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16. ABSTRACT

Phase I and II of this study tested approximately 1500 rehabilitated pavements (asphalt and PCC) throughout the State. These pavements ranged from 5 to 15 years old and were intended to develop a snapshot of how various rehabilitations were performing. Data for each site consisted of office data (asbuilts), field testing (FWD, distress and coring) and laboratory testing (Rice, gradation, etc.). Data was provided in an Access database. Indices were created for structural, roughness and distress as an evaluation tool to compare sections. Initial analyses using these indices were made on RAP and RAC sections throughout the State which showed that the data provides a basis for comparing strategies.

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Pavement Performance Evaluation, Phase II – Data Collection

Division of Research
& Innovation

Final Report

Report CA09-0291
December 2008

Pavement Performance Evaluation
Phase II – Data Collection

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December 23, 2008

Executive Summary

In 2000, Caltrans initiated Pavement Performance Evaluation - Phase I research project. The overall goals were to evaluate the performance of different pavement types and treatments across California and investigate the impact of different factors (design parameters, materials, construction variables, and environmental effects) on actual pavement performance. In total, around 1,000 test sections were evaluated in this phase, located in all but one of California's districts and all but one of the state's environmental zones.

The Phase I study concluded that two main issues limited the completeness of the analysis: the absence of traffic count data and the unbalanced distribution of test sections among districts and environmental zones. The Pavement Performance Evaluation - Phase II project was initiated in 2004 to address these issues and expand the Phase I investigations and analyses. The main goals of Phase II were to:

1. Select and test approximately 500 additional test sections to enhance the project dataset. This was referred to as the Phase II Main Study.

2. Ensure compatibility between the Phase I and Phase II data through harmonization of data collection and QC techniques between phases. A further task was the performance of an FWD correlation study account for any difference in collected deflection data that was attributable to use of different FWD equipment.

3. Perform a limited seasonal study to develop seasonal and temperature adjustment models. These models would be used to adjust FWD data for seasonal and temperature variations and bring pavement response parameters measured at different times of the day and year to the same standard conditions.

4. Perform a traffic study to estimate the accumulative axle weights that passed over Phase I and II sections since the construction of the last rehabilitation treatment. This would allow a more accurate assessment of how well a particular treatment has performed relative to the traffic loading it has been subjected to.

The information in this report represents results of the Phase II analyses performed up to the allowed limit of contract funds.

In the Seasonal Study, temperature adjustment models were developed for each sensor (D1-D9) for flexible and rigid pavements. These models were applied to the collected deflection data for Phase I and II Main Study sections to bring all deflections to the same standard temperature.

In the Traffic Study, axle weight data was collected for the Main Study test sections. Using the collected data and Caltrans permanent weigh station data, the total accumulated traffic carried since the last rehabilitation was estimated for 888 sections.

In the FWD Correlation Study, models were developed that would account for any differences in the measured deflections that were attributable to use of the different FWD units. However, as the team successfully achieved the primary goal of not using different units, the models did not need to be implemented.

In the Phase II Main Study, 537 sections were tested using ostensibly the same data collection and QC/QA procedures as in Phase I. The Phase II database was populated with office, field and laboratory data for these sections. Analyses were then conducted on two individual treatments – 60 Recycled Asphalt Pavement (RAP) sections and 69 Rubberized Asphalt Concrete (RAC) sections. Each treatment was evaluated in a number of environmental zones to assess the treatment's performance and to determine the effect of environmental conditions on that performance.

The performance evaluation covered all aspects of pavement performance – structural through the Structural Adequacy Index (SAI), functional through the Roughness Index (RI), and distresses through the Distress Index (DI). Each of these indices had a 0.0-1.0 scale, where 1.0 was a perfect pavement section and 0.5 was the assumed trigger level for rehabilitation.

As the test sections in this study had been in service for differing numbers of years, age adjustment was performed on the SAI, RI, and DI values to bring all values to those of the pavement section at age 5 years. This would allow for fair comparison of performance of sections with different ages. The effect of different accumulated traffic levels was not accounted for at this time.

For each pavement section, the expected service lives based on SAI, RI, and DI were calculated as the age at which the index would reach the assumed trigger level of 0.5. This resulted in the measures of Structural Service Life (SSL) based on SAI, Distress Service Life (DSL) based on DI, and Roughness Service Life (RSL) based on RI.

For the 60 RAP sections considered in these analyses, the average expected SSL, DSL, and RSL for each environmental zone are shown in Table E-1.

Table E-1: Average Expected Service Lives of RAP Sections by Environmental Zone

	SSL (years)	DSL (years)	RSL (years)
North Coast	19	18	20
Desert	19	9	20
Mountain	20	14	19

If the shortest of the 3 service lives will control when rehabilitation is required, then the RAP sections in the North Coast, Desert, Mountain zones would all be triggered for distresses first, after 18, 9, and 14 years, respectively. However, if appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. In this case, the RAP sections in the North Coast and Desert zones would instead be triggered for structural performance, both after 19 years. RAP sections in the Mountain zone would be triggered for ride quality, again after 19 years.

For the 69 RAC sections considered in these analyses, the average expected SSL, DSL, and RSL for each environmental zone are shown in Table E-2.

Table E-2: Average Expected Service Lives of RAC Sections by Environmental Zone

	SSL (years)	DSL (years)	RSL (years)
Central Valley	18	16	18
North Coast	16	16	20
Bay Area	19	19	19
Desert	19	15	19
South Coast	20	10	20

If the shortest of the 3 service lives will control when rehabilitation is required, then RAC sections in the Central Valley, Desert, and South Coast zones would be triggered for distresses first, after 16, 15, and 10 years, respectively. However, if appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. In this case, RAC sections in these zones would instead be triggered for ride quality or structural performance after 18, 19 or 20 years, respectively. In the North Coast zone, the RAC sections will be triggered for structural adequacy or distresses first after 16 years. In the Bay Area zone, the RAC sections may be triggered for structural adequacy, distresses or ride quality first, after 19 years.

The noticeably lower distress performance of the South Coast zone RAC sections was noted in the report and further investigation is recommended in this area.

Analysis of the sections’ structural performance was based on FWD data that had been corrected using the temperature adjustment models developed in the Seasonal Study. A comparison of RAP structural performance analysis before and after applying the temperature adjustment models highlighted the importance of using temperature-corrected deflections when assessing a pavement section’s structural performance.

A substantial amount of data has been collected and analyzed in this study so far. However, the report recommends the performance of the additional analysis required to fully complete the Phase II project. In comparison with the significant effort already expended, the effort required to complete these additional analyses should be minimal and is expected to produce a very positive return.

Further recommendations include the monitoring of additional test sections within the Seasonal Study to enhance the developed temperature adjustment models and for Caltrans to continue monitoring some of the Main Study sections to gain additional long-term data.

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1.0 Project Background

Caltrans initiated the first phase of the Pavement Performance Evaluation research project in 2000. The overall goals of this project were to evaluate the performance of different pavement types and treatments across California, and hence the success of Caltrans' pavement design and rehabilitation procedures. The project scope covered investigation of the impact of different factors on actual pavement performance as compared to the designed performance. The factors considered included design parameters, materials, construction variables, and environmental effects. At the completion of the project, it was concluded that a number of factors that could enhance the reported results had not been included in the project scope. Recommendations were made for additional tasks that would enhance and improve the findings of the project.

The Pavement Performance Evaluation - Phase II project was initiated in 2004 to address these recommendations and expand the investigations and analysis conducted in Phase I. A number of additional tasks based on the Phase I recommendations were included in the Phase II project scope with the intention of producing a more accurate evaluation of pavement performance in California and, therefore, a more realistic picture of the success of Caltrans' pavement design and rehabilitation procedures.

This section gives a summary of the Phase I project, the identified needs for additional study, and the objectives that the Phase II project set out to address.

1.1 OVERVIEW OF PHASE I PROJECT[1]

As mentioned above, the Pavement Performance Evaluation - Phase I project began in 2000 and had the overall goal of evaluating the performance of in-service pavements across the State of California. This in turn would give an indication of the success of Caltrans' pavement design and rehabilitation procedures. To meet all Caltrans' requirements for the project, it was divided into five main studies:

- Study 1: Construction Quality Evaluation Study
- Study 2: Concrete Pavement Rehabilitation Study
- Study 3: Asphalt Pavement Rehabilitation Study
- Study 4: Rubberized Asphalt Concrete (RAC) Study
- Study 5: Capitol Preventive Maintenance (CAPM) Study

In total, around 1,000 test sections were evaluated to determine the effect that environmental conditions, design parameters, materials, and construction variables had on structural and functional pavement performance. The test sections were located in all but one of California's districts (District

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[1] Stantec Consulting. 'Caltrans Pavement Performance Evaluation Services - Contract 65A0069 - Final Report'. November 2002

4 was not represented) and all but one of the state's environmental zones (the Bay Area zone was not represented). The sections covered a number of different rehabilitation treatments, materials, and pavement types in each district and zone.

Office, field, and laboratory data were collected for each pavement section and stored in the project database. Collected data included pavement structural information, core/bore logs, laboratory test results, deflection data, roughness data, and surface distress data for each section.

Extensive analysis was required in order to meet the project objectives. To address the large number of test sections and the large number of variables to be considered, three types of analysis were performed:

- Stage I analysis – Section-level analysis
- Stage II analysis – Project-level analysis
- Stage III analysis – Across-projects analysis

In the Stage I analysis, each section was analyzed separately. The International Roughness Index (IRI) and the Pavement Condition Index (PCI) were used to evaluate the functional performance, while Falling Weight Deflectometer (FWD) deflection data was used to evaluate the pavement structural performance. For Stage II analysis, sections located within the same project were grouped and compared to evaluate the construction and material variability within a project. Sections within each project were compared to evaluate cross-project consistency, structural performance, functional performance, and material properties. In the Stage III analysis, sections and groups of sections were compared across environmental zones and across treatment types to evaluate and compare the performance of different treatments.

Study 1 looked at construction consistency using two approaches. In the first approach, Stage I structural analysis results were used to evaluate the structural construction quality for each section. A Structural Construction Quality Index (SCQI) was developed for this purpose that was an indicator of the degree of variability in the structural capacity along the section. SCQI was used to compare the variation in construction consistency that occurred across different environmental zones and different districts. Based on the sections considered in this study, it was found that some districts had higher construction consistency, i.e. less variability, than others. In the second approach, Stage II analysis results were used to evaluate the overall construction consistency across projects in terms of material and thickness variability and structural capacity variability. A Construction Quality Index (CQI) was developed that considered a number of construction-related factors, including the variability in materials, the actual constructed layer thicknesses, and the structural capacity between sections within the project. Results of the CQI analysis indicated that there were, in some cases, significant differences in construction consistency among environmental zones.

The amount of traffic loading that a pavement is subjected to during its life cycle is an extremely important factor in determining how well a pavement has performed. If traffic loading is not considered, a pavement that has been subjected to substantially more than the design traffic may erroneously appear to have performed poorly, and a pavement subjected to substantially less than the design traffic may erroneously appear to have performed well. As accurate traffic data is vital to produce reliable results and conclusions on pavement performance, the 1998 Caltrans Traffic Database was searched for traffic counts for the selected test sections. However, the number of test sections with measured traffic counts was limited and as a result, actual accumulated traffic data was not considered in Phase I. Performance analysis was instead carried out in terms of the age of the pavement. As such, it was not possible to compare the actual pavement performance against the designed performance. For Studies 2 to 4, only the tasks to compare the performance of different treatments were completed; tasks that involved evaluating the performance of the treatment itself were not completed.

Analysis of data was first performed using a deterministic approach. However, the use of pavement age instead of traffic data resulted in a large scatter in the performance results. For non-Long Term Pavement Performance (LTPP) study sections, the deterministic approach was deemed to yield insignificant results. Deterministic analysis was successful for LTPP sections, but only up to Stage II. Stage III analysis was not possible for these sections due to the different levels of construction quality control and the limited number of sections within each treatment type. As a result, a probabilistic analysis approach was used for Studies 2-4 and also to address the effect that environmental zone has on pavement performance. Pavement performance was evaluated in terms of a Structural Adequacy Index (SAI), IRI, and PCI. Analysis of Variance (ANOVA) was used compare multiple treatments.

Environmental effects on pavement performance were evaluated by assessing the performance of several flexible pavement sections with DGAC overlay, which were distributed across the different environmental zones. Analysis performed on these selected sections suggested that environmental zone can have a significant effect on pavement performance – most particularly on functional rather than structural performance. However, this analysis was based on pavement age rather than traffic loading. A more comprehensive study that incorporated more treatments and test sections, and that included traffic data, may produce different results.

The effect of interlayers on pavement performance was evaluated by analyzing and comparing sections with Pavement Reinforcing Fabrics (PRF) and Stress Absorbing Membrane Interlayer (SAMI) against control sections without any interlayers. Results from these analyses suggested that use of interlayers generally had only minimal impact on pavement performance. However, this analysis was again performed in terms of pavement age rather than accumulated traffic, and the data for the PRF and SAMI sections was not comprehensive. As such, it was felt that definitive conclusions could not be drawn from this investigation.

The performance of the RAC overlays was evaluated against DGAC overlays in terms of SAI, IRI and PCI. The analysis results indicated that the RAC overlay had a lower structural capacity, which was expected as RAC overlays are typically thinner than the DGAC overlays. Statistical analysis indicated that there was no significant difference between the two overlay types in terms of PCI and IRI. The results of this analysis were, however, considered to be inconclusive.

Overall, at the completion of the Phase I project, it was concluded that due to the absence of reliable traffic data and the unbalanced distribution of test sections across environmental zones and districts, further study and analysis was required in order to produce more meaningful results.

1.2 RECOMMENDATIONS OF PHASE I PROJECT

The Phase I final report[2] concluded that two main issues limited the completeness of the analysis in this project: the absence of traffic count data and the unbalanced distribution of test sections among districts and environmental zones.

As such, it was recommended that a traffic study should be performed through which the traffic loading at the test sections could be estimated. This would allow a more accurate assessment of how well a particular treatment has performed given the traffic loading that it has been subjected to during its service life.

It was also recommended that an additional 350-400 (minimum) test sections should be added to the project in order to have a dataset that provides sufficient data for all variables. It was advised that a representative number of test sections be selected from the Bay Area (BA) environmental zone and from District 4, as these areas were not included in the Phase I project.

1.3 OBJECTIVES OF PHASE II PROJECT

Phase II was initiated with the purpose of expanding the investigations and analysis conducted in Phase I. The overall goal remained the same: to perform a comprehensive evaluation of in-situ pavement performance across the state of California, and therefore assess the success of Caltrans' design procedures. A number of tasks that would help achieve this goal were included in the Phase II scope. Overall, the main goals of Phase II can be summarized as follows:

1. **Select and test additional test sections to complement the Phase I sections**
   At the conclusion of Phase I, it was felt that the selected test sections did not give the coverage needed to properly evaluate the performance of certain treatments. In addition, the Bay Area environmental zone and District 4 had not been represented at all in the project. As a result, Phase II sought to enhance the dataset by adding approximately 500 test sections to the project. This included sections in the Bay Area and District 4, and additional sections for treatments that had been under-represented in the first phase. This initiative was referred to as the Phase II Main Study.

2. **Ensure compatibility between the Phase I and Phase II data**
   Between the two phases, data would be collected from around 1,500 test sections over a period of more than five years. Data from both phases was intended to form one complete dataset and be used to achieve the same overall goal. Therefore, it was important that all the collected data would be compatible. This was achieved through similar data collection

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[2] Stantec Consulting. 'Caltrans Pavement Performance Evaluation Services - Contract 65A0069 - Final Report'. November 2002

procedures being implemented in both phases and extensive QA checks being performed on all data.

As it was possible that different FWD equipment would be used in Phase II to collect deflection data, an FWD correlation study was added to the project scope. Through this study, models would be developed that would account for any difference in collected deflection data that was attributable to use of different FWD equipment.

3. **Develop seasonal and temperature adjustment models to adjust FWD data for seasonal and temperature variations**
   Pavement performance is highly influenced by environmental factors, most particularly by temperature and moisture. Temperature and moisture conditions vary with time (daily, seasonal, and longer cycles), meaning that deflection testing can be performed at the same pavement section, but yield very different results depending on the climatic conditions at the time of the test. Performance of different pavement sections that have been tested at different times of the day and year therefore cannot be meaningfully compared – differences in measured deflections may be due to climatic conditions rather than to a difference in structural performance. To allow fair comparison, adjustment models are required to account for the environmental variations and to bring pavement response parameters measured at different times of the day and year to the same standard conditions.

   In this project's two phases, tests were conducted not only in different years, but at different times of the year and at different times of the day. In order to allow meaningful comparisons between the FWD results collected under such different climatic conditions, and to therefore fully meet the overall project goals, some adjustment of the collected data was necessary. As such, a limited seasonal study was added to the scope of the Phase II project with the intention of developing adjustment models based on California conditions.

4. **Collect traffic data from Phase I and Phase II sections to enhance the pavement performance analysis**
   Due to the lack of available traffic counts in the Caltrans Traffic Database, analysis in Phase I was based on pavement age only. The limitation of this approach was that two pavement sections of the same age may receive significantly different traffic loadings, and as truck traffic is one of the key sources of damage to pavements, using only pavement age does not allow a fair comparison of performance in such a case. This limited the validity of the deterministic analysis approach and led to a probabilistic analysis approach being used in Phase I.

   As such, a traffic study was included in the Phase II project to collect limited time axle weight data and utilize the existing Caltrans permanent weigh stations to estimate the accumulative axle weights that passed over a project since the construction of the last rehabilitation treatment.

2.0 Main Study Data

2.1 TEST SECTIONS

During Phase I, a list of candidate sections was proposed for the Phase II project. This list represented the starting point in the selection of test sections for the Phase II Main Study. The list was extensively reviewed with respect to what had been achieved in Phase I and what was needed in Phase II in order to select the most relevant sections.

Caltrans required that at least 200 sections from the QC/QA and PMS lists be included in the Phase II testing. As such, these lists were examined and, based on as-built documents, Phase I roughness, distress, and FWD data, the sections were divided into three categories:

1. Sections that matched the Phase II test section requirements.
2. Sections that did not match the Phase II test section requirements exactly, but could potentially be considered for testing.
3. Sections that could not be considered at all, due to the nature of the project, such as bridge widening or interchange improvement, or due to safety concerns, such as very high traffic volumes.

From the candidate sections identified during Phase I and the QC/QA and PMS lists, a draft test section list was compiled and these sections were surveyed using the RT3000. In this survey, longitudinal profiles, left and right wheel path IRI measurements, and limited distress data were recorded, and digital images were taken.

The results of the RT3000 survey, as well as checks on the validity of available IRI data, were used to refine the list of test sections. The test sections that passed these checks underwent detailed field testing. Once coring had been completed, its results were compared with the expected as-built pavement structure. In cases where there were discrepancies, the list of sections was revised to ensure that all the required rehabilitation treatments and pavement types were represented in the final list of test sections.

After making all necessary refinements to the test section list in order to successfully meet the project requirements, 537 sections were included in the Phase II Main Study. Appendix A gives detailed information on the final 537 sections. As can be seen, test sections were located across 30 counties and in all six of the State’s environmental zones. Sections were selected in all but two of Caltrans’ twelve Districts (no sections were selected in Districts 7 and 12). While most of the sections were Asphalt Concrete (AC), more than 70 were Portland Cement Concrete (PC) and a further 13 were composite (CO). The QC/QA and PMS list supplied 220 of the sections and 17 sections from the Federal Highway Administration’s (FHWA) LTPP program were also included.

2.2 DATA COLLECTION

Since the objective of the Phase II Main Study is to supplement the Phase I project, the Phase II data collection program was very similar to Phase I, and can be divided into three main categories – office, field, and laboratory. Once collected, data was subjected to QC/QA checks, processed, and uploaded into the project database. The following subsections give an overview of the different types of data collection performed in this project.

2.2.1 Office Data

As in Phase I, office data was collected from a variety of sources in Caltrans, such as the local district offices and Caltrans' headquarters in Sacramento. The collected data included:

- As built and construction data, such as:
    - actual treatment
    - layer type and thickness
    - traffic loads
- Pavement design parameters, such as:
    - design treatment
    - design traffic
    - layer type and thickness

All collected office and as-built information was loaded into the project database.

2.2.2 Field Data

The field data collection program used in Phase I was followed in Phase II, with only slight modifications that were requested by Caltrans. These modifications included taking an additional core outside the wheel path and performing field classifications of the subgrade soil. Each data collection element is explained in the sections below.

2.2.2.1 RT3000 Survey

As mentioned above, an RT3000 survey was conducted on the list of potential test sections before the final 537 were selected. In this survey, longitudinal profiles, left and right wheel path IRI, digital images, and limited distresses were measured and recorded. IRI and rut depth data for the final Phase II test sections was loaded into the project database; front and rear images, such as the example shown in Figure 2-1, were hyperlinked to the database.

Figure 2-1: Example Image File

2.2.2.2 Visual Distress Survey (VDS) Data

In the distress surveys, the test sections were divided into 50-ft increments and the type, severity, and extent of any of the pavement distresses presented in Table 2-1 within each 50-ft section were recorded. The distress data was then loaded into the project database.

Table 2-1: Types of Collected Surface Distresses

Pavement Type	Distress Type	Severity levels	Extent Units
Flexible Pavements	Block Cracking	Low - Crack width < 0.25” Medium - Crack width 0.25”-0.75” High - Crack width > 0.75”	% area
	Alligator Cracking (wheel path)	Low - Crack width < 0.25” Medium - Crack width 0.25”-0.75” High - Crack width > 0.75”	% area
	Alligator Cracking (non-wheel path)	Low - Crack width < 0.25” Medium - Crack width 0.25”-0.75” High - Crack width > 0.75”	% area
	Transverse cracking	Low - Crack width < 0.25” Medium - Crack width 0.25”-0.75” High - Crack width > 0.75”	Count
	Longitudinal cracking (wheel path)	Low - Crack width < 0.25” Medium - Crack width 0.25”-0.75” High - Crack width > 0.75”	Linear feet
	Longitudinal cracking (non-wheel path)	Low - Crack width < 0.25” Medium - Crack width 0.25”-0.75” High - Crack width > 0.75”	Linear feet
	Rutting*	Low – rut depth < 0.50” Medium - rut depth 0.50”-1.0” High - rut depth > 1.0”	Linear feet

Pavement Type	Distress Type	Severity levels	Extent Units
	Raveling	Low – minor loss in fines Medium – shallow disintegration High – rough surface	% area
	Bleeding	Low – visible coloring Medium – visible free asphalt High – Wet looking	% area
Rigid Pavements	Longitudinal cracking	Low - Crack width < 0.125” Medium - Crack width 0.125”-0.50” High - Crack width > 0.50”	Linear feet
	Transverse cracking	Low - Crack width < 0.125” Medium - Crack width 0.125”-0.50” High - Crack width > 0.50”	Count
	Corner Cracking	Low - Crack width < 0.125” Medium - Crack width 0.125”-0.50” High - Crack width > 0.50”	% affected corners
	Durability Cracking	Low - Crack width < 0.125” Medium - Crack width 0.125”-0.50” High - Crack width > 0.50”	% affected sides
	Map Cracking		% area
	Pumping		Count
	Popouts	Low – voids < 0.25” Medium – voids well defined High – closely spaced voids	% area
	Corner Spalling		% area
	Joint Spalling		Count
	Smashed slabs		Count

*In the database, rutting is shown in the roughness table rather than the distress table.

