82.37	0.118
11.56	11.57	84.90	0.118
11.57	11.59	84.90	0.157
11.59	11.60	87.44	0.118
11.60	11.62	85.54	0.157
11.62	11.64	77.30	0.118
11.64	11.65	69.70	0.118
11.65	11.67	98.84	0.236
11.67	11.68	160.30	0.197
11.68	11.70	79.83	0.118
11.70	11.71	106.44	0.276
11.71	11.73	78.57	0.197
11.73	11.74	79.20	0.197
11.74	11.76	72.23	0.157
11.76	11.77	86.80	0.157
11.77	11.79	96.31	0.157
11.79	11.81	83.64	0.118
11.81	11.82	70.33	0.118
11.82	11.84	75.40	0.276
11.84	11.85	113.41	0.157
11.85	11.87	93.77	0.157
11.87	11.88	91.24	0.197
11.88	11.90	124.19	0.118
11.90	11.91	71.60	0.118
11.91	11.93	69.06	0.118
11.93	11.95	103.28	0.197
11.95	11.96	91.87	0.354
11.96	11.98	96.31	0.197
11.98	11.99	94.41	0.079
11.99	12.01	93.14	0.197

Table F-3: Highway 82 #2 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
7.30	7.32	162.20	0.236
7.32	7.33	159.67	0.276
7.33	7.35	144.46	0.157
7.35	7.36	112.15	0.315
7.36	7.38	88.07	0.276
7.38	7.39	93.14	0.354
7.39	7.41	121.02	0.315
7.41	7.42	290.82	0.197
7.42	7.44	186.28	0.276
7.44	7.46	204.02	0.236
7.46	7.47	152.70	0.236
7.47	7.49	84.90	0.276
7.49	7.50	112.78	0.236
7.50	7.52	121.02	0.197
7.52	7.53	78.57	0.197
7.53	7.55	85.54	0.354
7.55	7.56	82.37	0.315
7.56	7.58	105.81	0.276
7.58	7.60	102.64	0.236
7.60	7.61	95.04	0.315
7.61	7.63	78.57	0.197
7.63	7.64	97.57	0.236
7.64	7.66	79.83	0.276
7.66	7.67	66.53	0.236
7.67	7.69	97.57	0.276
7.69	7.70	110.88	0.276
7.70	7.72	119.75	0.197
7.72	7.74	100.74	0.197
7.74	7.75	89.34	0.315
7.75	7.77	108.98	0.157
7.77	7.78	84.90	0.276
7.78	7.80	92.51	0.197
7.80	7.81	86.17	0.276
7.81	7.83	72.86	0.236
7.83	7.84	88.70	0.236
7.84	7.86	104.54	0.197
7.86	7.88	170.44	0.236
7.88	7.89	71.60	0.236
7.89	7.91	91.87	0.197
7.91	7.92	82.37	0.236
7.92	7.94	103.28	0.197
7.94	7.95	77.93	0.236
7.95	7.97	102.01	0.197
7.97	7.98	99.48	0.197
7.98	8.00	113.41	0.197
8.00	8.02	70.96	0.157
8.02	8.03	81.73	0.236
8.03	8.05	80.47	0.157
8.05	8.06	141.29	0.236
8.06	8.08	69.06	0.197
8.08	8.09	119.12	0.197
8.09	8.11	81.10	0.276
8.11	8.12	99.48	0.236
8.12	8.14	74.13	0.157
8.14	8.15	105.18	0.197
8.15	8.17	83.64	0.118
8.17	8.19	106.44	0.236
8.19	8.20	94.41	0.118
8.20	8.22	89.34	0.236
8.22	8.23	84.90	0.236
8.23	8.25	107.08	0.197
8.25	8.26	146.36	0.276
8.26	8.28	165.37	0.315
8.28	8.29	93.77	0.197
8.29	8.31	214.16	0.197
8.31	8.33	112.15	0.197
8.33	8.34	72.86	0.157
8.34	8.36	110.88	0.276
8.36	8.37	94.41	0.354
8.37	8.39	70.33	0.236
8.39	8.40	71.60	0.276
8.40	8.42	121.02	0.276
8.42	8.43	77.93	0.197
8.43	8.45	96.31	0.354
8.45	8.47	77.93	0.315
8.47	8.48	76.03	0.394
8.48	8.50	89.34	0.315
8.50	8.51	105.18	0.276
8.51	8.53	87.44	0.315
8.53	8.54	148.26	0.276
8.54	8.56	66.53	0.276
8.56	8.57	110.25	0.157
8.57	8.59	84.27	0.315
8.59	8.61	107.08	0.276
8.61	8.62	118.48	0.276
8.62	8.64	124.19	0.315
8.64	8.65	106.44	0.433
8.65	8.67	114.68	0.276
8.67	8.68	105.18	0.354
8.68	8.70	83.64	0.276
8.70	8.71	105.81	0.315
8.71	8.73	77.30	0.276
8.73	8.75	114.05	0.315
8.75	8.76	122.28	0.236
8.76	8.78	175.51	0.394
8.78	8.79	130.52	0.315
8.79	8.81	98.21	0.236
8.81	8.82	120.38	0.354
8.82	8.84	117.22	0.236
8.84	8.85	120.38	0.236
8.85	8.87	139.39	0.276
8.87	8.88	234.43	0.315
8.88	8.90	162.20	0.197
8.90	8.92	104.54	0.276
8.92	8.93	143.83	0.276
8.93	8.95	176.77	0.236
8.95	8.96	145.73	0.276
8.96	8.98	181.21	0.354
8.98	8.99	124.82	0.394
8.99	9.01	247.74	0.197
9.01	9.02	203.39	0.157
9.02	9.04	169.80	0.118
9.04	9.06	143.83	0.236
9.06	9.07	129.89	0.276
9.07	9.09	115.32	0.236
9.09	9.10	160.30	0.197
9.10	9.12	102.64	0.276
9.12	9.13	119.75	0.315
9.13	9.15	105.81	0.433
9.15	9.16	126.09	0.394
9.16	9.18	128.62	0.512
9.18	9.20	160.93	0.512
9.20	9.21	166.00	0.394
9.21	9.23	145.73	0.472
9.23	9.24	179.94	0.315
9.24	9.26	142.56	0.197
9.26	9.27	110.25	0.118
9.27	9.29	184.38	0.157
9.29	9.30	199.58	0.157

Table F-4: Highway 82 #2 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
7.30	7.32	132.42	0.197
7.32	7.33	114.68	0.394
7.33	7.35	185.01	0.433
7.35	7.36	140.03	0.433
7.36	7.38	172.97	0.433
7.38	7.39	117.22	0.236
7.39	7.41	197.05	0.157
7.41	7.42	146.36	0.197
7.42	7.44	126.09	0.197
7.44	7.46	146.36	0.197
7.46	7.47	119.75	0.236
7.47	7.49	101.38	0.197
7.49	7.50	93.14	0.118
7.50	7.52	92.51	0.276
7.52	7.53	131.79	0.276
7.53	7.55	121.02	0.197
7.55	7.56	127.99	0.197
7.56	7.58	81.10	0.236
7.58	7.60	162.20	0.315
7.60	7.61	133.69	0.354
7.61	7.63	131.79	0.197
7.63	7.64	162.20	0.197
7.64	7.66	86.80	0.354
7.66	7.67	124.19	0.433
7.67	7.69	135.59	0.276
7.69	7.70	143.19	0.236
7.70	7.72	124.82	0.197
7.72	7.74	145.73	0.276
7.74	7.75	188.18	0.236
7.75	7.77	174.24	0.236
7.77	7.78	141.29	0.157
7.78	7.80	150.16	0.276
7.80	7.81	119.12	0.315
7.81	7.83	115.95	0.236
7.83	7.84	115.32	0.276
7.84	7.86	136.86	0.394
7.86	7.88	139.39	0.354
7.88	7.89	101.38	0.315
7.89	7.91	102.01	0.315
7.91	7.92	216.06	0.551
7.92	7.94	226.83	0.512
7.94	7.95	141.29	0.315
7.95	7.97	127.35	0.315
7.97	7.98	117.85	0.315
7.98	8.00	156.50	0.315
8.00	8.02	122.92	0.394
8.02	8.03	118.48	0.315
8.03	8.05	131.79	0.394
8.05	8.06	98.84	0.197
8.06	8.08	96.94	0.236
8.08	8.09	89.34	0.354
8.09	8.11	108.98	0.315
8.11	8.12	112.15	0.276
8.12	8.14	152.06	0.315
8.14	8.15	132.42	0.394
8.15	8.17	89.97	0.315
8.17	8.19	124.82	0.315
8.19	8.20	124.19	0.276
8.20	8.22	121.02	0.315
8.22	8.23	176.14	0.236
8.23	8.25	138.76	0.354
8.25	8.26	143.19	0.276
8.26	8.28	139.39	0.394
8.28	8.29	84.90	0.354
8.29	8.31	142.56	0.236
8.31	8.33	218.59	0.236
8.33	8.34	147.00	0.157
8.34	8.36	145.09	0.551
8.36	8.37	148.90	0.394
8.37	8.39	161.57	0.354
8.39	8.40	138.12	0.236
8.40	8.42	191.35	0.157
8.42	8.43	124.82	0.276
8.43	8.45	95.04	0.236
8.45	8.47	121.65	0.276
8.47	8.48	107.71	0.236
8.48	8.50	137.49	0.236
8.50	8.51	91.87	0.157
8.51	8.53	127.99	0.236
8.53	8.54	214.79	0.315
8.54	8.56	141.29	0.433
8.56	8.57	130.52	0.394
8.57	8.59	107.08	0.315
8.59	8.61	152.06	0.354
8.61	8.62	163.47	0.354
8.62	8.64	126.72	0.276
8.64	8.65	122.92	0.315
8.65	8.67	122.92	0.315
8.67	8.68	108.98	0.276
8.68	8.70	161.57	0.236
8.70	8.71	210.36	0.197
8.71	8.73	151.43	0.669
8.73	8.75	186.28	0.827
8.75	8.76	223.03	0.906
8.76	8.78	219.86	0.118
8.78	8.79	138.76	0.157
8.79	8.81	96.31	0.236
8.81	8.82	138.12	0.236
8.82	8.84	127.99	0.236
8.84	8.85	144.46	0.157
8.85	8.87	139.39	0.276
8.87	8.88	224.29	0.276
8.88	8.90	181.84	0.197
8.90	8.92	106.44	0.157
8.92	8.93	148.90	0.276
8.93	8.95	164.74	0.118
8.95	8.96	119.75	0.315
8.96	8.98	195.15	0.472
8.98	8.99	112.15	0.236
8.99	9.01	237.60	0.197
9.01	9.02	188.81	0.276
9.02	9.04	123.55	0.236
9.04	9.06	139.39	0.276
9.06	9.07	129.89	0.236
9.07	9.09	120.38	0.197
9.09	9.10	143.83	0.315
9.10	9.12	122.92	0.197
9.12	9.13	109.61	0.276
9.13	9.15	128.62	0.315
9.15	9.16	131.16	0.394
9.16	9.18	153.96	0.197
9.18	9.20	200.22	0.354
9.20	9.21	185.64	0.276
9.21	9.23	133.06	0.433
9.23	9.24	160.30	0.433
9.24	9.26	136.86	0.315
9.26	9.27	118.48	0.354
9.27	9.29	122.28	0.315
9.29	9.30	152.70	0.236

Table F-5: Highway 79 #1 and #2 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
4.60	4.61	121.65	0.118
4.61	4.63	199.58	0.197
4.63	4.64	218.59	0.236
4.64	4.66	124.19	0.236
4.66	4.67	93.77	0.157
4.67	4.69	50.69	0.118
4.69	4.71	72.86	0.197
4.71	4.72	93.14	0.118
4.72	4.74	60.19	0.118
4.74	4.75	66.53	0.236
4.75	4.77	53.22	0.157
4.77	4.78	86.80	0.118
4.78	4.80	63.99	0.079
4.80	4.81	73.50	0.118
4.81	4.83	90.60	0.118
4.83	4.84	81.73	0.118
4.84	4.86	79.83	0.157
4.86	4.88	91.87	0.197
4.88	4.89	83.00	0.197
4.89	4.91	60.19	0.157
4.91	4.92	83.00	0.197
4.92	4.94	70.33	0.236
4.94	4.95	77.93	0.118
4.95	4.97	66.53	0.276
4.97	4.98	82.37	0.236
4.98	5.00	98.84	0.157
5.00	5.02	72.86	0.118
5.02	5.03	70.33	0.157
5.03	5.05	63.99	0.118
5.05	5.06	65.89	0.118
5.06	5.08	107.08	0.197
5.08	5.09	135.59	0.197
5.09	5.11	138.76	0.197
5.11	5.12	77.93	0.315
5.12	5.14	191.35	0.197
5.14	5.16	129.25	0.157
5.16	5.17	133.69	0.236
5.17	5.19	96.31	0.157
5.19	5.20	76.03	0.315
5.20	5.22	66.53	0.315
5.22	5.23	77.93	0.315
5.23	5.25	105.81	0.315
5.25	5.26	85.54	0.315
5.26	5.28	94.41	0.315
5.28	5.30	94.41	0.315
5.30	5.31	98.21	0.236
5.31	5.33	134.96	0.276
5.33	5.34	112.78	0.354
5.34	5.36	115.95	0.354
5.36	5.37	103.28	0.276
5.37	5.39	120.38	0.276
5.39	5.40	149.53	0.236
5.40	5.42	142.56	0.354
5.42	5.44	79.20	0.394
5.44	5.45	72.86	0.354
5.45	5.47	97.57	0.236
5.47	5.48	101.38	0.315
5.48	5.50	95.04	0.276
5.50	5.51	108.35	0.118
5.51	5.53	87.44	0.197
5.53	5.54	72.86	0.236
5.54	5.56	112.15	0.197
5.56	5.57	86.80	0.118
5.57	5.59	92.51	0.197
5.59	5.61	110.25	0.197

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
5.61	5.62	74.13	0.197
5.62	5.64	60.83	0.157
5.64	5.65	56.39	0.236
5.65	5.67	79.20	0.157
5.67	5.68	53.86	0.118
5.68	5.70	74.76	0.197
5.70	5.71	59.56	0.157
5.71	5.73	67.80	0.197
5.73	5.75	72.23	0.118
5.75	5.76	94.41	0.157
5.76	5.78	95.67	0.197
5.78	5.79	70.33	0.197
5.79	5.81	75.40	0.197
5.81	5.82	63.36	0.197
5.82	5.84	72.23	0.197
5.84	5.85	62.09	0.197
5.85	5.87	73.50	0.236
5.87	5.89	81.73	0.197
5.89	5.90	77.30	0.197
5.90	5.92	77.93	0.197
5.92	5.93	112.78	0.157
5.93	5.95	103.91	0.236
5.95	5.96	98.21	0.236
5.96	5.98	136.86	0.236
5.98	5.99	86.17	0.118
5.99	6.01	78.57	0.236
6.01	6.03	72.86	0.276
6.03	6.04	65.89	0.236
6.04	6.06	65.26	0.197
6.06	6.07	70.96	0.157
6.07	6.09	74.13	0.118
6.09	6.10	93.14	0.197
6.10	6.12	74.76	0.236
6.12	6.13	75.40	0.236
6.13	6.15	69.70	0.197
6.15	6.17	96.31	0.236
6.17	6.18	63.36	0.276
6.18	6.20	81.73	0.315
6.20	6.21	89.34	0.276
6.21	6.23	71.60	0.276
6.23	6.24	60.83	0.157
6.24	6.26	69.06	0.118
6.26	6.27	67.80	0.197
6.27	6.29	69.06	0.197
6.29	6.31	69.70	0.118
6.31	6.32	69.06	0.197
6.32	6.34	70.96	0.197
6.34	6.35	75.40	0.157
6.35	6.37	75.40	0.157
6.37	6.38	81.73	0.197
6.38	6.40	83.64	0.197
6.40	6.41	89.97	0.197
6.41	6.43	75.40	0.236
6.43	6.44	101.38	0.157
6.44	6.46	78.57	0.157
6.46	6.48	75.40	0.236
6.48	6.49	81.10	0.236
6.49	6.51	85.54	0.157
6.51	6.52	115.32	0.157
6.52	6.54	142.56	0.197
6.54	6.55	62.09	0.157
6.55	6.57	65.26	0.079
6.57	6.58	67.80	0.157
6.58	6.60	79.83	0.236
6.60	6.62	111.51	0.236

Table F-6: Highway 49 #1 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
22.51	22.52	112	0.276
22.52	22.54	99	0.197
22.54	22.56	101	0.197
22.56	22.57	87	0.197
22.57	22.59	216	0.276
22.59	22.60	162	0.276
22.60	22.62	82	0.236
22.62	22.63	113	0.315
22.63	22.65	79	0.315
22.65	22.66	84	0.276
22.66	22.68	103	0.276
22.68	22.70	73	0.315
22.70	22.71	74	0.315
22.71	22.73	129	0.315
22.73	22.74	132	0.354
22.74	22.76	139	0.197
22.76	22.77	112	0.236
22.77	22.79	150	0.315
22.79	22.80	146	0.472
22.80	22.82	137	0.276
22.82	22.84	127	0.197
22.84	22.85	132	0.197
22.85	22.87	127	0.276
22.87	22.88	134	0.315
22.88	22.90	112	0.236
22.90	22.91	143	0.315
22.91	22.93	177	0.276
22.93	22.94	104	0.354
22.94	22.96	75	0.315
22.96	22.98	127	0.315
22.98	22.99	93	0.315
22.99	23.01	137	0.315
23.01	23.02	143	0.276
23.02	23.04	85	0.236
23.04	23.05	110	0.236
23.05	23.07	137	0.315
23.07	23.08	78	0.315
23.08	23.10	77	0.276
23.10	23.11	87	0.276
23.11	23.13	87	0.315
23.13	23.15	77	0.315
23.15	23.16	75	0.157
23.16	23.18	73	0.197
23.18	23.19	87	0.236
23.19	23.21	136	0.315
23.21	23.22	145	0.236
23.22	23.24	137	0.197
23.24	23.25	82	0.315
23.25	23.27	67	0.394
23.27	23.29	168	0.354
23.29	23.30	113	0.236
23.30	23.32	127	0.197
23.32	23.33	148	0.236
23.33	23.35	172	0.236
23.35	23.36	131	0.394
23.36	23.38	208	0.276
23.38	23.39	134	0.315
23.39	23.41	108	0.394
23.41	23.43	283	0.315
23.43	23.44	251	0.512
23.44	23.46	192	0.433
23.46	23.47	195	0.315
23.47	23.49	189	0.276
23.49	23.50	174	0.236
23.50	23.52	219	0.276
23.52	23.53	132	0.315
23.53	23.55	130	0.236
23.55	23.57	160	0.276
23.57	23.58	125	0.354
23.58	23.60	196	0.315
23.60	23.61	197	0.394
23.61	23.63	156	0.236
23.63	23.64	139	0.354
23.64	23.66	111	0.472
23.66	23.67	130	0.433
23.67	23.69	150	0.394
23.69	23.71	176	0.315
23.71	23.72	103	0.354
23.72	23.74	125	0.315
23.74	23.75	168	0.236
23.75	23.77	184	0.394
23.77	23.78	164	0.315
23.78	23.80	163	0.236
23.80	23.81	171	0.866
23.81	23.83	139	0.354
23.83	23.85	99	0.315
23.85	23.86	143	0.315
23.86	23.88	97	0.433
23.88	23.89	228	0.236
23.89	23.91	207	0.315
23.91	23.92	156	0.315
23.92	23.94	240	0.276
23.94	23.95	278	0.276
23.95	23.97	222	0.276
23.97	23.98	253	0.157
23.98	24.00	192	0.315
0.00	0.02	293	0.157
0.02	0.03	240	0.157
0.03	0.05	258	0.236
0.05	0.06	252	0.157
0.06	0.08	235	0.118
0.08	0.09	181	0.157
0.09	0.11	304	0.157
0.11	0.12	354	0.118
0.12	0.14	174	0.118
0.14	0.16	205	0.118
0.16	0.17	95	0.118
0.17	0.19	150	0.118
0.19	0.20	181	0.197
0.20	0.22	324	0.079
0.22	0.23	136	0.079
0.23	0.25	136	0.157
0.25	0.26	163	0.118
0.26	0.28	139	0.118
0.28	0.30	156	0.079
0.30	0.31	148	0.079
0.31	0.33	135	0.079
0.33	0.34	126	0.157
0.34	0.36	112	0.157
0.36	0.37	90	0.157
0.37	0.39	93	0.118
0.39	0.40	120	0.118
0.40	0.42	351	0.118
0.42	0.43	162	0.276
0.43	0.45	169	0.079
0.45	0.47	207	0.157
0.47	0.48	219	0.118
0.48	0.50	199	0.197
0.50	0.51	183	0.118

Table F-7: Highway 49 #2 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
19.20	19.22	457	0.157	20.21	20.23	306	0.354
19.22	19.23	214	0.197	20.23	20.24	177	0.197
19.23	19.25	184	0.315	20.24	20.26	149	0.354
19.25	19.26	267	0.197	20.26	20.27	119	0.315
19.26	19.28	123	0.315	20.27	20.29	156	0.354
19.28	19.29	203	0.354	20.29	20.30	87	0.354
19.29	19.31	219	0.315	20.30	20.32	91	0.433
19.31	19.32	143	0.276	20.32	20.33	107	0.394
19.32	19.34	127	0.276	20.33	20.35	231	0.551
19.34	19.36	215	0.315	20.35	20.37	390	0.236
19.36	19.37	216	0.276	20.37	20.38	278	0.315
19.37	19.39	478	0.276	20.38	20.40	179	0.433
19.39	19.40	169	0.197	20.40	20.41	110	0.354
19.40	19.42	117	0.276	20.41	20.43	112	0.236
19.42	19.43	115	0.315	20.43	20.44	112	0.354
19.43	19.45	106	0.276	20.44	20.46	150	0.276
19.45	19.46	112	0.315	20.46	20.47	134	0.197
19.46	19.48	65	0.236	20.47	20.49	144	0.276
19.48	19.50	82	0.315	20.49	20.51	98	0.354
19.50	19.51	99	0.197	20.51	20.52	141	0.276
19.51	19.53	137	0.354	20.52	20.54	84	0.315
19.53	19.54	100	0.394	20.54	20.55	111	0.472
19.54	19.56	77	0.354	20.55	20.57	95	0.394
19.56	19.57	70	0.276	20.57	20.58	130	0.354
19.57	19.59	89	0.276	20.58	20.60	67	0.315
19.59	19.60	60	0.276	20.60	20.61	115	0.354
19.60	19.62	85	0.394	20.61	20.63	120	0.354
19.62	19.64	66	0.315	20.63	20.65	101	0.236
19.64	19.65	101	0.276	20.65	20.66	89	0.315
19.65	19.67	94	0.197	20.66	20.68	108	0.315
19.67	19.68	105	0.276	20.68	20.69	91	0.394
19.68	19.70	154	0.512	20.69	20.71	125	0.236
19.70	19.71	130	0.354	20.71	20.72	91	0.315
19.71	19.73	131	0.197	20.72	20.74	113	0.394
19.73	19.74	101	0.315	20.74	20.75	114	0.433
19.74	19.76	165	0.276	20.75	20.77	151	0.236
19.76	19.78	144	0.433	20.77	20.78	147	0.354
19.78	19.79	156	0.315	20.78	20.80	103	0.315
19.79	19.81	187	0.354	20.80	20.82	96	0.236
19.81	19.82	115	0.354	20.82	20.83	73	0.315
19.82	19.84	182	0.354	20.83	20.85	120	0.315
19.84	19.85	116	0.354	20.85	20.86	131	0.354
19.85	19.87	136	0.315	20.86	20.88	110	0.394
19.87	19.88	117	0.197	20.88	20.89	123	0.315
19.88	19.90	178	0.276	20.89	20.91	154	0.276
19.90	19.91	105	0.236	20.91	20.92	86	0.236
19.91	19.93	119	0.315	20.92	20.94	79	0.315
19.93	19.95	169	0.315	20.94	20.96	200	0.197
19.95	19.96	193	0.315	20.96	20.97	106	0.276
19.96	19.98	108	0.315	20.97	20.99	86	0.276
19.98	19.99	106	0.276	20.99	21.00	105	0.354
19.99	20.01	196	0.354	21.00	21.02	110	0.236
20.01	20.02	127	0.354	21.02	21.03	72	0.394
20.02	20.04	80	0.315	21.03	21.05	129	0.315
20.04	20.05	102	0.236	21.05	21.06	106	0.315
20.05	20.07	104	0.197	21.06	21.08	75	0.236
20.07	20.09	101	0.315	21.08	21.10	72	0.354
20.09	20.10	89	0.276	21.10	21.11	90	0.197
20.10	20.12	110	0.236	21.11	21.13	189	0.315
20.12	20.13	106	0.236	21.13	21.14	174	0.315
20.13	20.15	98	0.276	21.14	21.16	155	0.315
20.15	20.16	79	0.197	21.16	21.17	121	0.394
20.16	20.18	120	0.354	21.17	21.19	275	0.315
20.18	20.19	162	0.276	21.19	21.20	215	0.276
20.19	20.21	240	0.394	21.20	21.22	191	0.197

Table F-8: Highway 270 #1 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
7.01	7.02	447.96	0.197	8.02	8.03	159.03	0.236
7.02	7.04	577.84	0.157	8.03	8.05	304.76	0.118
7.04	7.05	411.21	0.276	8.05	8.06	370.66	0.118
7.05	7.07	390.93	0.236	8.06	8.08	218.59	0.197
7.07	7.08	288.29	0.197	8.08	8.09	249.64	0.276
7.08	7.10	186.28	0.236	8.09	8.11	250.27	0.236
7.10	7.11	238.23	0.236	8.11	8.12	157.13	0.276
7.11	7.13	319.97	0.197	8.12	8.14	205.29	0.394
7.13	7.15	191.35	0.236	8.14	8.16	205.29	0.197
7.15	7.16	217.32	0.236	8.16	8.17	218.59	0.197
7.16	7.18	268.01	0.236	8.17	8.19	240.77	0.197
7.18	7.19	513.85	0.197	8.19	8.20	221.13	0.197
7.19	7.21	172.97	0.276	8.20	8.22	109.61	0.236
7.21	7.22	273.08	0.197	8.22	8.23	162.20	0.197
7.22	7.24	198.95	0.276	8.23	8.25	233.80	0.157
7.24	7.25	171.07	0.315	8.25	8.26	171.71	0.157
7.25	7.27	167.90	0.197	8.26	8.28	188.81	0.236
7.27	7.29	152.06	0.276	8.28	8.30	191.35	0.197
7.29	7.30	116.58	0.236	8.30	8.31	166.64	0.236
7.30	7.32	149.53	0.394	8.31	8.33	144.46	0.236
7.32	7.33	297.79	0.157	8.33	8.34	95.67	0.197
7.33	7.35	306.03	0.591	8.34	8.36	105.18	0.197
7.35	7.36	351.01	0.197	8.36	8.37	96.94	0.197
7.36	7.38	265.48	0.157	8.37	8.39	110.88	0.197
7.38	7.39	291.46	0.197	8.39	8.40	119.75	0.157
7.39	7.41	187.55	0.315	8.40	8.42	95.04	0.157
7.41	7.43	235.07	0.118	8.42	8.44	103.91	0.276
7.43	7.44	195.78	0.118	8.44	8.45	135.59	0.236
7.44	7.46	205.92	0.157	8.45	8.47	84.90	0.157
7.46	7.47	147.63	0.197	8.47	8.48	99.48	0.157
7.47	7.49	202.12	0.276	8.48	8.50	98.21	0.276
7.49	7.50	195.78	0.197	8.50	8.51	99.48	0.157
7.50	7.52	497.38	0.276	8.51	8.53	78.57	0.276
7.52	7.53	319.33	0.157	8.53	8.54	92.51	0.197
7.53	7.55	155.23	0.276	8.54	8.56	92.51	0.276
7.55	7.57	251.54	0.276	8.56	8.57	78.57	0.197
7.57	7.58	296.52	0.276	8.57	8.59	114.68	0.236
7.58	7.60	295.89	0.236	8.59	8.61	110.88	0.236
7.60	7.61	208.45	0.315	8.61	8.62	80.47	0.118
7.61	7.63	271.18	0.236	8.62	8.64	108.35	0.236
7.63	7.64	181.21	0.394	8.64	8.65	89.97	0.197
7.64	7.66	215.42	0.276	8.65	8.67	79.83	0.157
7.66	7.67	364.95	0.276	8.67	8.68	89.34	0.236
7.67	7.69	415.01	0.315	8.68	8.70	81.73	0.197
7.69	7.71	460.63	0.276	8.70	8.71	96.31	0.315
7.71	7.72	249.00	0.197	8.71	8.73	91.87	0.197
7.72	7.74	457.46	0.512	8.73	8.75	107.71	0.236
7.74	7.75	534.12	0.236	8.75	8.76	108.35	0.157
7.75	7.77	182.48	0.276	8.76	8.78	81.10	0.236
7.77	7.78	148.26	0.236	8.78	8.79	74.13	0.236
7.78	7.80	215.42	0.118	8.79	8.81	86.80	0.236
7.80	7.81	139.39	0.157	8.81	8.82	120.38	0.236
7.81	7.83	105.18	0.315	8.82	8.84	117.85	0.157
7.83	7.84	140.66	0.236	8.84	8.85	121.65	0.118
7.84	7.86	178.68	0.276	8.85	8.87	90.60	0.157
7.86	7.88	480.27	0.276	8.87	8.89	111.51	0.236
7.88	7.89	212.89	0.236	8.89	8.90	98.21	0.197
7.89	7.91	300.96	0.236	8.90	8.92	104.54	0.236
7.91	7.92	175.51	0.315	8.92	8.93	153.96	0.236
7.92	7.94	119.12	0.354	8.93	8.95	116.58	0.197
7.94	7.95	148.26	0.197	8.95	8.96	112.15	0.079
7.95	7.97	246.47	0.236	8.96	8.98	74.13	0.236
7.97	7.98	143.19	0.197	8.98	8.99	93.77	0.197
7.98	8.00	110.25	0.276	8.99	9.01	103.91	0.197
8.00	8.02	71.60	0.197	9.01	9.03	177.41	0.354