2.2.2.3 Falling Weight Deflectometer (FWD) Data

The FWD testing was carried out in 50-ft increments across the length of the section. Testing was carried out in the right wheel path for flexible pavements. For rigid pavements, testing was carried out in the right wheel path and at the center of the slab. Sensor offset distances from the center of the load plate were as follows:

D1	D2	D3	D4	D5	D6	D7	D8	D9
0 in.	12 in.	18 in.	24 in.	36 in.	48 in.	60 in.	72 in.	-12 in.

The loading sequence consisted of one seating drop at 12,000 lbs followed by one drop at each of three defined load levels. The load levels depended on the pavement type being tested, and were as follows:

Flexible Pavement	**Level 1**	**Level 2**	**Level 3**
	7,000 lbs	9,000 lbs	12,000 lbs
Rigid Pavement	**Level 1**	**Level 2**	**Level 3**
	9,000 lbs	12,000 lbs	14,000 lbs

All collected FWD data was loaded into the project database.

2.2.2.4 Core/Bore Data

Cores/bores were extracted at Station (-)50ft from all sections to obtain in-situ pavement structural information, such as material type and thickness of the pavement and base/subbase condition. FWD testing was also performed at the core location in order that the cores could be used to provide in-situ layer thickness information necessary for backcalculation analysis. As a slight modification for Phase II testing, two cores were extracted from each flexible pavement test section (one within the wheel path and one between wheel paths). Each core was assigned a unique core ID number and details on the material type and thickness were recorded on a Core Log. Digital images were taken to document each core and the cores themselves were sent for laboratory testing.

Data from the cores was uploaded into the project database. Core images, such as the example shown in Figure 2-2, are provided alongside the database and labeled with the corresponding section number.

Figure 2-2: Example Core Image File

2.2.2.5 Field Classified Subgrade Data

As a second modification to Phase II data collection, Caltrans requested the addition of subgrade classification at each site. This was conducted according to the American Society for Testing & Materials (ASTM) Standard 2488 for field soil classification. However, the data did not pass the rigorous QC/QA tests employed in this project and as a result no subgrade classifications are available in the project database.

2.2.2.6 Site Characterization Data

In the site characterization task, data attributes, such as geometry (curve, slope, tangent), pavement, substructure, shoulder type and condition, and cut/fill were collected using a detailed Site Characterization Form. These attributes were uploaded into the site characterization table within the project database.

2.2.3 Laboratory Data

As in Phase I, the following laboratory tests were performed on the samples taken from the AC top layer cored from each test section:

- AC Extraction, as per American Association of State Highway and Transportation Officials (AASHTO) T-164 Standard
- Gradation, as per AASHTO T27-97, ASTM C 136-95a Standards
- Bulk specific gravity, as per AASHTO T166-93 Standard
- Maximum theoretical specific gravity, as per AASHTO T 209-94 Standard
- Air voids using the bulk specific gravity and the maximum theoretical specific gravity

Two cores were extracted from the flexible pavement test sections (one within the wheel path and one between wheel paths). The between-wheel-path core was used to determine the impact of traffic on air voids, i.e. secondary compaction, as it is expected that the voids ratio will be different from within the wheel path to between wheel paths. However, the aggregate gradation and binder content of the AC mix are not expected to be significantly different between the two cores. Therefore, the wheel-path core was subject to all laboratory tests, whereas only specific gravity was performed on the between-wheel-path core. It should be noted that rigid pavement sections were not subject to laboratory testing.

In addition to the tests mentioned above, those sections that were part of Study 1 – the Construction Quality Evaluation Study – were subject to the following laboratory tests carried out on the aggregate base:

- Moisture content
- Aggregate gradation

These tests were conducted on Study 1 sections regardless of pavement type, i.e. flexible, composite, and rigid sections.

All collected laboratory data was uploaded into the project database.

2.2.4 Database

The collected data (field and office), the results of the laboratory tests and the results of the analyses performed on the collected data were loaded to the project Access database. Appendix B shows a list of the Access database tables and fields.

2.3 ENHANCEMENTS TO MAIN STUDY DATA

From the data collection initiatives, the database for Phase II Main Study test sections was populated with office, field and laboratory data. However, a number of additional factors needed to be considered in order to produce more meaningful results:

- The effects of climatic conditions on FWD test results
- The accumulated traffic loading that the test sections have been exposed to during their service life
- Differences in FWD results related to use of different FWD equipment within the project

These factors were addressed in Phase II through the Seasonal Study, the Traffic Study, and the FWD Correlation Study. Details on each of these studies, including how their results were implemented to enhance the Main Study data, are included in the next three sections of the report.

3.0 Seasonal Study

Pavement performance is highly influenced by environmental factors, most particularly by temperature and moisture. Since temperature and moisture conditions vary with time (daily, seasonal, and longer cycles) their effects should be accounted for when comparing the performance of different pavement sections that were tested under different environmental conditions. In such cases, the use of adjustment models is required to account for the environmental variations and to bring pavement response parameters measured at different times of the day and year to the same standard conditions.

In Phase I of this project, FWD data was collected from approximately 1,000 test sections. For the Phase II Main Study, it was collected from over 500 more. These 1,500+ sections were located across the state of California in different environmental zones, and FWD tests were conducted not only in different years, but at different times of the year and at different times of the day. In order to allow meaningful comparisons between the FWD results collected under such different climatic conditions, some adjustment of the collected data was necessary. As such, a limited seasonal study was added to the scope of the Phase II project.

The main objective of the Phase II Seasonal Study was to develop adjustment models based on California conditions that could be used to account for the variation in environmental factors during the FWD tests performed on Phase I and II sections. This would allow meaningful comparison of the FWD test results of the 1,500+ test sections – a necessary step to achieve the overall project goals.

3.1 FIELD TESTING

Two different kinds of FWD field testing were conducted within the Seasonal Study: monthly testing to monitor the seasonal changes (month to month); and 24-hour testing cycles (sections tested every 2 hours for a 24-hour period) to monitor short-term variability (mainly temperature variability). In addition to FWD testing, cores/bores were extracted from each test section during the first testing cycle to provide layer thickness information necessary for backcalculation analysis.

3.1.1 Test Sections

During the Phase I project, the State was divided into the following six environmental zones[3]:

- Bay Area (BA)
- Central Valley (CV)
- Desert (DS)
- Mountain (MT)

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[3] Harvey, J., Chong, A., Roesler, J. *Climate Regions for Mechanistic-Empirical Pavement Design in California and Expected Effects on Performance*. Draft report prepared for California Department of Transportation. Publication UCPRC-RR-2000-07. Pavement Research Center, CAL/APT Program, Institute of Transportation Studies, University of California, Berkeley, 2000.

- North Coast (NC)
- South Coast (SC)

Seasonal Study test sections were selected from within these six zones. Since traffic control represents a major cost item in California, test sections were selected from areas that required less traffic control, such as rest areas and weigh stations. The final list of sections tested in the Seasonal Study is shown in Table 3-1. As can be seen, a total of 11 flexible (asphalt concrete (AC)) and 7 rigid (Portland Cement Concrete (PC)) were included in the study. The three sections highlighted in the table were also used for the 24-hour testing cycles.

The flexible pavement sections had AC layer thicknesses ranging from 3.5 to 7 in., with base layers ranging from 2 to 15 in. The rigid pavement sections had PC layers ranging in thickness from 9 to 13 in., with base layers ranging from 3.5 to 10 in. A range of base / subbase and subgrade materials were represented in the chosen test sections.

3.1.2 FWD Testing Protocols

For flexible pavements, the FWD testing was conducted along the right wheel path and between the wheel paths. A minimum of 11 test points were tested per path for each test section. For rigid pavements, at least three slabs were tested per section. Three paths were tested at each slab:

- Pavement Edge (closest to shoulder)
- Right Wheel Path (3 ft from lane/shoulder joint)
- Between Wheel Path (6 ft from lane/shoulder joint)

Each slab was tested at mid-slab (5 ft from nearest joint or transverse crack) and at the approach and leave sides of the following joint/crack.

Testing consisted of a seating drop and one drop at each of three load levels. Sensor offset distance from the center of the load plate was as follows:

D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**
0 in.	8 in.	12 in.	18 in.	24 in.	36 in.	48 in.	60 in.	-12 in.

Pavement temperature measurements 0.5” from the surface, at mid-depth, and 0.5” from the bottom were taken at the beginning and end of testing at each section. Air temperature was continuously monitored throughout all tests.

Table 3-1: Seasonal Study Test Sections

							AC Pavement Layers				PC Pavement Layers			
Name	Site ID	Type	Route	Dir.	MP	Env. Zone	AC (in.)	Base (in.)	Subbase (in.)	Base/Subbase	PC (in.)	Base (in.)	Base	Subgrade
Alliso Creek	ALISO_S	Rest Area	5	S	59	SC	5	2	12	Gravel / Sand				Soft Clay
Antelope	ANT_E	Weigh Station	80	E	16	CV	4.5	4	5	CTB / Sandy Gravel				Silty Sand w Gravel
Antelope	ANT_E	Weigh Station	80	E	16	CV					9	5	Sandy Gravel	Silty Sand w Gravel
Antelope	ANT_W	Weigh Station	80	W	16	CV					9.5	4	Cement Treated Base	Silty Sand w Gravel up to 24"
Buckhorn	BUCK_W	Weigh Station	299	W	7.4	NC	6.5	15	0	Sandy Gravel & Cobble				Silty Sand
Buckhorn	BUCK_W	Weigh Station	299	W	7.4	NC					13	10	Sandy Gravel & Cobble	Silty Sand
Camino	CAM_W	Weigh Station	50	W	27.1	MT	3.5	7.5	0	Sandy Gravel				Clay
Camino	CAM_W	Weigh Station	50	W	27.1	MT					13	10	Sandy Gravel & Cobble	Silty Sand
Cordelia	CORD_W	Weigh Station	80	W	14.5	BA					11	3.5	Cement Treated Base	Silty Sand w Gravel
Desert Hill	DES_W	Weigh Station	10	W	15.8	DS	6.5	14		Sandy Gravel				Sandy Gravel
Dunnigan	DUN_N	Rest Area	5	N	26.3	CV	4	9	0	Sandy Gravel / Gravel				Silty Sand w Gravel
Gold Run	GOLD_W	Rest Area	80	W	41	MT	5.5	5		Gravelly Sand				Silty Clay
Irvine	IRV_N	Rest Area	101	N	61.82	NC	4	7	0	Clean Gravel				Sandy Gravel
Nimitz	NIM_S	Weigh Station	880	S	3.7	BA					10	6.25	Silty Gravel	Clay
Peralta	PER_E	Weigh Station	91	E	13.8	SC					9.5	5	Cement Treated Base	Sandy Gravel
Trinidad	TRIN_N	Rest Area	101	N	70	NC	7	4.75	0	Sandy Gravel				Silty Sand
Whitewater	WHITE_E	Rest Area	10	E	26	DS	4	2	17	Gravel (open graded)				Silty Clay
Whitewater	WHITE_W	Rest Area	10	W	26	DS	4.5	2	20	Gravel / Sand with Gravel				Silty Clay

3.1.3 Testing Frequency

Regular Seasonal Study test sections were tested approximately once a month for one year, using the above protocols. The 24-hour test sections were each tested every 2 hours for a 24-hour period to focus on the effect of short-term, mainly temperature, variations. Appendix C shows the dates of testing carried out at regular (non-24-hour) test sections.

3.2 DEVELOPMENT OF TEMPERATURE ADJUSTMENT MODELS – FLEXIBLE PAVEMENTS

3.2.1 Model Development

There are a number of factors that could possibly need to be accounted for in the development of temperature adjustment models for deflection data from flexible pavements. These include pavement surface temperature, sensor location, AC layer thickness, and environmental zone. It is not simply the factors themselves that may need to be considered, but also interaction between any one or more of these factors. Therefore the first step in the development of the models for flexible pavements was to perform Analysis of Variance (ANOVA) to determine which factors, or 'main effects', and two-way interactions between main effects, had significant effect on the deflection data and therefore needed to be addressed in the model.

The deflections measured from all 11 flexible test sites were considered. ANOVA was performed for each sensor individually (D1-D9) to examine the significance of main effects and two-way interactions on the measured deflections at that sensor. The main effects examined were pavement surface temperature, AC thickness, and environmental zone. The environmental zones were represented by the codes shown in Table 3-2.

Table 3-2: Environmental Zone Codes

Env. Zone	Code
Bay Area	31*
Central Valley	32
Desert	33
Mountain	34
North Coast	35
South Coast	36

* Because no flexible test sections from the BA zone were included in the Seasonal Study, a code of 35 (North Coast) is suggested to be used for Bay Area flexible pavement sections because of the similarity in climatic conditions.

Table 3-3 shows a summary of the significant and non-significant main effects and two-way interactions for each sensor. Aside from the noted exception, all results are based on a 95% confidence level and 3333 degrees of freedom.

Table 3-3: ANOVA Testing – Summary of Results

	Env. Zone	AC Thickness	Surface Temperature	Env. Zone & AC Thickness	Env. Zone & Temp	AC Thickness & Temp
D1	S	S	S	S	S	NS
D2	NS	S	S	S	S	NS
D3	NS	S	S	S	S	S
D4	NS	S*	S	NS	S	NS
D5	S	S	S	S	S	S
D6	S	S	NS	S	S	S
D7	S	S	NS	S	NS	S
D8	S	S	NS	S	NS	S
D9	NS	S	S	S	S	NS

*94% confidence level used instead based on practical engineering judgment.

As can be seen, all parameters were found to have a significant impact on all sensors (D1 – D9), either as main effects and/or as part of a two-way interaction. For example, environmental zone has a significant impact as a main effect on D1. This is not the case for D2 – environmental zone has no significant impact as a main effect. However, environmental zone does have significant impact on D2 in two-way interactions with asphalt thickness and also with pavement surface temperature.

Taking each sensor individually (D1 to D9), the non-significant main effects and two-way interactions were removed and multi-regression analysis was performed to develop temperature adjustment models for the deflections measured by each sensor as function of significant main effects and two-way interactions. The general form of the model is:

$$Y_i = m_{ij} * X_j \qquad [3\text{-}1]$$

Where,
Y_i = D1 to D9
X_j = Surface Temperature (T), AC Thickness (AC), Environmental Zone (EZ), Surface Temperature * AC Thickness (T*AC), Surface Temperature * Environmental Zone (T*EZ), and AC Thickness * Environmental Zone (AC*EZ), respectively
m_{ij} = regression coefficient

Table 3-4 shows the model coefficients for D1 to D9 for flexible pavements. The table also shows the coefficient of determination (R^2) and degrees of freedom (DF) for each model.

Table 3-4: Coefficients for Temperature Adjustment Models – Flexible Pavement

	Env. Zone	AC Thickness	Surface Temperature	Env. Zone & AC Thickness	Env. Zone & Temp	AC Thickness & Temp	DF	R^2
D1	0.704	-5.879	-1.020	0.085	0.032		3335	85%
D2		8.853	-1.178	-0.245	0.037		3336	78%
D3		1.670	0.081	-0.023	0.002	-0.021	3335	73%
D4		0.575	-0.374		0.012		3337	71%
D5	0.039	0.180	-0.167	0.010	0.006	-0.006	3334	74%
D6	-0.008	-1.216		0.053	0.001	-0.007	3335	75%
D7	0.042	-1.260		0.040		-0.001	3336	76%
D8	0.035	-0.973		0.030		-0.001	3336	78%
D9		8.036	-1.129	-0.222	0.036		3336	80%

These models were based on the data available in the Seasonal Study database, and are valid only for the range of parameters that are present in that dataset. The range of validity for each model, by individual parameter, is shown in Table 3-5. It should be noted that for the purposes of this particular study, deflections were measured at pavement surface temperatures higher than 120°F, but that it is not usually recommended that FWD tests be performed at temperatures higher than 120°F.

Table 3-5: Ranges of Validity for Temperature Adjustment Models – Flexible Pavement

Env. Zone (No.)		AC Thickness (in.)		Surface Temperature (°F)	
Min	Max	Min	Max	Min	Max
32	36	2.5	7.5	42.4	147.1

3.2.2 Application of Models

The developed models estimate the deflection at different sensor locations as a function of pavement surface temperature, AC layer thickness, and environmental zone, as well as different two-way combinations of these parameters. However, it should be noted that these models are mainly concerned with the impact of temperature on the measured deflections and that no material properties are contained in the models, i.e. they are not structural models. The models were not developed with the intention of predicting measured deflections and should not under any circumstances be used for this purpose. The models are intended to be used to bring measured deflections recorded at different temperatures to the same standard temperature.

The steps that should be followed to apply these models are illustrated in Figure 3-1, and can be summarized as follows:

- Estimate the deflections at different sensors using the appropriate model and the actual pavement surface temperature during testing (D_{ip}).
- Estimate the deflections at different sensors using the appropriate model and the standard pavement surface temperature, i.e. 68°F (D_{is}).
- Determine the required deflection adjustment (ΔD) due to the difference between the actual pavement surface temperature during testing and the standard pavement surface temperature, as $\Delta D = D_{is} - D_{ip}$.
- Calculate the temperature adjusted deflection by applying ΔD to the actual measured deflection, as Adjusted Deflection = Measured Deflection + ΔD

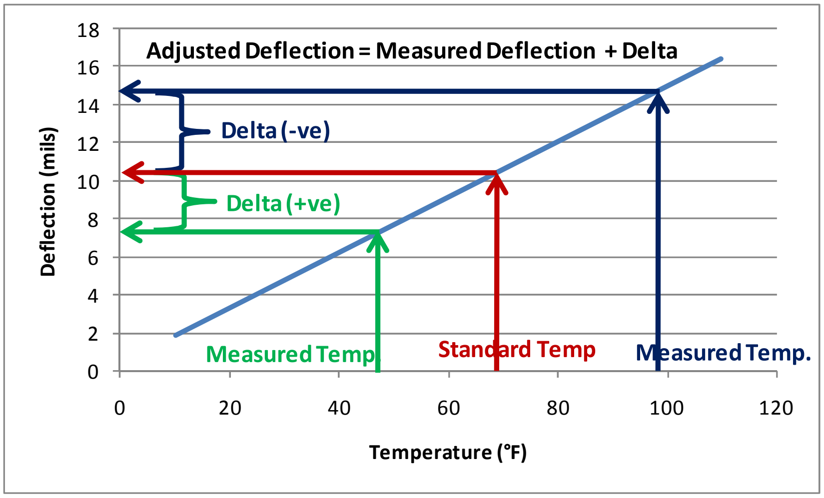

Figure 3-1: Implementation of Models

As a reasonableness check, the models were then applied to each of the measured deflections recorded within the Seasonal Study. As per the steps described above, the appropriate model (D1 to D9) was applied to each record in the database to estimate the deflection using the actual pavement surface temperature at the time of testing as an input. The process was then repeated but using a standard temperature (68°F) as an input, i.e. to estimate the deflection at the standard temperature. ΔD was then calculated as the difference in value between the estimated deflection at the actual measured temperature and the estimated deflection at the standard temperature. The actual measured deflection was then adjusted using ΔD, resulting in a temperature adjusted deflection.

3.2.2.1 Sample Application

Figure 3-2 shows an example implementation of the developed models. In this example, the recorded surface temperature during the testing was 96.3°F, AC thickness was 2.5 in. and environmental zone was South Coast (36). The actual measured deflection basin is represented by the blue line. The appropriate model was implemented for each deflection (D1-D8), resulting in the adjusted deflection basin (green line). For example, the actual measured D1 @ 96.3°F was 23.3 mils. The D1 model was used first to estimate the deflection @ 96.3°F as follows:

$$D1 = m_{ij} * X_j \qquad [3\text{-}2]$$

or,

$$D1 = 0.704 * \text{Env. Zone} - 5.879 * \text{AC Thick} - 1.020 * \text{Temp} + 0.085 * \text{Env. Zone} * \text{AC Thick} + 0.032 * \text{Env. Zone} * \text{Temp}$$

or,

$$D1 = 0.704 * 36 - 5.879 * 2.5 - 1.020 * 96.3 + 0.085 * 36 * 2.5 + 0.032 * 36 * 96.3$$

$$D1 = 31.25 \text{ mils}$$

The process was then repeated to estimate the deflection @ 68°F:

$$D1 = 0.704 * \text{Env. Zone} - 5.879 * \text{AC Thick} - 1.020 * \text{Temp} + 0.085 * \text{Env. Zone} * \text{AC Thick} + 0.032 * \text{Env. Zone} * \text{Temp}$$

or,

$$D1 = 0.704 * 36 - 5.879 * 2.5 - 1.020 * 68 + 0.085 * 36 * 2.5 + 0.032 * 36 * 68$$

$$D1 = 27.45 \text{ mils}$$

The difference between these two deflections, ΔD1, is equal to -3.8 mils. As a result, the adjusted D1 would be 23.3 – 3.8 = 19.5 mils. The same steps were then followed for each of the measured deflections using the appropriate model.

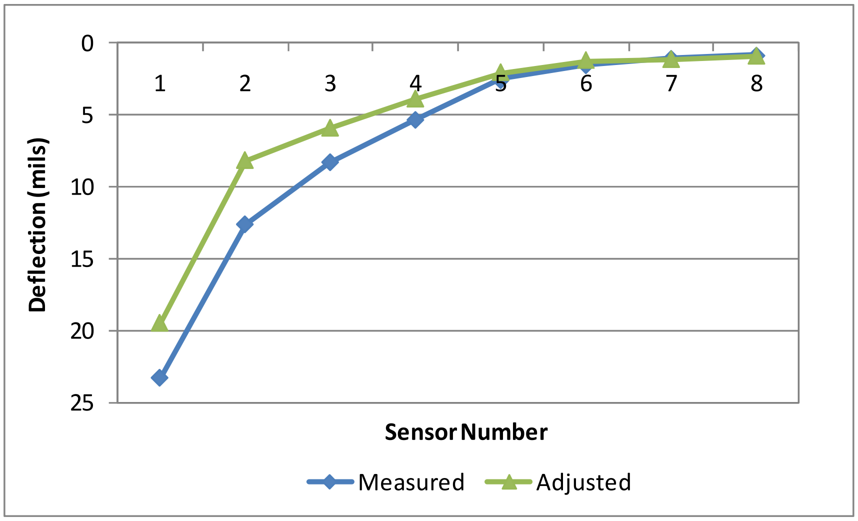

Figure 3-2: Example Flexible Model Implementation 96.3°F

Figure 3-3 illustrates another example implementation of the developed models. In this example, the recorded surface temperature during the testing was 60.0°F. Again, the actual measured deflection basin is represented by the blue line. The appropriate model was implemented for each deflection (D1-D8), resulting in the adjusted deflection basin (green line). For example, the measured D1 @ 60.0°F was 9.22 mils. The D1 model was used first to estimate the deflection @ 60.0°F (11.95 mils) and then the deflection @ 68°F (12.77 mils). The difference between these two deflections, Δ D1, is equal to +0.82 mils. As a result, the adjusted D1 would be 9.22 + 0.82 = 10.04 mils. The same steps were then followed for each of the measured deflections using the appropriate model.

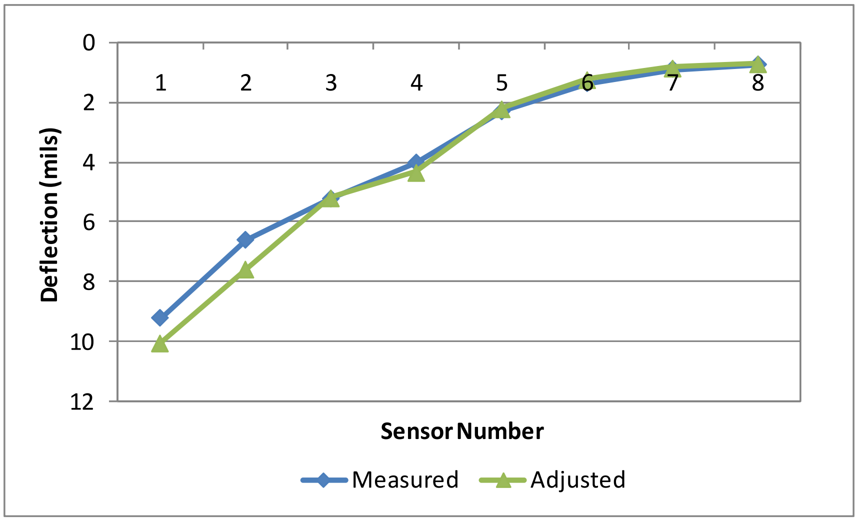

Figure 3-3: Example Flexible Model Implementation 60.0°F

Figure 3-4 shows a final example implementation of the developed models. In this example, the recorded surface temperature during the testing was 71.2°F. The actual measured deflection basin is once again represented by the blue line. The appropriate model was implemented for each deflection (D1-D8), resulting in the adjusted deflection basin (green line). For example, the measured D1 @ 71.2°F was 26.41 mils. The D1 model was used first to estimate the deflection @ 71.2°F (20.85 mils) and then the deflection @ 68°F (20.42 mils). The difference between these two deflections, ΔD1, is equal to -0.43 mils. As a result, the adjusted D1 would be 26.41 - 0.43 = 25.98 mils. The same steps were then followed for each of the measured deflections using the appropriate model.

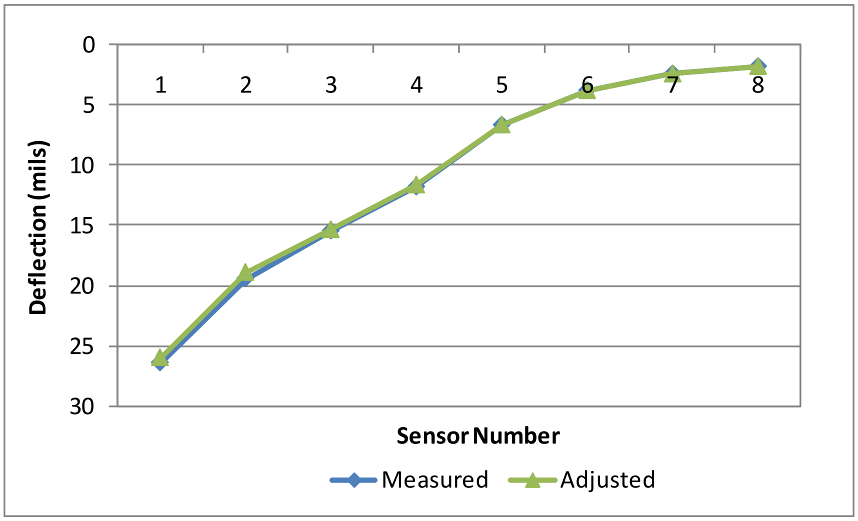

Figure 3-4: Example Flexible Model Implementation 71.2°F

As can seen from these three examples, when the temperature during the testing was much higher than the standard temperature (96.3°F compared to 68°F), ΔD1 was -3.8 mils (-14.4% of D1), i.e. D1 was reduced by ~15% to account for the 28.3°F difference between the temperature during testing and the standard temperature. The corresponding ΔD1 in the second and third examples, where the temperature differences from the standard temperature are -8°F and +3.2°F, are 8.9% and -1.6% of the measured D1s, respectively.

3.3 DEVELOPMENT OF TEMPERATURE ADJUSTMENT MODELS – RIGID PAVEMENTS

3.3.1 Model Development

A very similar approach was used in the development of temperature adjustment models for rigid pavements. However, because of the nature of the differences between flexible and rigid pavements, a number of additional considerations were necessary. Firstly, rigid pavement models were developed not only for each sensor (D1-D9), but also for each testing location on the slab (i.e. mid-slab, approach side of joint/crack, leave side of joint/crack), resulting in three models for each sensor. Secondly, due to the additional factors that may affect the response of rigid pavement to temperature, additional main effects were considered in the development of the rigid pavement models. The main effects considered were:

- Pavement surface temperature
- Air temperature gradient (change in air temperature between current test and the test conducted immediately prior to it)
    - “1” if air temperature is increasing
    - “0” if air temperature is constant
    - “-1” if air temperature is decreasing
- Environmental zone, as shown in Table 3-6
- Test path
    - Between wheel paths = “1”
    - Edge = “2”
    - Right wheel path = “3”
- PC Slab Thickness
- Base Course Thickness

Table 3-6: Environmental Zone Codes

Env. Zone	Code
Bay Area	31
Central Valley	32
Desert	33*
Mountain	34
North Coast	35
South Coast	36

*As no rigid sections in the DS zone were included in the study, it is recommended that Zone 33 not be used in the rigid pavement models.

In the same way as described for flexible pavements, ANOVA was performed on the main effects and some two-way interactions to identify those having significant impact on the deflections measured at the different sensors and different testing locations. Tables 3-7 to 3-9 present the results of the ANOVA analysis and show which main effects and two-way interactions are considered significant (S) or not significant (NS) for each sensor when testing is performed at the mid-slab, joint approach, and joint leave test locations, respectively. Other than a small number of noted exceptions, all results are based on a 95% confidence level. Degrees of freedom were 1448 for mid-slab, 1437 for joint approach, and 1366 for joint leave. The tables use the following abbreviations:

- Pavement surface temperature = T
- Air temperature gradient = G
- Environmental zone = EZ
- Test path = P
- PC Slab Thickness = PC
- Base Course Thickness = B

Table 3-7: ANOVA Testing – Summary of Results for Mid-Slab

	T	G	EZ	P	PC	B	T*G	T*EZ	T*P	T*PC	G*PC	G*P	EZ*PC	EZ*P	PC*P	PC*B
D1	NS	NS	S	NS	S	S	NS	S	NS	S	NS	NS	S	NS	NS	S
D2	NS	S	S	NS	S	S	NS	S	NS	S	NS	NS	S	NS	NS	S
D3	NS	S	S	NS	S	S	NS	S	NS	S	NS	NS	S	NS	NS	S
D4	NS	S	S	NS	S	S	NS	S	NS	S	NS	NS	S	NS	NS	S
D5	NS	S	S	NS	S	S	NS	S	NS	S	S	NS	S	NS	NS	S
D6	NS	S	S	NS	S	S	S	S	NS	S	S	NS	S	NS	NS	S
D7	NS	S	S	NS	S	S	S	S	NS	S	S	NS	S	S	NS	S
D8	NS	S	NS	S	NS	S	S	S	NS	S	NS	NS	NS	S	NS	S
D9	NS	NS	S	NS	S	S	NS	S	NS	S	NS	NS	S	NS	NS	S

Table 3-8: ANOVA Testing – Summary of Results for Joint Approach

	T	G	EZ	P	PC	B	T*G	T*EZ	T*P	T*PC	G*PC	G*P	EZ*PC	EZ*P	PC*P	PC*B
D1	S	NS	S	S	S	S	S*	NS	NS	NS	NS	NS	S	S	NS	S
D2	S	NS	S	NS	S	S	NS	S	NS	S	NS	NS	S	S*	NS	S
D3	S	NS	S	NS	S	S	NS	S	NS	S	NS	NS	S	S	NS	S
D4	S	NS	S	NS	S	S	NS	S	NS	S	NS	NS	S	S	NS	S
D5	S	NS	NS	NS	NS	S	NS	S	NS	S	NS	NS	NS	NS	NS	S
D6	S	NS	NS	NS	NS	NS	NS	S	NS	S	NS	NS	NS	NS	NS	NS
D7	S	NS	NS	NS	NS	NS	NS	S	NS	S	NS	NS	NS	S	NS	NS
D8	S	NS	NS	NS	S	NS	NS	S	NS	S	NS	NS	S	S	NS	NS
D9	S	S	S	S	S	S	NS	S	NS	NS	NS	NS	S	S	NS	S

*94% confidence level used instead based on practical engineering judgment.

Table 3-9: ANOVA Testing – Summary of Results for Joint Leave

	T	G	EZ	P	PC	B	T*G	T*EZ	T*P	T*PC	G*PC	G*P	EZ*PC	EZ*P	PC*P	PC*B
D1	S*	NS	NS	NS	NS	S	NS	NS	NS	NS	NS	NS	NS	S*	NS	S
D2	S	NS	NS	NS	NS	S	NS	S	NS	NS	NS	NS	NS	NS	NS	S
D3	S	NS	NS	NS	NS	S	NS	S	NS	NS	NS	NS	NS	NS	NS	S
D4	S	S	NS	NS	NS	NS	NS	S	NS	NS	NS	NS	NS	NS	NS	NS
D5	S	S	NS	NS	NS	NS	NS	S	NS	NS	NS	NS	NS	NS	NS	NS
D6	S	S	NS	NS	S	NS	NS	S	NS	NS	NS	NS	NS	NS	NS	NS
D7	S	S	NS	NS	S	NS	NS	S	NS	NS	NS	NS	S	NS	NS	NS
D8	S	S	S	NS	S	S	NS	S	NS	NS	NS	NS	S	S	NS	S
D9	S	NS	S	NS	S	S	NS	S	NS	S	NS	NS	S	S	NS	S

*94% confidence level used instead based on practical engineering judgment.

Taking each sensor (D1 to D9) and each testing location individually, the non-significant main effects and two-way interactions were removed and multi-regression analysis was performed to develop temperature adjustment models for the deflections measured by each sensor as a function of significant main effects and two-way interactions. Similarly to flexible pavements, the general form of the model is:

$Y_i = m_{ij} * X_j$

Where,

Y_i = D1 to D9

X_j = Surface Temperature (T), Temperature Gradient (G), Environmental Zone (EZ), Test Path (P), PC Slab Thickness (PC), Base Course Thickness (B), Surface Temperature * Temperature Gradient (T*G), Surface Temperature * Environmental Zone (T*EZ), Surface Temperature * Test Path (T*P), Surface Temperature * PC Slab Thickness (T*PC), Temperature Gradient * PC Slab Thickness (G*PC), Temperature Gradient * Test Path (G*P), Environmental Zone * PC Slab Thickness (EZ*PC), Environmental Zone * Test Path (EZ*P), PC Slab Thickness * Test Path (PC*P), PC Slab Thickness * Base Course Thickness (PC*B), respectively

m_{ij} = regression coefficient

Tables 3-10 to 3-12 show the model coefficients for D1 to D9 for mid-slab, joint approach, and joint leave testing locations, respectively. The tables also show the coefficient of determination (R^2) and degrees of freedom (DF) for each model.

These models were based on the data available in the Seasonal Study database, and are valid only for the range of parameters that are present in that dataset. The range of validity for each set of models, by individual parameter, is shown in Table 3-13. It should be noted that although deflections were measured at high pavement surface temperatures, it is not recommended to perform FWD tests at temperatures higher than 80°F to avoid artificially high load transfer efficiencies.

Table 3-10: Coefficients for Temperature Adjustment Models – Rigid Pavement at Mid-Slab

	T	G	EZ	P	PC	B	T*G	T*EZ	T*P	T*PC	G*PC	G*P	EZ*PC	EZ*P	PC*P	PC*B	DF	R^2
D1			-0.834		0.828	3.456		0.002		-0.005			0.065			-0.325	1458	91%
D2		-0.075	-0.789		0.825	3.235		0.002		-0.005			0.060			-0.303	1457	90%
D3		-0.075	-0.744		0.821	3.037		0.002		-0.005			0.055			-0.284	1457	90%
D4		-0.075	-0.684		0.816	2.778		0.002		-0.005			0.049			-0.259	1457	89%
D5		-0.508	-0.555		0.790	2.245		0.002		-0.005	0.043		0.037			-0.208	1456	89%
D6		-0.818	-0.405		0.739	1.656	0.003	0.001		-0.004	0.048		0.023			-0.152	1455	88%
D7		-0.714	-0.213		0.730	0.904	0.003	0.001		-0.004	0.044		0.003	0.001		-0.077	1454	86%
D8		-0.145		1.814		0.356	0.001	-0.0002		0.001				-0.050		-0.023	1457	83%
D9			-0.759		0.882	3.110		0.002		-0.005			0.055			-0.291	1458	90%

Table 3-11: Coefficients for Temperature Adjustment Models – Rigid Pavement at Joint Approach

	T	G	EZ	P	PC	B	T*G	T*EZ	T*P	T*PC	G*PC	G*P	EZ*PC	EZ*P	PC*P	PC*B	DF	R^2
D1	-0.026		-0.544	3.255	0.640	3.195	-0.001						0.058	-0.090		-0.309	1445	89%
D2	-0.179		-0.076		1.653	1.208		0.005		0.005			-0.038	0.002		-0.114	1445	91%
D3	-0.161		-0.054		1.526	1.044		0.004		0.005			-0.036	0.002		-0.100	1445	92%
D4	-0.141		-0.033		1.401	0.884		0.004		0.004			-0.034	0.001		-0.086	1445	92%
D5	0.015					0.725		-0.001		0.006						-0.066	1449	90%
D6	0.080							-0.001		-0.001							1451	88%
D7	0.071							-0.001		-0.001				0.002			1450	89%
D8	-0.028				0.802			0.001		-0.002			-0.022	0.001			1448	92%
D9	-0.071	-0.111	-0.447	2.652	0.940	2.552		0.002					0.033	-0.074		-0.244	1444	89%

Table 3-12: Coefficients for Temperature Adjustment Models – Rigid Pavement at Joint Leave

	T	G	EZ	P	PC	B	T*G	T*EZ	T*P	T*PC	G*PC	G*P	EZ*PC	EZ*P	PC*P	PC*B	DF	R^2
D1	0.048					0.338								0.005		0.006	1379	77%
D2	0.260					0.259		-0.007								0.014	1379	80%
D3	0.233					0.224		-0.006								0.012	1379	80%
D4	0.172	-0.264						-0.004									1380	76%
D5	0.137	-0.195						-0.003									1380	77%
D6	0.072	-0.089			0.266			-0.002									1379	85%
D7	-0.105	-0.065			1.561			0.003					-0.041				1378	85%
D8	-0.070	-0.047	0.063		1.222	-0.067		0.002					-0.039	0.001		0.013	1374	87%
D9	-0.163		0.035		1.376	1.229		0.003		0.009			-0.037	0.001		-0.123	1374	89%

Table 3-13: Ranges of Validity for Temperature Adjustment Models – Rigid Pavement

	Surface Temp. (°F)		Temperature Gradient (No.)		Environmental Zone (No.)*		Testing Path (No.)		PC Slab Thickness (in.)		Base Thickness (in.)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Mid-Slab Models	43.6	139.1	-1	1	31	36	1	3	9	13	3.5	14
Joint Approach Models	44.1	139.2	-1	1	31	36	1	3	9	13	3.5	14
Joint Leave Models	44.2	133.7	-1	1	31	36	1	3	9	13	3.5	14

*Excluding Zone 33

3.3.2 Application of Models

As with the flexible pavement models, these models were not developed with the intention of predicting measured deflections and should not under any circumstances be used for this purpose. The models are intended to be used to bring measured deflections recorded at different temperatures to the same standard temperature. The steps that should be followed to use the rigid pavement models can be summarized as follows:

- Estimate the deflections at different sensors using the appropriate model (mid-slab, joint leave or joint approach) and the actual pavement surface temperature during testing (D_{ip}).
- Estimate the deflections at different sensors using the appropriate model (mid-slab, joint leave or joint approach) and the standard pavement surface temperature, i.e. 68°F (D_{is}).
- Determine the required deflection adjustment (ΔD) due to the difference between the actual pavement surface temperature during testing and the standard pavement surface temperature, as $\Delta D = D_{is} - D_{ip}$.
- Calculate the temperature adjusted deflection by applying ΔD to the actual measured deflection, as Adjusted Deflection = Measured Deflection + ΔD.

To check the reasonableness of the models, they were applied to the deflections measured within the Seasonal Study. To do this, the models were applied to each record in the database to estimate the deflection using the actual temperature at the time of testing as an input. The process was then repeated but using a standard temperature (68°F) as an input, i.e. to estimate the deflection at the standard temperature. ΔD was then calculated as the difference in value between the estimated deflection at the actual measured temperature and the estimated deflection at the standard temperature. The actual measured deflection was then adjusted using ΔD, resulting in a temperature adjusted deflection.

3.3.2.1 Sample Application

Figure 3-5 shows an example implementation of the developed models. In this example, a mid-slab deflection basin was used. The recorded surface temperature during the testing was 76.0°F. The actual measured deflections (D1 to D4) are represented by the blue line. Only D1 to D4 deflections are shown in this figure, since these deflections are the only ones used in backcalculation analysis performed on mid-slab testing. The appropriate model was implemented for each deflection (D1-D4), resulting in the adjusted deflections represented by the green line. For example, the actual measured mid-slab D1 @ 76.0°F was 4.11 mils. The D1 model was used first to estimate the deflection @ 76.0°F as follows:

$D1 = m_{ij} * X_j$
or,
$D1 = -0.834 * EZ + 0.828 * PC + 3.456 * B + 0.002 * T * EZ – 0.005 * T * PC + 0.065 * EZ * PC – 0.325 * PC * B$
or,
$D1 = -0.834 * 36 + 0.828 * 9.5 + 3.456 * 5 + 0.002 * 76.0 * 36 – 0.005 * 76.0 * 9.5 + 0.065 * 36 * 9.5 – 0.325 * 9.5 * 5$
$D1 = 3.64$ mils

The process was then repeated to estimate the deflection @ 68°F:

$D1 = -0.834 * EZ + 0.828 * PC + 3.456 * B + 0.002 * T * EZ – 0.005 * T * PC + 0.065 * EZ * PC – 0.325 * PC * B$
or,
$D1 = -0.834 * 36 + 0.828 * 9.5 + 3.456 * 5 + 0.002 * 68.0 * 36 – 0.005 * 68.0 * 9.5 + 0.065 * 36 * 9.5 – 0.325 * 9.5 * 5$
$D1 = 3.46$ mils

The difference between these two deflections, ΔD1, is equal to -0.18 mils (-4% of measured D1). As a result, the adjusted D1 would be 4.11 – 0.18 = 3.93 mils. The same steps were then followed for each of the measured deflections using the appropriate model.

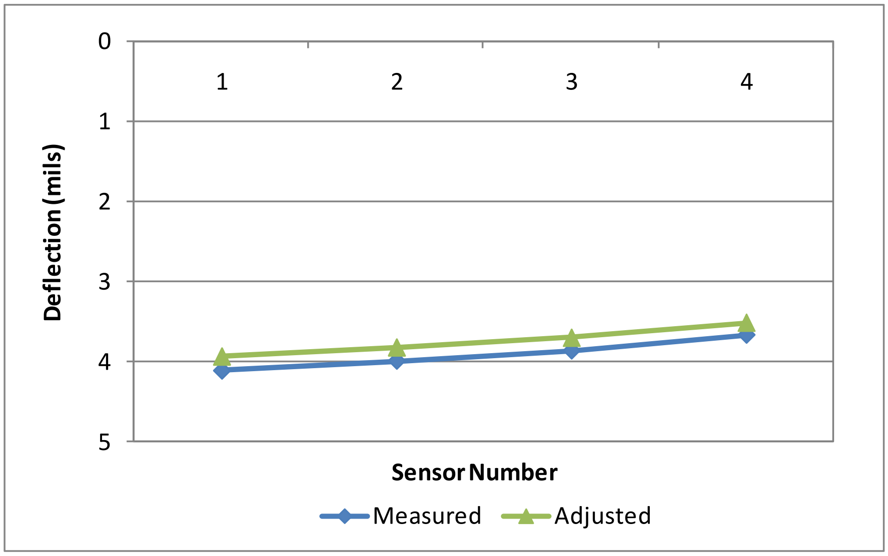

Figure 3-5: Example Rigid Model Implementation 76.0°F

Figure 3-6 illustrates another example implementation of the developed models using a mid-slab deflection basin. In this example, the recorded surface temperature during testing was 69.1°F. The actual measured deflections (D1 to D4) are represented by the blue line. The appropriate model was implemented for each deflection (D1-D4), resulting in the adjusted deflections (green line). For example, the actual measured mid-slab D1 @ 69.1°F was 3.63 mils. The D1 model was used first to estimate the deflection @ 69.1°F (3.49 mils) and then the deflection @ 68°F (3.46 mils). The difference between these two deflections, ∆D1, is equal to -0.03 mils (-1% of measured D1). As a result, the adjusted D1 would be 3.63 – 0.03 = 3.60 mils.

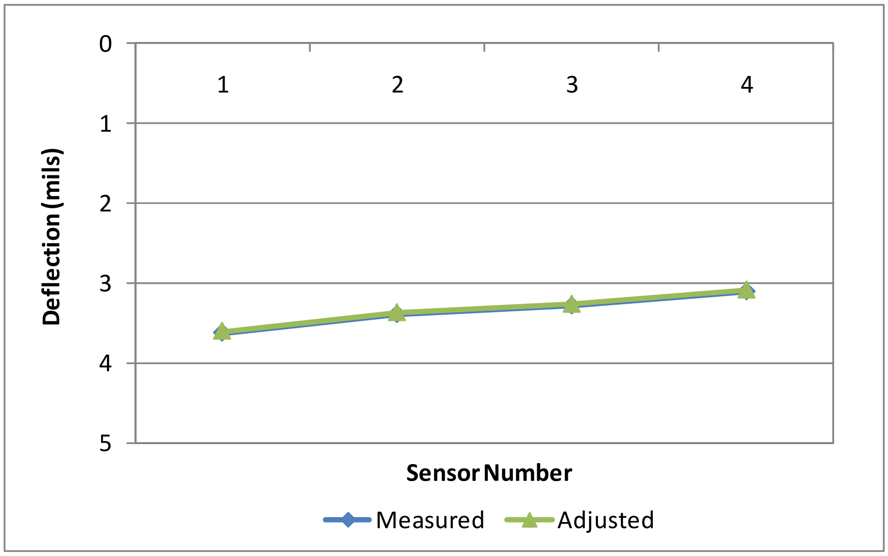

Figure 3-6: Example Rigid Model Implementation 69.1°F

Figure 3-7 shows a final example implementation of the developed models, again using a mid-slab deflection basin. In this example, the recorded surface temperature during testing was 58.0°F. The actual measured deflections (D1 to D4) are represented by the blue line. The appropriate model was implemented for each deflection (D1-D4), resulting in the adjusted deflections (green line). For example, the actual measured mid-slab D1 @ 58.0°F was 3.22 mils. The D1 model was used first to estimate the deflection @ 58.0°F (3.62 mils) and then the deflection @ 68°F (3.64 mils). The difference between these two deflections, ∆D1, is equal to +0.02 mils (~1% of measured D1). As a result, the adjusted D1 would be 3.22 + 0.02 = 3.24 mils.