Table F-9: Highway 270 #2 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
5.50	5.51	164.10	0.276	6.51	6.52	156.50	0.236
5.51	5.53	190.08	0.236	6.52	6.54	172.34	0.197
5.53	5.55	236.97	0.276	6.54	6.56	168.54	0.157
5.55	5.56	188.81	0.236	6.56	6.57	142.56	0.276
5.56	5.58	165.37	0.197	6.57	6.59	116.58	0.157
5.58	5.59	188.18	0.197	6.59	6.60	122.92	0.197
5.59	5.61	241.40	0.236	6.60	6.62	119.12	0.197
5.61	5.62	225.56	0.197	6.62	6.63	143.19	0.197
5.62	5.64	264.21	0.236	6.63	6.65	102.01	0.197
5.64	5.65	247.10	0.236	6.65	6.66	157.13	0.197
5.65	5.67	238.87	0.197	6.66	6.68	130.52	0.157
5.67	5.69	225.56	0.197	6.68	6.70	245.20	0.157
5.69	5.70	219.23	0.394	6.70	6.71	160.93	0.197
5.70	5.72	249.00	0.197	6.71	6.73	194.52	0.236
5.72	5.73	344.68	0.157	6.73	6.74	157.77	0.197
5.73	5.75	593.05	0.276	6.74	6.76	110.25	0.157
5.75	5.76	239.50	0.236	6.76	6.77	166.00	0.197
5.76	5.78	241.40	0.276	6.77	6.79	164.74	0.276
5.78	5.79	215.42	0.197	6.79	6.80	207.82	0.197
5.79	5.81	202.12	0.197	6.80	6.82	187.55	0.276
5.81	5.83	305.40	0.118	6.82	6.84	300.96	0.197
5.83	5.84	176.77	0.197	6.84	6.85	180.58	0.197
5.84	5.86	223.66	0.276	6.85	6.87	209.72	0.197
5.86	5.87	181.84	0.236	6.87	6.88	185.01	0.157
5.87	5.89	144.46	0.197	6.88	6.90	220.49	0.197
5.89	5.90	160.93	0.197	6.90	6.91	237.60	0.118
5.90	5.92	186.28	0.197	6.91	6.93	168.54	0.276
5.92	5.93	149.53	0.157	6.93	6.94	136.86	0.236
5.93	5.95	128.62	0.276	6.94	6.96	202.12	0.197
5.95	5.97	145.09	0.197	6.96	6.97	188.18	0.276
5.97	5.98	262.31	0.157	6.97	6.99	229.36	0.276
5.98	6.00	175.51	0.197	6.99	7.01	185.01	0.236
6.00	6.01	170.44	0.157	7.01	7.02	195.78	0.236
6.01	6.03	178.68	0.197	7.02	7.04	191.35	0.236
6.03	6.04	212.89	0.236	7.04	7.05	292.72	0.394
6.04	6.06	220.49	0.315	7.05	7.07	325.04	0.236
6.06	6.07	309.83	0.197	7.07	7.08	326.30	0.236
6.07	6.09	247.10	0.276	7.08	7.10	176.77	0.315
6.09	6.10	199.58	0.276	7.10	7.11	230.00	0.197
6.10	6.12	317.43	0.276	7.11	7.13	151.43	0.315
6.12	6.14	221.13	0.315	7.13	7.15	193.25	0.236
6.14	6.15	288.92	0.236	7.15	7.16	145.09	0.236
6.15	6.17	261.04	0.236	7.16	7.18	121.02	0.236
6.17	6.18	229.36	0.197	7.18	7.19	108.35	0.236
6.18	6.20	140.03	0.276	7.19	7.21	113.41	0.276
6.20	6.21	122.92	0.276	7.21	7.22	122.92	0.315
6.21	6.23	131.16	0.236	7.22	7.24	143.19	0.354
6.23	6.24	115.32	0.197	7.24	7.25	105.81	0.236
6.24	6.26	149.53	0.197	7.25	7.27	139.39	0.197
6.26	6.28	255.97	0.157	7.27	7.29	119.12	0.197
6.28	6.29	388.40	0.157	7.29	7.30	127.99	0.276
6.29	6.31	286.39	0.197	7.30	7.32	171.71	0.197
6.31	6.32	190.08	0.157	7.32	7.33	169.80	0.197
6.32	6.34	193.25	0.118	7.33	7.35	237.60	0.236
6.34	6.35	207.19	0.236	7.35	7.36	250.91	0.197
6.35	6.37	129.89	0.157	7.36	7.38	235.07	0.315
6.37	6.38	210.36	0.236	7.38	7.39	159.03	0.236
6.38	6.40	159.03	0.197	7.39	7.41	142.56	0.197
6.40	6.42	150.16	0.197	7.41	7.43	197.05	0.276
6.42	6.43	160.93	0.236	7.43	7.44	178.68	0.197
6.43	6.45	236.33	0.197	7.44	7.46	235.70	0.197
6.45	6.46	300.33	0.591	7.46	7.47	179.31	0.276
6.46	6.48	238.23	0.236	7.47	7.49	144.46	0.276
6.48	6.49	266.11	0.197	7.49	7.50	159.03	0.236
6.49	6.51	287.02	0.236	7.50	7.52	371.92	0.315

Table F-10: Highway 270 #2 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
5.50	5.51	236.33	0.118
5.51	5.53	195.78	0.236
5.53	5.55	261.04	0.197
5.55	5.56	245.20	0.315
5.56	5.58	191.98	0.197
5.58	5.59	171.07	0.157
5.59	5.61	232.53	0.433
5.61	5.62	284.49	0.276
5.62	5.64	227.46	0.236
5.64	5.65	219.86	0.197
5.65	5.67	286.39	0.236
5.67	5.69	232.53	0.197
5.69	5.70	304.13	0.157
5.70	5.72	230.63	0.157
5.72	5.73	206.55	0.157
5.73	5.75	188.81	0.157
5.75	5.76	216.69	0.197
5.76	5.78	197.68	0.236
5.78	5.79	247.10	0.118
5.79	5.81	163.47	0.157
5.81	5.83	145.73	0.118
5.83	5.84	223.66	0.157
5.84	5.86	308.56	0.118
5.86	5.87	203.39	0.197
5.87	5.89	243.94	0.197
5.89	5.90	268.01	0.236
5.90	5.92	205.29	0.197
5.92	5.93	238.87	0.118
5.93	5.95	218.59	0.157
5.95	5.97	275.62	0.197
5.97	5.98	266.11	0.118
5.98	6.00	233.80	0.118
6.00	6.01	176.77	0.276
6.01	6.03	330.11	0.354
6.03	6.04	437.18	0.197
6.04	6.06	332.64	0.236
6.06	6.07	299.06	0.276
6.07	6.09	205.29	0.197
6.09	6.10	166.64	0.197
6.10	6.12	271.81	0.276
6.12	6.14	209.72	0.236
6.14	6.15	243.94	0.197
6.15	6.17	269.91	0.197
6.17	6.18	219.23	0.157
6.18	6.20	169.17	0.236
6.20	6.21	135.59	0.276
6.21	6.23	127.99	0.315
6.23	6.24	141.29	0.276
6.24	6.26	206.55	0.276
6.26	6.28	374.46	0.236
6.28	6.29	407.40	0.197
6.29	6.31	298.43	0.236
6.31	6.32	379.53	0.236
6.32	6.34	429.58	0.157
6.34	6.35	224.29	0.197
6.35	6.37	199.58	0.236
6.37	6.38	159.67	0.118
6.38	6.40	305.40	0.236
6.40	6.42	345.95	0.236
6.42	6.43	191.35	0.236
6.43	6.45	252.17	0.236
6.45	6.46	285.75	0.276
6.46	6.48	520.19	0.197
6.48	6.49	245.84	0.118
6.49	6.51	197.68	0.157
6.51	6.52	179.31	0.118
6.52	6.54	188.81	0.236
6.54	6.56	197.68	0.157
6.56	6.57	172.34	0.236
6.57	6.59	162.20	0.157
6.59	6.60	198.95	0.118
6.60	6.62	397.27	0.157
6.62	6.63	159.67	0.157
6.63	6.65	253.44	0.197
6.65	6.66	133.06	0.157
6.66	6.68	226.20	0.236
6.68	6.70	276.88	0.157
6.70	6.71	223.66	0.197
6.71	6.73	230.63	0.197
6.73	6.74	160.30	0.157
6.74	6.76	124.19	0.118
6.76	6.77	302.86	0.157
6.77	6.79	205.92	0.157
6.79	6.80	185.01	0.236
6.80	6.82	138.12	0.197
6.82	6.84	106.44	0.157
6.84	6.85	186.91	0.197
6.85	6.87	262.31	0.157
6.87	6.88	227.46	0.197
6.88	6.90	181.21	0.315
6.90	6.91	227.46	0.276
6.91	6.93	194.52	0.118
6.93	6.94	195.78	0.236
6.94	6.96	186.91	0.197
6.96	6.97	138.76	0.236
6.97	6.99	271.81	0.197
6.99	7.01	253.44	0.236
7.01	7.02	447.96	0.197
7.02	7.04	577.84	0.157
7.04	7.05	411.21	0.276
7.05	7.07	390.93	0.236
7.07	7.08	288.29	0.197
7.08	7.10	186.28	0.236
7.10	7.11	238.23	0.236
7.11	7.13	319.97	0.197
7.13	7.15	191.35	0.236
7.15	7.16	217.32	0.236
7.16	7.18	268.01	0.236
7.18	7.19	513.85	0.197
7.19	7.21	172.97	0.276
7.21	7.22	273.08	0.197
7.22	7.24	198.95	0.276
7.24	7.25	171.07	0.315
7.25	7.27	167.90	0.197
7.27	7.29	152.06	0.276
7.29	7.30	116.58	0.236
7.30	7.32	149.53	0.394
7.32	7.33	297.79	0.157
7.33	7.35	306.03	0.591
7.35	7.36	351.01	0.197
7.36	7.38	265.48	0.157
7.38	7.39	291.46	0.197
7.39	7.41	187.55	0.315
7.41	7.43	235.07	0.118
7.43	7.44	195.78	0.118
7.44	7.46	205.92	0.157
7.46	7.47	147.63	0.197
7.47	7.49	202.12	0.276
7.49	7.50	195.78	0.197
7.50	7.52	497.38	0.276

Table F-11: Highway 65 #1 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
16.78	16.80	60.19	0.197
16.80	16.81	46.89	0.197
16.81	16.83	62.09	0.157
16.83	16.85	62.09	0.197
16.85	16.86	103.28	0.157
16.86	16.88	72.23	0.197
16.88	16.89	58.92	0.118
16.89	16.91	77.93	0.118
16.91	16.92	58.92	0.157
16.92	16.94	74.13	0.157
16.94	16.95	81.73	0.157
16.95	16.97	80.47	0.276
16.97	16.99	91.87	0.118
16.99	17.00	105.81	0.118
17.00	17.02	62.73	0.118
17.02	17.03	66.53	0.157
17.03	17.05	67.80	0.157
17.05	17.06	53.86	0.118
17.06	17.08	84.90	0.197
17.08	17.09	84.27	0.276
17.09	17.11	95.04	0.157
17.11	17.12	54.49	0.157
17.12	17.14	83.64	0.157
17.14	17.16	70.33	0.157
17.16	17.17	72.23	0.157
17.17	17.19	66.53	0.157
17.19	17.20	65.26	0.197
17.20	17.22	93.77	0.197
17.22	17.23	71.60	0.236
17.23	17.25	120.38	0.276
17.25	17.26	53.86	0.197
17.26	17.28	83.64	0.197
17.28	17.30	100.74	0.197
17.30	17.31	60.19	0.197
17.31	17.33	79.20	0.276
17.33	17.34	53.86	0.197
17.34	17.36	63.99	0.118
17.36	17.37	76.03	0.197
17.37	17.39	52.59	0.157
17.39	17.40	73.50	0.157
17.40	17.42	84.90	0.197
17.42	17.44	76.67	0.197
17.44	17.45	55.76	0.236
17.45	17.47	69.70	0.157
17.47	17.48	74.76	0.157
17.48	17.50	83.00	0.157
17.50	17.51	62.73	0.118
17.51	17.53	81.73	0.157
17.53	17.54	67.16	0.197
17.54	17.56	83.00	0.157
17.56	17.58	86.17	0.157
17.58	17.59	66.53	0.118
17.59	17.61	62.09	0.118
17.61	17.62	65.89	0.197
17.62	17.64	55.12	0.157
17.64	17.65	79.83	0.157
17.65	17.67	87.44	0.157
17.67	17.68	86.80	0.157
17.68	17.70	62.09	0.118
17.70	17.72	53.22	0.157
17.72	17.73	72.23	0.157
17.73	17.75	84.90	0.157
17.75	17.76	105.18	0.157
17.76	17.78	65.89	0.276
17.78	17.79	89.34	0.197

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
17.79	17.81	79.20	0.157
17.81	17.82	89.97	0.157
17.82	17.84	88.07	0.118
17.84	17.86	121.65	0.157
17.86	17.87	179.94	0.157
17.87	17.89	249.64	0.118
17.89	17.90	121.02	0.236
17.90	17.92	132.42	0.157
17.92	17.93	147.63	0.157
17.93	17.95	100.74	0.157
17.95	17.96	91.87	0.157
17.96	17.98	74.76	0.157
17.98	17.99	81.73	0.157
17.99	18.01	57.66	0.118
18.01	18.03	72.86	0.118
18.03	18.04	71.60	0.157
18.04	18.06	86.80	0.118
18.06	18.07	71.60	0.236
18.07	18.09	100.11	0.118
18.09	18.10	90.60	0.118
18.10	18.12	63.99	0.118
18.12	18.13	129.25	0.118
18.13	18.15	129.89	0.157
18.15	18.17	300.33	0.157
18.17	18.18	153.96	0.197
18.18	18.20	207.19	0.276
18.20	18.21	94.41	0.157
18.21	18.23	87.44	0.157
18.23	18.24	70.33	0.157
18.24	18.26	81.73	0.118
18.26	18.27	99.48	0.197
18.27	18.29	79.83	0.157
18.29	18.31	57.66	0.118
18.31	18.32	88.70	0.157
18.32	18.34	86.17	0.118
18.34	18.35	76.03	0.118
18.35	18.37	97.57	0.197
18.37	18.38	79.20	0.157
18.38	18.40	81.73	0.236
18.40	18.41	65.89	0.315
18.41	18.43	57.02	0.157
18.43	18.45	70.96	0.157
18.45	18.46	65.26	0.236
18.46	18.48	81.73	0.197
18.48	18.49	66.53	0.157
18.49	18.51	76.03	0.157
18.51	18.52	76.67	0.197
18.52	18.54	72.23	0.197
18.54	18.55	66.53	0.157
18.55	18.57	92.51	0.157
18.57	18.59	105.81	0.157
18.59	18.60	81.10	0.157
18.60	18.62	129.89	0.197
18.62	18.63	68.43	0.118
18.63	18.65	82.37	0.157
18.65	18.66	69.70	0.315
18.66	18.68	137.49	0.079
18.68	18.69	74.76	0.157
18.69	18.71	87.44	0.118
18.71	18.73	90.60	0.276
18.73	18.74	56.39	0.118
18.74	18.76	58.29	0.118
18.76	18.77	85.54	0.197
18.77	18.79	74.13	0.157
18.79	18.80	56.39	0.236

Table F-12: Highway 65 #2 and #10 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
10.69	10.71	95.67	0.157
10.71	10.72	136.22	0.157
10.72	10.74	129.89	0.157
10.74	10.76	116.58	0.157
10.76	10.77	106.44	0.118
10.77	10.79	117.85	0.236
10.79	10.80	110.25	0.236
10.80	10.82	110.25	0.079
10.82	10.83	87.44	0.118
10.83	10.85	114.68	0.276
10.85	10.86	99.48	0.157
10.86	10.88	82.37	0.197
10.88	10.90	144.46	0.197
10.90	10.91	97.57	0.118
10.91	10.93	147.00	0.236
10.93	10.94	153.33	0.118
10.94	10.96	121.02	0.197
10.96	10.97	121.65	0.197
10.97	10.99	150.80	0.157
10.99	11.00	131.79	0.472
11.00	11.02	141.93	0.236
11.02	11.04	152.06	0.157
11.04	11.05	124.82	0.236
11.05	11.07	156.50	0.197
11.07	11.08	139.39	0.315
11.08	11.10	140.03	0.118
11.10	11.11	117.85	0.551
11.11	11.13	145.73	0.197
11.13	11.14	148.90	0.236
11.14	11.16	153.96	0.236
11.16	11.18	152.06	0.394
11.18	11.19	103.91	0.315
11.19	11.21	86.80	0.315
11.21	11.22	127.35	0.315
11.22	11.24	137.49	0.315
11.24	11.25	170.44	0.354
11.25	11.27	139.39	0.276
11.27	11.28	114.05	0.315
11.28	11.30	133.06	0.197
11.30	11.32	114.68	0.394
11.32	11.33	140.66	0.276
11.33	11.35	163.47	0.276
11.35	11.36	147.63	0.236
11.36	11.38	91.24	0.276
11.38	11.39	101.38	0.157
11.39	11.41	107.08	0.236
11.41	11.42	118.48	0.512
11.42	11.44	120.38	0.276
11.44	11.45	133.69	0.236
11.45	11.47	134.32	0.394
11.47	11.49	189.45	0.197
11.49	11.50	129.25	0.276
11.50	11.52	232.53	0.354
11.52	11.53	113.41	0.433
11.53	11.55	114.05	0.157
11.55	11.56	128.62	0.276
11.56	11.58	176.77	0.354
11.58	11.59	193.25	0.551
11.59	11.61	147.63	0.669
11.61	11.63	112.15	0.157
11.63	11.64	127.35	0.354
11.64	11.66	148.90	0.591
11.66	11.67	186.91	0.394
11.67	11.69	223.03	0.433
11.69	11.70	134.96	0.748
11.70	11.72	132.42	0.472
11.72	11.73	140.66	0.433
11.73	11.75	94.41	0.433
11.75	11.77	114.68	0.354
11.77	11.78	105.18	0.591
11.78	11.80	95.04	0.472
11.80	11.81	114.68	0.433
11.81	11.83	111.51	0.315
11.83	11.84	121.02	0.315
11.84	11.86	160.93	0.354
11.86	11.87	222.39	0.787
11.87	11.89	217.32	0.394
11.89	11.91	208.45	0.512
11.91	11.92	117.85	0.276
11.92	11.94	155.87	0.827
11.94	11.95	181.84	0.394
11.95	11.97	124.19	0.472
11.97	11.98	137.49	0.433
11.98	12.00	101.38	0.472
12.00	12.01	183.11	0.236
12.01	12.03	117.22	0.276
12.03	12.05	88.07	0.315
12.05	12.06	173.61	0.276
12.06	12.08	109.61	0.197
12.08	12.09	147.00	0.315
12.09	12.11	146.36	0.118
12.11	12.12	152.70	0.433
12.12	12.14	163.47	0.433
12.14	12.15	232.53	0.157
12.15	12.17	138.76	0.236
12.17	12.19	127.99	0.354
12.19	12.20	220.49	0.197
12.20	12.22	191.35	0.197
12.22	12.23	143.83	0.197
12.23	12.25	133.06	0.394
12.25	12.26	120.38	0.236
12.26	12.28	88.07	0.472
12.28	12.29	91.24	0.551
12.29	12.31	131.79	0.354
12.31	12.32	98.21	0.787
12.32	12.34	99.48	0.276
12.34	12.36	98.84	0.197
12.36	12.37	95.04	0.236
12.37	12.39	109.61	0.236
12.39	12.40	98.21	0.394
12.40	12.42	93.77	0.394
12.42	12.43	86.17	0.276
12.43	12.45	117.22	0.197
12.45	12.46	105.81	0.197
12.46	12.48	86.17	0.276
12.48	12.50	94.41	0.197
12.50	12.51	102.01	0.197
12.51	12.53	160.93	0.315
12.53	12.54	95.67	0.276
12.54	12.56	83.64	0.197
12.56	12.57	92.51	0.276
12.57	12.59	94.41	0.118
12.59	12.60	89.97	0.236
12.60	12.62	116.58	0.197
12.62	12.64	95.67	0.315
12.64	12.65	74.13	0.118
12.65	12.67	122.28	0.157
12.67	12.68	109.61	0.236
12.68	12.70	110.25	0.236
12.70	12.71	84.90	0.276
12.71	12.73	106.44	0.315
12.73	12.74	105.18	0.236
12.74	12.76	126.72	0.197
12.76	12.78	84.90	0.197
12.78	12.79	99.48	0.394
12.79	12.81	89.97	0.157

Table F-13: Highway 65 #2 and #10 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
10.69	10.71	100.74	0.314
10.71	10.72	82.37	0.393
10.72	10.74	103.28	0.353
10.74	10.76	127.35	0.314
10.76	10.77	164.74	0.157
10.77	10.79	141.93	0.157
10.79	10.80	112.15	0.118
10.80	10.82	115.95	0.275
10.82	10.83	107.71	0.236
10.83	10.85	115.32	0.314
10.85	10.86	91.24	0.157
10.86	10.88	93.77	0.353
10.88	10.90	111.51	0.275
10.90	10.91	121.65	0.314
10.91	10.93	94.41	0.236
10.93	10.94	143.83	0.275
10.94	10.96	185.01	0.196
10.96	10.97	185.01	0.236
10.97	10.99	233.80	0.157
10.99	11.00	275.62	0.196
11.00	11.02	150.80	0.236
11.02	11.04	202.12	0.275
11.04	11.05	385.86	0.432
11.08	11.10	214.16	0.196
11.10	11.11	481.54	0.353
11.11	11.13	201.48	0.196
11.13	11.14	181.21	0.236
11.14	11.16	202.75	0.432
11.16	11.18	137.49	0.393
11.18	11.19	132.42	0.275
11.19	11.21	153.33	0.667
11.21	11.22	132.42	0.157
11.22	11.24	167.27	0.314
11.24	11.25	165.37	0.982
11.25	11.27	133.06	0.353
11.27	11.28	132.42	0.275
11.28	11.30	186.28	0.275
11.30	11.32	145.09	0.236
11.32	11.33	129.25	0.314
11.33	11.35	176.14	0.393
11.35	11.36	167.27	0.471
11.36	11.38	195.15	0.432
11.38	11.39	186.28	0.275
11.39	11.41	250.27	0.353
11.41	11.42	174.24	0.196
11.42	11.44	140.03	0.236
11.44	11.45	171.71	0.393
11.45	11.47	224.29	0.275
11.47	11.49	228.73	0.275
11.49	11.50	142.56	0.275
11.50	11.52	235.70	0.314
11.52	11.53	311.10	0.275
11.53	11.55	211.62	0.353
11.55	11.56	228.73	0.196
11.56	11.58	416.28	0.275
11.58	11.59	362.42	0.196
11.59	11.61	327.57	0.157
11.61	11.63	140.66	0.393
11.63	11.64	134.32	0.432
11.64	11.66	446.69	0.393
11.66	11.67	268.01	0.275
11.67	11.69	329.47	0.471
11.69	11.70	297.79	0.550
11.70	11.72	169.17	0.471
11.72	11.73	266.11	0.903
11.73	11.75	172.34	0.550
11.75	11.77	143.83	0.236
11.77	11.78	136.22	0.275
11.78	11.80	166.00	0.236
11.80	11.81	261.04	0.353
11.81	11.83	223.66	0.353
11.83	11.84	222.39	0.510
11.84	11.86	371.92	0.353
11.86	11.87	319.33	0.510
11.87	11.89	295.89	0.471
11.89	11.91	380.79	0.157
11.91	11.92	179.31	0.275
11.92	11.94	169.80	0.196
11.94	11.95	232.53	0.314
11.95	11.97	178.68	0.353
11.97	11.98	153.33	0.275
11.98	12.00	211.62	0.275
12.00	12.01	191.98	0.353
12.01	12.03	162.84	0.393
12.03	12.05	108.35	0.353
12.05	12.06	347.21	0.275
12.06	12.08	143.83	0.314
12.08	12.09	153.96	0.236
12.09	12.11	167.90	0.353
12.11	12.12	141.29	0.353
12.12	12.14	133.06	0.510
12.14	12.15	248.37	0.236
12.15	12.17	129.25	0.118
12.17	12.19	178.68	0.236
12.19	12.20	161.57	0.393
12.20	12.22	105.81	0.432
12.22	12.23	188.81	0.196
12.23	12.25	138.76	0.196
12.25	12.26	116.58	0.353
12.26	12.28	95.04	0.275
12.28	12.29	95.04	0.314
12.29	12.31	91.24	0.275
12.31	12.32	112.15	0.314
12.32	12.34	142.56	0.236
12.34	12.36	110.25	0.275
12.36	12.37	94.41	0.314
12.37	12.39	107.08	0.196
12.39	12.40	98.21	0.353
12.40	12.42	106.44	0.275
12.42	12.43	98.21	0.275
12.43	12.45	107.71	0.157
12.45	12.46	116.58	0.353
12.46	12.48	82.37	0.275
12.48	12.50	154.60	0.353
12.50	12.51	219.23	0.236
12.51	12.53	137.49	0.275
12.53	12.54	129.25	0.275
12.54	12.56	115.32	0.667
12.56	12.57	114.05	0.353
12.57	12.59	103.28	0.275
12.59	12.60	84.27	0.236
12.60	12.62	124.19	0.393
12.62	12.64	130.52	0.353
12.64	12.65	141.93	0.236
12.65	12.67	117.22	0.432
12.67	12.68	162.84	0.393
12.68	12.70	130.52	0.236
12.70	12.71	127.35	0.196
12.71	12.73	112.78	0.314
12.73	12.74	121.65	0.353
12.74	12.76	134.32	0.471
12.76	12.78	138.76	0.353
12.78	12.79	107.71	0.275
12.79	12.81	129.89	0.510

Table F-14: Highway 65 #11 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
12.74	12.76	126.72	0.197	13.75	13.77	91.87	0.276
12.76	12.78	84.90	0.197	13.77	13.79	95.04	0.236
12.78	12.79	99.48	0.394	13.79	13.80	112.78	0.157
12.79	12.81	89.97	0.157	13.80	13.82	133.69	0.197
12.81	12.82	99.48	0.236	13.82	13.83	103.28	0.157
12.82	12.84	91.24	0.197	13.83	13.85	143.83	0.315
12.84	12.85	95.04	0.354	13.85	13.86	105.18	0.315
12.85	12.87	121.65	0.276	13.86	13.88	125.45	0.157
12.87	12.88	134.96	0.433	13.88	13.89	111.51	0.197
12.88	12.90	108.98	0.551	13.89	13.91	122.92	0.157
12.90	12.92	102.01	0.197	13.91	13.92	124.19	0.276
12.92	12.93	102.01	0.197	13.92	13.94	105.18	0.197
12.93	12.95	105.81	0.197	13.94	13.96	167.90	0.236
12.95	12.96	84.90	0.276	13.96	13.97	260.41	0.197
12.96	12.98	113.41	0.197	13.97	13.99	91.87	0.236
12.98	12.99	86.80	0.197	13.99	14.00	86.17	0.197
12.99	13.01	126.09	0.236	14.00	14.02	118.48	0.118
13.01	13.02	101.38	0.276	14.02	14.03	153.33	0.157
13.02	13.04	109.61	0.276	14.03	14.05	74.13	0.157
13.04	13.06	128.62	0.236	14.05	14.06	89.97	0.118
13.06	13.07	107.08	0.157	14.06	14.08	100.11	0.079
13.07	13.09	110.88	0.354	14.08	14.10	69.70	0.118
13.09	13.10	77.93	0.157	14.10	14.11	70.96	0.157
13.10	13.12	95.67	0.354	14.11	14.13	63.99	0.118
13.12	13.13	114.05	0.276	14.13	14.14	62.09	0.118
13.13	13.15	95.04	0.197	14.14	14.16	85.54	0.236
13.15	13.16	87.44	0.236	14.16	14.17	62.73	0.197
13.16	13.18	86.17	0.157	14.17	14.19	86.80	0.157
13.18	13.19	97.57	0.276	14.19	14.20	78.57	0.197
13.19	13.21	102.64	0.197	14.20	14.22	72.23	0.157
13.21	13.23	82.37	0.197	14.22	14.24	82.37	0.118
13.23	13.24	147.00	0.236	14.24	14.25	57.02	0.157
13.24	13.26	159.03	0.118	14.25	14.27	74.76	0.118
13.26	13.27	88.07	0.394	14.27	14.28	71.60	0.118
13.27	13.29	98.21	0.236	14.28	14.30	54.49	0.118
13.29	13.30	87.44	0.157	14.30	14.31	94.41	0.157
13.30	13.32	106.44	0.157	14.31	14.33	94.41	0.118
13.32	13.33	120.38	0.197	14.33	14.34	73.50	0.157
13.33	13.35	97.57	0.197	14.34	14.36	67.80	0.157
13.35	13.37	123.55	0.118	14.36	14.38	104.54	0.118
13.37	13.38	82.37	0.276	14.38	14.39	60.19	0.118
13.38	13.40	122.92	0.354	14.39	14.41	62.09	0.118
13.40	13.41	109.61	0.394	14.41	14.42	82.37	0.118
13.41	13.43	167.27	0.276	14.42	14.44	57.66	0.118
13.43	13.44	102.64	0.197	14.44	14.45	58.92	0.118
13.44	13.46	87.44	0.236	14.45	14.47	59.56	0.118
13.46	13.47	98.21	0.157	14.47	14.48	74.13	0.118
13.47	13.49	94.41	0.157	14.48	14.50	70.96	0.157
13.49	13.51	84.27	0.236	14.50	14.52	88.70	0.157
13.51	13.52	100.74	0.157	14.52	14.53	63.99	0.157
13.52	13.54	107.08	0.354	14.53	14.55	69.70	0.118
13.54	13.55	89.97	0.236	14.55	14.56	77.30	0.118
13.55	13.57	86.17	0.433	14.56	14.58	94.41	0.118
13.57	13.58	102.64	0.197	14.58	14.59	59.56	0.118
13.58	13.60	135.59	0.394	14.59	14.61	68.43	0.118
13.60	13.61	167.27	0.236	14.61	14.62	53.86	0.118
13.61	13.63	123.55	0.472	14.62	14.64	52.59	0.118
13.63	13.65	120.38	0.394	14.64	14.66	55.12	0.118
13.65	13.66	146.36	0.354	14.66	14.67	76.03	0.236
13.66	13.68	83.64	0.906	14.67	14.69	69.06	0.118
13.68	13.69	142.56	0.197	14.69	14.70	68.43	0.157
13.69	13.71	105.18	0.197	14.70	14.72	79.20	0.118
13.71	13.72	85.54	0.157	14.72	14.73	60.83	0.118
13.72	13.74	105.81	0.276	14.73	14.75	86.80	0.276
13.74	13.75	154.60	0.197	14.75	14.76	92.51	0.197