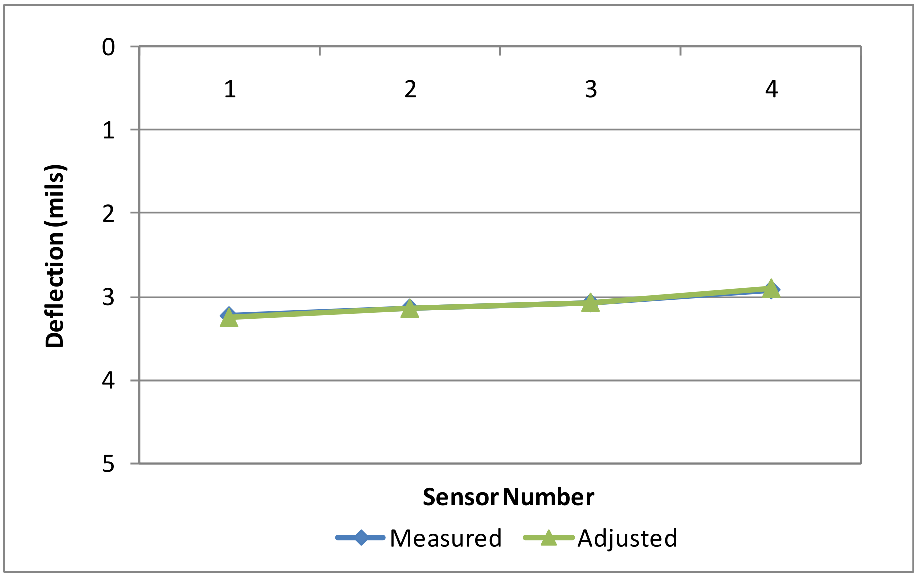

Figure 3-7: Example Rigid Model Implementation 58.0°F

As can be seen from these examples, in general the temperature adjustments of deflections for rigid pavements are very small compared with those of flexible pavements.

3.4 APPLICATION OF TEMPERATURE ADJUSTMENT MODELS TO MAIN STUDY DATA

Using the process outlined above, the developed temperature adjustment models were applied to the FWD data collected from Phase I and Phase II sections. The adjusted D1 – D9, E_p, and M_r values for flexible pavements, and the adjusted D1 – D9, E_{pcc} and k-static values for rigid pavements have been uploaded into the project database. The original deflections and parameters were not overwritten – these can also still be found in the database.

4.0 Traffic Study

Since traffic data represents a vital component for reaching reliable results and conclusions regarding pavement performance, Caltrans' Traffic Database was searched for traffic loadings for the selected test sections in the Phase I project. However, it was found that the number of test sections with measured traffic loadings was limited. Consequently, actual accumulated traffic loadings were not considered in the Phase I and analysis of the impact of different factors (materials, environmental effects, etc.) on pavement performance was instead carried out in terms of pavement age. The limitation of this approach is that two pavement sections of the same age may receive significantly different traffic loadings (i.e. truck loads), and as truck traffic is one of the key sources of damage to pavements, using only pavement age does not allow a fair comparison of performance in such a case.

The 2002 final report for the Phase I project[4] concluded that the analysis results could not be considered conclusive for two main reasons, one of which was the absence of reliable traffic data. As a result, a traffic study was included in the Phase II project to collect limited time axle weight data and utilize data from the existing Caltrans permanent weigh stations to estimate the accumulative axle weights that have passed over a project since the construction of the last rehabilitation treatment.

The following four steps were the main tasks involved in the Traffic Study:

1. Define the limits of the homogeneous traffic segments that contain one or more Phase I or II test sections.
2. Perform an 8- or 24-hour traffic survey using portable Weigh-in-Motion (WIM) devices on each traffic segment.
3. Convert the collected 8- or 24-hour traffic data to an annual volume using the historical traffic data available from Caltrans' permanent weigh stations.
4. Apply reasonable growth factors to annual traffic to estimate the past traffic applied to each test section since the construction of the existing treatment or to predict the expected future traffic.

Homogeneous traffic segments, which contained multiple Phase I and II sections, were determined and each segment was assigned an ID.

Traffic data collection using the portable WIMs was initially conducted in two periods – 2005 and 2007. Prior to commencing analysis, QC/QA checks were performed on the collected data. Very little of the 2007 data passed the QC/QA protocols; as a result, WIM surveys for these traffic segments were re-performed in 2008.

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[4] Stantec Consulting. 'Caltrans Pavement Performance Evaluation Services - Contract 65A0069 - Final Report'. November 2002.

The 2005 data collection was performed in conjunction with the FWD testing and included, as planned, some 8-hour and some 24-hour collections. The 2008 data collection, however, was performed as a standalone task and included only 24-hour surveys.

4.1 TRAFFIC DATA ANALYSIS

In this analysis, the 8- or 24-hour (approximate) traffic data collected using the portable WIMs was converted to an annual volume using historical traffic data available from Caltrans' permanent weigh stations. In this section, the analysis procedure will be explained using two example traffic segments:

1. Traffic segment 02-004-N-01, located in Contra Costa County, on Route 4 between mileposts 40.52 and 42.06
2. Traffic segment 02-085-S-02, located in Santa Clara County, on Route 85 between mileposts 13.52 and 13.63

4.1.1 Determination of Traffic at Permanent Weigh Station Locations

The first step in the analysis was to assign each of the traffic segments to their nearest permanent weigh station location. For traffic segments 02-004-N-01 and 02-085-S-02, the nearest permanent weigh stations were the Vacaville (EB) and Gilroy stations, respectively. Table 4-1 shows the permanent weigh station location assigned to each traffic segment.

Table 4-1: Permanent Weigh Station Locations Assigned to Traffic Segments

Traffic Segment ID	Permanent Weigh Station
01-005-L-01	Mt Shasta
01-005-L-02	Mt Shasta
01-005-L-03	Mt Shasta
01-005-L-04	Mt Shasta
01-005-L-05	Mt Shasta
01-005-L-06	Mt Shasta
01-005-L-07	Redding
01-005-L-09	Lodi
01-005-L-09	Lodi
01-005-L-09	Lodi
01-005-L-11	Castaic (SB)
01-005-L-12	Castaic (SB)
01-005-R-01	Castaic (SB)
01-005-R-04	Willows
01-005-R-05	Mt Shasta
01-005-R-06	Mt Shasta
01-005-R-07	Mt Shasta

Traffic Segment ID	Permanent Weigh Station
01-005-R-08	Mt Shasta
01-008-R-01	Cameron
01-010-R-01	Indio
01-010-R-02	Indio
01-010-R-03	Indio
01-012-L-01	Banta
01-012-R-01	Banta
01-015-L-01	Balboa (NB)
01-015-R-01	Balboa (NB)
01-015-R-02	Balboa (NB)
01-015-R-03	Elsinore (NB)
01-015-R-04	Elsinore (NB)
01-015-R-05	Elsinore (NB)
01-029-L-04	Lakeport
01-050-L-02	Antelope (WB)
01-050-L-03	Antelope (WB)
01-050-R-01	Antelope (WB)
01-050-R-01	Antelope (WB)
01-050-R-02	Antelope (WB)
01-050-R-02	Antelope (WB)
01-058-L-01	Arvin
01-058-L-02	Arvin
01-058-R-01	Arvin
01-058-R-02	Arvin
01-059-L-01	Los Banos
01-059-R-01	Los Banos
01-060-L-01	Murrieta
01-060-R-01	Murrieta
01-073-L-03	Saigon (SB)
01-073-L-04	Saigon (SB)
01-073-L-05	Saigon (SB)
01-073-R-01	Saigon (SB)
01-078-R-01	San Marcos
01-078-R-02	San Marcos
01-080-L-01	Antelope (EB)
01-080-R-01	Antelope (EB)

Traffic Segment ID	Permanent Weigh Station
01-083-L-01	Chino
01-083-L-02	Chino
01-083-R-01	Chino
01-083-R-02	Chino
01-099-L-02	Los Banos
01-099-L-03	Porterville
01-099-L-04	Bakersfield
01-099-L-05	Bakersfield
01-101-L-01	Templeton
01-101-L-03	Loleta
01-101-R-03	Loleta
01-101-R-05	Templeton
01-166-R-01	Positas
01-227-R-01	Templeton
01-299-L-01	Loleta
01-299-R-01	Loleta
01-405-L-01	Saigon (NB)
01-405-L-02	Saigon (NB)
01-405-L-03	Saigon (NB)
01-405-R-01	Saigon (NB)
01-405-R-02	Saigon (NB)
01-405-R-03	Saigon (NB)
01-405-R-04	Saigon (NB)
02-001-N-01	Templeton
02-001-N-03	Gilroy
02-001-N-04	Loleta
02-001-N-05	Loleta
02-001-S-03	Woodside (NB)
02-001-S-06	Templeton
02-004-N-01	Vacaville (EB)
02-005-N-02	Redding
02-005-S-01	Redding
02-020-E-01	Lakeport
02-020-E-01	Lakeport
02-020-E-01	Lakeport
02-029-N-02	Lakeport

Traffic Segment ID	Permanent Weigh Station
02-041-S-03	Fresno
02-058-E-01	Lodi
02-058-E-03	Arvin
02-058-W-03	Arvin
02-065-N-03	Porterville
02-065-S-01	Porterville
02-080-E-02	Vacaville (EB)
02-080-E-04	Vacaville (EB)
02-080-E-05	Vacaville (EB)
02-080-W-01	Vacaville (EB)
02-080-W-01	Vacaville (EB)
02-084-E-01	Hayward (NB)
02-084-E-01	Hayward (NB)
02-085-N-01	Gilroy
02-085-S-01	Gilroy
02-085-S-02	Gilroy
02-101-N-06	Positas
02-101-N-11	Templeton
02-101-N-12	Gilroy
02-101-N-12	Gilroy
02-101-N-12	Gilroy
02-101-N-14	Loleta
02-101-N-14	Loleta
02-101-N-14	Loleta
02-101-N-15	Loleta
02-101-N-16	Loleta
02-101-N-16	Loleta
02-101-N-16	Loleta
02-101-N-17	Loleta
02-101-N-17	Loleta
02-101-N-18	Loleta
02-101-N-18	Loleta
02-101-N-22	Loleta
02-101-S-06	Loleta
02-101-S-08	Loleta
02-101-S-09	Gilroy

Traffic Segment ID	Permanent Weigh Station
02-101-S-09	Gilroy
02-101-S-10	Gilroy
02-152-W-01	Gilroy
02-152-W-01	Gilroy
02-154-E-01	Positas
02-299-N-02	Loleta
02-299-N-03	Loleta

Once the permanent weigh stations were assigned, the data from each traffic segment was examined to identify the date and time of the portable WIM survey. This information for the example traffic segments is shown in Table 4-2. The data available for the assigned permanent weigh station was then examined. The permanent weigh stations typically had available data for the months of January, April, July, and October 2005. This information was contained in a series of spreadsheets. The spreadsheets for the month nearest to the month of the portable WIM survey were opened and the record for the day of the survey was examined. Permanent weigh station data was not always available for every day in the month, in which case the nearest date was selected.

Table 4-2: Time of Portable WIM Survey at Example Segments

Traffic Segment ID	Date	From	To	Survey Hours
02-004-N-01	TUE 07/12/2005	12:04:36 AM	11:53:21 PM	23:48
02-085-S-02	TUE 06/21/2005	6:33:33 AM	2:39:47 PM	8:06

The permanent weigh stations record individual axle weights. However, the measure required for this project is the Equivalent Single Axle Load (ESAL). Throughout this analysis, the ASTM E 1318-02 procedure[5] was used to calculate ESALs from the individual axle weights. Using the weigh station record from the day of the portable WIM survey (or the nearest day), two calculations were made: the total ESALs recorded at the weigh station for the entire day, and the total ESALs recorded at the weigh station for the time that the WIM survey was being conducted at the traffic segment. The calculated ESALs for the Vacaville (EB) and Gilroy stations on the days that the portable WIM surveys were being conducted at the example traffic segments are shown in Table 4-3.

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[5] ASTM Designation E1318-02. Standard Specification for Highway Weigh-in-Motion (WIM) Systems with User Requirements and Test Methods

Table 4-3: ESALs Calculated from Vacaville and Gilroy Weigh Stations

Vacaville (EB)	Total 24-hour ESALs	Total ESALs from 12:04:36 AM to 11:53:21 PM
	4,018	4,005
Gilroy	Total 24-hour ESALs	Total ESALs from 6:33:33 AM to 2:39:47 PM
	6,807	3,139

The permanent weigh station records for the rest of the month were then examined. Total daily ESALs were calculated for each day and totaled to give the total monthly ESALs at that station. If a station did not have data for each day in the given month, the daily ESALs were totaled for each available day and this figure was extrapolated to give a 30-day (monthly) total. This process was then repeated for all months in which data was available at that particular weigh station – typically four months. The available monthly data was then extrapolated to give a 12-month (annual) total. The monthly and annual ESALs calculated for the Vacaville (EB) and Gilroy stations are shown in Table 4-4. Occasionally during this process, a permanent WIM station measurement would appear erroneously high. In such cases, this data was excluded from the analysis.

Table 4-4: Total Monthly ESALs for Vacaville (EB) and Gilroy Weigh Stations

Weigh Station	Total Monthly ESALs – Month of WIM Survey	Monthly ESALs for Other Available Months			Total Annual ESALs
Vacaville (EB)	94,934	120,820	66,297	104,376	1,159,278
Gilroy	164,712	150,085	160,730	119,869	1,786,185

The daily, monthly, and annual ESALs calculated for each weigh station (based on the 2005 WIM surveys only) are shown in Figures 4-1 to 4-3. Data for a weigh station may be repeated if it was used for more than one traffic segment.

These figures give a good illustration of just how necessary the analysis being conducted is. In Figure 4-1, it can be seen how great the daily variability in truck traffic is amongst the weigh stations. By looking at Figure 4-2, it can be seen that the days of the WIM survey were not necessarily representative of the month as a whole. For example, the Antelope (WB) station has daily ESALs that are fairly average for the stations as a whole, but has the highest monthly ESALs. This means that the WIM survey was conducted on a day with unusually low truck traffic for that month. Figure 4-3 reiterates this point. Using Antelope (WB) as an example again, this station has gone from having the highest monthly ESALs to having fairly average annual ESALs, meaning that the month of the WIM survey had unusually high truck traffic. These noticeable variations are precisely the reason that accurate traffic data is needed for this project. It also shows how important it is not to rely on traffic data collected on one day, without determining how representative that day is of typical truck traffic at the site.

4.1.2 Estimation of Annual ESALs from WIM Survey Measurements

Once daily, monthly, and annual ESALs had been calculated for each weigh station, three ratios were calculated using the permanent weigh station data:

1. R1 – ratio between total ESALs recorded at the weigh station for the time that the WIM survey was being conducted at the traffic segment and the total ESALs recorded at the weigh station that day
2. R2 – ratio between the total ESALs recorded at the weigh station that day and the total ESALs recorded at the weigh station that month
3. R3 – ratio between the total ESALs recorded at the weigh station that month and the total ESALs recorded at the weigh station that year

Application of all three ratios gives, for the weigh station, the ratio between the total ESALs recorded at the time of the WIM survey and the total annual recorded ESALs. The ratios calculated for the Vacaville (EB) and Gilroy weigh stations are shown in Table 4-5.

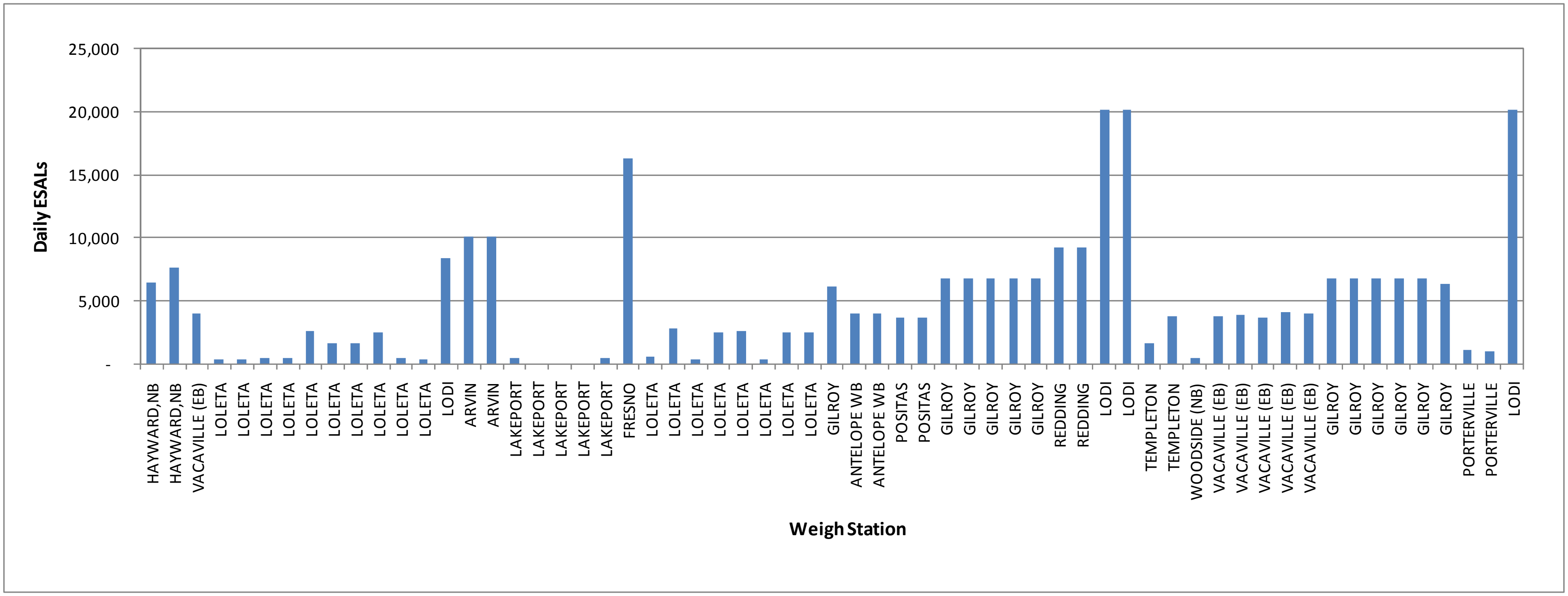

Figure 4-1: Total 24-Hour ESALs Calculated at Each Weigh Station on Day of WIM Survey

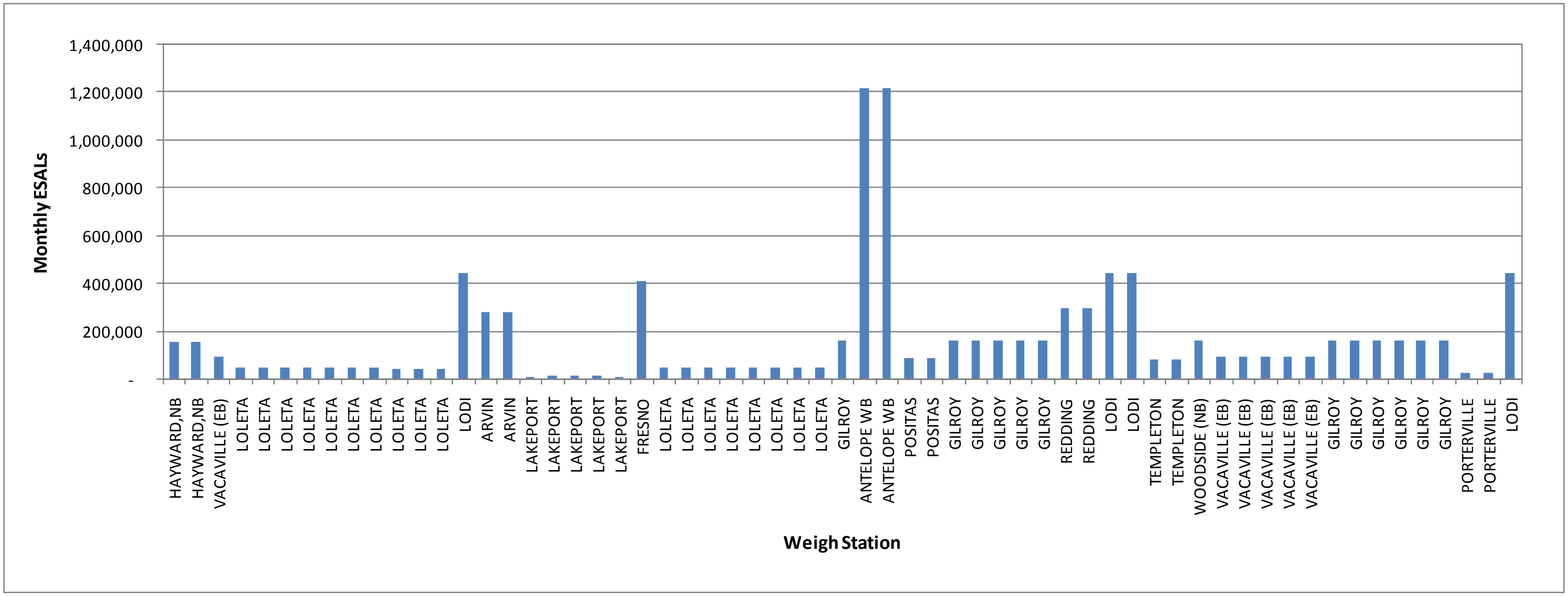

Figure 4-2: Total Monthly ESALs Calculated at Each Weigh Station for Month of WIM Survey

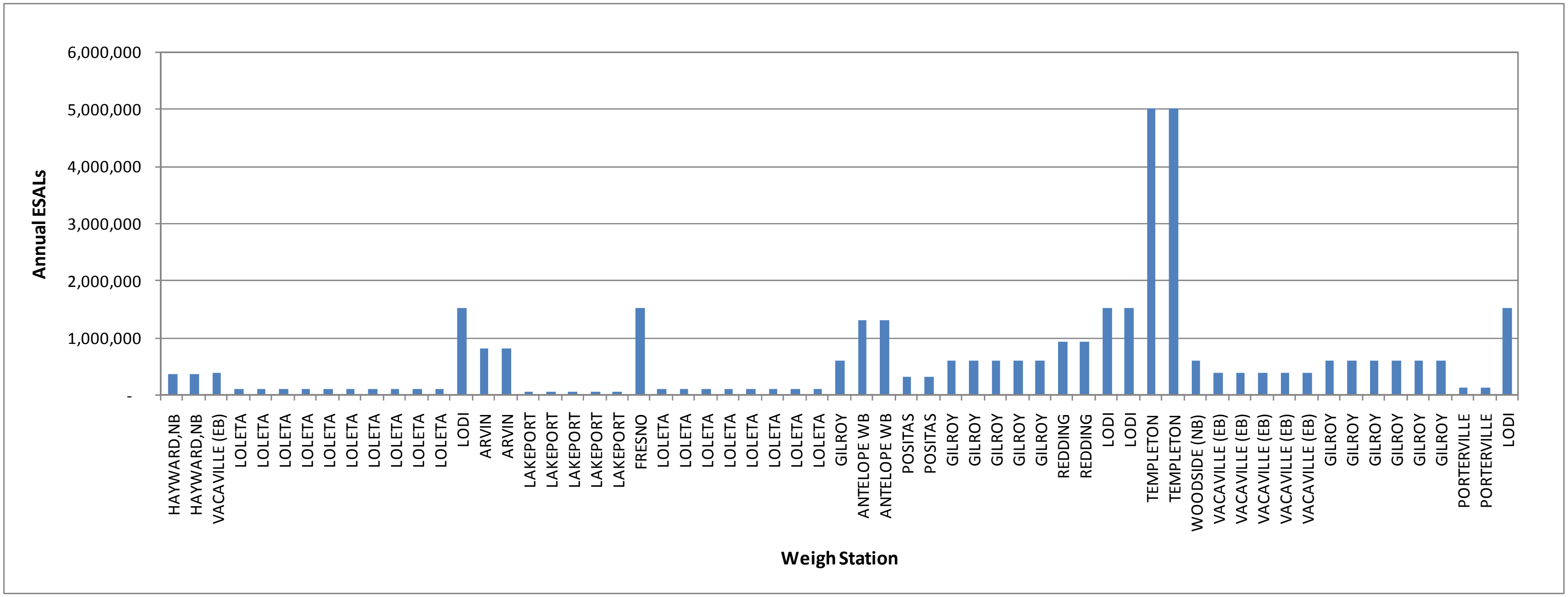

Figure 4-3: Total 2005 Annual ESALs Calculated for Each Weigh Station

Table 4-5: Ratios Calculated from Vacaville (EB) and Gilroy Weigh Station Data

Weigh Station	R1	R2	R3
Vacaville (EB)	1.003	23.63	12.21
Gilroy	2.169	24.196	10.844

The total ESALs measured during the portable WIM survey at the traffic segment were then identified. By applying all three of the above ratios to this figure, the annual ESALs for the traffic segment were calculated. For the two example traffic segments, Table 4-6 shows the ESALs measured during the portable WIM survey and the application of the above ratios to calculate annual ESALs.