Table F-15: Highway 65 #11 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
12.74	12.76	134.32	0.471	13.75	13.77	176.14	0.196
12.76	12.78	138.76	0.353	13.77	13.79	116.58	0.275
12.78	12.79	107.71	0.275	13.79	13.80	105.18	0.314
12.79	12.81	129.89	0.510	13.80	13.82	130.52	0.275
12.81	12.82	145.09	0.236	13.82	13.83	121.65	0.275
12.82	12.84	153.33	0.393	13.83	13.85	110.25	0.157
12.84	12.85	196.42	0.707	13.85	13.86	87.44	0.236
12.85	12.87	233.80	0.314	13.86	13.88	107.71	0.196
12.87	12.88	145.73	0.236	13.88	13.89	103.28	0.157
12.88	12.90	139.39	0.275	13.89	13.91	101.38	0.236
12.90	12.92	110.25	0.314	13.91	13.92	105.18	0.196
12.92	12.93	128.62	0.275	13.92	13.94	108.98	0.314
12.93	12.95	107.08	0.236	13.94	13.96	195.78	0.157
12.95	12.96	117.85	0.510	13.96	13.97	265.48	0.236
12.96	12.98	112.78	0.314	13.97	13.99	169.17	0.118
12.98	12.99	143.19	0.157	13.99	14.00	103.28	0.196
12.99	13.01	110.88	0.236	14.00	14.02	176.77	0.157
13.01	13.02	226.20	0.314	14.02	14.03	307.93	0.157
13.02	13.04	145.73	0.196	14.03	14.05	159.03	0.118
13.04	13.06	130.52	0.314	14.05	14.06	173.61	0.118
13.06	13.07	91.87	0.314	14.06	14.08	214.79	0.079
13.07	13.09	102.01	0.196	14.08	14.10	147.63	0.118
13.09	13.10	103.91	0.196	14.10	14.11	168.54	0.118
13.10	13.12	165.37	0.196	14.11	14.13	126.09	0.118
13.12	13.13	151.43	0.196	14.13	14.14	145.73	0.118
13.13	13.15	192.61	0.432	14.14	14.16	114.68	0.118
13.15	13.16	134.32	0.432	14.16	14.17	215.42	0.118
13.16	13.18	115.32	0.196	14.17	14.19	162.20	0.118
13.18	13.19	105.81	0.196	14.19	14.20	162.84	0.118
13.19	13.21	155.87	0.196	14.20	14.22	252.17	0.118
13.21	13.23	158.40	0.236	14.22	14.24	135.59	0.118
13.23	13.24	212.89	0.236	14.24	14.25	149.53	0.118
13.24	13.26	198.95	0.196	14.25	14.27	152.70	0.079
13.26	13.27	110.88	0.314	14.27	14.28	174.24	0.157
13.27	13.29	160.93	0.196	14.28	14.30	126.72	0.118
13.29	13.30	122.92	0.353	14.30	14.31	161.57	0.118
13.30	13.32	131.79	0.275	14.31	14.33	197.68	0.157
13.32	13.33	186.28	0.157	14.33	14.34	193.88	0.157
13.33	13.35	152.06	0.275	14.34	14.36	124.82	0.118
13.35	13.37	126.72	0.510	14.36	14.38	138.76	0.118
13.37	13.38	114.05	0.432	14.38	14.39	160.30	0.079
13.38	13.40	115.95	0.275	14.39	14.41	151.43	0.079
13.40	13.41	114.05	0.275	14.41	14.42	176.14	0.118
13.41	13.43	112.78	0.353	14.42	14.44	166.00	0.118
13.43	13.44	117.85	0.510	14.44	14.45	122.92	0.157
13.44	13.46	110.88	0.314	14.45	14.47	139.39	0.118
13.46	13.47	106.44	0.196	14.47	14.48	171.71	0.157
13.47	13.49	98.21	0.196	14.48	14.50	240.13	0.118
13.49	13.51	104.54	0.196	14.50	14.52	96.31	0.196
13.51	13.52	155.23	0.236	14.52	14.53	93.14	0.118
13.52	13.54	122.92	0.236	14.53	14.55	72.23	0.196
13.54	13.55	134.32	0.275	14.55	14.56	73.50	0.118
13.55	13.57	121.02	0.236	14.56	14.58	76.67	0.118
13.57	13.58	122.28	0.275	14.58	14.59	75.40	0.118
13.58	13.60	133.06	0.196	14.59	14.61	77.93	0.157
13.60	13.61	186.91	0.236	14.61	14.62	86.17	0.157
13.61	13.63	163.47	0.550	14.62	14.64	102.64	0.157
13.63	13.65	247.10	0.353	14.64	14.66	75.40	0.236
13.65	13.66	363.69	0.275	14.66	14.67	77.93	0.118
13.66	13.68	117.22	0.196	14.67	14.69	99.48	0.118
13.68	13.69	148.90	0.236	14.69	14.70	91.87	0.118
13.69	13.71	185.64	0.236	14.70	14.72	148.26	0.118
13.71	13.72	121.02	0.393	14.72	14.73	71.60	0.157
13.72	13.74	108.35	0.432	14.73	14.75	77.30	0.118
13.74	13.75	129.25	0.236	14.75	14.76	81.73	0.118

Table F-16: Highway 65 #12 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
16.21	16.22	81.10	0.157
16.22	16.24	58.92	0.118
16.24	16.26	62.73	0.118
16.26	16.27	78.57	0.118
16.27	16.29	51.96	0.157
16.29	16.30	69.70	0.236
16.30	16.32	62.73	0.157
16.32	16.33	58.29	0.118
16.33	16.35	55.12	0.157
16.35	16.36	80.47	0.118
16.36	16.38	62.73	0.197
16.38	16.39	144.46	0.157
16.39	16.41	74.13	0.118
16.41	16.43	61.46	0.157
16.43	16.44	69.70	0.157
16.44	16.46	73.50	0.157
16.46	16.47	55.12	0.118
16.47	16.49	76.67	0.118
16.49	16.50	54.49	0.157
16.50	16.52	44.35	0.118
16.52	16.53	51.96	0.157
16.53	16.55	60.83	0.157
16.55	16.57	82.37	0.157
16.57	16.58	72.23	0.197
16.58	16.60	69.70	0.197
16.60	16.61	58.92	0.118
16.61	16.63	51.32	0.197
16.63	16.64	53.86	0.157
16.64	16.66	77.93	0.197
16.66	16.67	78.57	0.236
16.67	16.69	62.09	0.157
16.69	16.71	75.40	0.157
16.71	16.72	57.66	0.197
16.72	16.74	67.16	0.118
16.74	16.75	97.57	0.197
16.75	16.77	84.90	0.157
16.77	16.78	72.23	0.197
16.78	16.80	60.19	0.197
16.80	16.81	46.89	0.197
16.81	16.83	62.09	0.157
16.83	16.85	62.09	0.197
16.85	16.86	103.28	0.157
16.86	16.88	72.23	0.197
16.88	16.89	58.92	0.118
16.89	16.91	77.93	0.118
16.91	16.92	58.92	0.157
16.92	16.94	74.13	0.157
16.94	16.95	81.73	0.157
16.95	16.97	80.47	0.276
16.97	16.99	91.87	0.118
16.99	17.00	105.81	0.118
17.00	17.02	62.73	0.118
17.02	17.03	66.53	0.157
17.03	17.05	67.80	0.157
17.05	17.06	53.86	0.118
17.06	17.08	84.90	0.197
17.08	17.09	84.27	0.276
17.09	17.11	95.04	0.157
17.11	17.12	54.49	0.157
17.12	17.14	83.64	0.157
17.14	17.16	70.33	0.157
17.16	17.17	72.23	0.157
17.17	17.19	66.53	0.157
17.19	17.20	65.26	0.197
17.20	17.22	93.77	0.197

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
17.22	17.23	71.60	0.236
17.23	17.25	120.38	0.276
17.25	17.26	53.86	0.197
17.26	17.28	83.64	0.197
17.28	17.30	100.74	0.197
17.30	17.31	60.19	0.197
17.31	17.33	79.20	0.276
17.33	17.34	53.86	0.197
17.34	17.36	63.99	0.118
17.36	17.37	76.03	0.197
17.37	17.39	52.59	0.157
17.39	17.40	73.50	0.157
17.40	17.42	84.90	0.197
17.42	17.44	76.67	0.197
17.44	17.45	55.76	0.236
17.45	17.47	69.70	0.157
17.47	17.48	74.76	0.157
17.48	17.50	83.00	0.157
17.50	17.51	62.73	0.118
17.51	17.53	81.73	0.157
17.53	17.54	67.16	0.197
17.54	17.56	83.00	0.157
17.56	17.58	86.17	0.157
17.58	17.59	66.53	0.118
17.59	17.61	62.09	0.118
17.61	17.62	65.89	0.197
17.62	17.64	55.12	0.157
17.64	17.65	79.83	0.157
17.65	17.67	87.44	0.157
17.67	17.68	86.80	0.157
17.68	17.70	62.09	0.118
17.70	17.72	53.22	0.157
17.72	17.73	72.23	0.157
17.73	17.75	84.90	0.157
17.75	17.76	105.18	0.157
17.76	17.78	65.89	0.276
17.78	17.79	89.34	0.197
17.79	17.81	79.20	0.157
17.81	17.82	89.97	0.157
17.82	17.84	88.07	0.118
17.84	17.86	121.65	0.157
17.86	17.87	179.94	0.157
17.87	17.89	249.64	0.118
17.89	17.90	121.02	0.236
17.90	17.92	132.42	0.157
17.92	17.93	147.63	0.157
17.93	17.95	100.74	0.157
17.95	17.96	91.87	0.157
17.96	17.98	74.76	0.157
17.98	17.99	81.73	0.157
17.99	18.01	57.66	0.118
18.01	18.03	72.86	0.118
18.03	18.04	71.60	0.157
18.04	18.06	86.80	0.118
18.06	18.07	71.60	0.236
18.07	18.09	100.11	0.118
18.09	18.10	90.60	0.118
18.10	18.12	63.99	0.118
18.12	18.13	129.25	0.118
18.13	18.15	129.89	0.157
18.15	18.17	300.33	0.157
18.17	18.18	153.96	0.197
18.18	18.20	207.19	0.276
18.20	18.21	94.41	0.157
18.21	18.23	87.44	0.157

Table F-17: Highway 412 #10 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
0.00	0.02	587.98	0.276
0.02	0.03	116.58	0.276
0.03	0.05	74.13	0.276
0.05	0.06	93.14	0.276
0.06	0.08	95.04	0.236
0.08	0.09	84.90	0.276
0.09	0.11	101.38	0.236
0.11	0.12	51.96	0.276
0.12	0.14	77.30	0.236
0.14	0.16	65.89	0.236
0.16	0.17	70.96	0.236
0.17	0.19	63.36	0.236
0.19	0.20	41.18	0.276
0.20	0.22	74.13	0.276
0.22	0.23	62.09	0.276
0.23	0.25	57.66	0.276
0.25	0.26	77.93	0.276
0.26	0.28	51.96	0.276
0.28	0.30	74.76	0.276
0.30	0.31	73.50	0.276
0.31	0.33	107.08	0.276
0.33	0.34	108.35	0.236
0.34	0.36	70.33	0.276
0.36	0.37	65.26	0.236
0.37	0.39	58.29	0.236
0.39	0.40	55.76	0.276
0.40	0.42	53.86	0.236
0.42	0.43	74.76	0.236
0.43	0.45	77.30	0.236
0.45	0.47	72.23	0.236
0.47	0.48	60.83	0.236
0.48	0.50	81.10	0.276
0.50	0.51	75.40	0.276
0.51	0.53	80.47	0.276
0.53	0.54	61.46	0.236
0.54	0.56	93.14	0.276
0.56	0.57	181.21	0.236
0.57	0.59	176.14	0.433
0.59	0.61	303.49	0.276
0.61	0.62	136.22	0.236
0.62	0.64	167.90	0.276
0.64	0.65	181.21	0.276
0.65	0.67	198.32	0.276
0.67	0.68	105.18	0.236
0.68	0.70	78.57	0.276
0.70	0.71	64.63	0.276
0.71	0.73	63.36	0.276
0.73	0.75	76.03	0.236
0.75	0.76	64.63	0.276
0.76	0.78	56.39	0.197
0.78	0.79	81.10	0.236
0.79	0.81	74.76	0.236
0.81	0.82	76.67	0.236
0.82	0.84	83.00	0.236
0.84	0.85	100.11	0.236
0.85	0.87	75.40	0.236
0.87	0.89	84.27	0.197
0.89	0.90	89.97	0.236
0.90	0.92	89.34	0.236
0.92	0.93	57.02	0.236
0.93	0.95	79.20	0.276
0.95	0.96	124.19	0.276
0.96	0.98	67.16	0.236
0.98	0.99	69.06	0.236
0.99	1.01	74.13	0.276

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
1.01	1.03	65.26	0.197
1.03	1.04	82.37	0.236
1.04	1.06	55.12	0.276
1.06	1.07	87.44	0.276
1.07	1.09	63.99	0.197
1.09	1.10	67.80	0.276
1.10	1.12	67.80	0.276
1.12	1.13	66.53	0.236
1.13	1.15	60.19	0.236
1.15	1.17	70.96	0.236
1.17	1.18	81.73	0.276
1.18	1.20	68.43	0.276
1.20	1.21	74.13	0.236
1.21	1.23	66.53	0.197
1.23	1.24	81.10	0.197
1.24	1.26	88.07	0.236
1.26	1.27	62.73	0.236
1.27	1.29	62.09	0.236
1.29	1.30	69.06	0.236
1.30	1.32	76.03	0.276
1.32	1.34	92.51	0.236
1.34	1.35	83.64	0.236
1.35	1.37	67.16	0.236
1.37	1.38	65.26	0.276
1.38	1.40	76.03	0.236
1.40	1.41	72.23	0.276
1.41	1.43	92.51	0.236
1.43	1.44	100.74	0.276
1.44	1.46	71.60	0.197
1.46	1.48	93.14	0.197
1.48	1.49	76.03	0.236
1.49	1.51	89.97	0.197
1.51	1.52	74.76	0.276
1.52	1.54	90.60	0.236
1.54	1.55	68.43	0.236
1.55	1.57	84.27	0.276
1.57	1.58	72.86	0.236
1.58	1.60	90.60	0.236
1.60	1.62	93.77	0.236
1.62	1.63	63.36	0.236
1.63	1.65	83.00	0.236
1.65	1.66	83.64	0.315
1.66	1.68	79.83	0.276
1.68	1.69	81.73	0.276
1.69	1.71	89.34	0.276
1.71	1.72	90.60	0.236
1.72	1.74	79.20	0.236
1.74	1.76	83.00	0.236
1.76	1.77	78.57	0.236
1.77	1.79	81.10	0.315
1.79	1.80	78.57	0.315
1.80	1.82	71.60	0.236
1.82	1.83	88.70	0.276
1.83	1.85	70.96	0.276
1.85	1.86	102.64	0.236
1.86	1.88	65.89	0.276
1.88	1.90	67.16	0.276
1.90	1.91	86.80	0.276
1.91	1.93	74.13	0.236
1.93	1.94	78.57	0.157
1.94	1.96	96.94	0.276
1.96	1.97	89.97	0.236
1.97	1.99	83.00	0.236
1.99	2.00	60.83	0.236
2.00	2.02	73.50	0.236

Table F-18: Highway 412 #11 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
0.99	1.01	74.13	0.276	2.00	2.02	73.50	0.236
1.01	1.03	65.26	0.197	2.02	2.03	79.20	0.236
1.03	1.04	82.37	0.236	2.03	2.05	71.60	0.236
1.04	1.06	55.12	0.276	2.05	2.07	82.37	0.276
1.06	1.07	87.44	0.276	2.07	2.08	102.01	0.276
1.07	1.09	63.99	0.197	2.08	2.10	68.43	0.276
1.09	1.10	67.80	0.276	2.10	2.11	83.00	0.276
1.10	1.12	67.80	0.276	2.11	2.13	79.83	0.315
1.12	1.13	66.53	0.236	2.13	2.14	107.71	0.236
1.13	1.15	60.19	0.236	2.14	2.16	100.11	0.276
1.15	1.17	70.96	0.236	2.16	2.17	79.83	0.236
1.17	1.18	81.73	0.276	2.17	2.19	77.93	0.236
1.18	1.20	68.43	0.276	2.19	2.21	81.73	0.197
1.20	1.21	74.13	0.236	2.21	2.22	70.33	0.276
1.21	1.23	66.53	0.197	2.22	2.24	104.54	0.315
1.23	1.24	81.10	0.197	2.24	2.25	75.40	0.236
1.24	1.26	88.07	0.236	2.25	2.27	88.07	0.276
1.26	1.27	62.73	0.236	2.27	2.28	102.01	0.276
1.27	1.29	62.09	0.236	2.28	2.30	178.04	0.236
1.29	1.30	69.06	0.236	2.30	2.31	81.10	0.276
1.30	1.32	76.03	0.276	2.31	2.33	69.06	0.276
1.32	1.34	92.51	0.236	2.33	2.35	65.26	0.276
1.34	1.35	83.64	0.236	2.35	2.36	72.86	0.276
1.35	1.37	67.16	0.236	2.36	2.38	67.16	0.276
1.37	1.38	65.26	0.276	2.38	2.39	57.02	0.276
1.38	1.40	76.03	0.236	2.39	2.41	57.66	0.236
1.40	1.41	72.23	0.276	2.41	2.42	56.39	0.276
1.41	1.43	92.51	0.236	2.42	2.44	88.70	0.276
1.43	1.44	100.74	0.276	2.44	2.45	83.64	0.276
1.44	1.46	71.60	0.197	2.45	2.47	99.48	0.276
1.46	1.48	93.14	0.197	2.47	2.49	91.24	0.276
1.48	1.49	76.03	0.236	2.49	2.50	86.17	0.276
1.49	1.51	89.97	0.197	2.50	2.52	89.97	0.236
1.51	1.52	74.76	0.276	2.52	2.53	79.20	0.236
1.52	1.54	90.60	0.236	2.53	2.55	62.73	0.276
1.54	1.55	68.43	0.236	2.55	2.56	152.06	0.236
1.55	1.57	84.27	0.276	2.56	2.58	88.70	0.197
1.57	1.58	72.86	0.236	2.58	2.59	94.41	0.236
1.58	1.60	90.60	0.236	2.59	2.61	96.31	0.236
1.60	1.62	93.77	0.236	2.61	2.63	89.97	0.236
1.62	1.63	63.36	0.236	2.63	2.64	67.80	0.276
1.63	1.65	83.00	0.236	2.64	2.66	132.42	0.236
1.65	1.66	83.64	0.315	2.66	2.67	81.10	0.236
1.66	1.68	79.83	0.276	2.67	2.69	98.84	0.236
1.68	1.69	81.73	0.276	2.69	2.70	88.70	0.236
1.69	1.71	89.34	0.276	2.70	2.72	67.80	0.236
1.71	1.72	90.60	0.236	2.72	2.73	88.07	0.236
1.72	1.74	79.20	0.236	2.73	2.75	200.22	0.236
1.74	1.76	83.00	0.236	2.75	2.77	95.04	0.236
1.76	1.77	78.57	0.236	2.77	2.78	196.42	0.197
1.77	1.79	81.10	0.315	2.78	2.80	94.41	0.236
1.79	1.80	78.57	0.315	2.80	2.81	89.34	0.236
1.80	1.82	71.60	0.236	2.81	2.83	92.51	0.276
1.82	1.83	88.70	0.276	2.83	2.84	61.46	0.236
1.83	1.85	70.96	0.276	2.84	2.86	69.06	0.276
1.85	1.86	102.64	0.236	2.86	2.87	73.50	0.236
1.86	1.88	65.89	0.276	2.87	2.89	106.44	0.197
1.88	1.90	67.16	0.276	2.89	2.90	96.31	0.236
1.90	1.91	86.80	0.276	2.90	2.92	86.17	0.276
1.91	1.93	74.13	0.236	2.92	2.94	77.30	0.236
1.93	1.94	78.57	0.157	2.94	2.95	113.41	0.236
1.94	1.96	96.94	0.276	2.95	2.97	103.28	0.236
1.96	1.97	89.97	0.236	2.97	2.98	81.10	0.236
1.97	1.99	83.00	0.236	2.98	3.00	73.50	0.236
1.99	2.00	60.83	0.236	3.00	3.01	66.53	0.197

Table F-19: Highway 412 #12 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
3.00	3.01	66.53	0.197
3.01	3.03	70.33	0.197
3.03	3.04	106.44	0.276
3.04	3.06	84.90	0.236
3.06	3.08	107.71	0.236
3.08	3.09	161.57	0.236
3.09	3.11	96.94	0.236
3.11	3.12	71.60	0.157
3.12	3.14	78.57	0.236
3.14	3.15	110.88	0.236
3.15	3.17	79.83	0.236
3.17	3.18	53.22	0.236
3.18	3.20	69.70	0.236
3.20	3.22	73.50	0.236
3.22	3.23	84.27	0.236
3.23	3.25	85.54	0.236
3.25	3.26	82.37	0.197
3.26	3.28	80.47	0.236
3.28	3.29	77.30	0.276
3.29	3.31	79.20	0.236
3.31	3.32	79.83	0.236
3.32	3.34	69.70	0.236
3.34	3.36	76.03	0.236
3.36	3.37	66.53	0.236
3.37	3.39	70.96	0.236
3.39	3.40	93.14	0.236
3.40	3.42	131.79	0.394
3.42	3.43	98.84	0.236
3.43	3.45	92.51	0.236
3.45	3.46	85.54	0.236
3.46	3.48	82.37	0.236
3.48	3.50	93.14	0.276
3.50	3.51	63.99	0.276
3.51	3.53	63.99	0.276
3.53	3.54	60.83	0.276
3.54	3.56	61.46	0.236
3.56	3.57	66.53	0.236
3.57	3.59	81.73	0.197
3.59	3.60	74.13	0.197
3.60	3.62	83.64	0.197
3.62	3.64	70.33	0.197
3.64	3.65	96.31	0.236
3.65	3.67	67.80	0.236
3.67	3.68	89.34	0.236
3.68	3.70	75.40	0.236
3.70	3.71	80.47	0.236
3.71	3.73	84.90	0.197
3.73	3.74	97.57	0.118
3.74	3.76	105.18	0.197
3.76	3.77	88.70	0.236
3.77	3.79	110.25	0.276
3.79	3.81	90.60	0.118
3.81	3.82	91.24	0.236
3.82	3.84	86.17	0.236
3.84	3.85	104.54	0.236
3.85	3.87	94.41	0.236
3.87	3.88	85.54	0.236
3.88	3.90	74.13	0.236
3.90	3.91	85.54	0.236
3.91	3.93	107.71	0.236
3.93	3.95	126.09	0.236
3.95	3.96	93.77	0.236
3.96	3.98	91.87	0.236
3.98	3.99	87.44	0.197
3.99	4.01	102.01	0.197
4.01	4.02	75.40	0.236
4.02	4.04	76.67	0.197
4.04	4.05	85.54	0.197
4.05	4.07	117.22	0.197
4.07	4.09	115.95	0.197
4.09	4.10	77.30	0.236
4.10	4.12	69.06	0.236
4.12	4.13	82.37	0.236
4.13	4.15	94.41	0.236
4.15	4.16	77.30	0.236
4.16	4.18	70.33	0.276
4.18	4.19	78.57	0.236
4.19	4.21	67.16	0.236
4.21	4.23	77.93	0.197
4.23	4.24	88.70	0.197
4.24	4.26	81.73	0.197
4.26	4.27	72.86	0.236
4.27	4.29	77.93	0.236
4.29	4.30	83.64	0.236
4.30	4.32	74.76	0.236
4.32	4.33	74.76	0.197
4.33	4.35	64.63	0.236
4.35	4.37	91.87	0.236
4.37	4.38	83.64	0.236
4.38	4.40	70.33	0.236
4.40	4.41	56.39	0.236
4.41	4.43	66.53	0.236
4.43	4.44	88.70	0.197
4.44	4.46	67.16	0.236
4.46	4.47	77.30	0.197
4.47	4.49	69.06	0.236
4.49	4.50	60.19	0.197
4.50	4.52	69.06	0.236
4.52	4.54	93.14	0.236
4.54	4.55	92.51	0.276
4.55	4.57	92.51	0.197
4.57	4.58	95.04	0.197
4.58	4.60	106.44	0.197
4.60	4.61	95.67	0.157
4.61	4.63	79.20	0.236
4.63	4.64	117.22	0.197
4.64	4.66	95.04	0.236
4.66	4.68	100.11	0.197
4.68	4.69	100.74	0.236
4.69	4.71	77.93	0.197
4.71	4.72	70.33	0.197
4.72	4.74	72.86	0.197
4.74	4.75	79.83	0.197
4.75	4.77	65.89	0.197
4.77	4.78	59.56	0.197
4.78	4.80	71.60	0.197
4.80	4.82	77.30	0.236
4.82	4.83	83.00	0.236
4.83	4.85	72.86	0.197
4.85	4.86	68.43	0.197
4.86	4.88	110.88	0.157
4.88	4.89	84.27	0.197
4.89	4.91	70.33	0.197
4.91	4.92	95.04	0.197
4.92	4.94	104.54	0.197
4.94	4.96	75.40	0.276
4.96	4.97	74.76	0.197
4.97	4.99	74.13	0.236
4.99	5.00	90.60	0.197
5.00	5.02	72.23	0.197

Table F-20: Highway 412 #12 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
3.00	3.01	74.76	0.236	4.01	4.02	57.66	0.197
3.01	3.03	58.29	0.197	4.02	4.04	46.25	0.197
3.03	3.04	76.67	0.236	4.04	4.05	88.70	0.197
3.04	3.06	61.46	0.197	4.05	4.07	67.80	0.236
3.06	3.08	89.97	0.197	4.07	4.09	86.80	0.197
3.08	3.09	82.37	0.197	4.09	4.10	57.66	0.197
3.09	3.11	67.16	0.197	4.10	4.12	70.33	0.197
3.11	3.12	91.24	0.236	4.12	4.13	91.24	0.157
3.12	3.14	88.07	0.236	4.13	4.15	57.02	0.157
3.14	3.15	84.27	0.276	4.15	4.16	68.43	0.197
3.15	3.17	73.50	0.197	4.16	4.18	60.83	0.197
3.17	3.18	74.76	0.197	4.18	4.19	67.80	0.276
3.18	3.20	61.46	0.236	4.19	4.21	67.16	0.236
3.20	3.22	64.63	0.354	4.21	4.23	70.96	0.157
3.22	3.23	81.10	0.197	4.23	4.24	74.13	0.236
3.23	3.25	69.70	0.157	4.24	4.26	72.86	0.236
3.25	3.26	72.86	0.236	4.26	4.27	60.83	0.236
3.26	3.28	55.12	0.197	4.27	4.29	52.59	0.197
3.28	3.29	85.54	0.354	4.29	4.30	63.36	0.197
3.29	3.31	74.13	0.157	4.30	4.32	55.12	0.197
3.31	3.32	79.83	0.197	4.32	4.33	83.00	0.197
3.32	3.34	74.76	0.197	4.33	4.35	83.00	0.197
3.34	3.36	75.40	0.197	4.35	4.37	101.38	0.197
3.36	3.37	68.43	0.157	4.37	4.38	72.86	0.197
3.37	3.39	57.66	0.197	4.38	4.40	63.99	0.197
3.39	3.40	86.17	0.236	4.40	4.41	76.03	0.236
3.40	3.42	83.64	0.236	4.41	4.43	55.76	0.236
3.42	3.43	62.73	0.118	4.43	4.44	75.40	0.197
3.43	3.45	62.73	0.236	4.44	4.46	53.22	0.197
3.45	3.46	56.39	0.236	4.46	4.47	76.67	0.236
3.46	3.48	67.16	0.315	4.47	4.49	66.53	0.236
3.48	3.50	58.29	0.276	4.49	4.50	70.96	0.197
3.50	3.51	58.92	0.276	4.50	4.52	74.76	0.197
3.51	3.53	66.53	0.236	4.52	4.54	77.30	0.197
3.53	3.54	55.76	0.197	4.54	4.55	65.89	0.197
3.54	3.56	58.29	0.236	4.55	4.57	75.40	0.197
3.56	3.57	52.59	0.197	4.57	4.58	100.11	0.197
3.57	3.59	63.99	0.276	4.58	4.60	66.53	0.394
3.59	3.60	46.25	0.197	4.60	4.61	62.73	0.197
3.60	3.62	77.30	0.197	4.61	4.63	86.80	0.276
3.62	3.64	79.83	0.197	4.63	4.64	136.86	0.276
3.64	3.65	64.63	0.197	4.64	4.66	76.67	0.236
3.65	3.67	65.89	0.197	4.66	4.68	74.13	0.197
3.67	3.68	72.23	0.236	4.68	4.69	60.83	0.197
3.68	3.70	62.09	0.197	4.69	4.71	73.50	0.197
3.70	3.71	69.06	0.197	4.71	4.72	81.73	0.118
3.71	3.73	45.62	0.197	4.72	4.74	67.16	0.118
3.73	3.74	65.26	0.157	4.74	4.75	86.17	0.197
3.74	3.76	59.56	0.157	4.75	4.77	57.02	0.157
3.76	3.77	69.06	0.236	4.77	4.78	55.76	0.118
3.77	3.79	64.63	0.197	4.78	4.80	69.06	0.197
3.79	3.81	83.00	0.236	4.80	4.82	66.53	0.197
3.81	3.82	56.39	0.236	4.82	4.83	75.40	0.236
3.82	3.84	75.40	0.197	4.83	4.85	61.46	0.197
3.84	3.85	72.86	0.197	4.85	4.86	59.56	0.197
3.85	3.87	59.56	0.197	4.86	4.88	76.67	0.197
3.87	3.88	63.99	0.197	4.88	4.89	77.30	0.157
3.88	3.90	53.22	0.157	4.89	4.91	53.22	0.157
3.90	3.91	66.53	0.197	4.91	4.92	77.93	0.197
3.91	3.93	69.70	0.197	4.92	4.94	51.32	0.197
3.93	3.95	62.73	0.197	4.94	4.96	74.13	0.118
3.95	3.96	113.41	0.197	4.96	4.97	69.06	0.157
3.96	3.98	75.40	0.197	4.97	4.99	76.03	0.197
3.98	3.99	61.46	0.157	4.99	5.00	86.80	0.394
3.99	4.01	45.62	0.197	5.00	5.02	93.14	0.236

Table F-21: Highway 412 #13 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
5.27	5.28	76.67	0.236	6.28	6.29	112.15	0.197
5.28	5.30	70.33	0.276	6.29	6.31	62.73	0.236
5.30	5.31	65.26	0.236	6.31	6.32	108.98	0.157
5.31	5.33	88.07	0.197	6.32	6.34	82.37	0.157
5.33	5.34	80.47	0.197	6.34	6.35	91.24	0.197
5.34	5.36	94.41	0.197	6.35	6.37	108.98	0.157
5.36	5.37	63.99	0.197	6.37	6.38	72.23	0.197
5.37	5.39	83.00	0.118	6.38	6.40	91.87	0.197
5.39	5.41	80.47	0.236	6.40	6.42	71.60	0.197
5.41	5.42	89.34	0.236	6.42	6.43	88.07	0.197
5.42	5.44	82.37	0.236	6.43	6.45	79.83	0.197
5.44	5.45	70.96	0.236	6.45	6.46	76.67	0.236
5.45	5.47	89.97	0.236	6.46	6.48	87.44	0.197
5.47	5.48	80.47	0.236	6.48	6.49	80.47	0.157
5.48	5.50	83.00	0.236	6.49	6.51	62.73	0.157
5.50	5.51	58.92	0.236	6.51	6.52	94.41	0.236
5.51	5.53	84.27	0.197	6.52	6.54	103.91	0.197
5.53	5.55	103.91	0.197	6.54	6.56	118.48	0.197
5.55	5.56	77.30	0.157	6.56	6.57	247.74	0.197
5.56	5.58	80.47	0.236	6.57	6.59	117.85	0.197
5.58	5.59	77.93	0.236	6.59	6.60	218.59	0.197
5.59	5.61	102.64	0.157	6.60	6.62	153.96	0.236
5.61	5.62	76.67	0.197	6.62	6.63	169.80	0.315
5.62	5.64	73.50	0.197	6.63	6.65	166.00	0.236
5.64	5.65	79.83	0.236	6.65	6.66	157.13	0.236
5.65	5.67	71.60	0.236	6.66	6.68	150.80	0.197
5.67	5.69	76.67	0.197	6.68	6.70	115.32	0.276
5.69	5.70	107.08	0.197	6.70	6.71	105.18	0.197
5.70	5.72	84.90	0.197	6.71	6.73	141.93	0.197
5.72	5.73	104.54	0.157	6.73	6.74	185.64	0.157
5.73	5.75	134.32	0.276	6.74	6.76	141.29	0.276
5.75	5.76	72.23	0.197	6.76	6.77	96.94	0.276
5.76	5.78	98.21	0.157	6.77	6.79	88.70	0.315
5.78	5.79	91.24	0.197	6.79	6.80	82.37	0.315
5.79	5.81	60.83	0.197	6.80	6.82	61.46	0.276
5.81	5.83	78.57	0.157	6.82	6.84	67.80	0.236
5.83	5.84	72.23	0.197	6.84	6.85	67.80	0.276
5.84	5.86	76.67	0.197	6.85	6.87	69.70	0.236
5.86	5.87	71.60	0.197	6.87	6.88	76.03	0.197
5.87	5.89	67.16	0.236	6.88	6.90	74.76	0.236
5.89	5.90	70.33	0.197	6.90	6.91	79.83	0.236
5.90	5.92	92.51	0.197	6.91	6.93	78.57	0.197
5.92	5.93	88.07	0.197	6.93	6.94	79.83	0.157
5.93	5.95	79.20	0.197	6.94	6.96	77.30	0.157
5.95	5.97	76.03	0.197	6.96	6.97	83.64	0.236
5.97	5.98	77.30	0.236	6.97	6.99	73.50	0.118
5.98	6.00	103.91	0.118	6.99	7.01	78.57	0.197
6.00	6.01	80.47	0.197	7.01	7.02	72.23	0.276
6.01	6.03	69.70	0.197	7.02	7.04	102.01	0.197
6.03	6.04	65.26	0.236	7.04	7.05	93.77	0.236
6.04	6.06	96.31	0.197	7.05	7.07	59.56	0.236
6.06	6.07	74.13	0.197	7.07	7.08	112.78	0.197
6.07	6.09	69.70	0.197	7.08	7.10	95.04	0.197
6.09	6.10	64.63	0.236	7.10	7.11	95.04	0.197
6.10	6.12	76.67	0.276	7.11	7.13	59.56	0.236
6.12	6.14	55.12	0.197	7.13	7.15	91.87	0.118
6.14	6.15	53.22	0.118	7.15	7.16	119.75	0.197
6.15	6.17	76.67	0.157	7.16	7.18	79.20	0.276
6.17	6.18	78.57	0.197	7.18	7.19	93.14	0.197
6.18	6.20	87.44	0.157	7.19	7.21	74.76	0.236
6.20	6.21	69.70	0.197	7.21	7.22	59.56	0.236
6.21	6.23	78.57	0.197	7.22	7.24	90.60	0.157
6.23	6.24	66.53	0.197	7.24	7.25	71.60	0.197
6.24	6.26	96.94	0.236	7.25	7.27	65.89	0.197
6.26	6.28	76.67	0.197	7.27	7.29	88.07	0.197

Table F-22: Highway 412 #13 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
5.27	5.28	102.01	0.157
5.28	5.30	73.50	0.157
5.30	5.31	70.33	0.197
5.31	5.33	95.04	0.236
5.33	5.34	76.67	0.197
5.34	5.36	79.20	0.197
5.36	5.37	69.06	0.197
5.37	5.39	108.98	0.197
5.39	5.41	83.00	0.118
5.41	5.42	102.64	0.236
5.42	5.44	88.70	0.157
5.44	5.45	69.06	0.276
5.45	5.47	148.26	0.197
5.47	5.48	117.22	0.118
5.48	5.50	79.20	0.197
5.50	5.51	89.97	0.197
5.51	5.53	82.37	0.157
5.53	5.55	76.03	0.197
5.55	5.56	103.91	0.118
5.56	5.58	69.06	0.157
5.58	5.59	145.09	0.197
5.59	5.61	84.27	0.118
5.61	5.62	81.10	0.157
5.62	5.64	120.38	0.197
5.64	5.65	86.80	0.197
5.65	5.67	70.96	0.236
5.67	5.69	95.67	0.236
5.69	5.70	98.84	0.197
5.70	5.72	112.15	0.079
5.72	5.73	152.06	0.197
5.73	5.75	125.45	0.236
5.75	5.76	158.40	0.157
5.76	5.78	74.13	0.157
5.78	5.79	93.14	0.118
5.79	5.81	88.07	0.118
5.81	5.83	80.47	0.118
5.83	5.84	84.90	0.118
5.84	5.86	58.92	0.118
5.86	5.87	76.03	0.197
5.87	5.89	81.73	0.236
5.89	5.90	81.10	0.276
5.90	5.92	76.03	0.118
5.92	5.93	67.16	0.118
5.93	5.95	124.82	0.118
5.95	5.97	102.01	0.118
5.97	5.98	70.33	0.197
5.98	6.00	62.09	0.118
6.00	6.01	101.38	0.118
6.01	6.03	82.37	0.079
6.03	6.04	67.16	0.197
6.04	6.06	89.34	0.157
6.06	6.07	62.09	0.157
6.07	6.09	88.70	0.236
6.09	6.10	116.58	0.197
6.10	6.12	93.14	0.157
6.12	6.14	84.90	0.157
6.14	6.15	88.07	0.197
6.15	6.17	147.63	0.118
6.17	6.18	105.81	0.197
6.18	6.20	95.04	0.236
6.20	6.21	127.35	0.236
6.21	6.23	81.73	0.197
6.23	6.24	74.76	0.197
6.24	6.26	102.01	0.197
6.26	6.28	84.27	0.197
6.28	6.29	93.77	0.197
6.29	6.31	96.94	0.197
6.31	6.32	74.76	0.197
6.32	6.34	67.16	0.236
6.34	6.35	67.16	0.197
6.35	6.37	94.41	0.236
6.37	6.38	71.60	0.157
6.38	6.40	99.48	0.157
6.40	6.42	96.31	0.118
6.42	6.43	91.24	0.118
6.43	6.45	86.17	0.118
6.45	6.46	95.67	0.197
6.46	6.48	62.09	0.118
6.48	6.49	78.57	0.118
6.49	6.51	97.57	0.118
6.51	6.52	123.55	0.157
6.52	6.54	311.73	0.118
6.54	6.56	261.68	0.118
6.56	6.57	143.83	0.118
6.57	6.59	100.11	0.079
6.59	6.60	188.81	0.236
6.60	6.62	348.48	0.197
6.63	6.65	281.95	0.236
6.65	6.66	200.22	0.236
6.66	6.68	202.75	0.197
6.68	6.70	89.97	0.197
6.70	6.71	108.98	0.630
6.71	6.73	392.83	0.118
6.73	6.74	206.55	0.236
6.74	6.76	142.56	0.197
6.76	6.77	153.33	0.197
6.77	6.79	92.51	0.236
6.79	6.80	103.28	0.197
6.80	6.82	65.26	0.236
6.82	6.84	71.60	0.197
6.84	6.85	94.41	0.157
6.85	6.87	110.25	0.157
6.87	6.88	76.67	0.197
6.88	6.90	84.27	0.236
6.90	6.91	64.63	0.236
6.91	6.93	81.73	0.157
6.93	6.94	108.98	0.236
6.94	6.96	107.71	0.157
6.96	6.97	68.43	0.197
6.97	6.99	84.27	0.236
6.99	7.01	147.63	0.236
7.01	7.02	79.83	0.197
7.02	7.04	75.40	0.197
7.04	7.05	74.13	0.197
7.05	7.07	81.10	0.197
7.07	7.08	72.86	0.276
7.08	7.10	63.99	0.236
7.10	7.11	87.44	0.197
7.11	7.13	115.32	0.157
7.13	7.15	193.25	0.197
7.15	7.16	79.83	0.197
7.16	7.18	82.37	0.276
7.18	7.19	83.64	0.276
7.19	7.21	78.57	0.157
7.21	7.22	138.76	0.236
7.22	7.24	77.93	0.197
7.24	7.25	80.47	0.236
7.25	7.27	92.51	0.197
7.27	7.29	78.57	0.315

Table F-23: Highway 412 #14 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)	Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
6.54	6.56	118.48	0.197	7.49	7.50	93.77	0.276
6.56	6.57	247.74	0.197	7.50	7.52	118.48	0.236
6.57	6.59	117.85	0.197	7.52	7.53	89.34	0.157
6.59	6.60	218.59	0.197	7.53	7.55	111.51	0.276
6.60	6.62	153.96	0.236	7.55	7.57	57.02	0.197
6.62	6.63	169.80	0.315	7.57	7.58	73.50	0.236
6.63	6.65	166.00	0.236	7.58	7.60	78.57	0.197
6.65	6.66	157.13	0.236	7.60	7.61	86.17	0.197
6.66	6.68	150.80	0.197	7.61	7.63	66.53	0.236
6.68	6.70	115.32	0.276	7.63	7.64	195.15	0.236
6.70	6.71	105.18	0.197	7.64	7.66	75.40	0.236
6.71	6.73	141.93	0.197	7.66	7.67	91.24	0.197
6.73	6.74	185.64	0.157	7.67	7.69	60.83	0.315
6.74	6.76	141.29	0.276	7.69	7.71	84.90	0.197
6.76	6.77	96.94	0.276	7.71	7.72	84.27	0.157
6.77	6.79	88.70	0.315	7.72	7.74	127.35	0.236
6.79	6.80	82.37	0.315	7.74	7.75	97.57	0.315
6.80	6.82	61.46	0.276	7.75	7.77	86.80	0.276
6.82	6.84	67.80	0.236	7.77	7.78	68.43	0.315
6.84	6.85	67.80	0.276	7.78	7.80	93.14	0.394
6.85	6.87	69.70	0.236	7.80	7.81	94.41	0.157
6.87	6.88	76.03	0.197	7.81	7.83	111.51	0.276
6.88	6.90	74.76	0.236	7.83	7.84	78.57	0.315
6.90	6.91	79.83	0.236	7.84	7.86	105.81	0.354
6.91	6.93	78.57	0.197	7.86	7.88	89.34	0.236
6.93	6.94	79.83	0.157	7.88	7.89	140.66	0.276
6.94	6.96	77.30	0.157	7.89	7.91	107.71	0.276
6.96	6.97	83.64	0.236	7.91	7.92	76.67	0.315
6.97	6.99	73.50	0.118	7.92	7.94	67.80	0.236
6.99	7.01	78.57	0.197	7.94	7.95	69.70	0.157
7.01	7.02	72.23	0.276	7.95	7.97	72.23	0.236
7.02	7.04	102.01	0.197	7.97	7.98	133.69	0.236
7.04	7.05	93.77	0.236	7.98	8.00	74.76	0.315
7.05	7.07	59.56	0.236	8.00	8.02	88.70	0.315
7.07	7.08	112.78	0.197	8.02	8.03	100.11	0.236
7.08	7.10	95.04	0.197	8.03	8.05	60.83	0.157
7.10	7.11	95.04	0.197	8.05	8.06	102.01	0.236
7.11	7.13	59.56	0.236	8.06	8.08	81.10	0.276
7.13	7.15	91.87	0.118	8.08	8.09	86.17	0.276
7.15	7.16	119.75	0.197	8.09	8.11	96.94	0.197
7.16	7.18	79.20	0.276	8.11	8.12	74.13	0.197
7.18	7.19	93.14	0.197	8.12	8.14	122.28	0.276
7.19	7.21	74.76	0.236	8.14	8.16	89.34	0.236
7.21	7.22	59.56	0.236	8.16	8.17	98.84	0.197
7.22	7.24	90.60	0.157	8.17	8.19	91.24	0.197
7.24	7.25	71.60	0.197	8.19	8.20	100.74	0.315
7.25	7.27	65.89	0.197	8.20	8.22	102.01	0.157
7.27	7.29	88.07	0.197	8.22	8.23	96.31	0.197
7.29	7.30	79.83	0.197	8.23	8.25	91.24	0.236
7.30	7.32	79.20	0.157	8.25	8.26	122.92	0.157
7.32	7.33	74.76	0.197	8.26	8.28	117.85	0.157
7.33	7.35	99.48	0.276	8.28	8.30	125.45	0.157
7.35	7.36	58.29	0.276	8.30	8.31	108.98	0.197
7.36	7.38	133.69	0.236	8.31	8.33	167.27	0.236
7.38	7.39	77.30	0.197	8.33	8.34	108.98	0.236
7.39	7.41	96.94	0.197	8.34	8.36	222.39	0.236
7.41	7.43	79.20	0.197	8.45	8.47	640.57	0.354
7.43	7.44	76.67	0.276	8.47	8.48	316.80	0.354
7.44	7.46	72.23	0.236	8.48	8.50	297.79	0.197
7.46	7.47	82.37	0.157	8.50	8.51	233.80	0.276
7.47	7.49	74.13	0.157	8.51	8.53	261.04	0.197

Table F-24: Highway 412 #14 IRI and Rut Data for the Full-Depth Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
6.54	6.56	261.68	0.118
6.56	6.57	143.83	0.118
6.57	6.59	100.11	0.079
6.59	6.60	188.81	0.236
6.60	6.62	348.48	0.197
6.63	6.65	281.95	0.236
6.65	6.66	200.22	0.236
6.66	6.68	202.75	0.197
6.68	6.70	89.97	0.197
6.70	6.71	108.98	0.630
6.71	6.73	392.83	0.118
6.73	6.74	206.55	0.236
6.74	6.76	142.56	0.197
6.76	6.77	153.33	0.197
6.77	6.79	92.51	0.236
6.79	6.80	103.28	0.197
6.80	6.82	65.26	0.236
6.82	6.84	71.60	0.197
6.84	6.85	94.41	0.157
6.85	6.87	110.25	0.157
6.87	6.88	76.67	0.197
6.88	6.90	84.27	0.236
6.90	6.91	64.63	0.236
6.91	6.93	81.73	0.157
6.93	6.94	108.98	0.236
6.94	6.96	107.71	0.157
6.96	6.97	68.43	0.197
6.97	6.99	84.27	0.236
6.99	7.01	147.63	0.236
7.01	7.02	79.83	0.197
7.02	7.04	75.40	0.197
7.04	7.05	74.13	0.197
7.05	7.07	81.10	0.197
7.07	7.08	72.86	0.276
7.08	7.10	63.99	0.236
7.10	7.11	87.44	0.197
7.11	7.13	115.32	0.157
7.13	7.15	193.25	0.197
7.15	7.16	79.83	0.197
7.16	7.18	82.37	0.276
7.18	7.19	83.64	0.276
7.19	7.21	78.57	0.157
7.21	7.22	138.76	0.236
7.22	7.24	77.93	0.197
7.24	7.25	80.47	0.236
7.25	7.27	92.51	0.197
7.27	7.29	78.57	0.315
7.29	7.30	86.80	0.197
7.30	7.32	60.83	0.157
7.32	7.33	147.63	0.197
7.33	7.35	111.51	0.236
7.35	7.36	114.05	0.197
7.36	7.38	90.60	0.197
7.38	7.39	65.89	0.197
7.39	7.41	87.44	0.197
7.41	7.43	77.30	0.157
7.43	7.44	72.86	0.354
7.44	7.46	88.70	0.236
7.46	7.47	94.41	0.197
7.47	7.49	106.44	0.197
7.49	7.50	126.09	0.236
7.50	7.52	103.91	0.197
7.52	7.53	74.76	0.197
7.53	7.55	95.67	0.197
7.55	7.57	91.87	0.236
7.57	7.58	110.88	0.197
7.58	7.60	110.25	0.236
7.60	7.61	95.67	0.236
7.61	7.63	219.23	0.276
7.63	7.64	173.61	0.236
7.64	7.66	110.25	0.197
7.66	7.67	79.83	0.236
7.67	7.69	92.51	0.197
7.69	7.71	112.15	0.197
7.71	7.72	125.45	0.197
7.72	7.74	109.61	0.236
7.74	7.75	80.47	0.197
7.75	7.77	78.57	0.236
7.77	7.78	91.24	0.197
7.78	7.80	96.31	0.197
7.80	7.81	98.21	0.197
7.81	7.83	82.37	0.276
7.83	7.84	82.37	0.197
7.84	7.86	69.70	0.197
7.86	7.88	80.47	0.197
7.88	7.89	107.71	0.197
7.89	7.91	97.57	0.157
7.91	7.92	86.80	0.157
7.92	7.94	108.35	0.157
7.94	7.95	95.67	0.197
7.95	7.97	94.41	0.236
7.97	7.98	72.86	0.276
7.98	8.00	69.70	0.276
8.00	8.02	84.27	0.236
8.02	8.03	93.77	0.197
8.03	8.05	72.23	0.236
8.05	8.06	96.94	0.197
8.06	8.08	124.82	0.197
8.08	8.09	93.77	0.197
8.09	8.11	89.34	0.197
8.11	8.12	136.22	0.276
8.12	8.14	119.75	0.197
8.14	8.16	167.90	0.197
8.16	8.17	115.95	0.197
8.17	8.19	100.74	0.236
8.19	8.20	131.79	0.236
8.20	8.22	83.00	0.197
8.22	8.23	106.44	0.157
8.23	8.25	138.76	0.197
8.25	8.26	114.68	0.197
8.26	8.28	109.61	0.236
8.28	8.30	82.37	0.236
8.30	8.31	108.98	0.197
8.31	8.33	176.77	0.157
8.33	8.34	172.34	0.118
8.34	8.36	223.03	0.236
8.36	8.37	242.67	0.315
8.37	8.39	311.73	0.197
8.42	8.44	1006.16	0.630
8.44	8.45	333.27	0.354
8.45	8.47	242.04	0.157
8.47	8.48	194.52	0.315
8.48	8.50	171.07	0.157
8.50	8.51	207.82	0.394
8.51	8.53	238.23	0.197

Table F-25: Highway 412 #15 IRI and Rut Data for the Stone Base Lanes

Starting Log Mile	Ending Log Mile	IRI (in/mi)	Rut Depth (inches)
7.61	7.63	66.53	0.236
7.63	7.64	195.15	0.236
7.64	7.66	75.40	0.236
7.66	7.67	91.24	0.197
7.67	7.69	60.83	0.315
7.69	7.71	84.90	0.197
7.71	7.72	84.27	0.157
7.72	7.74	127.35	0.236
7.74	7.75	97.57	0.315
7.75	7.77	86.80	0.276
7.77	7.78	68.43	0.315
7.78	7.80	93.14	0.394
7.80	7.81	94.41	0.157
7.81	7.83	111.51	0.276
7.83	7.84	78.57	0.315
7.84	7.86	105.81	0.354
7.86	7.88	89.34	0.236
7.88	7.89	140.66	0.276
7.89	7.91	107.71	0.276
7.91	7.92	76.67	0.315
7.92	7.94	67.80	0.236
7.94	7.95	69.70	0.157
7.95	7.97	72.23	0.236
7.97	7.98	133.69	0.236
7.98	8.00	74.76	0.315
8.00	8.02	88.70	0.315
8.02	8.03	100.11	0.236
8.03	8.05	60.83	0.157
8.05	8.06	102.01	0.236
8.06	8.08	81.10	0.276
8.08	8.09	86.17	0.276
8.09	8.11	96.94	0.197
8.11	8.12	74.13	0.197
8.12	8.14	122.28	0.276
8.14	8.16	89.34	0.236
8.16	8.17	98.84	0.197
8.17	8.19	91.24	0.197
8.19	8.20	100.74	0.315
8.20	8.22	102.01	0.157
8.22	8.23	96.31	0.197
8.23	8.25	91.24	0.236
8.25	8.26	122.92	0.157
8.26	8.28	117.85	0.157
8.28	8.30	125.45	0.157
8.30	8.31	108.98	0.197
8.31	8.33	167.27	0.236
8.33	8.34	108.98	0.236
8.34	8.36	222.39	0.236
8.45	8.47	640.57	0.354
8.47	8.48	316.80	0.354
8.48	8.50	297.79	0.197
8.50	8.51	233.80	0.276
8.51	8.53	261.04	0.197
8.57	8.59	1046.07	0.276
8.59	8.61	468.23	0.276
8.61	8.62	345.31	0.315
8.62	8.64	346.58	0.472
8.64	8.65	347.21	0.354
8.65	8.67	212.26	0.276
8.67	8.68	241.40	0.197
8.68	8.70	193.88	0.236
8.70	8.71	219.23	0.354
8.71	8.73	155.23	0.315
8.73	8.75	105.18	0.276
8.75	8.76	121.02	0.236
8.76	8.78	135.59	0.394
8.78	8.79	76.67	0.315
8.79	8.81	122.92	0.236
8.81	8.82	100.74	0.236
8.82	8.84	102.01	0.236
8.84	8.85	105.18	0.354
8.85	8.87	111.51	0.276
8.87	8.89	95.04	0.236
8.89	8.90	99.48	0.197
8.90	8.92	110.88	0.197
8.92	8.93	117.22	0.276
8.93	8.95	96.94	0.315
8.95	8.96	88.70	0.354
8.96	8.98	101.38	0.394
8.98	8.99	110.25	0.433
8.99	9.01	115.95	0.276
9.01	9.03	137.49	0.315
9.03	9.04	338.98	0.433
9.04	9.06	122.92	0.433
9.06	9.07	120.38	0.315
9.07	9.09	151.43	0.236
9.09	9.10	318.07	0.276
9.15	9.17	701.40	0.276
9.17	9.18	268.65	0.276
9.18	9.20	251.54	0.315
9.20	9.21	226.20	0.354
9.21	9.23	154.60	0.236
9.23	9.24	103.91	0.236
9.24	9.26	82.37	0.236
9.26	9.27	95.04	0.197
9.27	9.29	70.33	0.157
9.29	9.31	101.38	0.276
9.31	9.32	87.44	0.236
9.32	9.34	122.92	0.197
9.34	9.35	72.86	0.315
9.35	9.37	117.22	0.276
9.37	9.38	116.58	0.236
9.38	9.40	98.21	0.315
9.40	9.41	74.76	0.315
9.41	9.43	65.89	0.276
9.43	9.44	80.47	0.276
9.44	9.46	98.84	0.354
9.46	9.48	93.77	0.276
9.48	9.49	198.32	0.354
9.49	9.51	84.27	0.394
9.51	9.52	83.64	0.472
9.52	9.54	84.90	0.433
9.54	9.55	118.48	0.197
9.55	9.57	110.25	0.315
9.57	9.58	109.61	0.394
9.58	9.60	111.51	0.472
9.60	9.62	98.21	0.394
9.62	9.63	152.70	0.394
9.63	9.65	162.20	0.472

Table G-1: Stripping Information

Location	Boring #	Pavement Type	Stripping
Hwy 82 #1	1	Full-Depth	sliightly stripped
	2	Full-Depth	at bottom
	3	Full-Depth	*
	5	Stone Base	*
Hwy 82 #2	1	Full-Depth	severe
	2	Full-Depth	at bottom
	3	Full-Depth	at bottom
	5	Stone Base	at bottom
Hwy 79 #1	1	Stone Base	*
	2	Stone Base	*
	3	Stone Base	*
	5	Stone Base	*
Hwy 79 #2	1	Stone Base	*
	2	Stone Base	*
	3	Stone Base	*
	4	Stone Base	*
	5	Stone Base	*
Hwy 49 #1	1	Stone Base	none
	2	Stone Base	none
Hwy 49 #2	1	Full-Depth	none
	2	Full-Depth	none
	3	Stone Base	none
	4	Stone Base	none
	5	Full-Depth	none
	6	Full-Depth	none
	7	Full-Depth	none
	8	Stone Base	bottom 1.5"
Hwy 270 #1	1	Stone Base	none
	2	Stone Base	none
	3	Stone Base	bottom 1.5"
	4	Stone Base	bottom 2"
	5	Stone Base	at 2.5"
	6	Stone Base	bottom 3"
	7	Stone Base	bottom 3.5"
	8	Stone Base	none
Hwy 270 #2	1	Full-Depth	from 3" to 9"
	2	Full-Depth	none
	3	Full-Depth	from 1.5" to 8" and bottom 4"
	4	Full-Depth	from 1.5" to 9" and from 9" to 13"
	5	Full-Depth	from 5" to 15"
	6	Full-Depth	from 1.5" to 14.5"
	7	Full-Depth	throughout

* Note: No adequate filed evaluation for stripping

Table G-1 (Continued): Stripping Information

Location	Boring #	Pavement Type	Stripping
Hwy 65 #1	1	Stone Base	none
	2	Stone Base	at bottom
	3	Stone Base	none
	4	Stone Base	none
	5	Stone Base	none
	6	Stone Base	bottom 1"
	7	Stone Base	none
	8	Stone Base	bottom 2.5"
Hwy 65 #2	1	Full-Depth	at 6.5" and 9.5"
	2	Full-Depth	at 6.5" and 10"
	3	Full-Depth	none
	4	Full-Depth	none
Hwy 65 #10	1	Full-Depth	none
	2	Full-Depth	none
	3	Full-Depth	bottom 0.5"
	4	Full-Depth	at bottom
	5	Full-Depth	at 8" and at bottom
	6	Stone Base	none
Hwy 65 #11	1	Stone Base	none
	2	Stone Base	bottom 1"
	3	Stone Base	bottom 0.5"
	4	Stone Base	at 3", 10", and at bottom 0.5"
	5	Stone Base	at 5.5"
Hwy 65 #12	1	Full-Depth	at 6" and at 10"
	2	Full-Depth	at 8.5"
	3	Full-Depth	bottom 5"
	4	Stone Base	from 7.5" to 9.5"
	5	Stone Base	at 6" and at bottom
Hwy 412 #10	1	Stone Base	none
	2	Stone Base	none
	3	Stone Base	none
	4	Stone Base	none
Hwy 412 #11	1	Stone Base	none
	2	Stone Base	none
	3	Stone Base	none
	4	Stone Base	none
Hwy 412 #12	1	Full-Depth	none
	2	Full-Depth	none
	3	Full-Depth	none
	4	Full-Depth	none
	5	Full-Depth	none
	6	Full-Depth	none
Hwy 412 #13	1	Full-Depth	at bottom
	2	Full-Depth	none
	3	Full-Depth	none
	4	Full-Depth	none
	5	Full-Depth	bottom 2.5"
Hwy 412 #14	1	Full-Depth	none
	2	Full-Depth	none
	3	Full-Depth	none
	4	Full-Depth	none
Hwy 412 #15	1	Full-Depth	none
	2	Full-Depth	none
	3	Full-Depth	none

APPENDIX H

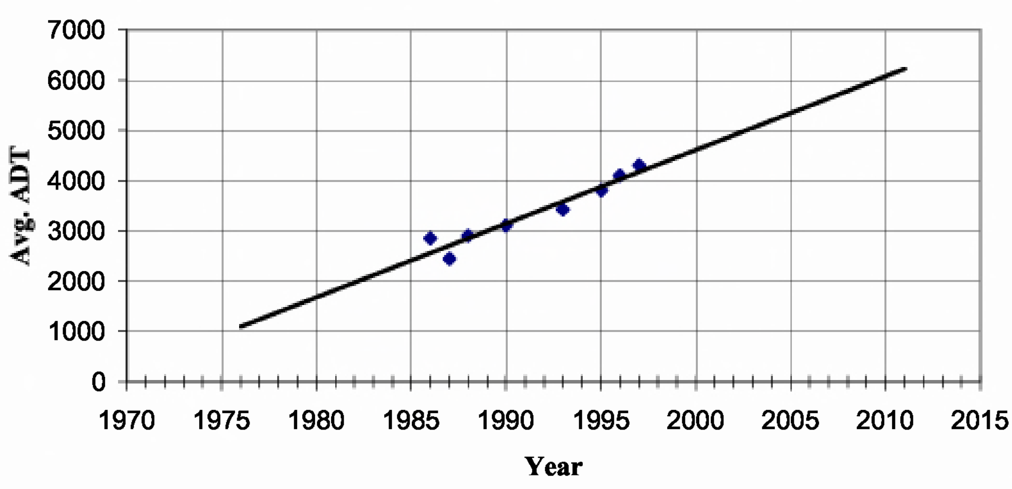
AVERAGE DAILY TRAFFIC DATA

ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 82 #1	7	14	82	4	11.03		1986	2850	2
							1987	2440	2
							1988	2900	2
							1989		
							1990	3100	2
							1991		
							1992		
							1993	3430	2
							1994		
							1995	3800	2
							1996	4100	2
							1997	4300	2

Figure H-1: ADT Data for Highway 82 #1

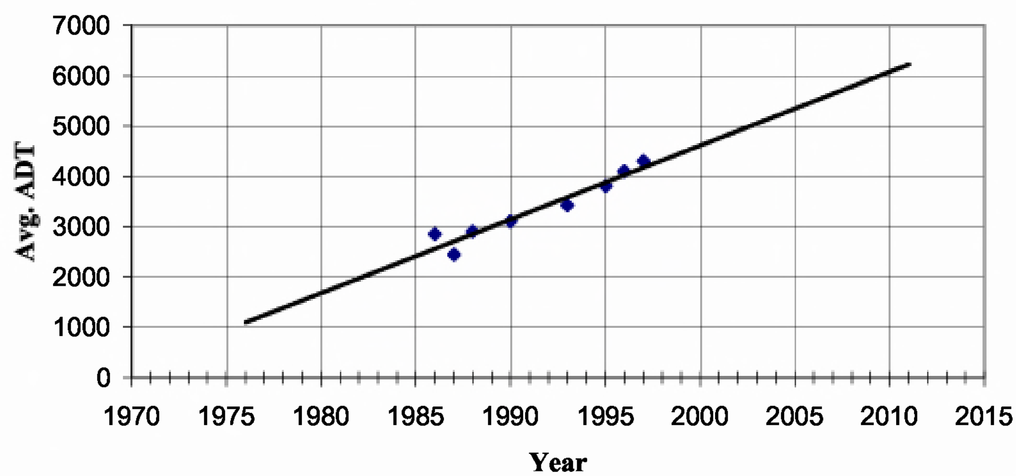


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 82 #2	7	14	82	4	8.34		1986	2850	2
							1987	2440	2
							1988	2900	2
							1989		
							1990	3100	2
							1991		
							1992		
							1993	3430	2
							1994		
							1995	3800	2
							1996	4100	2
							1997	4300	2

Figure H-2: ADT Data for Highway 82 #2

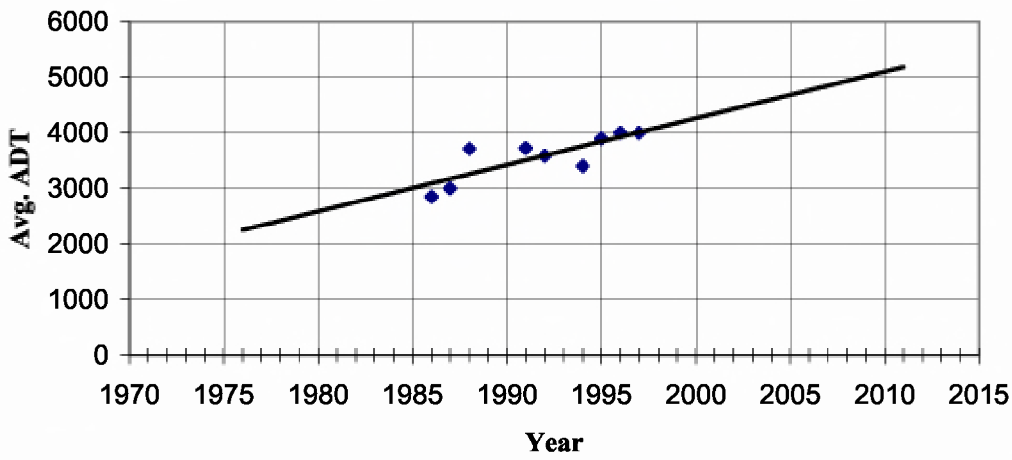


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 79 #1	7	7	79	5	5.64	16	1986	2850	2
							1987	3000	2
							1988	3710	2
							1989		
							1990		
							1991	3720	2
							1992	3590	2
							1993		
							1994	3400	2
							1995	3900	2
							1996	4000	2
							1997	4000	2