Table 4-6: Annual ESALs Calculated for Example Traffic Segments

Traffic Segment ID	ESALs Measured during Portable WIM Survey	x R1 =	24-Hour ESALs	x R2 =	Monthly ESALs	x R3 =	Annual ESALs
02-004-N-01	1,143	x 1.003 =	1,146	x 23.63 =	27,090	x 12.21 =	**330,770**
02-085-S-02	187	x 2.169 =	406	x 24.196 =	9,824	x 10.844 =	**106,531**

The above process was repeated for each traffic segment. The annual ESALs calculated for each traffic segment tested in 2005 are shown in Figure 4-4. It can be seen from this figure that the calculated ESALs are all in a reasonable range, with the highest being in the range of 4.5 million for the year. This is in a similar range to the annual ESALs calculated for the permanent weigh stations.

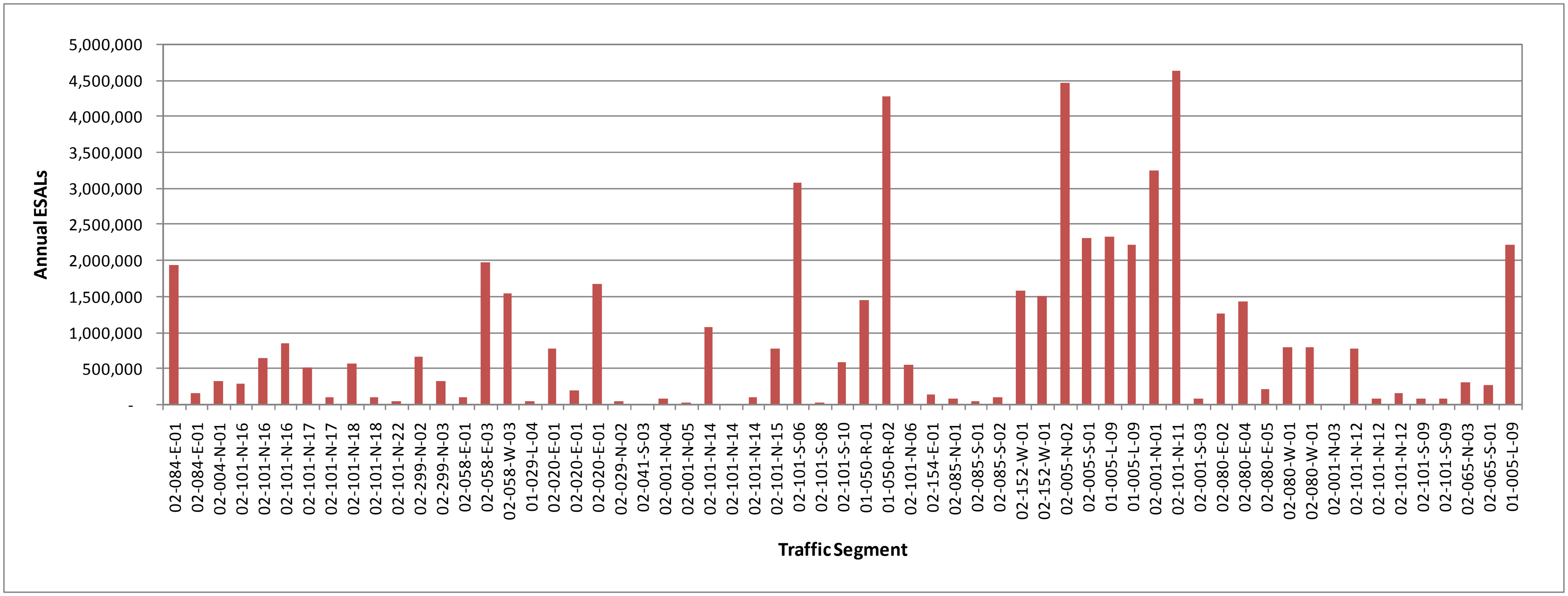

Figure 4-4: Annual 2005 ESALs Calculated for Traffic Segments

4.2 APPLICATION OF TRAFFIC STUDY DATA TO MAIN STUDY TEST SECTIONS

The annual ESALs calculated for each segment were used to estimate the past traffic applied to the Main Study test sections since the construction of the existing treatment. To do so, the annual ESALs for the appropriate traffic segment were used to estimate the total accumulated traffic from the date of construction through to the date of the FWD testing (2005). A growth factor of 2.5% was applied, in reverse, to the annual ESALs to account for increases in traffic volume over time. The same process was repeated to estimate past traffic from the date of construction to the date of IRI testing (assumed to occur one year prior to the FWD testing for all sections).

Once the ESALs calculated for each traffic segment were applied to the individual Main Study test sections, it was found that data was available for 638 test sections. In order to expand the number of sections having traffic data, the Main Study sections were grouped in three ways:

1. Sections within the same project
2. Sections with the same Traffic ID
3. Sections on the same route

This resulted in the creation of 314 project groupings, 264 Traffic ID groupings, and 93 route groupings. If a test section was missing traffic data, its project group was examined. If any other test sections within the project group had traffic data, then this data was applied to the test section in question. If no data was available for the project group, then the process was repeated, but using the Traffic ID group instead. If no data was available for the Traffic ID group, then the process was again repeated, but using the route group. If any group held traffic data for more than one other test section, then the average of these ESAL values was applied to the test section that was missing data. When this process was completed, traffic data had been populated for 888 of the Main Study sections. This traffic data was uploaded to the project database and is presented in Appendix D.

5.0 FWD Correlation Study

Many highway agencies are required to operate or utilize more than one FWD unit to be able to accomplish the necessary volume of testing. This raises the questions: What is the impact of using different FWD units? How can this impact be minimized? Numerous previous studies[6,7,8] have examined the repeatability and reproducibility of FWD units, where repeatability refers to the measurements made using the same unit on the same section under similar conditions, and reproducibility refers to the measurements made using different units on the same section at the same time. The studies have commonly found that FWDs are, in general, capable of producing repeatable results. However, the studies have also commonly found that different units do not always produce reproducible results and that, in some cases, different units can produce significantly different results.

The Pavement Performance Evaluation project involved collection of deflection data from about 1,500 test sections over a number of years. In a project that tried to accurately model the performance of pavements built with a wide range of materials under different environmental and traffic conditions, it was vital that no equipment-related error was introduced to the project's FWD data if more than one FWD unit was used. In other words, it was important to ensure that the difference between the deflections measured at Section A and those measured at Section B were not due to differences in equipment but to differences in the sections' structural capacity.

Two Dynatest FWD units were allocated for the Pavement Performance Evaluation project – FWD 952 and FWD 231 – with the intention of making every effort to use only one unit to test all sections to avoid any potential issues. However, in the event that this did not prove possible, an FWD correlation study was added to the scope of Phase II. Through this study, models would be developed to account for any difference in collected deflection data that was attributable to the use of different FWD equipment. This study was specific to the Pavement Performance Evaluation project, i.e. its object was to acquire an FWD dataset from the 1,500 test sections that was not impacted by any equipment differences and could be used in performance model development. The scope did not include wider issues such as looking at why the equipment might produce different results, it simply sought to account for those differences in order to meet the overall project objectives.

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[6] Information and Technology Centre for Transport and Infrastructure, CROW, "FWD Comparative Day 2003," CROW Report 04-03, October 2003.

[7] Rocha, S., V. Tandon and S. Nazarian, "Reproducibility of Texas Department of Transportation Falling Weight Deflectometer Fleet," Presented at 83rd Annual TRB Meeting, Washington, D.C., 2004.

[8] Zaghloul, S., Ahmed, Z., Swan, DJ, Jumikis, A. and Vitillo, N. "Falling Weight Deflectometer Correlation". In Transportation Research Record: Journal of the Transportation Research Board, No. 1905, TRB, National Research Council, Washington, D.C., 2005, pp. 90-96.

5.1 TEST SECTIONS

Test sections for the correlation study were chosen in such a way that would allow the developed models to be used across any of the 1,500 test sections, if necessary. As such, multiple test sections were considered from both flexible and rigid pavement types to widen the coverage of the developed models and to allow the use of these models on a wide range of layer thicknesses. In addition, sections in more than one environmental zone were considered to allow the use of the developed models in different environmental zones.

Details of the test sections used in this study are shown in Table 5-1 and in Figures 5-1 and 5-2. As can be seen, the flexible pavement sections considered in the correlation study had asphalt thicknesses ranging from 3.5 in. to 7.0 in. and total aggregate thicknesses ranging from 4.75 in. to 15.0 in. The rigid pavement sections had PCC thicknesses that ranged from 9.0 in. to 13.0 in. and total aggregate thicknesses that ranged from 3.5 in. to 14.0 in. The sections considered in the correlation study were located in 4 environmental zones:

- Central Valley (CV)
- Mountain (MT)
- Bay Area (BA)
- North Coast (NC)

As the test sections considered in this study were located in 6 different locations and 4 different environmental zones, the subgrade type and condition are expected to represent common types and conditions of California subgrades.

Table 5-1: FWD Correlation Test Sections

						AC Pavement Layers				PCC Pavement Layers			
Env. Zone	**Name**	**Type**	**Route**	**MP**	**Dir**	**AC (in.)**	**Base (in.)**	**Subbase (in.)**	**Base / Subbase Material**	**PCC (in.)**	**Base (in.)**	**Base Material**	**Subgrade**
CV	Antelope	Weigh Station	80	16	EB	4.5	4	5	CTB / Sandy Gravel	9	5	Sandy Gravel	Silty Sand w. Gravel
MT	Gold Run	Rest Area	80	41	WB	5.5	5		Gravelly Sand				Silty Clay
BA	Cordelia	Weigh Station	80	14.5	WB	6.5	7.5	0	Gravelly Sand	11	3.5	CTB	Silty Sand w. Gravel
MT	Camino	Weigh Station	50	27.1	WB	3.5	7.5	0	Sandy Gravel	9	14	Sandy Gravel	Clay
NC	Buckhorn	Weigh Station	299	7.4	WB	6.5	15	0	Sandy Gravel & Coble	13	10	Sandy Gravel & Coble	Silty Sand
NC	Trinidad	Rest Area	101	70	NB	7	4.75	0	Sandy Gravel				Silty Sand

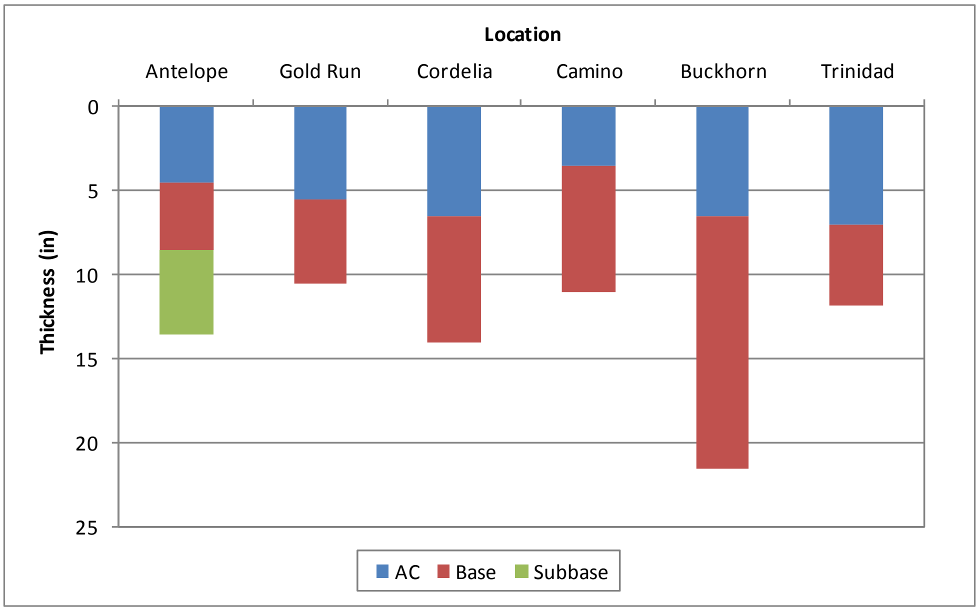

Figure 5-1: Correlation Study Test Sections – Flexible

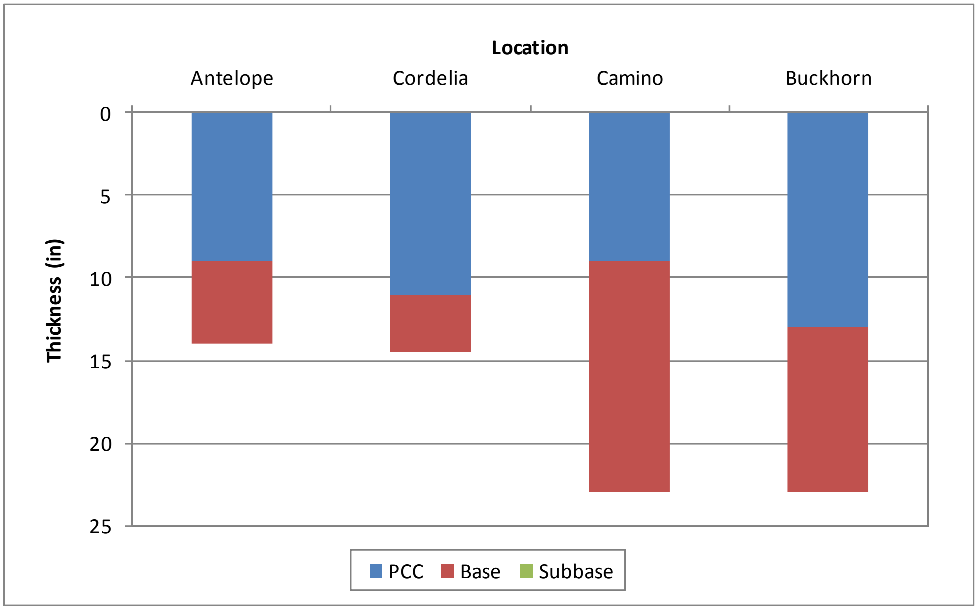

Figure 5-2: Correlation Study Test Sections - Rigid

5.2 FIELD TESTING

For flexible pavements, tests were conducted at each project section (150 - 250 ft long) along the right wheel path (3 ft from the lane/shoulder joint) and along the center of the pavement.

For rigid pavements, three paths (edge, right wheel path, center/between wheel paths) per slab were tested at each project section (150-250 ft long and at least 3 slabs per section). Along each path, tests were performed at three locations, namely, “mid-slab,” “approach joint” and “leave joint”. The following protocols were observed:

- Test along edge (closest to shoulder) of pavement
- Test Right Wheel Path (RWP) (3 ft from lane/edge)
- Test along center/between wheel paths (6 ft from lane/edge)
- Test mid-slab at 5 ft from the nearest active transverse crack or joint
- Test the following joint/crack (approach side and leave side of crack or joint)

Testing consisted of a seating drop at 12,000 lbs and one drop at each of the three load levels used in the Main Study data collection effort (i.e. 7,000 lbs, 9,000 lbs, 12,000 lbs for flexible pavement sections and 9,000 lbs, 12,000 lbs, and 14,000 lbs for rigid pavement sections). Sensor offset distance from the center of the load plate was as follows:

D1	D2	D3	D4	D5	D6	D7	D8	D9
0 in.	8 in.	12 in.	18 in.	24 in.	36 in.	48 in.	60 in.	-12 in.

Air and surface temperature measurements were made for each test performed.

FWD tests were first conducted using the FWD 231, and then followed by the FWD 952. An effort was made to test the exact same spots using both units and to minimize the time gap between the tests performed by the two units at each test location. In general, only a few minutes separated the tests performed by each unit at any one given location. The main purpose of reducing the time gap between the two units was to minimize environmental changes, mainly temperature changes, between the two tests.

5.3 ANALYSIS

A pair-wise correlation between the two FWDs (FWD 952 and FWD 231) was conducted to develop correlation models that could be used to convert one of the FWD measurements to the corresponding measurements of the other FWD. This was done for all sensors (Sensors D1-D8 for flexible pavement and D1-D9 for rigid pavement) and for all test sections considered in this study.

Linear correlation models were developed in the form of the following equation:

$$D_{i_{FWD_1}} = \left(D_{i_{FWD_2}}\right) \times a + b \qquad [5\text{-}1]$$

Where,
i = sensor number (1-9)
a, b = regression constants

5.3.1 Flexible Pavement

The correlation analysis of flexible pavements followed Equation 5-1 above. The corresponding deflections measured by the units were paired based on the test locations and sensors. These deflections were normalized to a 9000-lb load level. A simple scatter plot was then created for each sensor (D1 to D8) and a linear regression model, similar to that presented in Equation 5-1, was fitted. As a result, eight correlation models were developed using regression analysis in the form of Equation 5-1 – one for each sensor.

Table 5-2 shows the regression coefficients, along with the coefficient of determination (R^2) for these 8 models (Sensors D1 to D8). The models are shown graphically in Figures 5-3 to 5-10. It should be noted that no temperature correction was applied to any of the deflection measurements made using either FWD unit.

As can be seen, R^2 ranged from 87.3% to 96.5%. The slope of the correlation model (coefficient ‘a’ in Equation 5-1) ranged from 0.821 to 0.985. Ideally, the slope of the model should be 1.0. The intercept of the models (coefficient ‘b’ in Equation 5-1) ranged from 0.063 to 0.40. This intercept represents a fixed difference between the corresponding sensors of the 2 FWD units.

In Figure 5-10 it can be seen that there are a few data points (11 out of 152) with poor correlation between the two FWD units for D8. No specific reason was found to explain this issue, other than that Sensor D8 of the FWD 231 did not function properly (very low D8 measured by FWD 231). If these 11 data points are eliminated, a better R^2 can be achieved: 93.5% instead of 87.3%. Table 5-2 and Figure 5-10 are reproduced as Table 5-3 and Figure 5-11 after excluding the 11 data points.