Figure H-3: ADT Data for Highway 79 #1

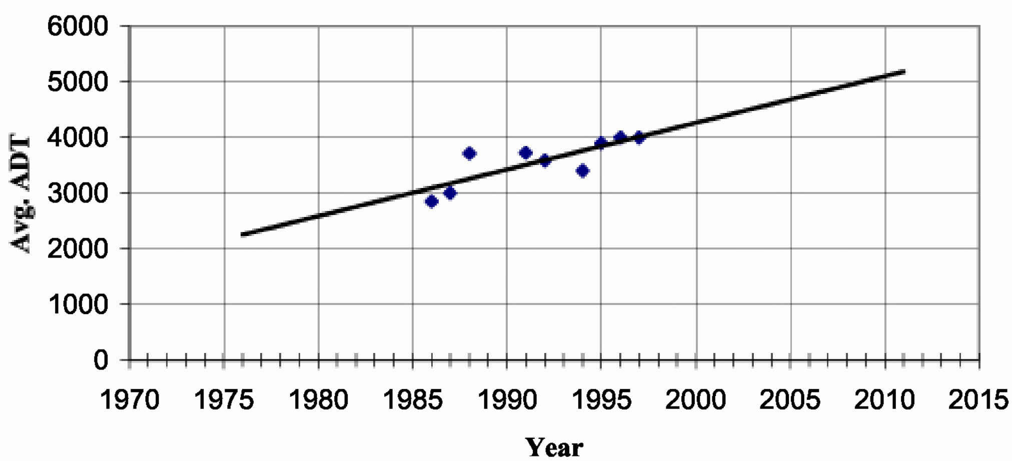


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 79 #2	7	7	79	5	5.64	16	1986	2850	2
							1987	3000	2
							1988	3710	2
							1989		
							1990		
							1991	3720	2
							1992	3590	2
							1993		
							1994	3400	2
							1995	3900	2
							1996	4000	2
							1997	4000	2

Figure H-4: ADT Data for Highway 79 #2

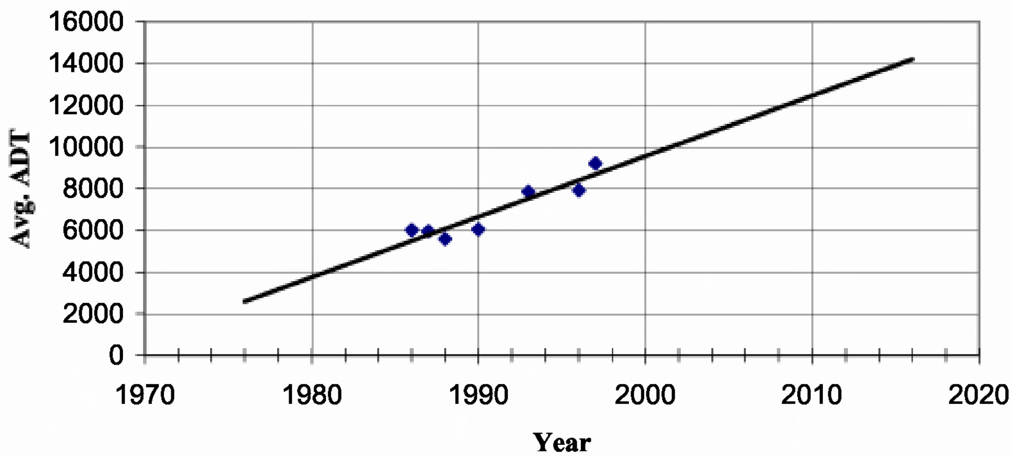


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 49 #1	10	28	49	2	23.51		1986	6000	2
							1987	5960	2
							1988	5590	2
							1989		
							1990	6040	2
							1991		
							1992		
							1993	7840	2
							1994		
							1995		
							1996	7900	2
							1997	9200	2

Figure H-5: ADT Data for Highway 49 #1

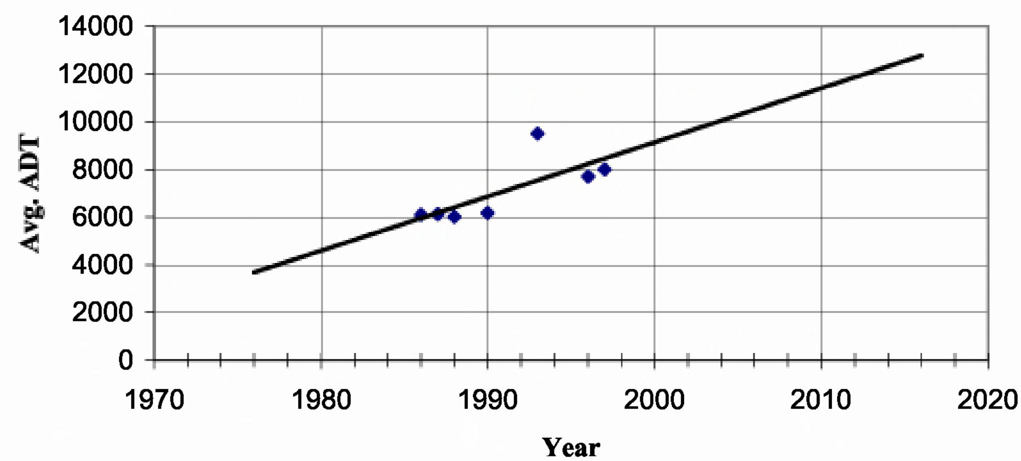


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 49 #2	10	28	49	2	20.21		1986	6100	2
							1987	6110	2
							1988	6000	2
							1989		
							1990	6160	2
							1991		
							1992		
							1993	9490	2
							1994		
							1995		
							1996	7700	2
							1997	8000	2

Figure H-6: ADT Data for Highway 49 #2

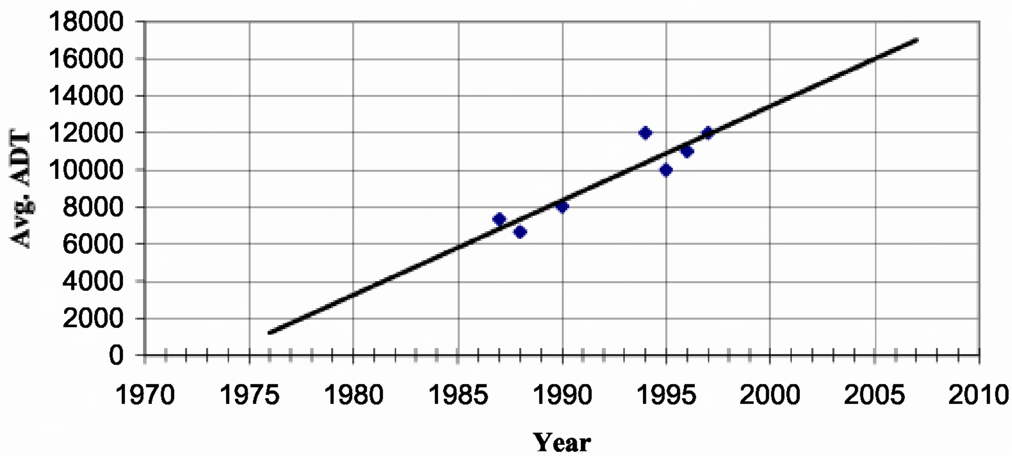


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 270 #1	6	26	270	6	8.6		1986		
							1987	7360	2
							1988	6660	2
							1989		
							1990	8050	2
							1991		
							1992		
							1993		
							1994	12000	2
							1995	10000	2
							1996	11000	2
							1997	12000	2

Figure H-7: ADT Data for Highway 270 #1

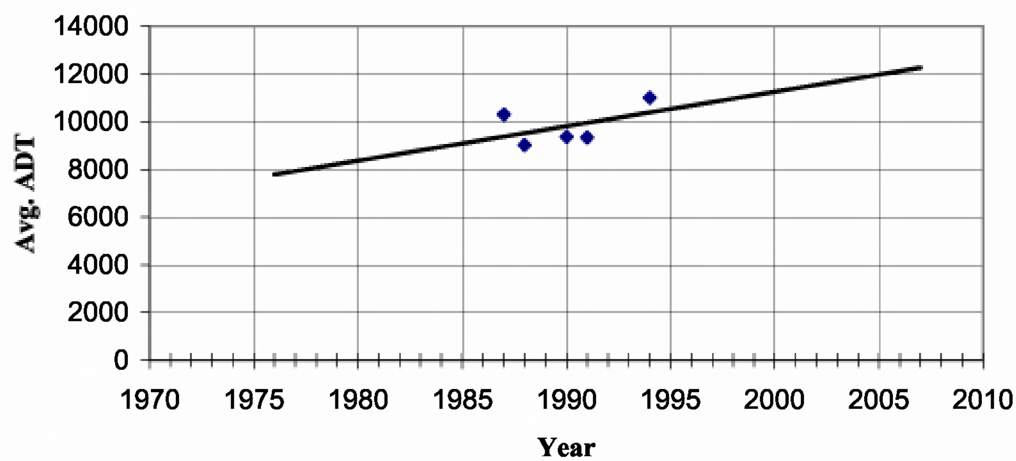


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 270 #2	6	26	270	6	6.47		1986		
							1987	10310	2
							1988	9020	2
							1989		
							1990	9370	2
							1991	9320	2
							1992		
							1993		
							1994	11000	2
							1995		
							1996		
							1997		

Figure H-8: ADT Data for Highway 270 #2

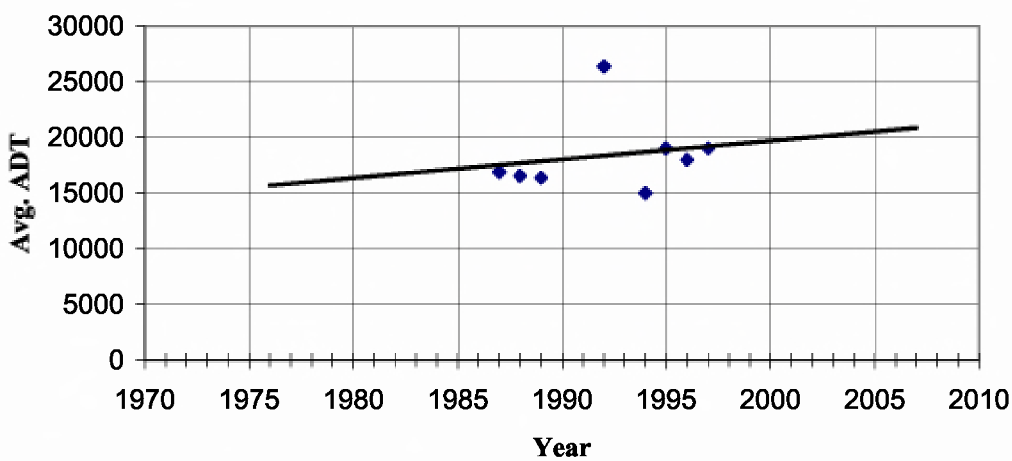


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 65 #1	8	23	65	9	17.79	17	1986		
							1987	16910	2
							1988	16560	2
							1989	16390	2
							1990		
							1991		
							1992	26360	2
							1993		
							1994	15000	2
							1995	19000	2
							1996	18000	2
							1997	19000	2

Figure H-9: ADT Data for Highway 65 #1

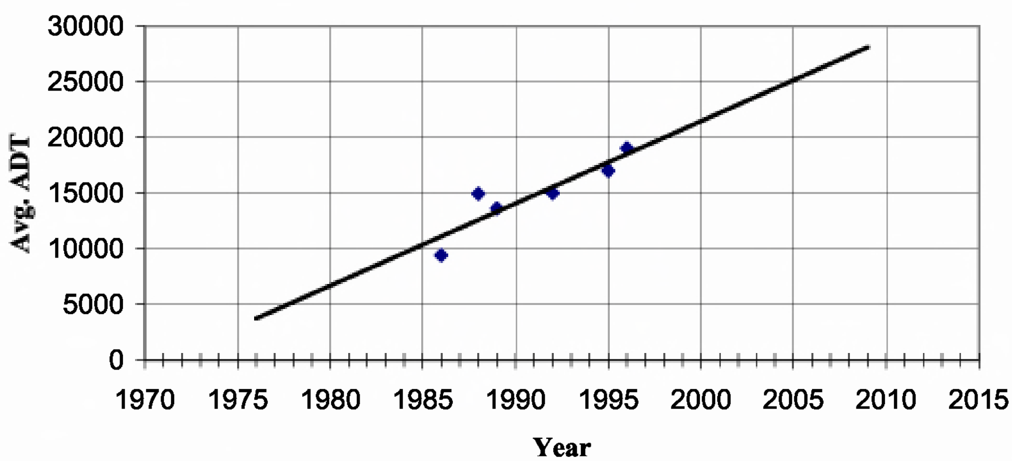


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 65 #2	8	23	65	9	11.79	17	1986	9400	2
							1987		
							1988	14930	2
							1989	13610	2
							1990		
							1991		
							1992	15020	2
							1993		
							1994		
							1995	17000	2
							1996	19000	2
							1997		

Figure H-10: ADT Data for Highway 65 #2

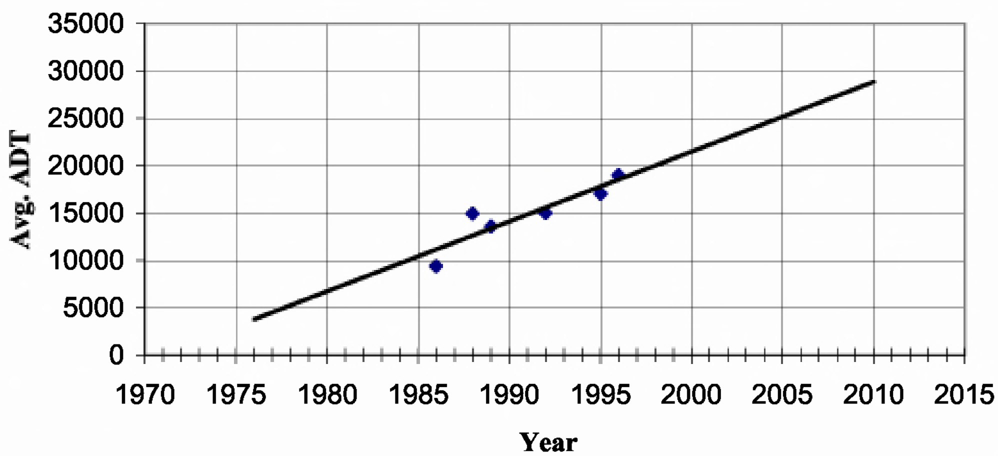


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 65 #10	8	23	65	9	11.79	17	1986	9400	2
							1987		
							1988	14930	2
							1989	13610	2
							1990		
							1991		
							1992	15020	2
							1993		
							1994		
							1995	17000	2
							1996	19000	2
							1997		

Figure H-11: ADT Data for Highway 65 #10

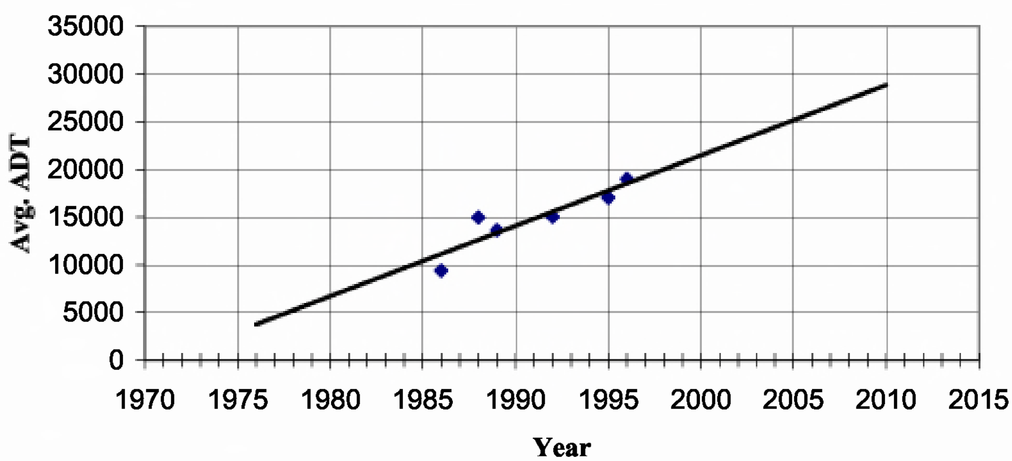


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 65 #11	8	23	65	9	13.75	17	1986	9400	2
							1987		
							1988	14930	2
							1989	13610	2
							1990		
							1991		
							1992	15020	2
							1993		
							1994		
							1995	17000	2
							1996	19000	2
							1997		

Figure H-12: ADT Data for Highway 65 #11

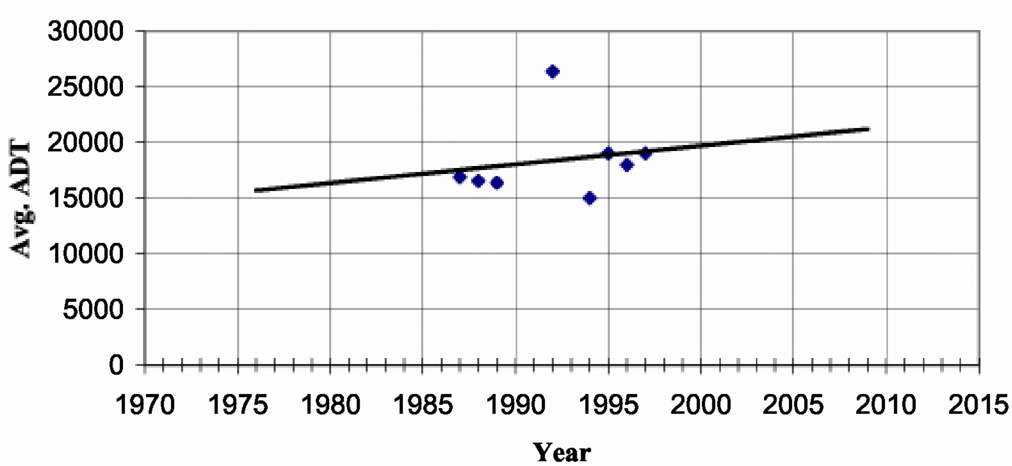


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 65 #12	8	23	65	9	17.2	17	1986		
							1987	16910	2
							1988	16560	2
							1989	16390	2
							1990		
							1991		
							1992	26360	2
							1993		
							1994	15000	2
							1995	19000	2
							1996	18000	2
							1997	19000	2

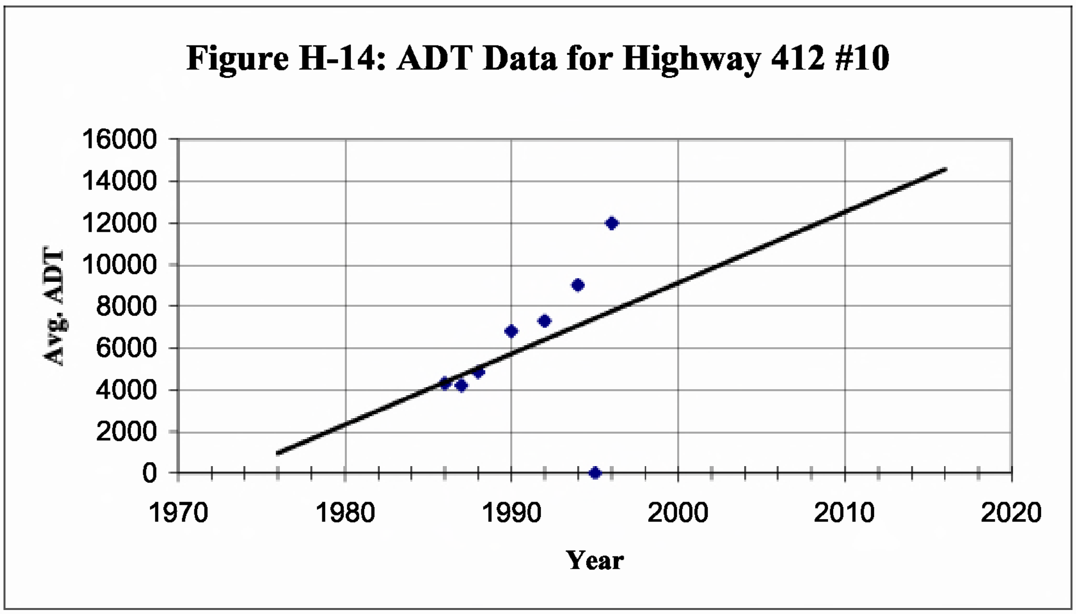
Figure H-13: ADT Data for Highway 65 #12



ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

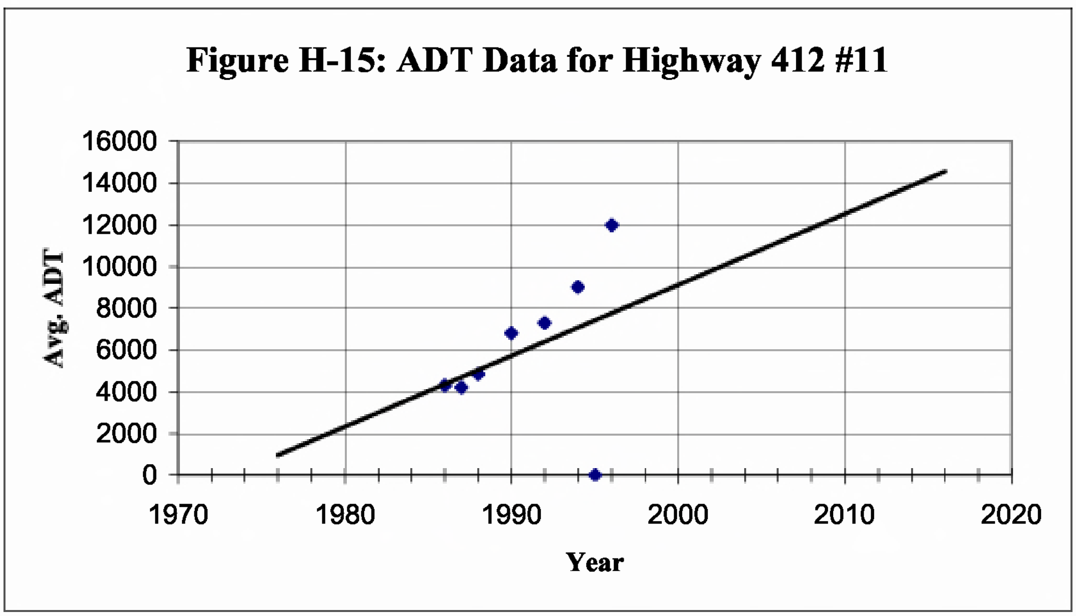
Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 412 #10	4	72	412	2	0.95	17	1986	4300	2
							1987	4190	2
							1988	4840	2
							1989		
							1990	6800	2
							1991		
							1992	7290	2
							1993		
							1994	9000	2
							1995	330 (???)	2
							1996	12000	2
							1997		



ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 412 #11	4	72	412	2	2.08	17	1986	4300	2
							1987	4190	2
							1988	4840	2
							1989		
							1990	6800	2
							1991		
							1992	7290	2
							1993		
							1994	9000	2
							1995	330 (???)	2
							1996	12000	2
							1997		

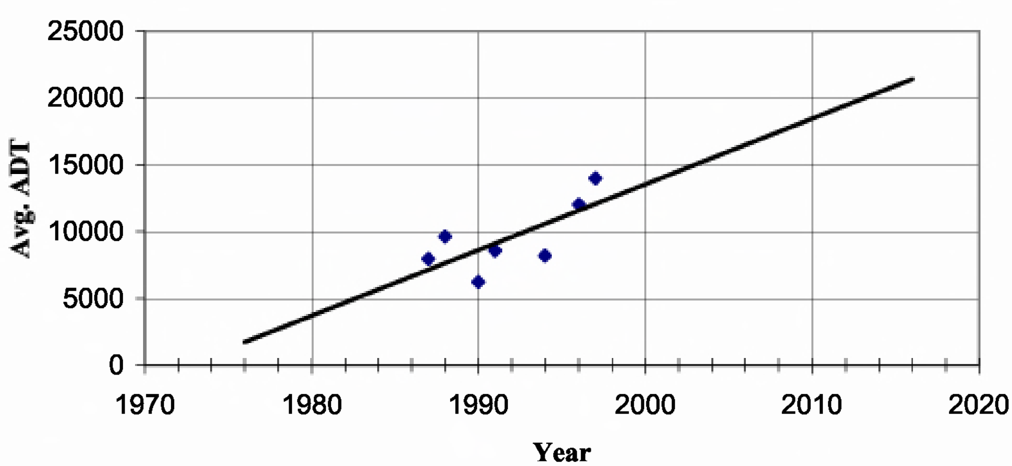


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 412 #12	4	72	412	2	4.05	17	1986		
							1987	7930	2
							1988	9640	2
							1989		
							1990	6210	2
							1991	8580	2
							1992		
							1993		
							1994	8200	2
							1995		
							1996	12000	2
							1997	14000	2

Figure H-16: ADT Data for Highway 412 #12

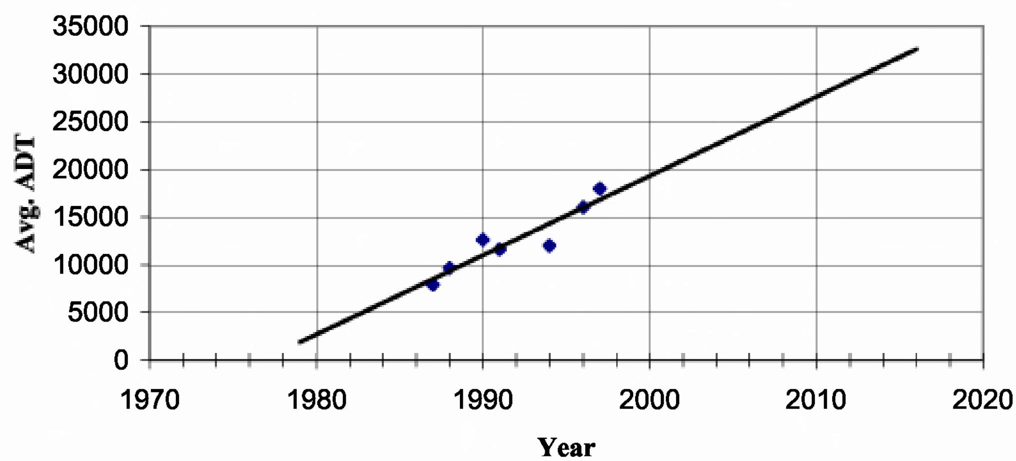


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 412 #13	4	72	412	2	6.27	17	1986		
							1987	7930	2
							1988	9640	2
							1989		
							1990	12620	2
							1991	11620	2
							1992		
							1993		
							1994	12000	2
							1995		
							1996	16000	2
							1997	18000	2

Figure H-17: ADT Data For Highway 412 #13

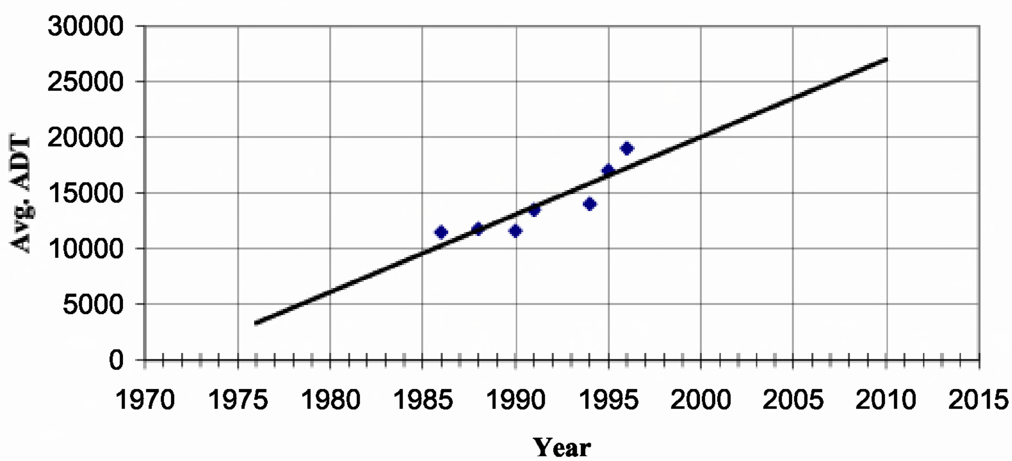


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 412 #14	4	72	412	2	7.55	17	1986	11500	2
							1987		
							1988	11790	2
							1989		
							1990	11620	2
							1991	13510	2
							1992		
							1993		
							1994	14000	2
							1995	17000	2
							1996	19000	2
							1997		

Figure H-18: ADT Data for Highway 412 #14

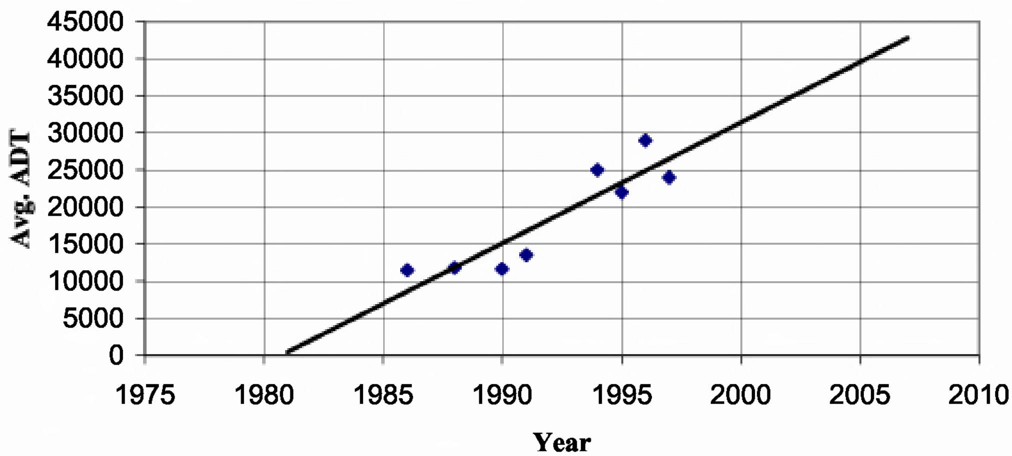


ADT DATA (from 1997 AHTD database)

* ADT are from station containing sampled location or as close as possible.

Location	District #	County #	Route	Section	Log Mile	% Trucks	AHTD ADT History		
							Year	AADT	Fun.Class
Hwy 412 #15	4	72	412	2	8.63	17	1986	11500	2
							1987		
							1988	11790	2
							1989		
							1990	11620	2
							1991	13510	2
							1992		
							1993		
							1994	25000	14
							1995	22000	14
							1996	29000	14
							1997	24000	14

Figure H-19: ADT Data for Highway 412 #15



APPENDIX I

EXPECTED PSI AND

EQUIVALENT SINGLE AXLE LOAD CALCULATIONS

Table I-1: Expected PSI Based on AASHTO Performance Equations

Location	Job Number	Year Built	ESAL's Experienced as of 1997	Expected ESAL's as of 1999	SN**	β	log ρ	log((4.2-Expected PSI)/(4.2-1.5)) = (log W - log ρ)* β	Expected PSI
Hwy 82 #1	R70050	1990	534944	687785	5.5	0.4660	7.4136	-0.734573602	3.70
Hwy 82 #2	R70051	1990	534944	687785	5.5	0.4660	7.4136	-0.734573602	3.70
Hwy 79 #1 & #2	R70016	1991	591738	788984	5.23	0.4823	7.2412	-0.648281238	3.59
Hwy 49 #1	R00081	1999	576700	807380	4.2	0.6103	6.5066	-0.365853939	3.04
Hwy 49 #2	R00071	1999	508080	762120	5.5	0.4660	7.4136	-0.713801677	3.68
Hwy 270 #1	60116	1984	2115540	2441008	4.25	0.6001	6.5455	-0.094749995	2.03
Hwy 270 #2	60115	1981	1971000	2217375	5.3	0.4777	7.2866	-0.44937696	3.24
Hwy 65 #1	8827	1987	1979614	2375537	4.42	0.5696	6.6750	-0.170445428	2.38
Hwy 65 #2 & #10	R80010	1988	2360820	2885447	5.6	0.4610	7.4757	-0.468153882	3.28
Hwy 65 #11	R80011	1988	2360820	2885447	5.66	0.4582	7.5125	-0.48216763	3.31
Hwy 65 #12	8827	1987	1979614	2375537	4.42	0.5696	6.6750	-0.170445428	2.38
Hwy 412 #10	1675	1994	747520	1245867	5.28	0.4790	7.2737	-0.564319953	3.46
Hwy 412 #11	1675	1994	747520	1245867	5.28	0.4790	7.2737	-0.564319953	3.46
Hwy 412 #12	40112	1994	961848	1603080	6.1	0.4418	7.7725	-0.692510197	3.65
Hwy 412 #13	40112	1994	1061128	1768547	6.5	0.4314	7.9953	-0.754015163	3.72
Hwy 412 #14	R40016	1987	3136518	3763822	5.3	0.4777	7.2866	-0.339612038	2.96

* Note: Since the ADT counts were only known through 1997, straight-line interpolation was used to determine the ESAL's through 1999.
** Note: SN obtained from either AHTD design records or calculated based on borings.

Table I-2: Summary of ESAL's Experienced

Location	**Design Data**						**Actual Counts for 1997**	
	% Trucks	**Year**	**ADT**	**Year**	**ADT**	**ESAL's***	**ADT**	**ESAL's***
Hwy 82 #1 & #2	15.33	1989	2760	2009	4100	452	4200	458
Hwy 79 #1 & #2	16.79	1990	3930	2010	5955	713	4100	579
Hwy 49 #1	11	1992	7525	2012	11750	911	9200	790
Hwy 49 #2	11	1993	10000	2013	15700	1215	8400	870
Hwy 270 #1	12	1982	6650	2002	10400	879	12100	966
Hwy 270 #2	8.8	1979	8940	1999	18560	1040	10900	750
Hwy 65 #1 & #12	8	1984	11320	2004	19600	1064	19000	1043
Hwy 65 #2, #10, & #1	11	1986	11095	2006	19600	1451	20000	1470
Hwy 412 #10 & #11	19	1993	7195	2013	12225	1584	8500	1280
Hwy 412 #12	19	1993	8950	2013	14040	1732	13000	1647
Hwy 412 #13	16	1993	8950	2013	14040	1579	17500	1817
Hwy 412 #14	16	1986	10425	2006	18035	1955	18000	1953

* These are 24 hr ESAL's

Location	**Design ESAL's****	**Actual ESAL's***	**Percent of Design Life**	**Percent of Design ESAL's**
Hwy 82 #1 & #2	1319840	534944	40	40.53097345
Hwy 79 #1 & #2	2081960	591738	35	28.42215989
Hwy 49 #1	2660120	576700	25	21.67947311
Hwy 49 #2	3547800	508080	20	14.32098765
Hwy 270 #1	2566680	2115540	75	82.42320819
Hwy 270 #2	3036800	1971000	90	64.90384615
Hwy 65 #1 & #12	3106880	1979614	65	63.71710526
Hwy 65 #2, #10, & #1	4236920	2360820	55	55.72019297
Hwy 412 #10 & #11	4625280	747520	20	16.16161616
Hwy 412 #12	5057440	961848	20	19.01847575
Hwy 412 #13	4610680	1061128	20	23.01456618
Hwy 412 #14	5708600	3136518	55	54.94373402

** ESAL's = (24 hr ESAL's)(0.5)(0.8 if 2 lanes in that direction)(years)(365)

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 82 #1 & #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1989 ADT	15.33	2760	2337	423
2009 ADT	15.33	4100	3471	629
AVERAGE ADT	15.33	3430	2904	526
DHV	11.1909	451		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	78	0.02
2,001- 4,000	331	0.99
4,001- 6,000	111	1.44
6,001- 8,000	74	3.02
8,001-10,000	107	10.87
10,001-12,000	99	21.16
12,001-14,000	52	20.32
14,001-16,000	25	16.05
16,001-18,000	13	12.57
18,001-20,000	8	11.04
20,001-22,000	4	7.37
22,001-24,000	2	5.75
24,001-26,000	1	3.89
26,001-28,000	1	2.83
28,001-30,000	0	1.85
30,001-32,000	0	1.59
32,001-34,000	0	1.02
34,001-36,000	0	1.30
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	904	123.07

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	2	0.00
2,001- 4,000	9	0.00
4,000- 6,000	11	0.01
6,001- 8,000	17	0.07
8,001-10,000	28	0.25
10,001-12,000	40	0.72
12,001-14,000	44	1.46
14,001-16,000	38	2.16
16,001-18,000	28	2.54
18,001-20,000	24	3.39
20,001-22,000	21	4.34
22,001-24,000	19	5.59
24,001-26,000	22	9.00
26,001-28,000	27	14.44
28,001-30,000	31	21.52
30,001-32,000	34	30.12
32,001-34,000	30	33.57
34,001-36,000	25	34.54
36,001-38,000	18	29.74
38,001-40,000	14	28.39
40,001-42,000	11	25.96
42,001-46,000	8	23.19
46,001-48,000	5	18.60
48,001-50,000	3	12.12
50,001-52,000	2	8.62
52,001-54,000	1	7.77
54,001-56,000	1	5.46
56,001-58,000	0	2.60
58,001-60,000	0	1.69
TOTALS	516	327.88

S/A 18K EAL= 123 T/A 18K = 328 AUTO 18K = 1
TOTAL 18K EAL= **452**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 82 #1 & #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1989 ADT	15.33	2760	2337	423
1997 ADT	15.33	4200	3556	644
AVERAGE ADT	15.33	3480	2947	533
DHV	11.1909	462		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	79	0.02
2,001- 4,000	336	1.01
4,001- 6,000	113	1.46
6,001- 8,000	75	3.06
8,001-10,000	108	11.03
10,001-12,000	101	21.46
12,001-14,000	53	20.62
14,001-16,000	25	16.28
16,001-18,000	13	12.76
18,001-20,000	8	11.20
20,001-22,000	4	7.48
22,001-24,000	2	5.84
24,001-26,000	1	3.95
26,001-28,000	1	2.87
28,001-30,000	0	1.87
30,001-32,000	0	1.62
32,001-34,000	0	1.04
34,001-36,000	0	1.32
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	918	124.87

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	2	0.00
2,001- 4,000	10	0.00
4,000- 6,000	12	0.01
6,001- 8,000	18	0.07
8,001-10,000	29	0.26
10,001-12,000	41	0.73
12,001-14,000	45	1.49
14,001-16,000	38	2.19
16,001-18,000	28	2.58
18,001-20,000	24	3.44
20,001-22,000	21	4.40
22,001-24,000	19	5.67
24,001-26,000	23	9.13
26,001-28,000	27	14.65
28,001-30,000	31	21.84
30,001-32,000	34	30.56
32,001-34,000	31	34.06
34,001-36,000	25	35.05
36,001-38,000	18	30.17
38,001-40,000	14	28.81
40,001-42,000	11	26.34
42,001-46,000	8	23.53
46,001-48,000	6	18.87
48,001-50,000	3	12.30
50,001-52,000	2	8.75
52,001-54,000	1	7.89
54,001-56,000	1	5.54
56,001-58,000	0	2.64
58,001-60,000	0	1.72
TOTALS	523	332.66

S/A 18K EAL= 125 T/A 18K = 333 AUTO 18K = 1
TOTAL 18K EAL= **458**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 79 #1 & #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1990 ADT	16.79	3930	3270	660
2010 ADT	16.79	5955	4955	1000
AVERAGE ADT	16.79	4943	4113	830
DHV	12.2567	655		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	123	0.02
2,001- 4,000	523	1.57
4,001- 6,000	175	2.28
6,001- 8,000	116	4.76
8,001-10,000	168	17.15
10,001-12,000	157	33.39
12,001-14,000	83	32.07
14,001-16,000	39	25.32
16,001-18,000	20	19.84
18,001-20,000	12	17.42
20,001-22,000	6	11.64
22,001-24,000	3	9.08
24,001-26,000	2	6.14
26,001-28,000	1	4.46
28,001-30,000	0	2.91
30,001-32,000	0	2.51
32,001-34,000	0	1.61
34,001-36,000	0	2.06
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1427	194.24

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	3	0.00
2,001- 4,000	15	0.00
4,000- 6,000	18	0.02
6,001- 8,000	27	0.11
8,001-10,000	44	0.40
10,001-12,000	63	1.14
12,001-14,000	70	2.31
14,001-16,000	60	3.40
16,001-18,000	44	4.01
18,001-20,000	38	5.35
20,001-22,000	33	6.85
22,001-24,000	30	8.82
24,001-26,000	35	14.21
26,001-28,000	43	22.79
28,001-30,000	49	33.97
30,001-32,000	54	47.54
32,001-34,000	48	52.98
34,001-36,000	40	54.52
36,001-38,000	28	46.94
38,001-40,000	22	44.81
40,001-42,000	17	40.97
42,001-46,000	13	36.59
46,001-48,000	9	29.35
48,001-50,000	5	19.13
50,001-52,000	3	13.61
52,001-54,000	2	12.27
54,001-56,000	1	8.61
56,001-58,000	1	4.11
58,001-60,000	0	2.67
TOTALS	814	517.47

S/A 18K EAL= 194 T/A 18K = 517 AUTO 18K = 1
TOTAL 18K EAL= **713**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Design
LOCATION: Hwy 79 #1 & #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1990 ADT	16.79	3930	3270	660
1997 ADT	16.79	4100	3412	688
AVERAGE ADT	16.79	4015	3341	674
DHV	12.2567	451		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

<u>SINGLE AXLES</u>

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	100	0.02
2,001- 4,000	425	1.27
4,001- 6,000	142	1.85
6,001- 8,000	94	3.87
8,001-10,000	137	13.93
10,001-12,000	127	27.12
12,001-14,000	67	26.05
14,001-16,000	32	20.57
16,001-18,000	16	16.12
18,001-20,000	10	14.15
20,001-22,000	5	9.45
22,001-24,000	3	7.37
24,001-26,000	1	4.99
26,001-28,000	1	3.63
28,001-30,000	0	2.37
30,001-32,000	0	2.04
32,001-34,000	0	1.31
34,001-36,000	0	1.67
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1160	157.79

<u>TANDEM AXLES</u>

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	3	0.00
2,001- 4,000	12	0.00
4,000- 6,000	15	0.01
6,001- 8,000	22	0.09
8,001-10,000	36	0.33
10,001-12,000	51	0.92
12,001-14,000	57	1.88
14,001-16,000	48	2.76
16,001-18,000	35	3.26
18,001-20,000	31	4.35
20,001-22,000	27	5.56
22,001-24,000	25	7.17
24,001-26,000	29	11.54
26,001-28,000	35	18.51
28,001-30,000	40	27.59
30,001-32,000	44	38.62
32,001-34,000	39	43.04
34,001-36,000	32	44.28
36,001-38,000	23	38.13
38,001-40,000	18	36.40
40,001-42,000	14	33.28
42,001-46,000	10	29.73
46,001-48,000	7	23.85
48,001-50,000	4	15.54
50,001-52,000	2	11.05
52,001-54,000	2	9.97
54,001-56,000	1	7.00
56,001-58,000	0	3.33
58,001-60,000	0	2.17
TOTALS	661	420.36

S/A 18K EAL= 158 T/A 18K = 420 AUTO 18K = 1
TOTAL 18K EAL= **579**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 49 #1

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1992 ADT	11	7525	6697	828
2012 ADT	11	11750	10458	1293
AVERAGE ADT	11	9638	8577	1060
DHV	8.03	1293		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	157	0.03
2,001- 4,000	668	2.00
4,001- 6,000	224	2.91
6,001- 8,000	148	6.08
8,001-10,000	215	21.91
10,001-12,000	200	42.65
12,001-14,000	106	40.97
14,001-16,000	50	32.35
16,001-18,000	25	25.35
18,001-20,000	15	22.25
20,001-22,000	7	14.87
22,001-24,000	4	11.60
24,001-26,000	2	7.84
26,001-28,000	1	5.70
28,001-30,000	1	3.72
30,001-32,000	0	3.21
32,001-34,000	0	2.06
34,001-36,000	0	2.63
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1824	248.14

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	4	0.00
2,001- 4,000	19	0.01
4,000- 6,000	23	0.02
6,001- 8,000	35	0.14
8,001-10,000	57	0.51
10,001-12,000	81	1.45
12,001-14,000	89	2.95
14,001-16,000	76	4.35
16,001-18,000	56	5.12
18,001-20,000	48	6.84
20,001-22,000	42	8.74
22,001-24,000	39	11.27
24,001-26,000	45	18.15
26,001-28,000	55	29.12
28,001-30,000	62	43.39
30,001-32,000	68	60.73
32,001-34,000	61	67.68
34,001-36,000	50	69.64
36,001-38,000	36	59.96
38,001-40,000	28	57.24
40,001-42,000	22	52.34
42,001-46,000	16	46.75
46,001-48,000	11	37.50
48,001-50,000	6	24.43
50,001-52,000	4	17.38
52,001-54,000	3	15.67
54,001-56,000	2	11.00
56,001-58,000	1	5.24
58,001-60,000	0	3.41
TOTALS	1040	661.06

S/A 18K EAL= 248 T/A 18K = 661 AUTO 18K = 2
TOTAL 18K EAL= **911**
WORKED BY:

JOB NUMBER:	
JOB TITLE:	Actual Data
LOCATION:	Hwy 49 #1

COUNTY:

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1992 ADT	11	7525	6697	828
1997 ADT	11	9200	8188	1012
AVERAGE ADT	11	8363	7443	920
DHV	8.03	1012		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	136	0.03
2,001- 4,000	580	1.74
4,001- 6,000	194	2.52
6,001- 8,000	129	5.27
8,001-10,000	186	19.01
10,001-12,000	174	37.01
12,001-14,000	92	35.55
14,001-16,000	44	28.07
16,001-18,000	22	22.00
18,001-20,000	13	19.31
20,001-22,000	6	12.90
22,001-24,000	3	10.06
24,001-26,000	2	6.81
26,001-28,000	1	4.95
28,001-30,000	0	3.23
30,001-32,000	0	2.79
32,001-34,000	0	1.79
34,001-36,000	0	2.28
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1582	215.31

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	4	0.00
2,001- 4,000	16	0.00
4,000- 6,000	20	0.02
6,001- 8,000	30	0.12
8,001-10,000	49	0.44
10,001-12,000	70	1.26
12,001-14,000	78	2.56
14,001-16,000	66	3.77
16,001-18,000	48	4.44
18,001-20,000	42	5.93
20,001-22,000	37	7.59
22,001-24,000	33	9.78
24,001-26,000	39	15.75
26,001-28,000	47	25.26
28,001-30,000	54	37.65
30,001-32,000	59	52.70
32,001-34,000	53	58.73
34,001-36,000	44	60.43
36,001-38,000	31	52.03
38,001-40,000	24	49.67
40,001-42,000	19	45.42
42,001-46,000	14	40.56
46,001-48,000	10	32.54
48,001-50,000	5	21.20
50,001-52,000	3	15.08
52,001-54,000	3	13.60
54,001-56,000	2	9.55
56,001-58,000	1	4.55
58,001-60,000	0	2.96
TOTALS	902	573.61

S/A 18K EAL= 215 T/A 18K = 574 AUTO 18K = 1

TOTAL 18K EAL= **790**

WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 49 #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	11	10000	8900	1100
2013 ADT	11	15700	13973	1727
AVERAGE ADT	11	12850	11437	1414
DHV	8.03	1727		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

<u>SINGLE AXLES</u>

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	209	0.04
2,001- 4,000	890	2.67
4,001- 6,000	298	3.88
6,001- 8,000	198	8.11
8,001-10,000	286	29.22
10,001-12,000	267	56.87
12,001-14,000	141	54.63
14,001-16,000	67	43.13
16,001-18,000	34	33.80
18,001-20,000	20	29.67
20,001-22,000	9	19.82
22,001-24,000	5	15.46
24,001-26,000	3	10.46
26,001-28,000	1	7.60
28,001-30,000	1	4.96
30,001-32,000	0	4.28
32,001-34,000	0	2.75
34,001-36,000	0	3.50
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	2431	330.85

<u>TANDEM AXLES</u>

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	6	0.00
2,001- 4,000	25	0.01
4,000- 6,000	31	0.03
6,001- 8,000	46	0.19
8,001-10,000	76	0.68
10,001-12,000	108	1.94
12,001-14,000	119	3.94
14,001-16,000	102	5.80
16,001-18,000	74	6.83
18,001-20,000	65	9.12
20,001-22,000	56	11.66
22,001-24,000	51	15.03
24,001-26,000	60	24.20
26,001-28,000	73	38.82
28,001-30,000	83	57.85
30,001-32,000	91	80.97
32,001-34,000	81	90.24
34,001-36,000	67	92.86
36,001-38,000	48	79.95
38,001-40,000	38	76.32
40,001-42,000	29	69.79
42,001-46,000	22	62.33
46,001-48,000	15	50.00
48,001-50,000	8	32.58
50,001-52,000	5	23.17
52,001-54,000	4	20.90
54,001-56,000	2	14.67
56,001-58,000	1	6.99
58,001-60,000	1	4.55
TOTALS	1387	881.41

S/A 18K EAL= 331 T/A 18K = 881 AUTO 18K = 2
TOTAL 18K EAL= **1215**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 49 #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	11	10000	8900	1100
1997 ADT	11	8400	7476	924
AVERAGE ADT	11	9200	8188	1012
DHV	8.03	924		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

<u>SINGLE AXLES</u>

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	150	0.03
2,001- 4,000	638	1.91
4,001- 6,000	214	2.78
6,001- 8,000	142	5.80
8,001-10,000	205	20.92
10,001-12,000	191	40.72
12,001-14,000	101	39.11
14,001-16,000	48	30.88
16,001-18,000	24	24.20
18,001-20,000	14	21.24
20,001-22,000	7	14.19
22,001-24,000	4	11.07
24,001-26,000	2	7.49
26,001-28,000	1	5.44
28,001-30,000	1	3.55
30,001-32,000	0	3.06
32,001-34,000	0	1.97
34,001-36,000	0	2.51
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1741	236.87

<u>TANDEM AXLES</u>

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	4	0.00
2,001- 4,000	18	0.01
4,000- 6,000	22	0.02
6,001- 8,000	33	0.13
8,001-10,000	54	0.49
10,001-12,000	77	1.39
12,001-14,000	85	2.82
14,001-16,000	73	4.15
16,001-18,000	53	4.89
18,001-20,000	46	6.53
20,001-22,000	40	8.35
22,001-24,000	37	10.76
24,001-26,000	43	17.33
26,001-28,000	52	27.79
28,001-30,000	60	41.42
30,001-32,000	65	57.97
32,001-34,000	58	64.61
34,001-36,000	48	66.48
36,001-38,000	34	57.24
38,001-40,000	27	54.64
40,001-42,000	21	49.96
42,001-46,000	15	44.63
46,001-48,000	11	35.80
48,001-50,000	6	23.32
50,001-52,000	4	16.59
52,001-54,000	3	14.96
54,001-56,000	2	10.50
56,001-58,000	1	5.01
58,001-60,000	0	3.26
TOTALS	993	631.05

S/A 18K EAL= 237 T/A 18K = 631 AUTO 18K = 2
TOTAL 18K EAL= **870**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 270 #1

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1982 ADT	12	6650	5852	798
2002 ADT	12	10400	9152	1248
AVERAGE ADT	12	8525	7502	1023
DHV	8.76	1144		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	151	0.03
2,001- 4,000	644	1.93
4,001- 6,000	216	2.81
6,001- 8,000	143	5.87
8,001-10,000	207	21.15
10,001-12,000	193	41.16
12,001-14,000	102	39.54
14,001-16,000	48	31.22
16,001-18,000	24	24.46
18,001-20,000	15	21.47
20,001-22,000	7	14.34
22,001-24,000	4	11.19
24,001-26,000	2	7.57
26,001-28,000	1	5.50
28,001-30,000	1	3.59
30,001-32,000	0	3.10
32,001-34,000	0	1.99
34,001-36,000	0	2.53
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1760	239.45

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	4	0.00
2,001- 4,000	18	0.01
4,000- 6,000	22	0.02
6,001- 8,000	34	0.13
8,001-10,000	55	0.49
10,001-12,000	78	1.40
12,001-14,000	86	2.85
14,001-16,000	74	4.20
16,001-18,000	54	4.94
18,001-20,000	47	6.60
20,001-22,000	41	8.44
22,001-24,000	37	10.88
24,001-26,000	44	17.51
26,001-28,000	53	28.10
28,001-30,000	60	41.87
30,001-32,000	66	58.60
32,001-34,000	59	65.31
34,001-36,000	49	67.20
36,001-38,000	34	57.86
38,001-40,000	27	55.24
40,001-42,000	21	50.51
42,001-46,000	16	45.11
46,001-48,000	11	36.19
48,001-50,000	6	23.58
50,001-52,000	4	16.77
52,001-54,000	3	15.13
54,001-56,000	2	10.62
56,001-58,000	1	5.06
58,001-60,000	0	3.29
TOTALS	1003	637.91

S/A 18K EAL= 239 T/A 18K = 638 AUTO 18K = 2
TOTAL 18K EAL= **879**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 270 #1

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1982 ADT	12	6650	5852	798
1997 ADT	12	12100	10648	1452
AVERAGE ADT	12	9375	8250	1125
DHV	8.76	1331		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	166	0.03
2,001- 4,000	709	2.13
4,001- 6,000	237	3.09
6,001- 8,000	157	6.45
8,001-10,000	228	23.25
10,001-12,000	213	45.26
12,001-14,000	112	43.48
14,001-16,000	53	34.33
16,001-18,000	27	26.90
18,001-20,000	16	23.61
20,001-22,000	8	15.78
22,001-24,000	4	12.31
24,001-26,000	2	8.32
26,001-28,000	1	6.05
28,001-30,000	1	3.95
30,001-32,000	0	3.41
32,001-34,000	0	2.19
34,001-36,000	0	2.79
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1935	263.32

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	5	0.00
2,001- 4,000	20	0.01
4,000- 6,000	24	0.02
6,001- 8,000	37	0.15
8,001-10,000	60	0.54
10,001-12,000	86	1.54
12,001-14,000	95	3.13
14,001-16,000	81	4.61
16,001-18,000	59	5.43
18,001-20,000	51	7.26
20,001-22,000	45	9.28
22,001-24,000	41	11.96
24,001-26,000	48	19.26
26,001-28,000	58	30.90
28,001-30,000	66	46.05
30,001-32,000	73	64.45
32,001-34,000	65	71.82
34,001-36,000	54	73.90
36,001-38,000	38	63.63
38,001-40,000	30	60.75
40,001-42,000	23	55.54
42,001-46,000	17	49.61
46,001-48,000	12	39.80
48,001-50,000	7	25.93
50,001-52,000	4	18.44
52,001-54,000	3	16.63
54,001-56,000	2	11.68
56,001-58,000	1	5.57
58,001-60,000	0	3.62
TOTALS	1104	701.52

S/A 18K EAL= 263 T/A 18K = 702 AUTO 18K = 2
TOTAL 18K EAL= **966**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 270 #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1979 ADT	8.8	8940	8153	787
1999 ADT	8.8	18560	16927	1633
AVERAGE ADT	8.8	13750	12540	1210
DHV	6.424	2042		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES			TANDEM AXLES		
WEIGHT GROUP	# OF AXLES	18K EQ	WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	179	0.04	UNDER 2,000	5	0.00
2,001- 4,000	762	2.29	2,001- 4,000	22	0.01
4,001- 6,000	255	3.32	4,000- 6,000	26	0.03
6,001- 8,000	169	6.94	6,001- 8,000	40	0.16
8,001-10,000	245	25.01	8,001-10,000	65	0.58
10,001-12,000	229	48.68	10,001-12,000	92	1.66
12,001-14,000	121	46.76	12,001-14,000	102	3.37
14,001-16,000	57	36.92	14,001-16,000	87	4.96
16,001-18,000	29	28.93	16,001-18,000	64	5.85
18,001-20,000	17	25.40	18,001-20,000	55	7.80
20,001-22,000	8	16.97	20,001-22,000	48	9.98
22,001-24,000	5	13.23	22,001-24,000	44	12.87
24,001-26,000	2	8.95	24,001-26,000	52	20.72
26,001-28,000	1	6.51	26,001-28,000	62	33.23
28,001-30,000	1	4.25	28,001-30,000	71	49.52
30,001-32,000	0	3.66	30,001-32,000	78	69.32
32,001-34,000	0	2.35	32,001-34,000	70	77.25
34,001-36,000	0	3.00	34,001-36,000	58	79.49
36,001-38,000	0	0.00	36,001-38,000	41	68.44
38,001-40,000	0	0.00	38,001-40,000	32	65.34
			40,001-42,000	25	59.74
			42,001-46,000	19	53.36
			46,001-48,000	13	42.80
			48,001-50,000	7	27.89
			50,001-52,000	4	19.84
			52,001-54,000	3	17.89
			54,001-56,000	2	12.56
			56,001-58,000	1	5.99
			58,001-60,000	0	3.90
TOTALS	2081	283.22	TOTALS	1187	754.52

S/A 18K EAL= 283 T/A 18K = 755 AUTO 18K = 3
TOTAL 18K EAL= **1040**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 270 #2

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1979 ADT	8.8	8940	8153	787
1997 ADT	8.8	10900	9941	959
AVERAGE ADT	8.8	9920	9047	873
DHV	6.424	1199		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	129	0.03
2,001- 4,000	550	1.65
4,001- 6,000	184	2.40
6,001- 8,000	122	5.01
8,001-10,000	177	18.04
10,001-12,000	165	35.12
12,001-14,000	87	33.74
14,001-16,000	41	26.64
16,001-18,000	21	20.87
18,001-20,000	12	18.32
20,001-22,000	6	12.24
22,001-24,000	3	9.55
24,001-26,000	2	6.46
26,001-28,000	1	4.69
28,001-30,000	0	3.06
30,001-32,000	0	2.64
32,001-34,000	0	1.70
34,001-36,000	0	2.16
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	1502	204.33

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	4	0.00
2,001- 4,000	16	0.00
4,000- 6,000	19	0.02
6,001- 8,000	29	0.11
8,001-10,000	47	0.42
10,001-12,000	66	1.20
12,001-14,000	74	2.43
14,001-16,000	63	3.58
16,001-18,000	46	4.22
18,001-20,000	40	5.63
20,001-22,000	35	7.20
22,001-24,000	32	9.28
24,001-26,000	37	14.95
26,001-28,000	45	23.98
28,001-30,000	51	35.73
30,001-32,000	56	50.01
32,001-34,000	50	55.73
34,001-36,000	42	57.35
36,001-38,000	29	49.37
38,001-40,000	23	47.14
40,001-42,000	18	43.10
42,001-46,000	13	38.50
46,001-48,000	9	30.88
48,001-50,000	5	20.12
50,001-52,000	3	14.31
52,001-54,000	2	12.91
54,001-56,000	1	9.06
56,001-58,000	1	4.32
58,001-60,000	0	2.81
TOTALS	856	544.35

S/A 18K EAL= 204 T/A 18K = 544 AUTO 18K = 2
TOTAL 18K EAL= **750**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 65 #1 & #12

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1984 ADT	8	11320	10414	906
2004 ADT	8	19600	18032	1568
AVERAGE ADT	8	15460	14223	1237
DHV	5.84	2156		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES WEIGHT GROUP	# OF AXLES	18K EQ	TANDEM AXLES WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	183	0.04	UNDER 2,000	5	0.00
2,001- 4,000	779	2.34	2,001- 4,000	22	0.01
4,001- 6,000	261	3.39	4,000- 6,000	27	0.03
6,001- 8,000	173	7.09	6,001- 8,000	41	0.16
8,001-10,000	251	25.57	8,001-10,000	66	0.60
10,001-12,000	234	49.76	10,001-12,000	94	1.69
12,001-14,000	123	47.80	12,001-14,000	104	3.45
14,001-16,000	59	37.74	14,001-16,000	89	5.07
16,001-18,000	30	29.58	16,001-18,000	65	5.98
18,001-20,000	18	25.96	18,001-20,000	57	7.98
20,001-22,000	8	17.34	20,001-22,000	49	10.20
22,001-24,000	5	13.53	22,001-24,000	45	13.15
24,001-26,000	2	9.15	24,001-26,000	53	21.18
26,001-28,000	1	6.65	26,001-28,000	64	33.97
28,001-30,000	1	4.34	28,001-30,000	73	50.62
30,001-32,000	0	3.74	30,001-32,000	80	70.85
32,001-34,000	0	2.40	32,001-34,000	71	78.96
34,001-36,000	0	3.06	34,001-36,000	59	81.25
36,001-38,000	0	0.00	36,001-38,000	42	69.95
38,001-40,000	0	0.00	38,001-40,000	33	66.78
			40,001-42,000	25	61.06
			42,001-46,000	19	54.54
			46,001-48,000	13	43.75
			48,001-50,000	7	28.51
			50,001-52,000	4	20.28
			52,001-54,000	3	18.29
			54,001-56,000	2	12.84
			56,001-58,000	1	6.12
			58,001-60,000	0	3.98
TOTALS	2127	289.49	TOTALS	1213	771.23

S/A 18K EAL= 289 T/A 18K = 771 AUTO 18K = 3
TOTAL 18K EAL= **1064**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 65 #1 & #12