Table 5-2: Values for Correlation Models – Flexible

Sensor	a	b	R^2
D1	0.967	0.399	0.965
D2	0.954	0.377	0.955
D3	0.920	0.40	0.949
D4	0.935	0.323	0.947
D5	0.951	0.195	0.949
D6	0.968	0.089	0.957
D7	0.985	0.063	0.960
D8	0.821	0.266	0.873

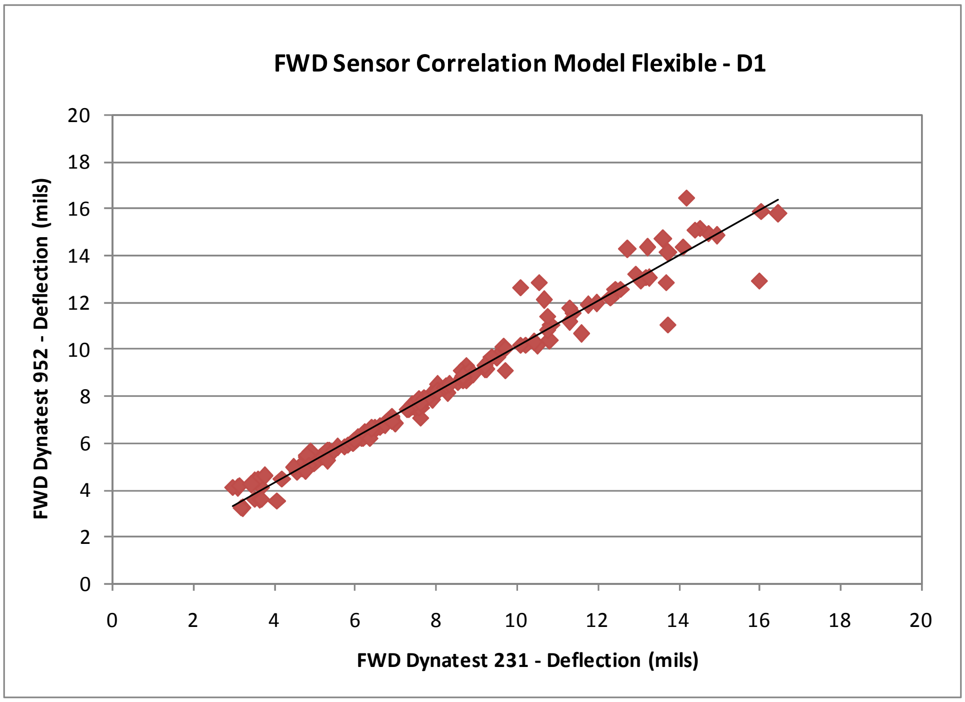

Figure 5-3: FWD Sensor Correlation Model, Flexible – D1

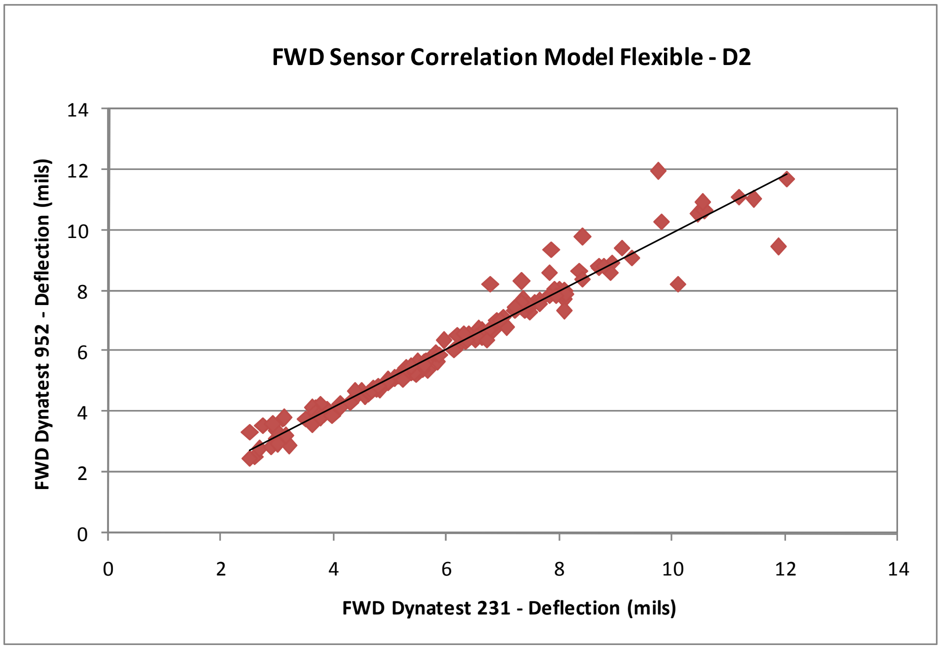

Figure 5-4: FWD Sensor Correlation Model, Flexible – D2

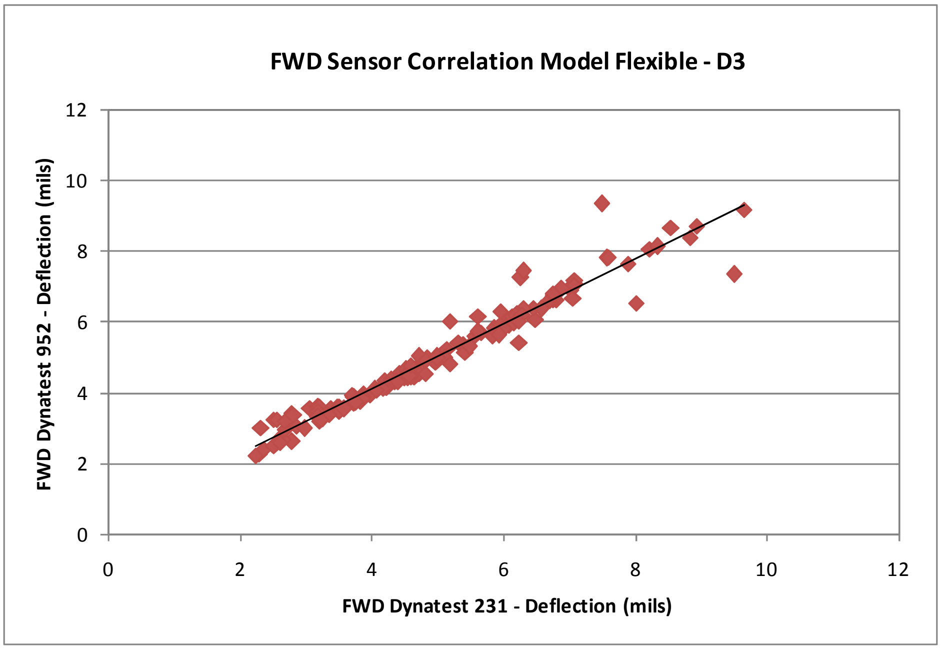

Figure 5-5: FWD Sensor Correlation Model, Flexible – D3

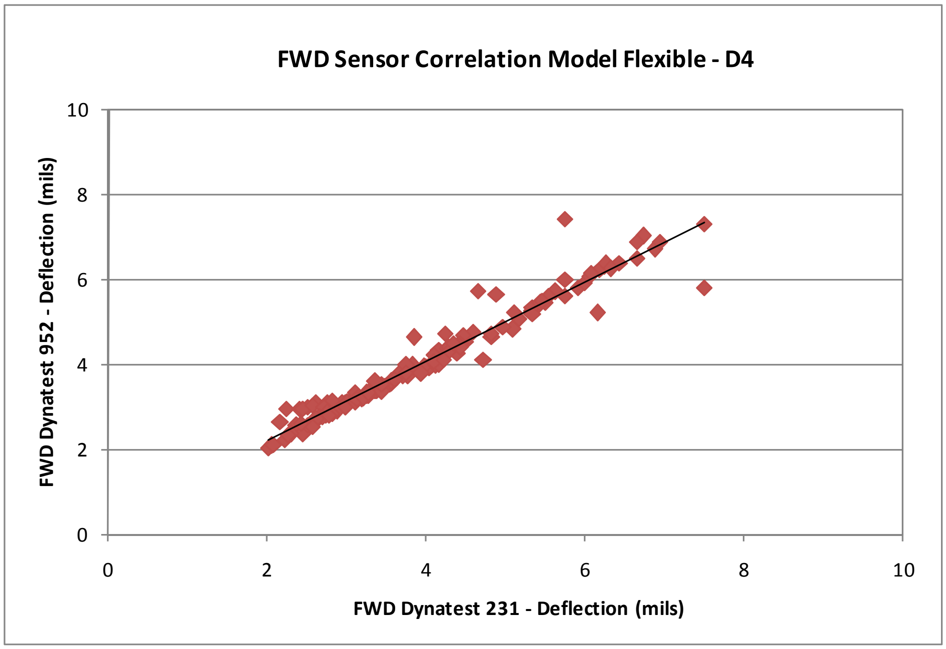

Figure 5-6: FWD Sensor Correlation Model, Flexible – D4

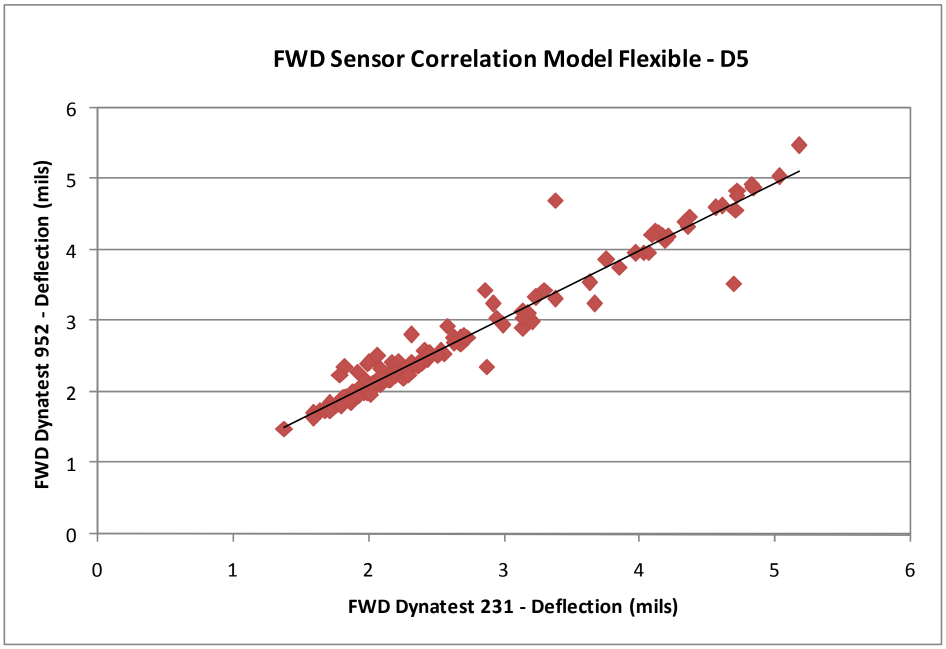

Figure 5-7: FWD Sensor Correlation Model, Flexible – D5

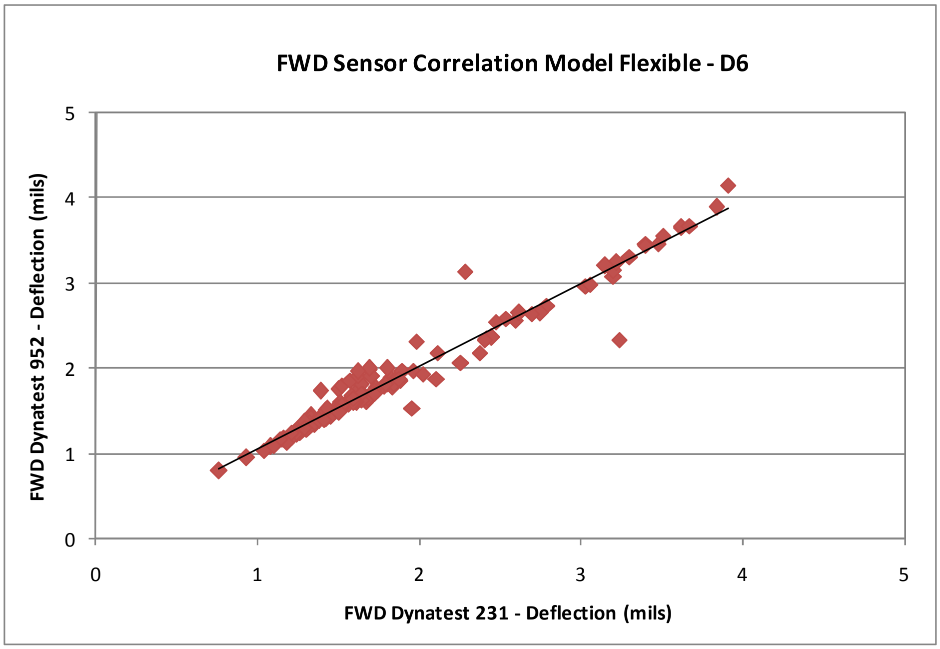

Figure 5-8: FWD Sensor Correlation Model, Flexible – D6

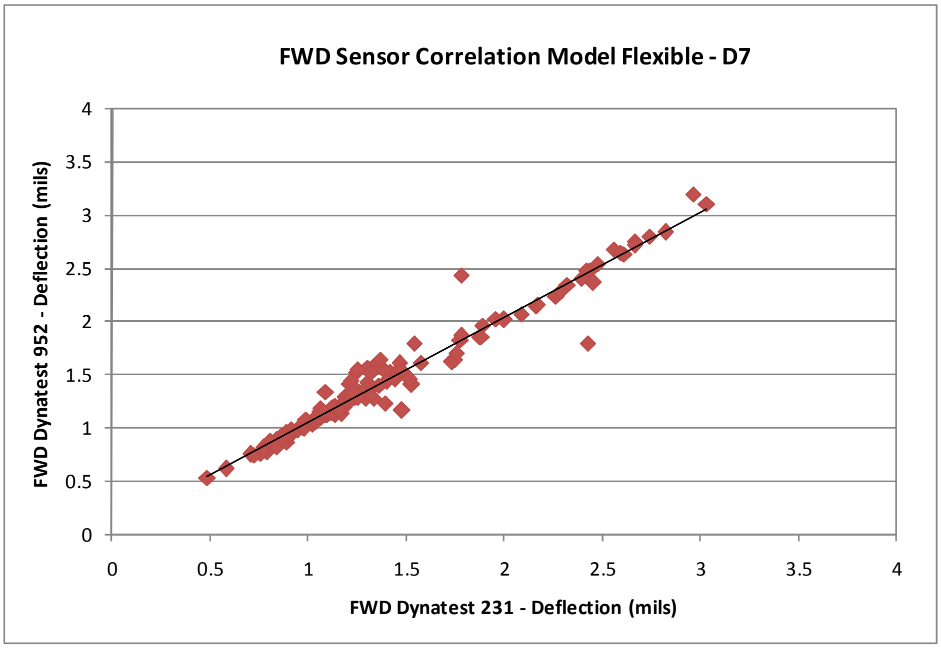

Figure 5-9: FWD Sensor Correlation Model, Flexible – D7

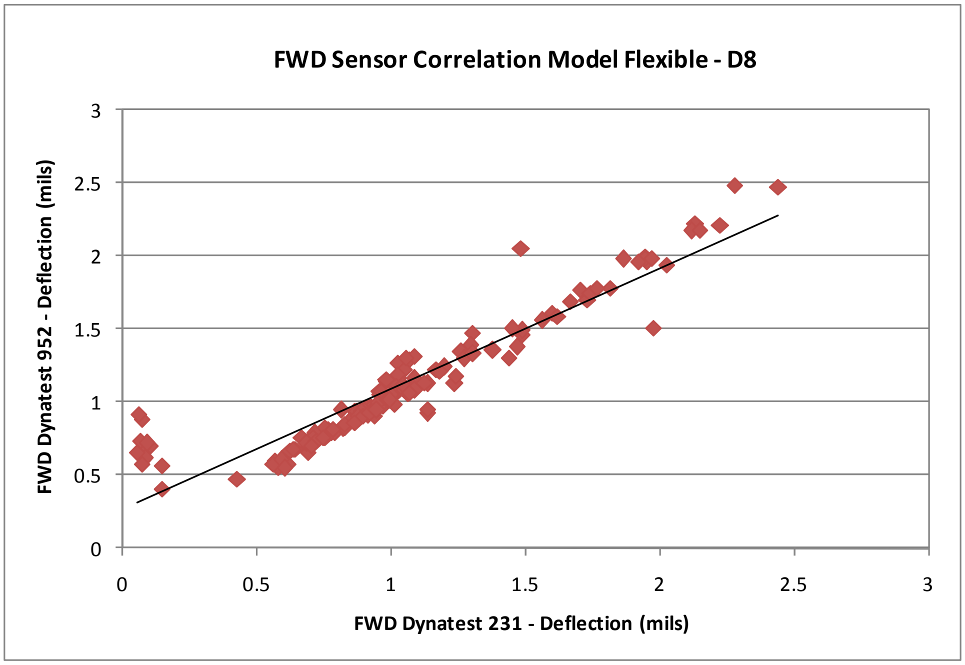

Figure 5-10: FWD Sensor Correlation Model, Flexible – D8

Table 5-3: Values for Correlation Models – Flexible (Revised D8)

Sensor	a	b	R^2
D1	0.967	0.399	0.965
D2	0.954	0.377	0.955
D3	0.920	0.40	0.949
D4	0.935	0.323	0.947
D5	0.951	0.195	0.949
D6	0.968	0.089	0.957
D7	0.985	0.063	0.960
D8	0.871	0.187	0.935

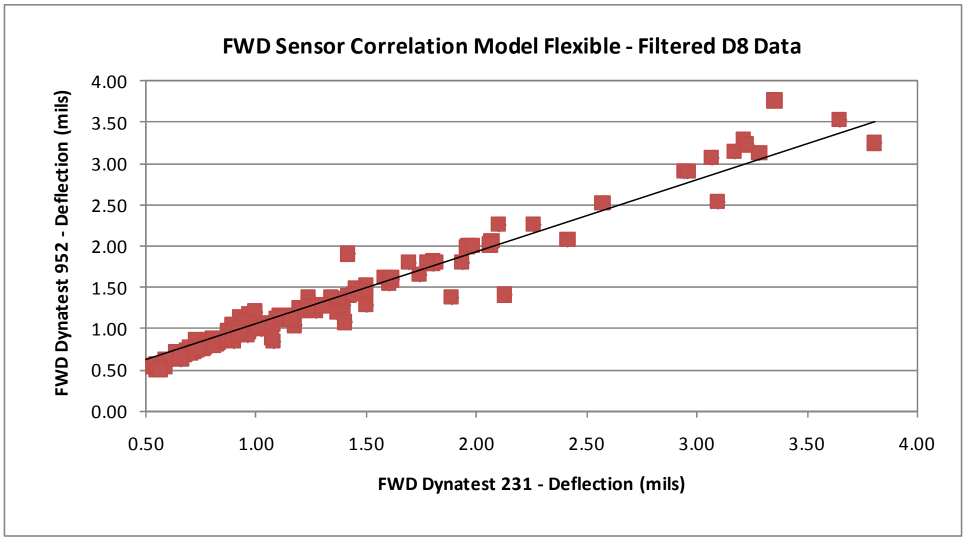

Figure 5-11: FWD Sensor Correlation Model, Flexible – Filtered D8 Data

It was planned to have only a few minutes separating the tests performed using the 2 units at any one given location. However, at some tests locations the gap in time between the tests exceeded the planned few minutes, but at no time exceeding one hour. However, the time gaps did result in some temperature differences where tests were taken during sunny morning hours. The observed difference in surface temperature ranged from 0.0°F to 7.9°F with an average of 3.2°F. Figures 5-12 and 5-13 show the distribution of the time gap and the temperature differences between the corresponding tests performed using the two FWD units. As can be seen, more than 50% of the tests had a time gap of less than 10 minutes and a temperature difference less than 3°F. Only about 12% of the tests had a time gap of 50-60 minutes, which resulted in a 6°F-8°F difference in surface temperature.

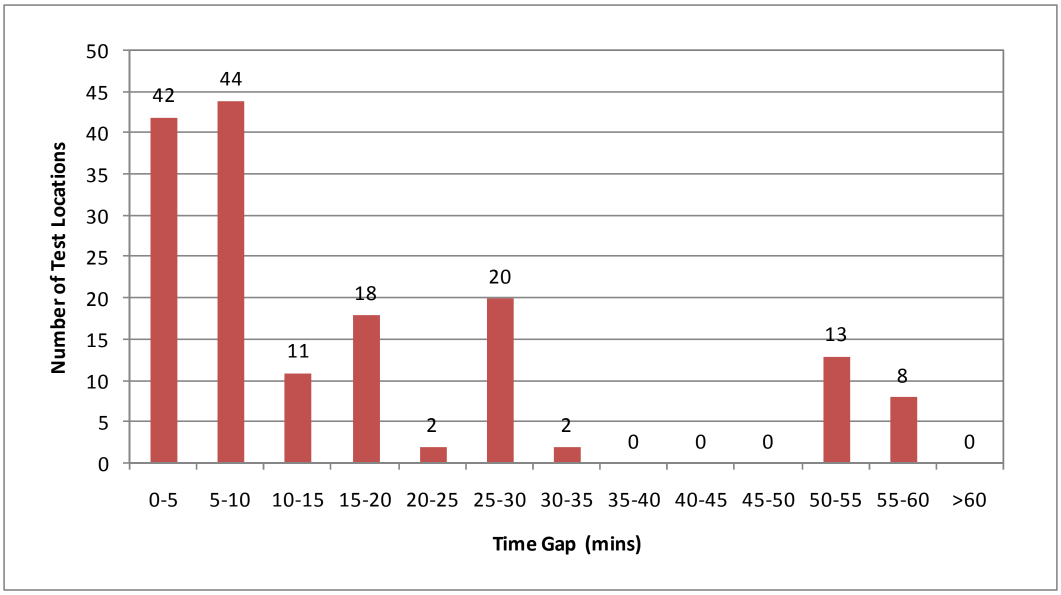

Figure 5-12: Time Gap Distribution

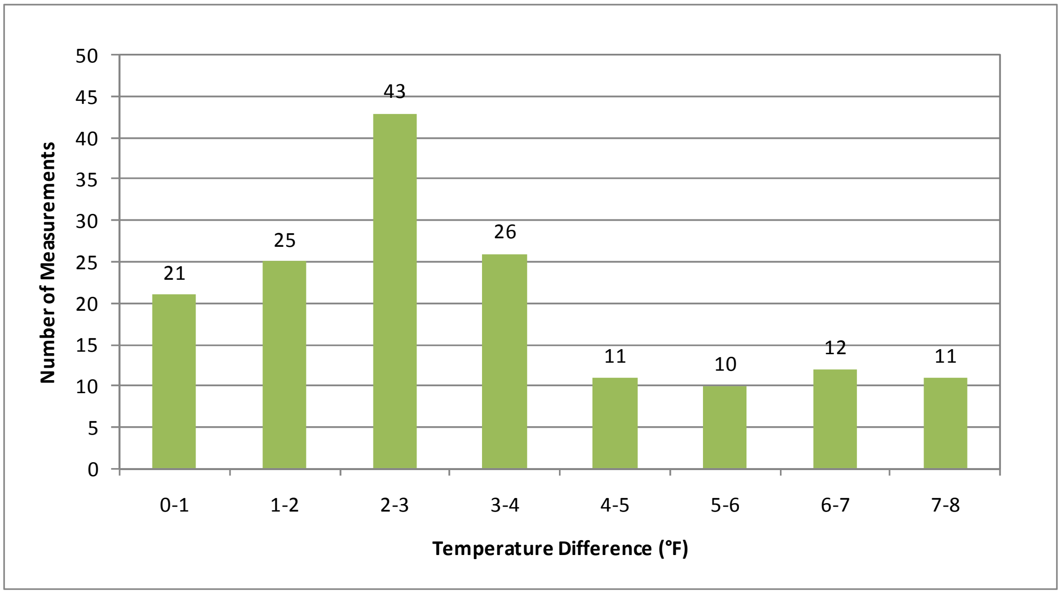

Figure 5-13: Temperature Difference Distribution

Although the observed differences were not very high, a decision was made to account for these differences by adjusting the deflection measurements of the FWD 952, made at certain surface temperatures, to the surface temperatures recorded when the corresponding deflection measurements were made using the FWD 231. These temperature adjustments required the development of some basic temperature correction models for use in the Correlation Study only.

The data collected during the 24-hour testing cycles conducted as part of the Seasonal Study and collected using the FWD 231 was used to develop the temperature adjustment models required within the Correlation Study. It should be noted that these temperature adjustment models have very limited applicability because the 24-hour testing data was collected from only one site. This site is a part of the Correlation Study. Since the differences in surface temperature between the corresponding measurements made by the 2 FWD units is not very high and since the 24-hour testing was performed on one of the sections considered in the Correlation Study, it was considered reasonable to develop temperature correction models from this data for use only in the Correlation Study. It is not intended that these models should be used outside of this study.

The normalized deflection data of the 24-hour testing cycle was grouped by sensor and averaged for each temperature range (10°F increments). Scatter plots were then developed using this data and a linear regression model, similar to that shown in Equation 5-1, was fitted within each of these plots. Figures 5-14 to 5-20 show the resulting temperature adjustment models. The model for Sensor D8 (72 in. from the center of the load plate) was excluded because of the minimal change in deflection as a result of temperature changes at this offset distance.