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1984 ADT	8	11320	10414	906
1997 ADT	8	19000	17480	1520
AVERAGE ADT	8	15160	13947	1213
DHV	5.84	2090		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	179	0.04
2,001- 4,000	764	2.29
4,001- 6,000	256	3.33
6,001- 8,000	170	6.95
8,001-10,000	246	25.07
10,001-12,000	229	48.80
12,001-14,000	121	46.87
14,001-16,000	57	37.01
16,001-18,000	29	29.00
18,001-20,000	17	25.46
20,001-22,000	8	17.01
22,001-24,000	5	13.27
24,001-26,000	2	8.97
26,001-28,000	1	6.52
28,001-30,000	1	4.26
30,001-32,000	0	3.67
32,001-34,000	0	2.36
34,001-36,000	0	3.00
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	2086	283.87

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	5	0.00
2,001- 4,000	22	0.01
4,000- 6,000	26	0.03
6,001- 8,000	40	0.16
8,001-10,000	65	0.58
10,001-12,000	92	1.66
12,001-14,000	102	3.38
14,001-16,000	87	4.97
16,001-18,000	64	5.86
18,001-20,000	55	7.82
20,001-22,000	48	10.00
22,001-24,000	44	12.90
24,001-26,000	52	20.76
26,001-28,000	62	33.31
28,001-30,000	71	49.64
30,001-32,000	78	69.48
32,001-34,000	70	77.43
34,001-36,000	58	79.67
36,001-38,000	41	68.59
38,001-40,000	32	65.49
40,001-42,000	25	59.88
42,001-46,000	19	53.48
46,001-48,000	13	42.90
48,001-50,000	7	27.95
50,001-52,000	4	19.88
52,001-54,000	3	17.93
54,001-56,000	2	12.59
56,001-58,000	1	6.00
58,001-60,000	0	3.90
TOTALS	1190	756.26

S/A 18K EAL= 284 T/A 18K = 756 AUTO 18K = 3
TOTAL 18K EAL= **1043**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 65 #2, #10, & #11

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1986 ADT	11	11095	9875	1220
2006 ADT	11	19600	17444	2156
AVERAGE ADT	11	15348	13659	1688
DHV	8.03	2156		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	250	0.05
2,001- 4,000	1064	3.19
4,001- 6,000	356	4.63
6,001- 8,000	236	9.68
8,001-10,000	342	34.90
10,001-12,000	319	67.92
12,001-14,000	168	65.25
14,001-16,000	80	51.52
16,001-18,000	40	40.37
18,001-20,000	24	35.44
20,001-22,000	11	23.67
22,001-24,000	6	18.47
24,001-26,000	3	12.49
26,001-28,000	2	9.08
28,001-30,000	1	5.92
30,001-32,000	1	5.11
32,001-34,000	0	3.28
34,001-36,000	0	4.18
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	2904	395.15

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	7	0.00
2,001- 4,000	30	0.01
4,000- 6,000	37	0.04
6,001- 8,000	56	0.22
8,001-10,000	90	0.81
10,001-12,000	128	2.31
12,001-14,000	143	4.70
14,001-16,000	121	6.92
16,001-18,000	89	8.16
18,001-20,000	77	10.89
20,001-22,000	67	13.93
22,001-24,000	61	17.95
24,001-26,000	72	28.90
26,001-28,000	87	46.37
28,001-30,000	99	69.10
30,001-32,000	109	96.71
32,001-34,000	97	107.78
34,001-36,000	80	110.90
36,001-38,000	57	95.48
38,001-40,000	45	91.16
40,001-42,000	34	83.35
42,001-46,000	26	74.45
46,001-48,000	18	59.72
48,001-50,000	10	38.91
50,001-52,000	6	27.68
52,001-54,000	5	24.96
54,001-56,000	3	17.52
56,001-58,000	1	8.35
58,001-60,000	1	5.44
TOTALS	1656	1052.72

S/A 18K EAL= 395 T/A 18K = 1053 AUTO 18K = 3
TOTAL 18K EAL= **1451**
WORKED BY:

JOB NUMBER:		COUNTY:
JOB TITLE:	Actual Data	
LOCATION:	Hwy 65 #2, #10, & #11	

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1986 ADT	11	11095	9875	1220
1997 ADT	11	20000	17800	2200
AVERAGE ADT	11	15548	13837	1710
DHV	8.03	2200		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES			TANDEM AXLES		
WEIGHT GROUP	# OF AXLES	18K EQ	WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	253	0.05	UNDER 2,000	7	0.00
2,001- 4,000	1077	3.23	2,001- 4,000	31	0.01
4,001- 6,000	361	4.69	4,000- 6,000	37	0.04
6,001- 8,000	239	9.81	6,001- 8,000	56	0.22
8,001-10,000	347	35.35	8,001-10,000	92	0.82
10,001-12,000	323	68.81	10,001-12,000	130	2.34
12,001-14,000	170	66.10	12,001-14,000	144	4.76
14,001-16,000	81	52.19	14,001-16,000	123	7.01
16,001-18,000	41	40.90	16,001-18,000	90	8.26
18,001-20,000	24	35.90	18,001-20,000	78	11.03
20,001-22,000	11	23.98	20,001-22,000	68	14.11
22,001-24,000	6	18.71	22,001-24,000	62	18.18
24,001-26,000	3	12.65	24,001-26,000	73	29.28
26,001-28,000	2	9.20	26,001-28,000	88	46.97
28,001-30,000	1	6.00	28,001-30,000	101	70.00
30,001-32,000	1	5.18	30,001-32,000	110	97.97
32,001-34,000	0	3.32	32,001-34,000	98	109.19
34,001-36,000	0	4.24	34,001-36,000	81	112.35
36,001-38,000	0	0.00	36,001-38,000	58	96.73
38,001-40,000	0	0.00	38,001-40,000	45	92.35
			40,001-42,000	35	84.44
			42,001-46,000	26	75.42
			46,001-48,000	18	60.50
			48,001-50,000	10	39.42
			50,001-52,000	6	28.04
			52,001-54,000	5	25.29
			54,001-56,000	3	17.75
			56,001-58,000	1	8.46
			58,001-60,000	1	5.51
TOTALS	2942	400.30	TOTALS	1678	1066.44

S/A 18K EAL= 400 T/A 18K = 1066 AUTO 18K = 3

TOTAL 18K EAL= **1470**

WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 412 #10 & #11

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	19	7195	5828	1367
2013 ADT	19	12225	9902	2323
AVERAGE ADT	19	9710	7865	1845
DHV	13.87	1345		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	273	0.05
2,001- 4,000	1162	3.49
4,001- 6,000	389	5.06
6,001- 8,000	258	10.58
8,001-10,000	374	38.14
10,001-12,000	348	74.23
12,001-14,000	184	71.30
14,001-16,000	87	56.30
16,001-18,000	44	44.12
18,001-20,000	26	38.72
20,001-22,000	12	25.87
22,001-24,000	7	20.18
24,001-26,000	3	13.65
26,001-28,000	2	9.92
28,001-30,000	1	6.47
30,001-32,000	1	5.59
32,001-34,000	0	3.59
34,001-36,000	0	4.57
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	3174	431.82

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	8	0.00
2,001- 4,000	33	0.01
4,000- 6,000	40	0.04
6,001- 8,000	61	0.24
8,001-10,000	99	0.89
10,001-12,000	140	2.53
12,001-14,000	156	5.14
14,001-16,000	133	7.57
16,001-18,000	97	8.91
18,001-20,000	84	11.90
20,001-22,000	74	15.22
22,001-24,000	67	19.62
24,001-26,000	79	31.59
26,001-28,000	95	50.67
28,001-30,000	109	75.51
30,001-32,000	119	105.69
32,001-34,000	106	117.79
34,001-36,000	88	121.20
36,001-38,000	62	104.35
38,001-40,000	49	99.62
40,001-42,000	37	91.09
42,001-46,000	28	81.36
46,001-48,000	19	65.26
48,001-50,000	11	42.52
50,001-52,000	7	30.25
52,001-54,000	5	27.28
54,001-56,000	3	19.15
56,001-58,000	1	9.13
58,001-60,000	1	5.94
TOTALS	1810	1150.42

S/A 18K EAL= 432 T/A 18K = 1150 AUTO 18K = 2
TOTAL 18K EAL= **1584**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 412 #10 & #11

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	19	7195	5828	1367
1997 ADT	19	8500	6885	1615
AVERAGE ADT	19	7848	6356	1491
DHV	13.87	935		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	221	0.04
2,001- 4,000	939	2.82
4,001- 6,000	315	4.09
6,001- 8,000	209	8.55
8,001-10,000	302	30.82
10,001-12,000	282	59.99
12,001-14,000	149	57.62
14,001-16,000	71	45.50
16,001-18,000	36	35.65
18,001-20,000	21	31.30
20,001-22,000	10	20.91
22,001-24,000	6	16.31
24,001-26,000	3	11.03
26,001-28,000	2	8.02
28,001-30,000	1	5.23
30,001-32,000	1	4.51
32,001-34,000	0	2.90
34,001-36,000	0	3.69
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	2565	348.99

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	6	0.00
2,001- 4,000	27	0.01
4,000- 6,000	32	0.03
6,001- 8,000	49	0.20
8,001-10,000	80	0.72
10,001-12,000	113	2.04
12,001-14,000	126	4.15
14,001-16,000	107	6.11
16,001-18,000	78	7.20
18,001-20,000	68	9.62
20,001-22,000	59	12.30
22,001-24,000	54	15.85
24,001-26,000	64	25.53
26,001-28,000	77	40.95
28,001-30,000	88	61.03
30,001-32,000	96	85.41
32,001-34,000	86	95.19
34,001-36,000	71	97.95
36,001-38,000	50	84.33
38,001-40,000	40	80.51
40,001-42,000	30	73.61
42,001-46,000	23	65.75
46,001-48,000	16	52.74
48,001-50,000	9	34.37
50,001-52,000	5	24.45
52,001-54,000	4	22.05
54,001-56,000	2	15.47
56,001-58,000	1	7.38
58,001-60,000	1	4.80
TOTALS	1463	929.76

S/A 18K EAL= 349 T/A 18K = 930 AUTO 18K = 1
TOTAL 18K EAL= **1280**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 412 #12

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	19	7195	5828	1367
2013 ADT	19	14040	11372	2668
AVERAGE ADT	19	10618	8600	2017
DHV	13.87	1544		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	298	0.06
2,001- 4,000	1271	3.81
4,001- 6,000	426	5.54
6,001- 8,000	282	11.57
8,001-10,000	409	41.70
10,001-12,000	381	81.17
12,001-14,000	201	77.96
14,001-16,000	95	61.56
16,001-18,000	48	48.24
18,001-20,000	29	42.34
20,001-22,000	14	28.29
22,001-24,000	8	22.07
24,001-26,000	4	14.93
26,001-28,000	2	10.85
28,001-30,000	1	7.08
30,001-32,000	1	6.11
32,001-34,000	0	3.92
34,001-36,000	0	5.00
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	3470	472.18

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	8	0.00
2,001- 4,000	36	0.01
4,000- 6,000	44	0.04
6,001- 8,000	66	0.27
8,001-10,000	108	0.97
10,001-12,000	153	2.76
12,001-14,000	170	5.62
14,001-16,000	145	8.27
16,001-18,000	106	9.75
18,001-20,000	92	13.01
20,001-22,000	80	16.64
22,001-24,000	73	21.45
24,001-26,000	86	34.54
26,001-28,000	104	55.40
28,001-30,000	119	82.57
30,001-32,000	130	115.56
32,001-34,000	116	128.79
34,001-36,000	96	132.52
36,001-38,000	68	114.10
38,001-40,000	54	108.93
40,001-42,000	41	99.60
42,001-46,000	31	88.96
46,001-48,000	21	71.36
48,001-50,000	12	46.50
50,001-52,000	7	33.07
52,001-54,000	6	29.83
54,001-56,000	3	20.94
56,001-58,000	1	9.98
58,001-60,000	1	6.49
TOTALS	1979	1257.94

S/A 18K EAL= 472 T/A 18K = 1258 AUTO 18K = 2
TOTAL 18K EAL= **1732**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 412 #12

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	19	7195	5828	1367
1997 ADT	19	13000	10530	2470
AVERAGE ADT	19	10098	8179	1919
DHV	13.87	1430		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	284	0.06
2,001- 4,000	1209	3.63
4,001- 6,000	405	5.26
6,001- 8,000	268	11.00
8,001-10,000	389	39.66
10,001-12,000	362	77.19
12,001-14,000	191	74.15
14,001-16,000	91	58.54
16,001-18,000	46	45.88
18,001-20,000	27	40.27
20,001-22,000	13	26.90
22,001-24,000	7	20.98
24,001-26,000	4	14.20
26,001-28,000	2	10.32
28,001-30,000	1	6.73
30,001-32,000	1	5.81
32,001-34,000	0	3.73
34,001-36,000	0	4.75
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	3300	449.06

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	8	0.00
2,001- 4,000	34	0.01
4,000- 6,000	42	0.04
6,001- 8,000	63	0.25
8,001-10,000	103	0.93
10,001-12,000	146	2.63
12,001-14,000	162	5.34
14,001-16,000	138	7.87
16,001-18,000	101	9.27
18,001-20,000	88	12.37
20,001-22,000	76	15.83
22,001-24,000	70	20.40
24,001-26,000	82	32.85
26,001-28,000	99	52.69
28,001-30,000	113	78.52
30,001-32,000	124	109.90
32,001-34,000	110	122.49
34,001-36,000	91	126.03
36,001-38,000	65	108.51
38,001-40,000	51	103.59
40,001-42,000	39	94.72
42,001-46,000	29	84.60
46,001-48,000	20	67.87
48,001-50,000	11	44.22
50,001-52,000	7	31.45
52,001-54,000	5	28.37
54,001-56,000	3	19.91
56,001-58,000	1	9.49
58,001-60,000	1	6.18
TOTALS	1882	1196.33

S/A 18K EAL= 449 T/A 18K = 1196 AUTO 18K = 2
TOTAL 18K EAL= **1647**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 412 #13

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	16	8950	7518	1432
2013 ADT	16	14040	11794	2246
AVERAGE ADT	16	11495	9656	1839
DHV	11.68	1544		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	272	0.05
2,001- 4,000	1159	3.48
4,001- 6,000	388	5.05
6,001- 8,000	257	10.55
8,001-10,000	373	38.02
10,001-12,000	347	74.00
12,001-14,000	183	71.08
14,001-16,000	87	56.12
16,001-18,000	44	43.98
18,001-20,000	26	38.60
20,001-22,000	12	25.79
22,001-24,000	7	20.12
24,001-26,000	3	13.61
26,001-28,000	2	9.89
28,001-30,000	1	6.45
30,001-32,000	1	5.57
32,001-34,000	0	3.58
34,001-36,000	0	4.56
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	3164	430.49

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	8	0.00
2,001- 4,000	33	0.01
4,000- 6,000	40	0.04
6,001- 8,000	60	0.24
8,001-10,000	99	0.89
10,001-12,000	140	2.52
12,001-14,000	155	5.12
14,001-16,000	132	7.54
16,001-18,000	97	8.89
18,001-20,000	84	11.86
20,001-22,000	73	15.17
22,001-24,000	67	19.56
24,001-26,000	79	31.49
26,001-28,000	95	50.51
28,001-30,000	108	75.28
30,001-32,000	119	105.36
32,001-34,000	106	117.42
34,001-36,000	88	120.82
36,001-38,000	62	104.02
38,001-40,000	49	99.31
40,001-42,000	37	90.80
42,001-46,000	28	81.10
46,001-48,000	19	65.06
48,001-50,000	11	42.39
50,001-52,000	6	30.15
52,001-54,000	5	27.19
54,001-56,000	3	19.09
56,001-58,000	1	9.10
58,001-60,000	1	5.92
TOTALS	1804	1146.87

S/A 18K EAL= 430 T/A 18K = 1147 AUTO 18K = 2
TOTAL 18K EAL= **1579**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 412 #13

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1993 ADT	16	8950	7518	1432
1997 ADT	16	17500	14700	2800
AVERAGE ADT	16	13225	11109	2116
DHV	11.68	1925		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	313	0.06
2,001- 4,000	1333	4.00
4,001- 6,000	447	5.81
6,001- 8,000	296	12.13
8,001-10,000	429	43.74
10,001-12,000	400	85.14
12,001-14,000	211	81.78
14,001-16,000	100	64.57
16,001-18,000	51	50.60
18,001-20,000	30	44.41
20,001-22,000	14	29.67
22,001-24,000	8	23.14
24,001-26,000	4	15.66
26,001-28,000	2	11.38
28,001-30,000	1	7.43
30,001-32,000	1	6.41
32,001-34,000	0	4.11
34,001-36,000	0	5.24
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	3640	495.28

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	9	0.00
2,001- 4,000	38	0.01
4,000- 6,000	46	0.05
6,001- 8,000	70	0.28
8,001-10,000	113	1.02
10,001-12,000	161	2.90
12,001-14,000	179	5.89
14,001-16,000	152	8.68
16,001-18,000	111	10.22
18,001-20,000	97	13.65
20,001-22,000	84	17.45
22,001-24,000	77	22.50
24,001-26,000	90	36.23
26,001-28,000	109	58.11
28,001-30,000	125	86.61
30,001-32,000	137	121.22
32,001-34,000	122	135.09
34,001-36,000	101	139.01
36,001-38,000	71	119.68
38,001-40,000	56	114.26
40,001-42,000	43	104.47
42,001-46,000	32	93.31
46,001-48,000	22	74.85
48,001-50,000	12	48.77
50,001-52,000	7	34.69
52,001-54,000	6	31.29
54,001-56,000	4	21.96
56,001-58,000	1	10.47
58,001-60,000	1	6.81
TOTALS	2076	1319.47

S/A 18K EAL= 495 T/A 18K = 1319 AUTO 18K = 2
TOTAL 18K EAL= **1817**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Design Data
LOCATION: Hwy 412 #14

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1986 ADT	16	10425	8757	1668
2006 ADT	16	18035	15149	2886
AVERAGE ADT	16	14230	11953	2277
DHV	11.68	1984		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	337	0.07
2,001- 4,000	1434	4.30
4,001- 6,000	481	6.25
6,001- 8,000	318	13.06
8,001-10,000	461	47.06
10,001-12,000	430	91.60
12,001-14,000	227	87.99
14,001-16,000	108	69.48
16,001-18,000	54	54.44
18,001-20,000	33	47.79
20,001-22,000	15	31.93
22,001-24,000	9	24.90
24,001-26,000	4	16.85
26,001-28,000	2	12.24
28,001-30,000	1	7.99
30,001-32,000	1	6.89
32,001-34,000	0	4.43
34,001-36,000	0	5.64
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	3916	532.91

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	9	0.00
2,001- 4,000	41	0.01
4,000- 6,000	49	0.05
6,001- 8,000	75	0.30
8,001-10,000	122	1.10
10,001-12,000	173	3.12
12,001-14,000	192	6.34
14,001-16,000	164	9.34
16,001-18,000	120	11.00
18,001-20,000	104	14.68
20,001-22,000	91	18.78
22,001-24,000	83	24.21
24,001-26,000	97	38.98
26,001-28,000	117	62.53
28,001-30,000	134	93.19
30,001-32,000	147	130.43
32,001-34,000	131	145.36
34,001-36,000	108	149.57
36,001-38,000	77	128.77
38,001-40,000	61	122.94
40,001-42,000	46	112.41
42,001-46,000	35	100.40
46,001-48,000	24	80.54
48,001-50,000	13	52.48
50,001-52,000	8	37.33
52,001-54,000	6	33.66
54,001-56,000	4	23.63
56,001-58,000	2	11.26
58,001-60,000	1	7.33
TOTALS	2233	1419.74

S/A 18K EAL= 533 T/A 18K = 1420 AUTO 18K = 2
TOTAL 18K EAL= **1955**
WORKED BY:

JOB NUMBER: COUNTY:
JOB TITLE: Actual Data
LOCATION: Hwy 412 #14

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
1986 ADT	16	10425	8757	1668
1997 ADT	16	18000	15120	2880
AVERAGE ADT	16	14213	11939	2274
DHV	11.68	1980		

DD = .60 F-FACTOR = 3.683 SN = 4 SI= 2.50

SINGLE AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	336	0.07
2,001- 4,000	1433	4.30
4,001- 6,000	480	6.24
6,001- 8,000	318	13.04
8,001-10,000	461	47.01
10,001-12,000	430	91.49
12,001-14,000	227	87.88
14,001-16,000	108	69.39
16,001-18,000	54	54.38
18,001-20,000	32	47.73
20,001-22,000	15	31.89
22,001-24,000	9	24.87
24,001-26,000	4	16.83
26,001-28,000	2	12.23
28,001-30,000	1	7.98
30,001-32,000	1	6.89
32,001-34,000	0	4.42
34,001-36,000	0	5.63
36,001-38,000	0	0.00
38,001-40,000	0	0.00
TOTALS	3912	532.26

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	9	0.00
2,001- 4,000	41	0.01
4,000- 6,000	49	0.05
6,001- 8,000	75	0.30
8,001-10,000	122	1.10
10,001-12,000	173	3.11
12,001-14,000	192	6.33
14,001-16,000	164	9.33
16,001-18,000	119	10.99
18,001-20,000	104	14.67
20,001-22,000	91	18.76
22,001-24,000	83	24.18
24,001-26,000	97	38.93
26,001-28,000	117	62.45
28,001-30,000	134	93.07
30,001-32,000	147	130.27
32,001-34,000	131	145.18
34,001-36,000	108	149.39
36,001-38,000	77	128.62
38,001-40,000	60	122.79
40,001-42,000	46	112.27
42,001-46,000	35	100.28
46,001-48,000	24	80.44
48,001-50,000	13	52.41
50,001-52,000	8	37.28
52,001-54,000	6	33.62
54,001-56,000	4	23.60
56,001-58,000	2	11.25
58,001-60,000	1	7.32
TOTALS	2231	1418.00

S/A 18K EAL= 532 T/A 18K = 1418 AUTO 18K = 2
TOTAL 18K EAL= **1953**
WORKED BY:

APPENDIX J

CONSTRUCTION COSTS

AND

MAINTENANCE COST HISTORIES

Table J-1: Construction Costs for Highway 82 #1 and #2

Location: Hwy 82 #1 & #2
Job Number: R70050

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	5,000	LF	2.50	12,500
611	underdrain outlet protectors	20	EACH	75.00	1,500
	SELECTED PIPE BEDDING				
SP & 606	selected pipe (bedding)	200	CU YD	5.00	1,000
	BASE AND SURFACING				
303	agrgegate base course (class 5)	7,844	TON	10.50	82,363
401	tack coat (0.03 gal per sq yd)	39,417	GAL	0.75	29,563
	achm binder course (type 1)	48,870	TON		
SS & 405	mineral aggregate in achm binder course (type 1)	46,817	TON	15.76	737,840
405, 406	asphalt cement in achm binder course (type 1)	2,053	TON	125.00	256,566
	achm surface course (type 1)	34,694	TON		
SS & 406	mineral aggregate in achm surface course (type 1)	32,889	TON	15.76	518,338
405, 406	asphalt cement in achm surface course (type 1)	1,804	TON	125.00	225,508
	achm binder course (type 2)	20,934	TON		
SS & 405	mineral aggregate in achm binder course (type 2)	19,992	TON	15.76	315,078
405, 406	asphalt cement in achm binder course (type 2)	942	TON	125.00	117,755
	achm surface course (type 2)	6,931	TON		
SS & 406	mineral aggregate in achm surface course (type 2)	6,529	TON	15.76	102,903
405, 406	asphalt cement in achm surface course (type 2)	402	TON	125.00	50,253
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				2,451,167

Table J-2: Construction Costs for Highway 79 #1 and #2

Location: Hwy 79 #1 & #2
Job Number: R70016

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	5,800	LF	2.50	14,500
611	underdrain outlet protectors	20	EACH	75.00	1,500
	SELECTED PIPE BEDDING				
SS & 606	selected pipe (bedding)	1,500	CU YD	12.50	18,750
	BASE AND SURFACING				
303	agrgegate base course (class 5)	228,399	TON	7.25	1,655,891
401	prime coat (0.4 gal per sq yd)	49,368	GAL	1.00	49,368
401	tack coat (0.03 gal per sq yd)	13,795	GAL	1.00	13,795
	achm binder course (type 1)	34,577	TON		
SP, SS & 405	mineral aggregate in achm binder course (type 1)	33,124	TON	18.58	615,449
405, 406	asphalt cement in achm binder course (type 1)	1,452	TON	150.00	217,832
	achm surface course (type 1)	8,980	TON		
SP, SS & 406	mineral aggregate in achm surface course (type 1)	8,513	TON	17.68	150,516
405, 406	asphalt cement in achm surface course (type 1)	467	TON	150.00	70,046
	achm binder course (type 2)	12,397	TON		
SP, SS & 405	mineral aggregate in achm binder course (type 2)	11,840	TON	18.58	219,978
405, 406	asphalt cement in achm binder course (type 2)	558	TON	150.00	83,682
	achm surface course (type 2)	3,808	TON		
SP, SS & 405	mineral aggregate in achm surface course (type 2)	3,591	TON	17.68	63,488
405, 406	asphalt cement in achm surface course (type 2)	217	TON	150.00	32,558
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				3,207,354

Table J-3: Construction Costs for Highway 49 #1

Location: Hwy 49 #1
Job Number: R00081

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	3,800	LF	4.65	17,670
611	underdrain outlet protectors	12	EACH	295.00	3,540
	SELECTED PIPE BEDDING AND BACKFILL				
606	selected pipe (bedding)	250	CU YD		
606	selected pipe (backfill)	250	CU YD		
	STONE BACKFILL				
SS & 207	stone backfill	1,000	TON	14.40	14,400
	BASE AND SURFACING				
SS & 303	aggregate base course (class 7)	83,957	TON	11.24	943,676
401	prime coat (0.4 gal per sq yd)	10,852	GAL	1.40	15,193
401	tack coat (0.03 gal per sq yd)	8,367	GAL	1.17	9,790
	performance grade achm binder course (type 1)	24,785	TON		
SP,SS & 406	mineral aggregate in performance grade achm binder course (type 1)	23,645	TON	23.10	546,189
SP & 406	asphalt binder (PG 64-22) in performance grade achm binder course (type 1)	1,140	TON	140.00	159,613
	performance grade achm surface course (type 1)	23,960	TON		
SP,SS & 407	mineral aggregate in performance grade achm surface course (type 1)	22,714	TON	22.90	520,152
SP & 407	asphalt binder (PG 64-22) in performance grade achm surface course (type 1)	1,246	TON	140.00	174,429
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				2,404,652

Table J-4: Construction Costs for Highway 49 #2

Location: Hwy 49 #2
Job Number: R00071

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
SP & 601	4" pipe underdrains	22,428	LF	3.20	71,770
611	underdrain outlet protectors	75	EACH	200.00	15,000
	STONE BACKFILL				
SS & 207	stone backfill	5,200	TON	11.00	57,200
	SELECTED PIPE BEDDING AND BACKFILL				
606	selected pipe (bedding)	250	CU YD		
606	selected pipe (backfill)	250	CU YD		
	BASE AND SURFACING				
303	aggregate base course (class 7)	14,501	TON	10.50	152,263
401	prime coat (0.4 gal per sq yd)	7,605	GAL	1.36	10,342
401	tack coat (0.03 gal per sq yd)	29,345	GAL	1.50	44,017
	performance grade achm binder course (type 1)	89,489	TON		
SS & 406	mineral aggregate in performance grade achm binder course (type 1)	85,730	TON	27.75	2,379,010
406	asphalt binder (PG 64-22) in performance grade achm binder course (type 1)	3,759	TON	110.00	413,437
	performance grade achm surface course (type 1)	32,016	TON		
SS & 407	mineral aggregate in performance grade achm surface course (type 1)	30,351	TON	27.25	827,072
407	asphalt binder (PG 64-22) in performance grade achm surface course (type 1)	1,665	TON	110.00	183,132
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				4,153,243

Table J-5: Construction Costs for Highway 270 #1

Location: Hwy 270 #1
Job Number: 60116

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	1,000	LF	4.00	4,000
	BASE AND SURFACING				
306	crushed stone base course (class SB-2)	125,231	TON	6.28	786,453
401	prime coat (0.4 gal per sq yd)	66,519	GAL	1.25	83,149
401	tack coat (0.03 gal per sq yd)	3,731	GAL	1.15	4,291
	achm binder course (type 2)	25,580	TON		
SP & 405	mineral aggregate in achm binder course (type 2)	24,429	TON	15.90	388,424
SP & 405	asphalt cement in achm binder course (type 2)	1,151	TON	195.43	224,962
	achm surface course (type 2)	13,287	TON		
SP & 408	mineral aggregate in achm surface course (type 2)	12,556	TON	16.40	205,925
SP & 408	asphalt cement in achm surface course (type 2)	731	TON	195.43	142,819
	bituminous plant mix seal	2,744	TON		
SP-413-1	mineral aggregate in bituminous plant mix seal	2,563	TON	20.40	52,289
SP-413-1	asphalt cement in bituminous plant mix seal	181	TON	196.00	35,500
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				1,927,812

Table J-6: Construction Costs for Highway 270 #2

Location: Hwy 270 #2
Job Number: 60115

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	BASE AND SURFACING				
306	crushed stone base course (class SB-2)	17,810	TON	5.95	105,970
401	prime coat (0.4 gal per sq yd)	8,373	GAL	0.80	6,698
401	tack coat (0.1 gal per sq yd)	15,249	GAL	0.75	11,436
	achm stabilized base course	63,684	TON		
309	mineral aggregate in achm stabilized base course	61,455	TON	15.90	977,135
SP & 309	asphalt cement in achm stabilized base course	2,229	TON	149.25	332,669
	achm binder course (type 2)	20,123	TON		
405	mineral aggregate in achm binder course (type 2)	19,157	TON	17.51	335,441
SP & 405	asphalt cement in achm binder course (type 2)	966	TON	162.25	156,718
	achm surface course (type 2)	12,258	TON		
408	mineral aggregate in achm surface course (type 2)	11,523	TON	18.63	214,665
SP & 408	asphalt cement in achm surface course (type 2)	735	TON	162.25	119,332
TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT					2,260,064

Table J-7: Construction Costs for Highway 65 #1 and #12

Location: Hwy 65 #1 & #12
Job Number: 8827

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	6,100	LF	4.20	25,620
	SURFACING				
306	crushed stone base course (class sb-2)	60,121	TON	6.00	360,726
401	prime coat (0.4 gla per sq yd)	48,838	GAL	1.05	51,280
401	tack coat (0.1 gal per sq yd)	15,064	GAL	1.00	15,064
	achm binder course (type 2)	42,992	TON		
SP & 405	mineral aggregate in achm binder course (type 2)	41,057	TON	15.95	654,866
SP & 405	asphalt cement in achm binder course (type 2)	1,935	TON	170.00	328,890
	achm surface course (type 2)	13,533	TON		
SP & 408	mineral aggregate in achm surface course (type 2)	12,829	TON	16.80	215,530
SP & 408	asphalt cement in achm surface course (type 2)	704	TON	170.00	119,631
	bituminous plant seal mix	2,723	TON		
SP-413-1	mineral aggregate in bituminous plant seal mix	2,546	TON	23.55	59,947
SP-413-1	asphalt cement in bituminous plant seal mix	177	TON	170.00	30,084
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				1,861,638

Table J-8: Construction Costs for Highway 65 #2, #10, and #11

Location: Hwy 65 #2, #10, & #11
Job Number: R80010

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	5,000	LF	2.00	10,000
	SURFACING				
306	crushed stone base course (class sb-2)	1,718	TON	10.25	17,610
401	prime coat (0.4 gal per sq yd)	2,480	GAL		
401	tack coat (0.1 gal per sq yd)	11,156	GAL	0.90	10,040
	hmas base course	33,044	TON		
SP	mineral aggregate in hmas base course	31,557	TON	13.70	432,326
SP	asphalt cement in hmas base course	1,487	TON	150.00	223,044
	achm binder course (type 2)	21,130	TON		
SP & 405	mineral aggregate in achm binder course (type 2)	20,221	TON	15.15	306,350
SP & 405	asphalt cement in achm binder course (type 2)	909	TON	150.00	136,287
	achm surface course (type 2)	9,336	TON		
SP & 408	mineral aggregate in achm surface course (type 2)	8,869	TON	16.00	141,907
SP & 408	asphalt cement in achm surface course (type 2)	467	TON	150.00	70,020
	BITUMINOUS PLANT MIX SEAL				
401	tack coat (0.03 gal per sq yd)	3,025	TON	0.90	2,723
	bituminous plant mix seal	2,723	TON		
SP-413-1	mineral aggregate in bituminous plant mix seal	2,546	TON	19.80	50,402
SP-413-1	asphalt cement in bituminous plant mix seal	177	TON	150.00	26,544
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				1,427,253

Table J-9: Construction Costs for Highway 412 #10 and #11

Location: Hwy 412 #10 & #11
Job Number: 1675

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	STONE BACKFILL				
207	stone backfill	1,000	TON	10.50	10,500
	SELECTED PIPE BEDDING				
606	selected pipe (bedding)	200	CU YD		
	BASE AND SURFACING				
303	aggregate base course (class 7)	429,348	TON	9.50	4,078,809
401	prime coat (0.4 gal per sq yd)	74,677	TON	0.70	52,274
401	tack coat (0.03 gal per sq yd)	30,308	GAL	0.70	21,215
	achm stabilized base course	136,234	TON		
SS & 405	mineral aggregate in achm stabilized base course	130,512	TON	14.15	1,846,745
405	asphalt cement in achm stabilized base course	5,722	TON	90.00	514,964
	achm binder course (type 1)	71,841	TON		
SS & 406	mineral aggregate in achm binder course (type 1)	68,608	TON	14.70	1,008,543
406	asphalt cement in achm binder course (type 1)	3,233	TON	90.00	290,957
	achm surface course (type 1)	58,812	TON		
SS & 407	mineral aggregate in achm surface course (type 1)	55,695	TON	23.30	1,297,699
407	asphalt cement in achm surface course (type 1)	3,117	TON	90.00	280,535
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				9,402,240

Table J-10: Construction Costs for Highway 412 #12 and #13

Location: Hwy 412 #12 & #13
Job Number: 40112

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	5,000	LF	5.50	27,500
611	underdrain outlet protectors	25	EACH	25.00	625
	SELECTED PIPE BEDDING				
606	selected pipe (bedding)	500	CU YD		
	STONE BACKFILL				
207	stone backfill	5,000	TON	15.00	75,000
	BASE AND SURFACING				
303	agrgegate base course (class 5)	16,484	TON	13.00	214,288
401	tack coat (0.03 gal per sq yd)	16,999	GAL	0.70	11,899
401	prime coat (0.40 gal per sq yd)	9,596	GAL	0.70	6,717
	achm stabilized base course	946	TON		
SS & 405	mineral aggregate in achm stabilized base course	906	TON	20.00	18,125
405	asphalt cement in achm stailized base course	40	TON	142.00	5,642
	achm binder course (type 1)	17,726	TON		
SS & 406	mineral aggregate in achm binder course (type 1)	16,929	TON	22.00	372,427
406	asphalt cement in achm binder course (type 1)	798	TON	142.00	113,270
	achm surface course (type 1)	31,643	TON		
SS & 407	mineral aggregate in achm surface course (type 1)	29,966	TON	25.00	749,146
407	asphalt cement in achm surface course (type 1)	1,677	TON	150.00	251,561
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				1,846,201

Table J-11: Construction Costs for Highway 412 #14

Location: Hwy 412 #14
Job Number: R40016

Item No.	Description	Quantity	Unit	Unit Price	Total ($)
	4" PIPE UNDERDRAINS				
611	4" pipe underdrains	4,000	LF	4.50	18,000
	BASE AND SURFACING				
306	agrgegate base course (class sb-2)	560	TON	11.00	6,160
401	tack coat (0.03 gal per sq yd)	6,052	GAL	2.00	12,104
	hmas bas course	21,017	TON		
SP	mineral aggregate in hmas base course	20,113	TON	20.75	417,346
SP	asphalt cement in hmas base course	904	TON	170.00	153,633
	achm binder course (type 2)	10,479	TON		
SP & 405	mineral aggregate in achm binder course (type 2)	10,028	TON	22.00	220,625
SP & 405	asphalt cement in achm binder course (type 2)	451	TON	170.00	76,601
	achm surface course (type 2)	4,707	TON		
SP & 408	mineral aggregate in achm surface course (type 2)	4,439	TON	24.90	110,528
SP & 408	asphalt cement in achm surface course (type 2)	268	TON	170.00	45,613
	TOTAL ROADWAY CONSTRUCTION COSTS FOR PROJECT				1,060,611

Table J-12: Maintenance Costs for Highway 82

Route and Section:	Hwy 82 Section 4
Length of Section (miles):	15.86
Number of Lanes:	3

Year	Maintenance Function	Total Costs ($)
1999	412	1516.46
	416	504.11
	419	6311.93
	429	2599.34
	430	4911.25
	435	11530.38
	565	1675.81
	Maintenance for Year	29049.28
	Maintenance per Lane-Mile	610.54
1998	412	583.20
	414	9026.43
	416	1747.99
	419	176.29
	435	2294.70
	441	429.58
	565	504.90
	580	941.69
	Maintenance for Year	15704.78
	Maintenance per Lane-Mile	330.07
1997	412	366.20
	419	345.00
	435	837.77
	441	949.22
	565	483.78
	Maintenance for Year	2981.97
	Maintenance per Lane-Mile	62.67
1996	414	74.80
	416	215.88
	419	1581.60
	441	234.70
	565	75.11
	Maintenance for Year	2182.09
	Maintenance per Lane-Mile	45.86
1995	412	1992.70
	416	476.16
	419	292.09
	429	1002.95
	430	1518.28
	441	762.07
	565	349.93
	Maintenance for Year	6394.18
	Maintenance per Lane-Mile	134.39

Year	Maintenance Function	Total Costs ($)
1994	412	1179.07
	413	4212.34
	414	1310.49
	416	2754.49
	419	422.96
	441	435.54
	565	3197.35
	Maintenance for Year	13512.24
	Maintenance per Lane-Mile	283.99
1993	413	21125.65
	416	497.23
	441	2721.70
	Maintenance for Year	24344.58
	Maintenance per Lane-Mile	511.66
1992	416	610.27
	441	2538.67
	565	197.10
	Maintenance for Year	3346.04
	Maintenance per Lane-Mile	70.32
1991	419	316.26
	441	1956.45
	565	696.65
	Maintenance for Year	2969.36
	Maintenance per Lane-Mile	62.41
1990	419	154.48
	430	421.68
	435	56.51
	441	1488.24
	565	1071.85
	Maintenance for Year	3192.76
	Maintenance per Lane-Mile	67.10

Table J-13: Maintenance Costs for Highway 79

Route and Section:	Hwy 79 Section 5
Length of Section (miles):	8.48
Number of Lanes:	4

Year	Maintenance Function	Total Costs ($)
1999	413	7954.66
	419	965.92
	Maintenance for Year	8920.58
	Maintenance per Lane-Mile	262.99
1998	419	2858.07
	565	158.87
	Maintenance for Year	3016.94
	Maintenance per Lane-Mile	88.94
1997	412	249.35
	414	6160.08
	419	2727.09
	565	528.30
	580	-1757.21
	Maintenance for Year	7907.61
	Maintenance per Lane-Mile	233.13
1996	419	714.15
	435	15863.37
	Maintenance for Year	16577.52
	Maintenance per Lane-Mile	488.72
1995	419	2749.75
	435	1397.53
	441	621.05
	565	273.21
	Maintenance for Year	5041.54
	Maintenance per Lane-Mile	148.63
1994	412	185.18
	419	3137.16
	441	141.56
	Maintenance for Year	3463.90
	Maintenance per Lane-Mile	102.12

Year	Maintenance Function	Total Costs ($)
1993	412	197.68
	416	948.20
	419	437.32
	435	3982.75
	441	41.81
	565	62.15
	Maintenance for Year	5669.91
	Maintenance per Lane-Mile	167.16
1992	412	37.91
	413	2332.92
	419	397.15
	441	364.27
	565	67.35
	Maintenance for Year	3199.60
	Maintenance per Lane-Mile	94.33
1991	419	1491.45
	435	960.98
	441	110.60
	565	53.33
	Maintenance for Year	2616.36
	Maintenance per Lane-Mile	77.13

Table J-14: Maintenance Costs for Highway 49

Route and Section:	Hwy 49 Section 2
Length of Section (miles):	24.00
Number of Lanes:	4

Year	Maintenance Function	Total Costs ($)
1999	412	1147.78
	414	4188.93
	416	575.63
	419	1359.53
	429	431.15
	430	1244.71
	441	1887.09
	565	207.34
	Maintenance for Year	11042.16
	Maintenance per Lane-Mile	115.02
1998	412	6466.49
	414	6485.43
	419	2573.28
	430	684.20
	435	2044.80
	441	7186.01
	Maintenance for Year	25440.21
	Maintenance per Lane-Mile	265.00
1997	411	270.43
	412	1171.73
	413	3059.41
	414	5092.34
	419	972.38
	429	211.42
	430	635.61
	432	4892.99
	441	714.26
	565	953.34
	Maintenance for Year	17973.91
	Maintenance per Lane-Mile	187.23

Year	Maintenance Function	Total Costs ($)
1996	412	3345.15
	414	1737.04
	416	533.04
	419	2090.45
	441	2419.86
	565	343.16
	Maintenance for Year	10468.70
	Maintenance per Lane-Mile	109.05
1995	412	1963.65
	414	356.09
	416	1326.95
	419	2237.88
	429	402.23
	430	795.83
	433	534.09
	441	7015.66
	Maintenance for Year	14632.38
	Maintenance per Lane-Mile	152.42
1994	412	3193.94
	413	2479.38
	414	5684.68
	416	63.60
	419	1407.48
	435	2025.21
	441	11904.00
	565	140.00
	Maintenance for Year	26898.29
	Maintenance per Lane-Mile	280.19

Table J-15: Maintenance Costs for Highway 270

Route and Section:	Hwy 270 Section 6
Length of Section (miles):	8.86
Number of Lanes:	5

Year	Maintenance Function	Total Costs ($)
1999	412	3632.45
	413	135.73
	419	12790.15
	441	1492.41
	565	60.20
	Maintenance for Year	18110.94
	Maintenance per Lane-Mile	408.82
1998	411	162.32
	412	32124.12
	414	484.75
	419	13846.10
	429	3726.97
	430	28535.80
	435	5749.15
	441	13905.69
	565	190.57
	Maintenance for Year	98725.47
	Maintenance per Lane-Mile	2228.57
1997	412	307.34
	419	8601.78
	441	5760.43
	565	133.54
	Maintenance for Year	14803.09
	Maintenance per Lane-Mile	334.16
1996	411	6.93
	412	376.74
	419	4526.60
	441	2421.90
	565	58.10
	Maintenance for Year	7390.27
	Maintenance per Lane-Mile	166.82
1995	411	151.37
	412	2950.87
	419	3915.77
	429	398.85
	430	874.88
	435	14790.25
	441	7268.74
	565	95.00
	Maintenance for Year	30445.73
	Maintenance per Lane-Mile	687.26

Year	Maintenance Function	Total Costs ($)
1994	412	2680.56
	419	6238.62
	429	60.39
	430	773.95
	441	1980.18
	Maintenance for Year	11733.70
	Maintenance per Lane-Mile	264.87
1993	412	2784.92
	413	3555.49
	419	4718.52
	441	1830.11
	Maintenance for Year	12889.04
	Maintenance per Lane-Mile	290.95
1992	412	2586.39
	414	1481.94
	419	2118.81
	435	885.06
	Maintenance for Year	7072.20
	Maintenance per Lane-Mile	159.64
1991	412	350.39
	419	4535.95
	430	486.78
	435	6834.96
	441	139.86
	Maintenance for Year	12347.94
	Maintenance per Lane-Mile	278.73
1990	412	2852.79
	413	11304.43
	419	2295.80
	441	82.12
	565	279.55
	Maintenance for Year	16814.69
	Maintenance per Lane-Mile	379.56

Table J-15 (Continued): Maintenance Costs for Highway 270

Route and Section: Hwy 270 Section 6
Length of Section (miles): 8.86
Number of Lanes: 5

Year	Maintenance Function	Total Costs ($)
1989	412	923.33
	414	725.32
	419	1473.07
	441	604.04
	Maintenance for Year	3725.76
	Maintenance per Lane-Mile	84.10
1988	412	1385.05
	413	969.46
	419	1651.88
	441	475.96
	565	113.73
	Maintenance for Year	4596.08
	Maintenance per Lane-Mile	103.75
1987	412	507.50
	419	4694.85
	441	769.76
	565	313.95
	Maintenance for Year	6286.06
	Maintenance per Lane-Mile	141.90
1986	412	1312.59
	413	5323.48
	419	518.86
	565	261.17
	Maintenance for Year	7416.10
	Maintenance per Lane-Mile	167.41
1985	412	354.52
	419	1403.56
	435	1127.96
	441	428.26
	565	141.96
	Maintenance for Year	3456.26
	Maintenance per Lane-Mile	78.02

Year	Maintenance Function	Total Costs ($)
1984	412	1290.50
	419	89.94
	Maintenance for Year	1380.44
	Maintenance per Lane-Mile	31.16
1983	412	424.55
	419	453.71
	441	611.07
	565	520.38
	Maintenance for Year	2009.71
	Maintenance per Lane-Mile	45.37
1982	412	984.17
	412	1700.16
	413	381.10
	413	1202.12
	419	1092.81
	441	526.66
	565	264.87
	Maintenance for Year	6151.89
	Maintenance per Lane-Mile	138.87
1981	411	549.39
	411	695.27
	412	128.63
	412	602.21
	419	71.47
	435	3614.01
	435	1103.01
	441	120.21
	565	176.21
	Maintenance for Year	7060.41
	Maintenance per Lane-Mile	159.38

Table J-16: Maintenance Costs for Highway 65

Route and Section:	Hwy 65 Section 9
Length of Section (miles):	20.85
Number of Lanes:	5

Year	Maintenance Function	Total Costs ($)
1999	412	6387.04
	413	2689.96
	419	8609.84
	435	33889.49
	441	3517.14
	565	261.83
	Maintenance for Year	55355.30
	Maintenance per Lane-Mile	530.99
1998	412	7806.93
	413	1012.03
	414	931.28
	419	5660.97
	432	227.27
	436	203.13
	437	604.69
	441	1076.55
	565	336.26
	Maintenance for Year	17859.11
	Maintenance per Lane-Mile	171.31
1997	412	7605.03
	413	1275.59
	419	1758.15
	429	12172.39
	430	8469.99
	437	3490.33
	441	674.75
	565	1027.62
	Maintenance for Year	36473.85
	Maintenance per Lane-Mile	349.87

Year	Maintenance Function	Total Costs ($)
1996	411	10272.34
	412	6092.09
	419	3391.58
	429	123.61
	441	9278.33
	565	828.00
	Maintenance for Year	29985.95
	Maintenance per Lane-Mile	287.64
1995	412	20.28
	413	6139.47
	414	5179.76
	419	668.18
	435	4828.94
	441	74148.25
	Maintenance for Year	90984.88
	Maintenance per Lane-Mile	872.76
1994	412	3404.31
	413	724.56
	414	320.86
	419	3440.57
	435	17871.86
	441	3831.33
	565	436.79
	Maintenance for Year	30030.28
	Maintenance per Lane-Mile	288.06

Table J-16 (Continued): Maintenance Costs for Highway 65

Route and Section: Hwy 65 Section 9
Length of Section (miles): 20.85
Number of Lanes: 5

Year	Maintenance Function	Total Costs ($)
1993	412	5572.37
	413	405.25
	416	258.21
	419	2723.55
	435	67421.05
	441	2267.97
	565	121.15
	Maintenance for Year	78769.55
	Maintenance per Lane-Mile	755.58
1992	412	2680.82
	413	50.18
	419	3242.77
	435	85288.23
	441	4107.63
	565	607.41
	Maintenance for Year	95977.04
	Maintenance per Lane-Mile	920.64
1991	412	1517.27
	413	359.28
	414	-1.79
	419	8784.15
	435	2060.11
	441	1235.86
	565	830.52
	Maintenance for Year	14785.40
	Maintenance per Lane-Mile	141.83
1990	412	4469.64
	413	734.42
	414	1394.95
	419	7738.55
	435	17640.87
	441	1616.25
	580	-7.56
	Maintenance for Year	33587.12
	Maintenance per Lane-Mile	322.18

Year	Maintenance Function	Total Costs ($)
1989	412	6551.06
	413	4213.20
	415	111.39
	418	1186.35
	419	4858.80
	433	2380.18
	441	2978.09
	580	-179.84
	Maintenance for Year	22099.23
	Maintenance per Lane-Mile	211.98
1988	412	5528.38
	413	610.54
	414	804.21
	419	936.09
	565	26.46
	Maintenance for Year	7905.68
	Maintenance per Lane-Mile	75.83
1987	412	2387.42
	419	2861.03
	429	2186.70
	430	1843.96
	431	59.36
	433	3512.72
	435	2890.13
	441	136.90
	580	-25.35
	Maintenance for Year	15852.87
	Maintenance per Lane-Mile	152.07

Table J-17: Maintenance Costs for Highway 412 (#10-#15)

Route and Section:	Hwy 412 Section 2
Length of Section (miles):	25.98
Number of Lanes:	5

Year	Maintenance Function	Total Costs ($)
1999	412	1043.46
	419	5066.70
	435	26345.25
	437	167.71
	441	584.09
	565	16.50
	Maintenance for Year	33223.71
	Maintenance per Lane-Mile	255.76
1998	412	3204.43
	419	5611.23
	441	13190.04
	Maintenance for Year	22005.70
	Maintenance per Lane-Mile	169.40
1997	412	3298.69
	416	957.42
	419	6493.51
	435	2243.42
	441	155.06
	565	283.00
	Maintenance for Year	13431.10
	Maintenance per Lane-Mile	103.40

Year	Maintenance Function	Total Costs ($)
1996	412	3071.41
	419	3304.20
	441	9402.29
	Maintenance for Year	15777.90
	Maintenance per Lane-Mile	121.46
1995	412	1253.36
	419	3405.21
	435	7916.59
	441	853.28
	Maintenance for Year	13428.44
	Maintenance per Lane-Mile	103.38
1994	412	1358.15
	414	1274.77
	419	799.74
	429	1300.37
	430	121.14
	435	909.66
	441	3159.02
	565	437.76
	Maintenance for Year	9360.61
	Maintenance per Lane-Mile	72.06

Table K-1: Economic Analysis for Highway 82 #1

Location: Hwy 82 #1
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1990	60,947	4.5	1.000	60,947.00
1990	67.10	4.5	1.000	67.10
1991	62.41	4.5	0.957	59.72
1992	70.32	4.5	0.916	64.39
1993	511.66	4.5	0.876	448.37
1994	283.99	4.5	0.839	238.14
1995	134.39	4.5	0.802	107.84
1996	45.86	4.5	0.768	35.22
1997	62.67	4.5	0.735	46.05
1998	330.07	4.5	0.703	232.10
1999	610.54	4.5	0.673	410.84
1999	-13,124	4.5	0.673	-8,831.20

Net Present Worth = Σ = 53,825.57
Increase in NPW due to Maintenance (%) = 3.28

Table K-2: Economic Analysis for Highway 82 #2

Location: Hwy 82 #2
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1990	60,947	4.5	1.000	60,947.00
1990	67.10	4.5	1.000	67.10
1991	62.41	4.5	0.957	59.72
1992	70.32	4.5	0.916	64.39
1993	511.66	4.5	0.876	448.37
1994	283.99	4.5	0.839	238.14
1995	134.39	4.5	0.802	107.84
1996	45.86	4.5	0.768	35.22
1997	62.67	4.5	0.735	46.05
1998	330.07	4.5	0.703	232.10
1999	610.54	4.5	0.673	410.84
1999	-5,742	4.5	0.673	-3,863.82

Net Present Worth = Σ = 58,792.95
Increase in NPW due to Maintenance (%) = 3.00

Table K-3: Economic Analysis for Highway 79 #1 and #2

Location: Hwy 79 #1 & #2
Type of Construction: Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1991	252,866	4.5	0.957	241,977.03
1991	77.13	4.5	0.957	73.81
1992	94.33	4.5	0.916	86.38
1993	167.16	4.5	0.876	146.48
1994	102.12	4.5	0.839	85.63
1995	148.63	4.5	0.802	119.27
1996	488.72	4.5	0.768	375.29
1997	233.13	4.5	0.735	171.31
1998	88.94	4.5	0.703	62.54
1999	262.99	4.5	0.673	176.97
1999	-92,812	4.5	0.673	-62,453.61

Net Present Worth = Σ = 180,821.11
Increase in NPW due to Maintenance (%) = 0.72

Table K-4: Economic Analysis for Highway 49 #1

Location: Hwy 49 #1
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1999	170,785	4.5	0.673	114,921.98
1999	115.02	4.5	0.673	77.40
1999	4,640	4.5	0.673	3,122.28

Net Present Worth = Σ = 118,121.66
Increase in NPW due to Maintenance (%) = 0.07

Table K-5: Economic Analysis for Highway 49 #2

Location: Hwy 49 #2
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1999	200,795	4.5	0.673	135,115.84
1999	115.02	4.5	0.673	77.40
1999	-12,729	4.5	0.673	-8,565.40

Net Present Worth = Σ = 126,627.84
Increase in NPW due to Maintenance (%) = 0.06

Table K-6: Economic Analysis for Highway 270 #1

Location: Hwy 270 #1
Type of Construction: Stone Base Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1984	142,801	9	1.677	239,491.57
1984	31.16	9	1.677	52.26
1985	78.02	9	1.539	120.04
1986	167.41	9	1.412	236.31
1987	141.90	9	1.295	183.76
1988	103.75	9	1.188	123.27
1989	84.10	9	1.090	91.67
1990	379.56	4.5	1.000	379.56
1991	278.73	4.5	0.957	266.73
1992	159.64	4.5	0.916	146.19
1993	290.95	4.5	0.876	254.96
1994	264.87	4.5	0.839	222.11
1995	687.26	4.5	0.802	551.49
1996	166.82	4.5	0.768	128.10
1997	334.16	4.5	0.735	245.55
1998	2,228.57	4.5	0.703	1,567.10
1999	408.82	4.5	0.673	275.10
1999	0	4.5	0.673	0.00

Net Present Worth = Σ = 244,335.77
Increase in NPW due to Maintenance (%) = 2.02

Table K-7: Economic Analysis for Highway 270 #2

Location: Hwy 270 #2
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1981	157,342	9	2.172	341,730.03
1981	159.38	9	2.172	346.16
1982	138.87	9	1.993	276.71
1983	45.37	9	1.828	82.94
1984	31.16	9	1.677	52.26
1985	78.02	9	1.539	120.04
1986	167.41	9	1.412	236.31
1987	141.90	9	1.295	183.76
1988	103.75	9	1.188	123.27
1989	84.10	9	1.090	91.67
1990	379.56	4.5	1.000	379.56
1991	278.73	4.5	0.957	266.73
1992	159.64	4.5	0.916	146.19
1993	290.95	4.5	0.876	254.96
1994	264.87	4.5	0.839	222.11
1995	687.26	4.5	0.802	551.49
1996	166.82	4.5	0.768	128.10
1997	334.16	4.5	0.735	245.55
1998	2,228.57	4.5	0.703	1,567.10
1999	408.82	4.5	0.673	275.10
1999	0	4.5	0.673	0.00

Net Present Worth = Σ = 347,280.03
Increase in NPW due to Maintenance (%) = 1.62

Table K-8: Economic Analysis for Highway 65 #1

Location: Hwy 65 #1
Type of Construction: Stone Base Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1987	105,955	9	1.295	137,214.80
1987	152.07	9	1.295	196.94
1988	75.83	9	1.188	90.09
1989	211.98	9	1.090	231.06
1990	322.18	4.5	1.000	322.18
1991	141.83	4.5	0.957	135.72
1992	920.64	4.5	0.916	843.06
1993	755.58	4.5	0.876	662.11
1994	288.06	4.5	0.839	241.56
1995	872.76	4.5	0.802	700.35
1996	287.64	4.5	0.768	220.88
1997	349.87	4.5	0.735	257.09
1998	171.31	4.5	0.703	120.46
1999	530.99	4.5	0.673	357.31
1999	-46,166	4.5	0.673	-31,065.31

Net Present Worth = Σ = 110,528.29
Increase in NPW due to Maintenance (%) = 4.13

Table K-9: Economic Analysis for Highway 65 #2, and #10

Location: Hwy 65 #2, & #10
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1988	96,469	9	1.188	114,614.82
1988	75.83	9	1.188	90.09
1989	211.98	9	1.090	231.06
1990	322.18	4.5	1.000	322.18
1991	141.83	4.5	0.957	135.72
1992	920.64	4.5	0.916	843.06
1993	755.58	4.5	0.876	662.11
1994	288.06	4.5	0.839	241.56
1995	872.76	4.5	0.802	700.35
1996	287.64	4.5	0.768	220.88
1997	349.87	4.5	0.735	257.09
1998	171.31	4.5	0.703	120.46
1999	530.99	4.5	0.673	357.31
1999	0	4.5	0.673	0.00

Net Present Worth = Σ = 118,796.69
Increase in NPW due to Maintenance (%) = 3.65

Table K-10: Economic Analysis for Highway 65 #11

Location: Hwy 65 #11
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1988	96,469	9	1.188	114,614.82
1988	75.83	9	1.188	90.09
1989	211.98	9	1.090	231.06
1990	322.18	4.5	1.000	322.18
1991	141.83	4.5	0.957	135.72
1992	920.64	4.5	0.916	843.06
1993	755.58	4.5	0.876	662.11
1994	288.06	4.5	0.839	241.56
1995	872.76	4.5	0.802	700.35
1996	287.64	4.5	0.768	220.88
1997	349.87	4.5	0.735	257.09
1998	171.31	4.5	0.703	120.46
1999	530.99	4.5	0.673	357.31
1999	-10,797	4.5	0.673	-7,265.35

Net Present Worth = Σ = 111,531.34
Increase in NPW due to Maintenance (%) = 3.90

Table K-11: Economic Analysis for Highway 65 #12

Location: Hwy 65 #12
Type of Construction: Stone Base Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1987	105,955	9	1.295	137,214.80
1987	152.07	9	1.295	196.94
1988	75.83	9	1.188	90.09
1989	211.98	9	1.090	231.06
1990	322.18	4.5	1.000	322.18
1991	141.83	4.5	0.957	135.72
1992	920.64	4.5	0.916	843.06
1993	755.58	4.5	0.876	662.11
1994	288.06	4.5	0.839	241.56
1995	872.76	4.5	0.802	700.35
1996	287.64	4.5	0.768	220.88
1997	349.87	4.5	0.735	257.09
1998	171.31	4.5	0.703	120.46
1999	530.99	4.5	0.673	357.31
1999	-59,093	4.5	0.673	-39,763.94

Net Present Worth = Σ = 101,829.66
Increase in NPW due to Maintenance (%) = 4.49

Table K-12: Economic Analysis for Highway 412 #10

Location: Hwy 412 #10
Type of Construction: Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1994	200,611	4.5	0.839	168,224.63
1994	72.06	4.5	0.839	60.43
1995	103.38	4.5	0.802	82.96
1996	121.46	4.5	0.768	93.27
1997	103.40	4.5	0.735	75.98
1998	169.40	4.5	0.703	119.12
1999	255.76	4.5	0.673	172.10
1999	-65,655	4.5	0.673	-44,179.54

Net Present Worth = Σ = 124,648.95
Increase in NPW due to Maintenance (%) = 0.49

Table K-13: Economic Analysis for Highway 412 #11

Location: Hwy 412 #11
Type of Construction: Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1994	200,611	4.5	0.839	168,224.63
1994	72.06	4.5	0.839	60.43
1995	103.38	4.5	0.802	82.96
1996	121.46	4.5	0.768	93.27
1997	103.40	4.5	0.735	75.98
1998	169.40	4.5	0.703	119.12
1999	255.76	4.5	0.673	172.10
1999	-70,183	4.5	0.673	-47,226.45

Net Present Worth = Σ = 121,602.03
Increase in NPW due to Maintenance (%) = 0.50

Table K-14: Economic Analysis for Highway 412 #12

Location: Hwy 412 #12
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1994	86,453	4.5	0.839	72,496.14
1994	72.06	4.5	0.839	60.43
1995	103.38	4.5	0.802	82.96
1996	121.46	4.5	0.768	93.27
1997	103.40	4.5	0.735	75.98
1998	169.40	4.5	0.703	119.12
1999	255.76	4.5	0.673	172.10
1999	-37,563	4.5	0.673	-25,276.31

Net Present Worth = Σ = 47,823.69
Increase in NPW due to Maintenance (%) = 1.28

Table K-15: Economic Analysis for Highway 412 #13

Location: Hwy 412 #13
Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1994	86,453	4.5	0.839	72,496.14
1994	72.06	4.5	0.839	60.43
1995	103.38	4.5	0.802	82.96
1996	121.46	4.5	0.768	93.27
1997	103.40	4.5	0.735	75.98
1998	169.40	4.5	0.703	119.12
1999	255.76	4.5	0.673	172.10
1999	-19,513	4.5	0.673	-13,130.38

Net Present Worth = Σ = 59,969.62
Increase in NPW due to Maintenance (%) = 1.02

Table K-16: Economic Analysis for Highway 412 #14

Location: Hwy 412 #14

Type of Construction: Full-Depth Widening of Stone Base Pavement

Year	Cost/Lane-Mile ($/lane-mile)	Discount Rate i (%)	$pwf = \frac{1}{(1+i)^n}$ to take to 1990	NPW at 1990 = Cost/Lane-Mile*pwf ($/lane-mile)
1987	131,021	9	1.295	169,675.99
1987	*	9	1.295	-
1988	*	9	1.188	-
1989	*	9	1.090	-
1990	*	4.5	1.000	-
1991	*	4.5	0.957	-
1992	*	4.5	0.916	-
1993	*	4.5	0.876	-
1994	72.06	4.5	0.839	60.43
1995	103.38	4.5	0.802	82.96
1996	121.46	4.5	0.768	93.27
1997	103.40	4.5	0.735	75.98
1998	169.40	4.5	0.703	119.12
1999	255.76	4.5	0.673	172.10
1999	-25,119	4.5	0.673	-16,902.69

* Maintenance costs not obtained (not significant because of such a small impact on results)

Net Present Worth = Σ = 153,377.16

Increase in NPW due to Maintenance (%) = 0.40