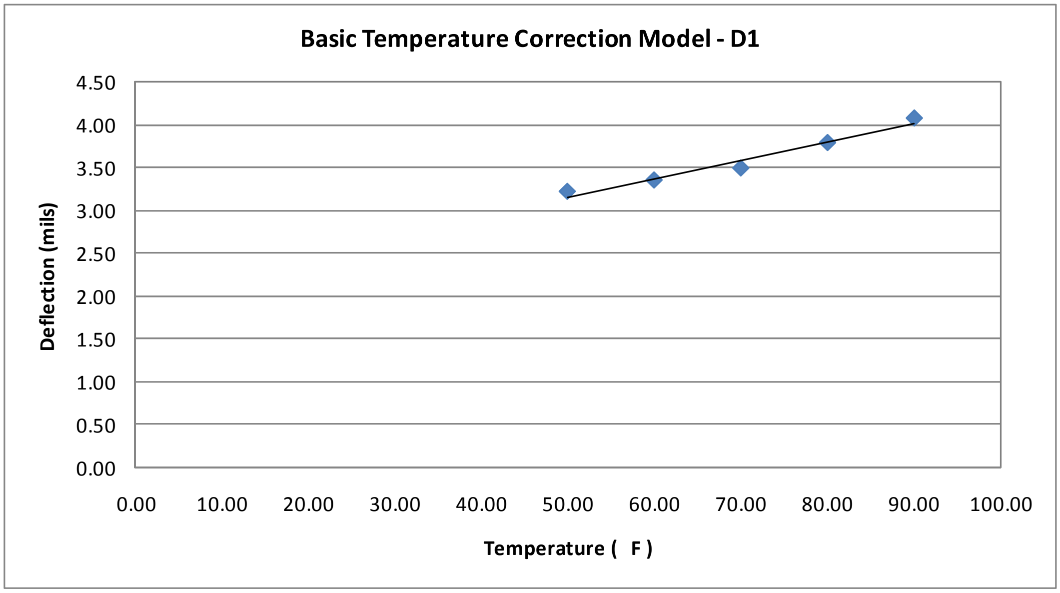

Figure 5-14: Basic Temperature Adjustment Model – D1

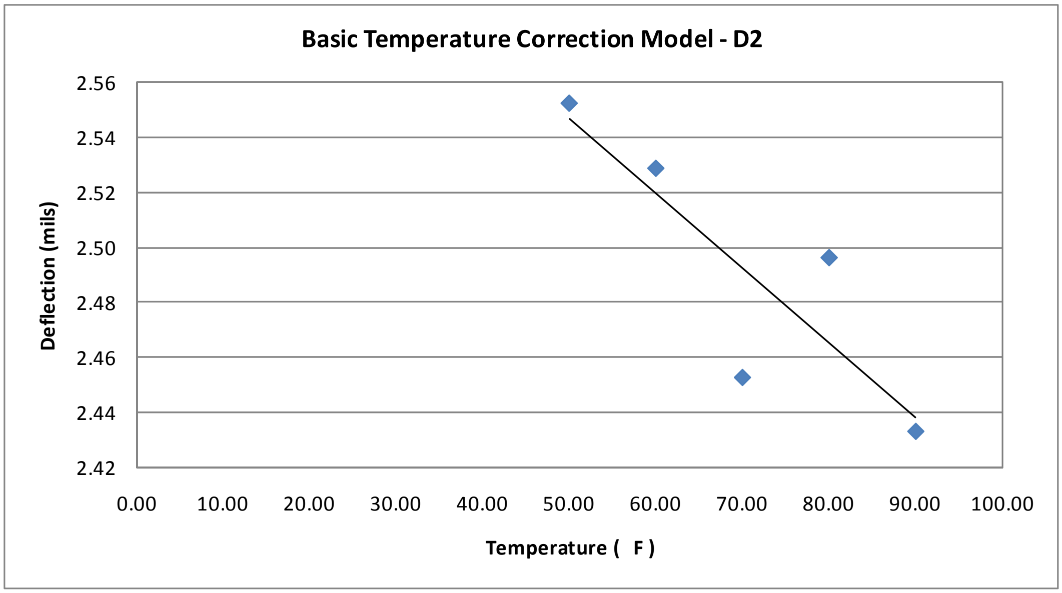

Figure 5-15: Basic Temperature Adjustment Model – D2

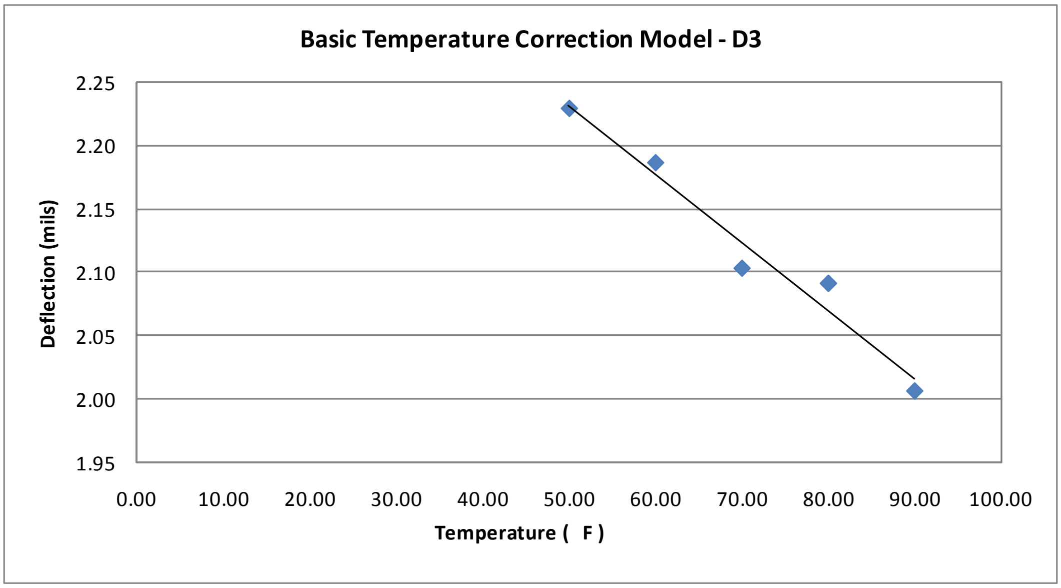

Figure 5-16: Basic Temperature Adjustment Model – D3

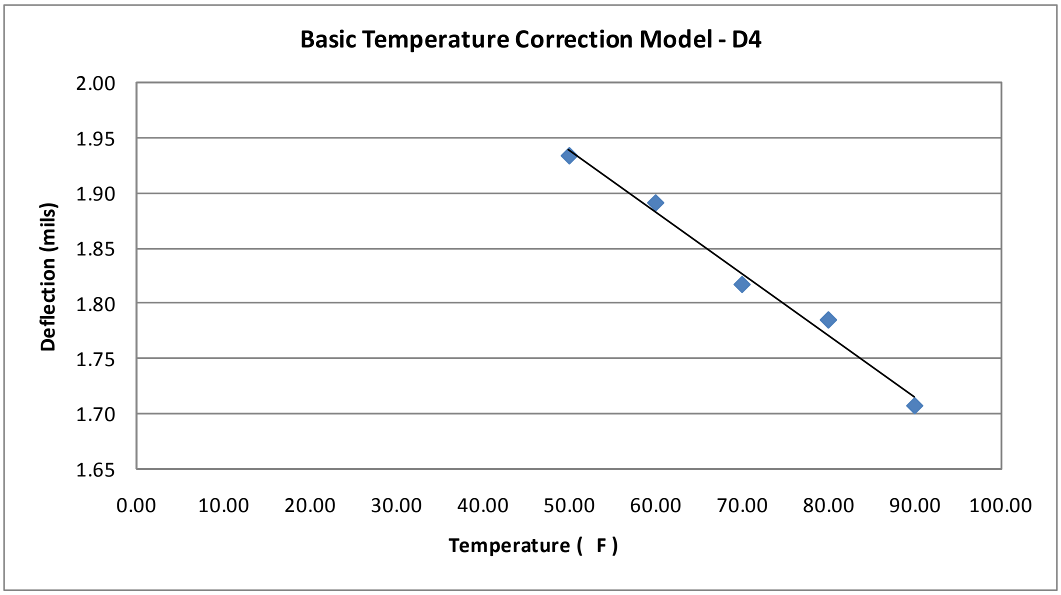

Figure 5-17: Basic Temperature Adjustment Model – D4

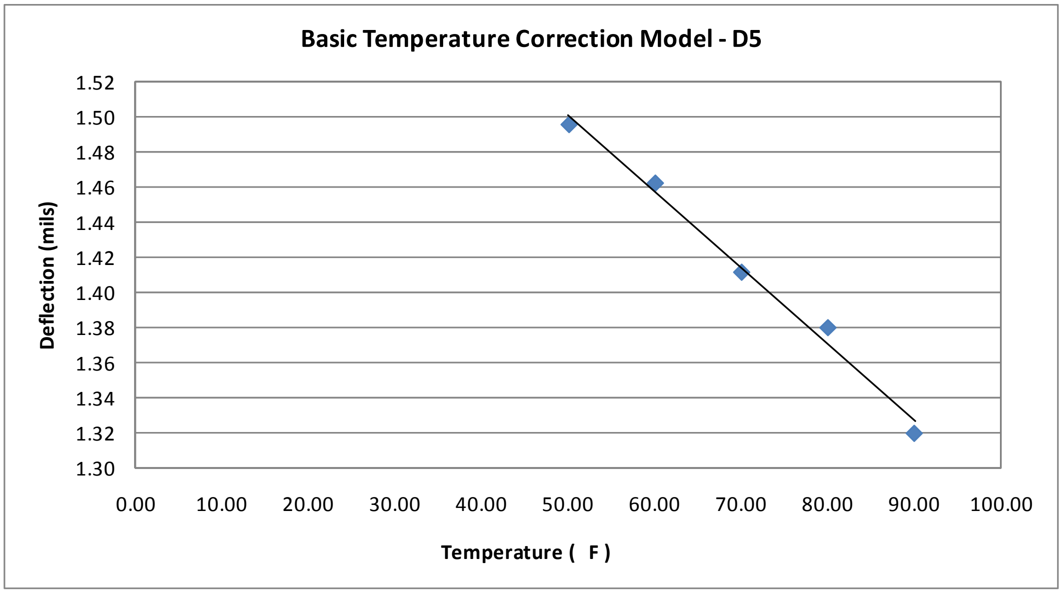

Figure 5-18: Basic Temperature Adjustment Model – D5

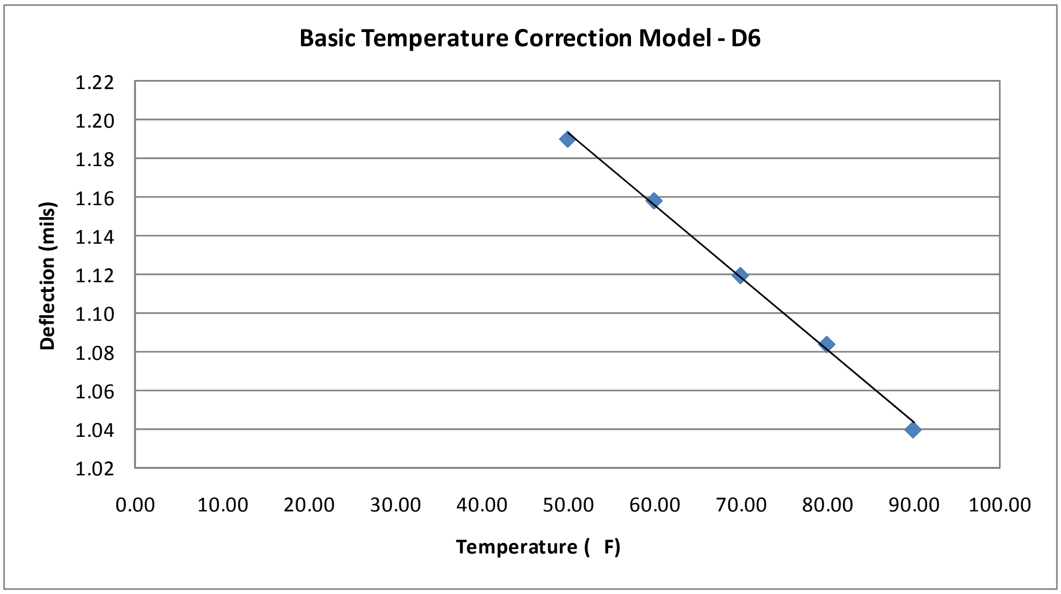

Figure 5-19: Basic Temperature Adjustment Model – D6

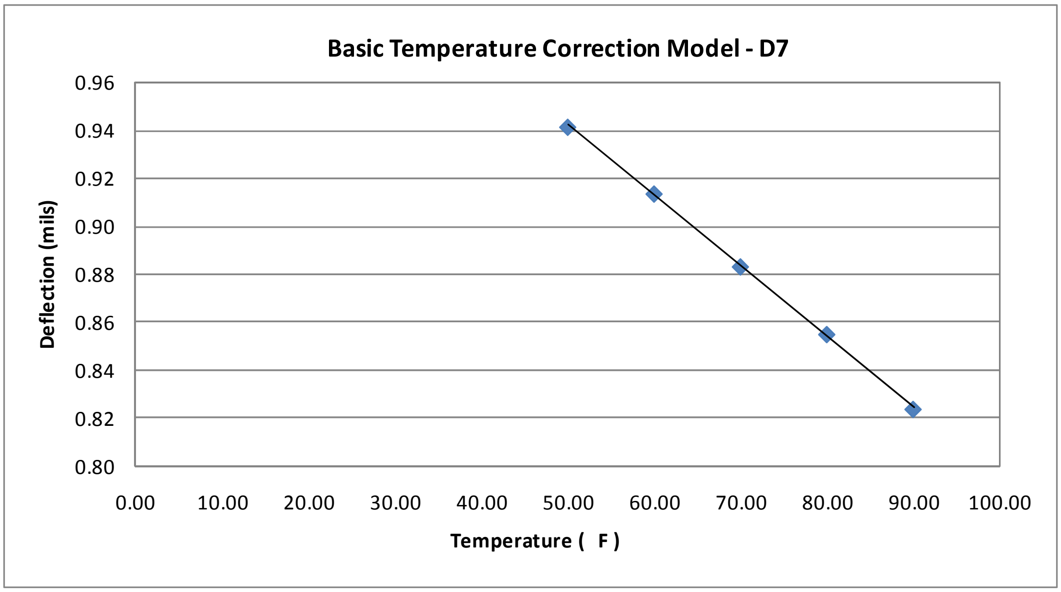

Figure 5-20: Basic Temperature Adjustment Model – D7

The developed temperature correction models were applied to the FWD 952 data to correct the deflections to correspond with the temperature recorded during the FWD 231 tests. With the temperature differences now accounted for, the FWD 231 and the temperature-corrected 952 data was correlated and revised correlation models for flexible pavement were developed following exactly the same procedures explained earlier in this section. The a, b, and R^2 values for these models are shown in Table 5-4. The models are presented graphically in Figures 5-21 to 5-28.

As can be seen, R^2 ranged 93.5% to 96.7%. The slope of the correlation model (coefficient 'a' in Equation 5-1) ranged from 0.871 to 0.956. The intercept of the models (coefficient 'b' in Equation 5-1) ranged from -0.080 to 0.689. These results indicate that better correlations were achieved when the differences in surface temperature between the tests performed by the 2 FWD units were accounted for. The developed models can be used to convert the measurements made using one FWD to the corresponding values if the other FWD had been used instead.

Table 5-4: Values for Revised Correlation Models – Flexible

Sensor	a	b	R^2
D1	0.919	0.689	0.935
D2	0.936	0.374	0.946
D3	0.920	0.301	0.951
D4	0.943	0.207	0.955
D5	0.956	0.126	0.962
D6	0.939	0.094	0.967
D7	0.946	0.080	0.967
D8	0.871	0.187	0.935

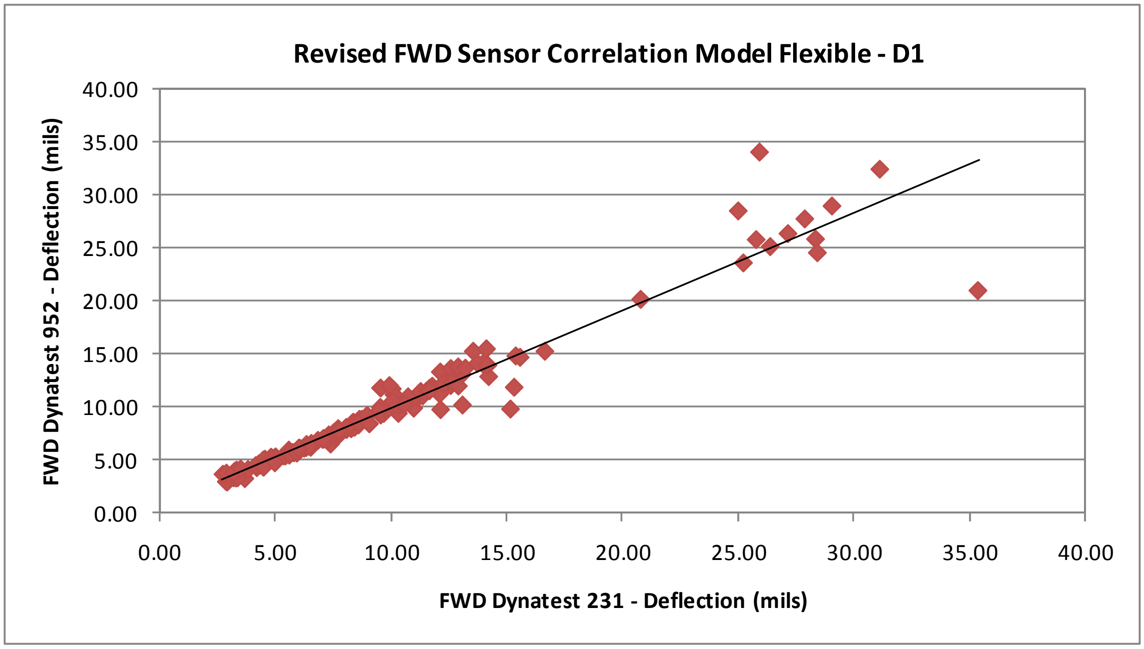

Figure 5-21: Revised FWD Sensor Correlation Model, Flexible – D1

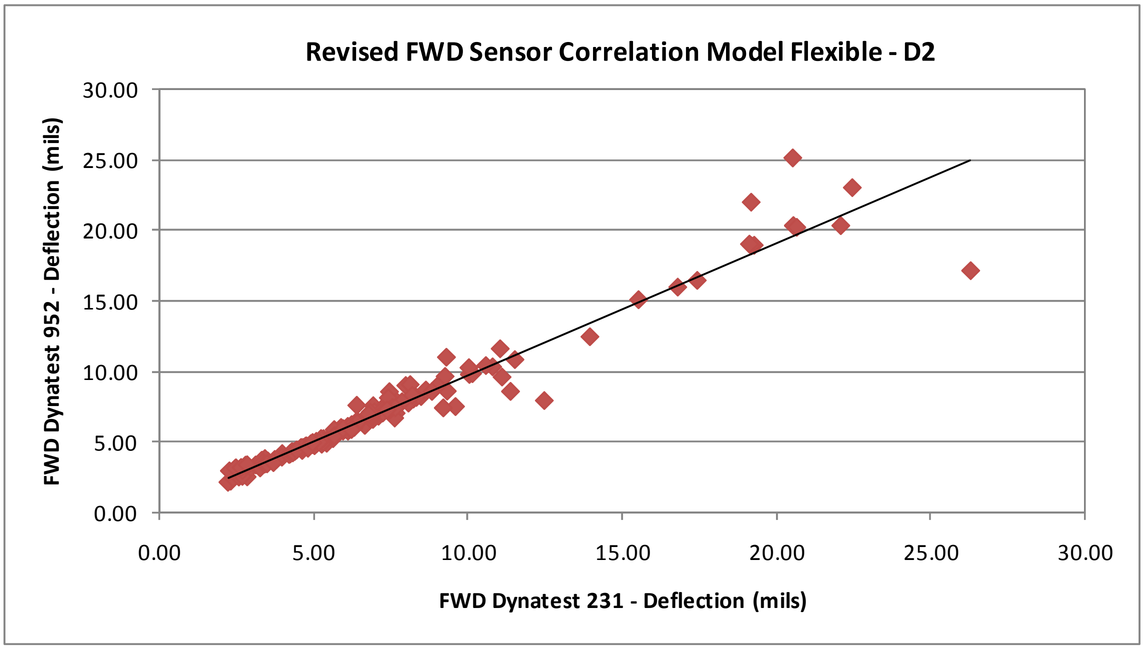

Figure 5-22: Revised FWD Sensor Correlation Model, Flexible – D2

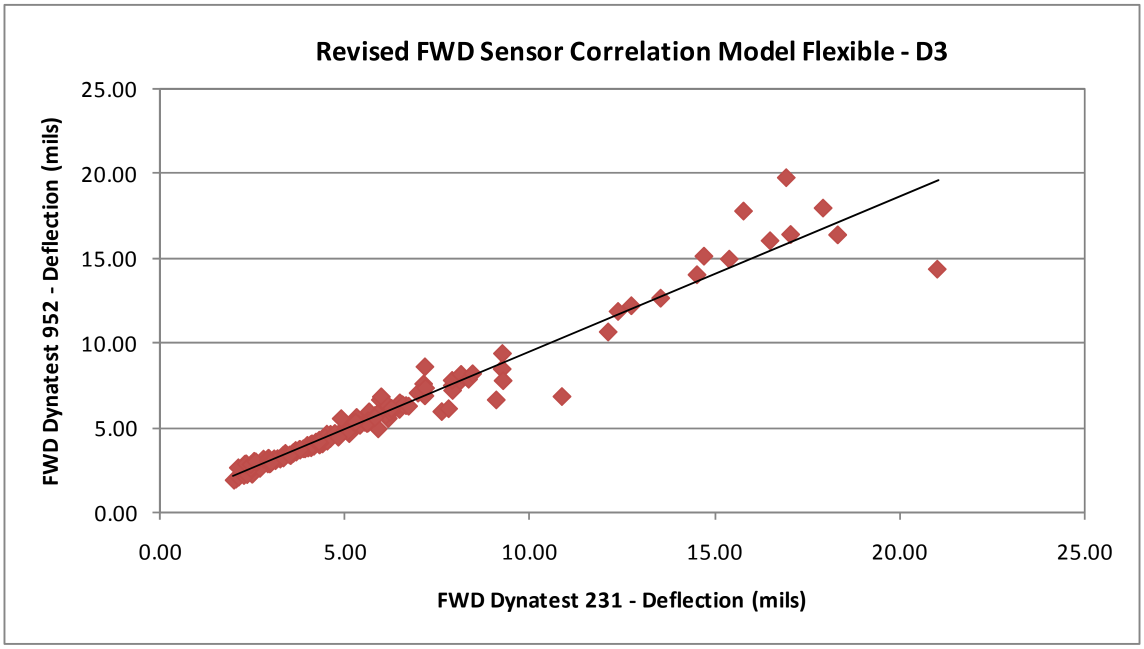

Figure 5-23: Revised FWD Sensor Correlation Model, Flexible – D3

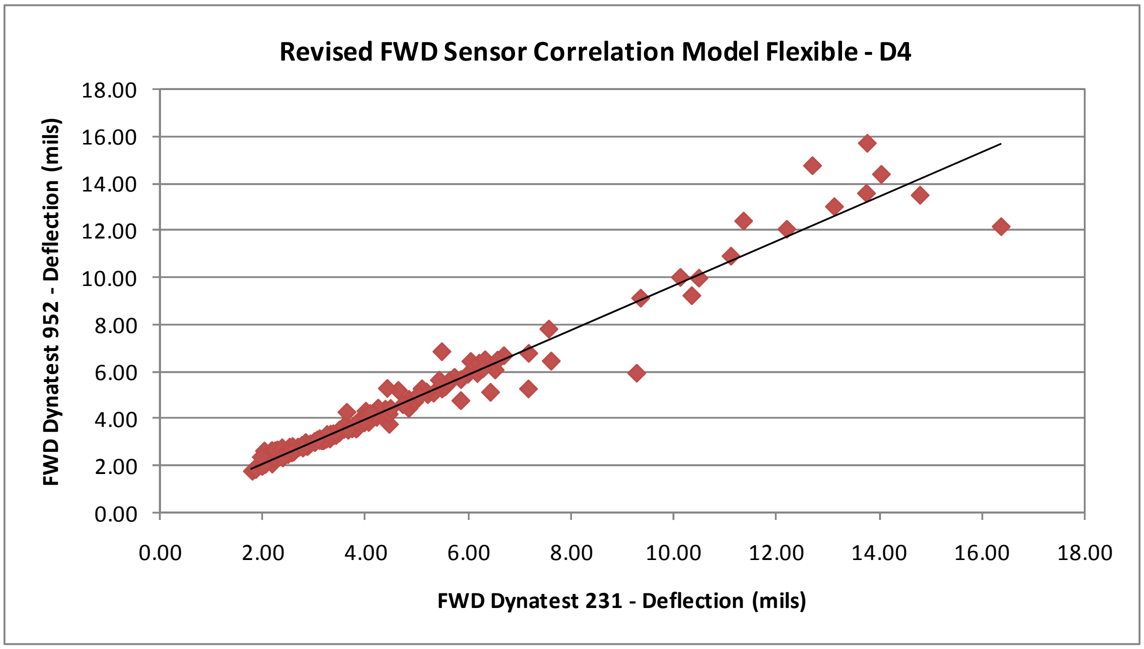

Figure 5-24: Revised FWD Sensor Correlation Model, Flexible – D4

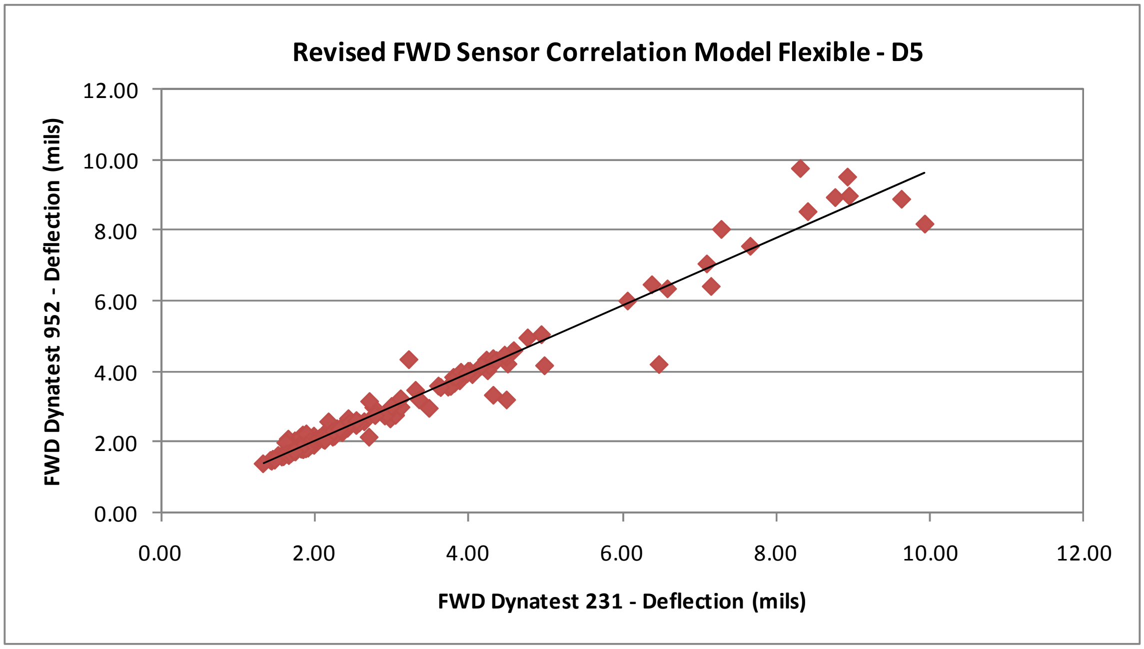

Figure 5-25: Revised FWD Sensor Correlation Model, Flexible – D5

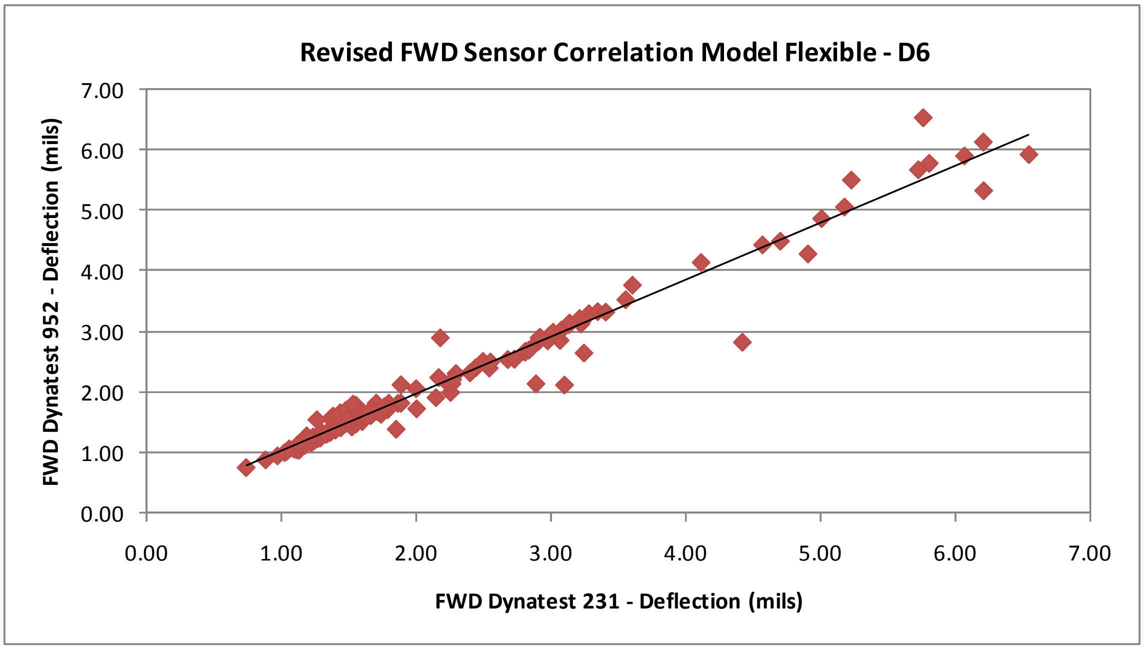

Figure 5-26: Revised FWD Sensor Correlation Model, Flexible – D6

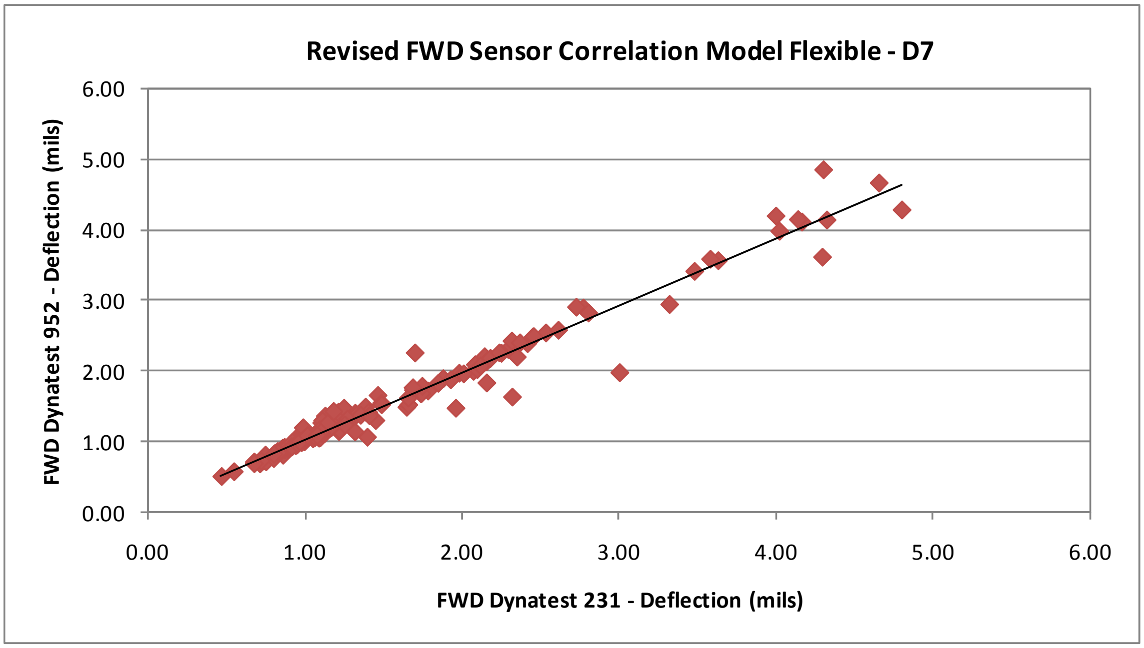

Figure 5-27: Revised FWD Sensor Correlation Model, Flexible – D7

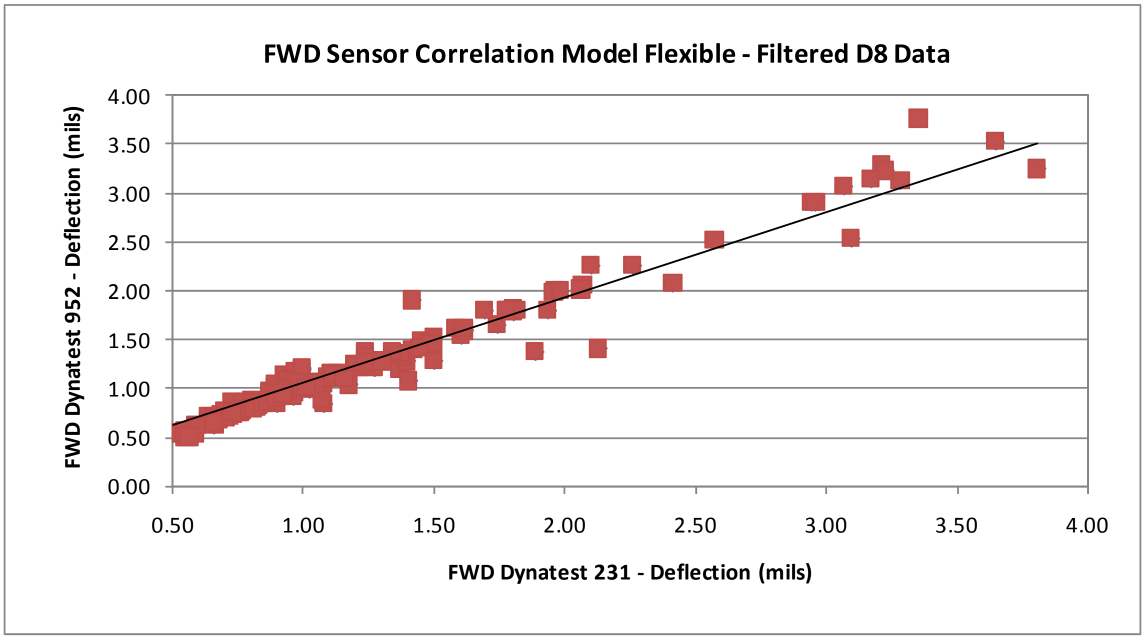

Figure 5-28: FWD Sensor Correlation Model, Flexible – D8

5.3.2 Rigid Pavements

The correlation analysis of rigid pavements followed the formula presented in Equation 5-1. The corresponding normalized deflections measured at mid-slab locations by the two units were paired based on the test locations. A simple scatter plot was then created for each sensor (D1 to D9) and a linear regression model was fitted to each plot. As a result, nine regression models following the form presented in Equation 5-1 were developed. Table 5-5 shows the regression coefficients, along with the coefficient of determination (R^2) for these 9 models. The models are shown graphically in Figures 5-29 to 5-37.

As can be seen, R^2 ranged from 96.4% to 96.7%. The slope of the correlation model (coefficient ‘a’ in Equation 5-1) ranged from 1.138 to 1.223. Ideally, the slope of the model should be 1.0. The intercept of the models (coefficient ‘b’ in Equation 5-1) ranged from -0.766 to -0.164. This intercept represents a fixed difference between the corresponding sensors of the 2 FWD units. The developed models can be used to convert the measurements made using one FWD to the corresponding values if the other FWD had been used instead.

Table 5-5: Values for Correlation Models – Rigid

Sensor	a	b	R^2
D1	1.205	-0.735	0.964
D2	1.194	-0.627	0.965
D3	1.181	-0.575	0.966
D4	1.168	-0.490	0.964

Sensor	a	b	R^2
D5	1.160	-0.371	0.966
D6	1.141	-0.285	0.965
D7	1.138	-0.188	0.967
D8	1.155	-0.164	0.964
D9	1.223	-0.766	0.965

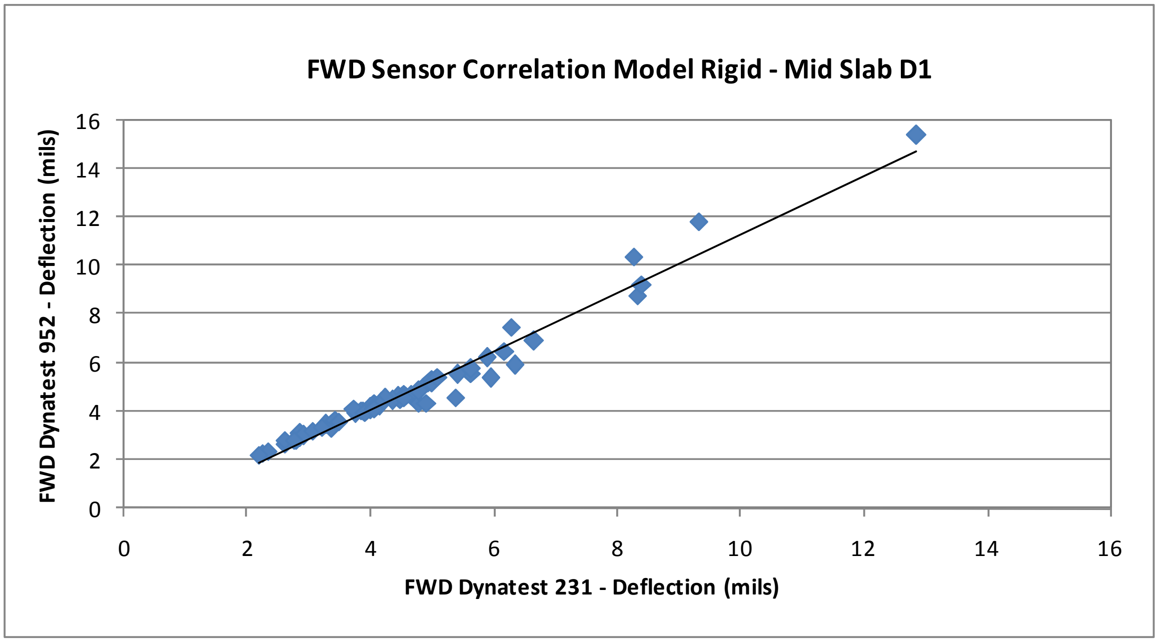

Figure 5-29: FWD Sensor Correlation Model, Rigid – D1

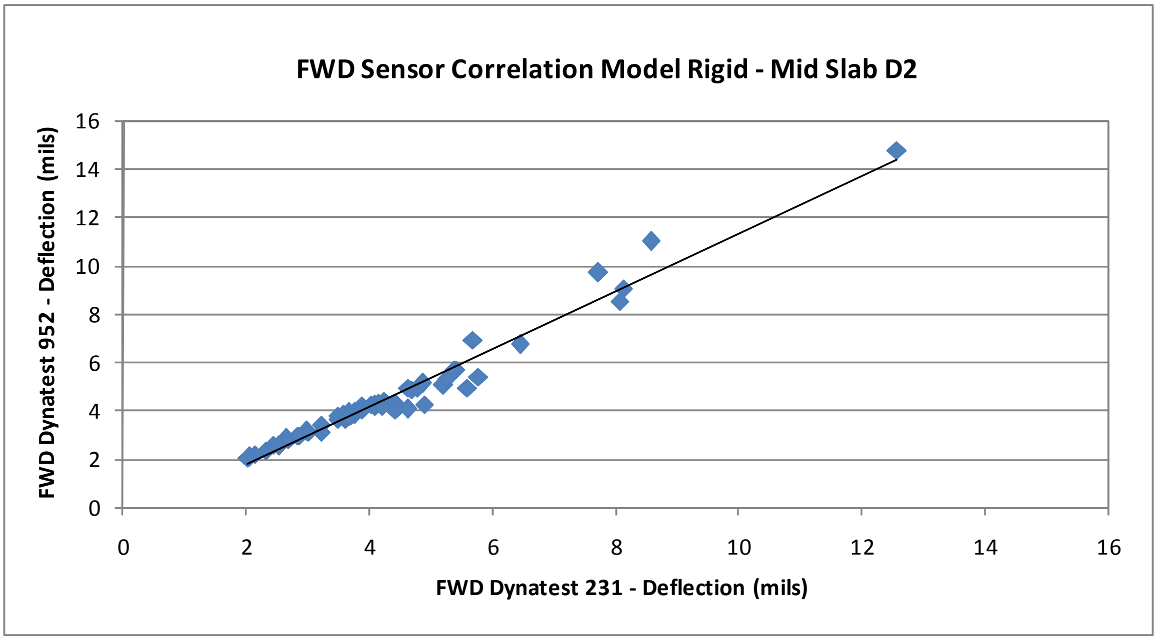

Figure 5-30: FWD Sensor Correlation Model, Rigid – D2

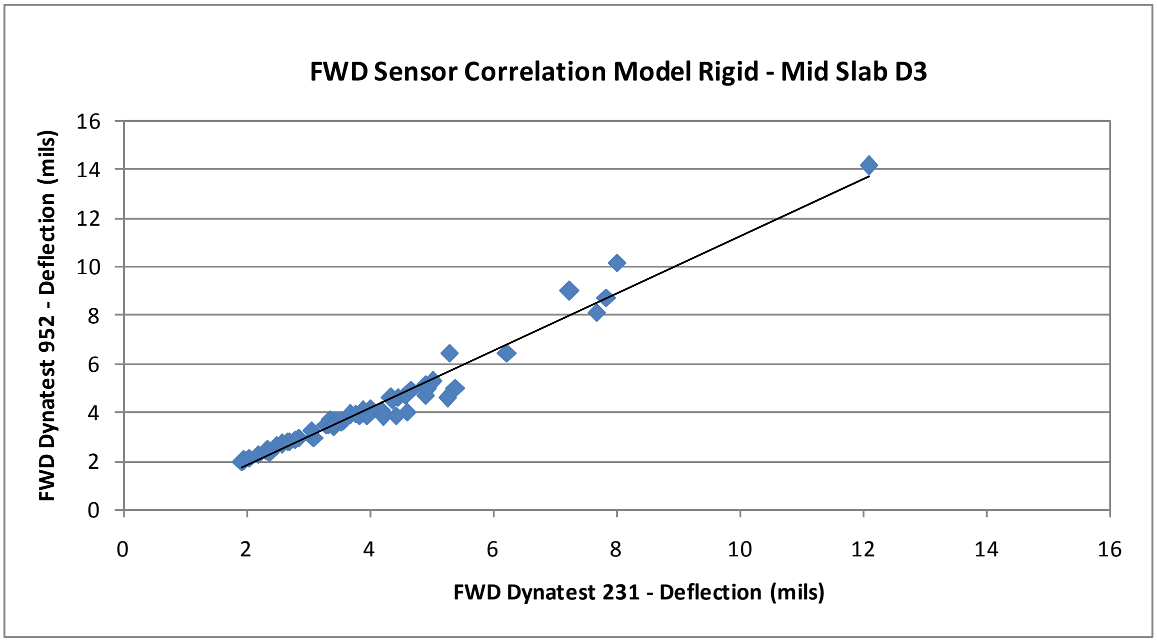

Figure 5-31: FWD Sensor Correlation Model, Rigid – D3

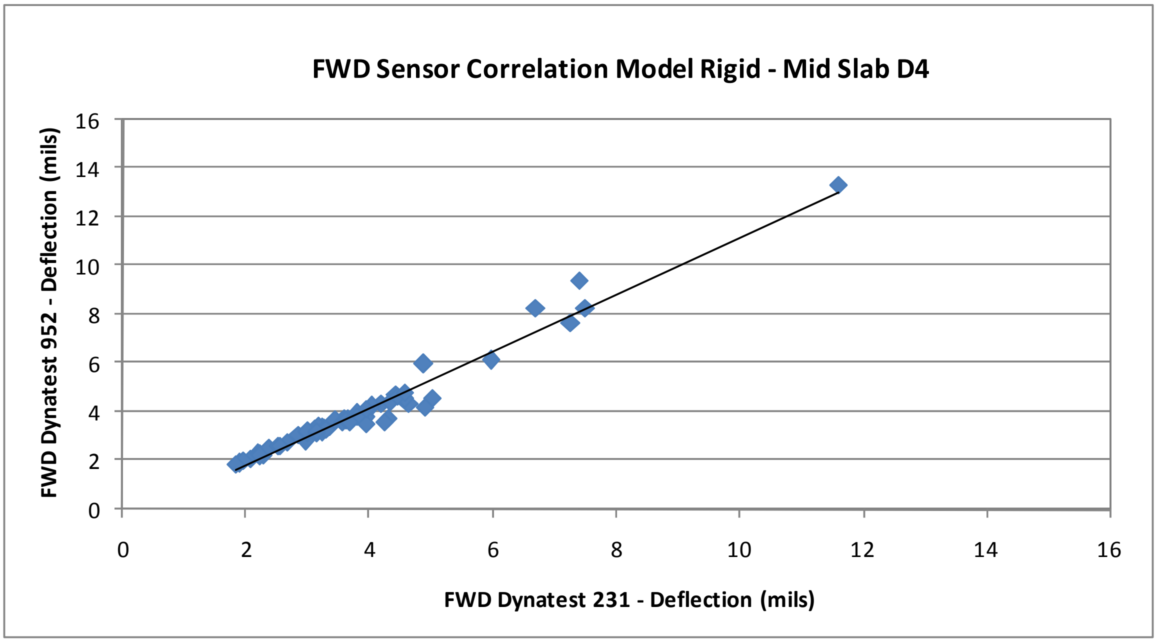

Figure 5-32: FWD Sensor Correlation Model, Rigid – D4

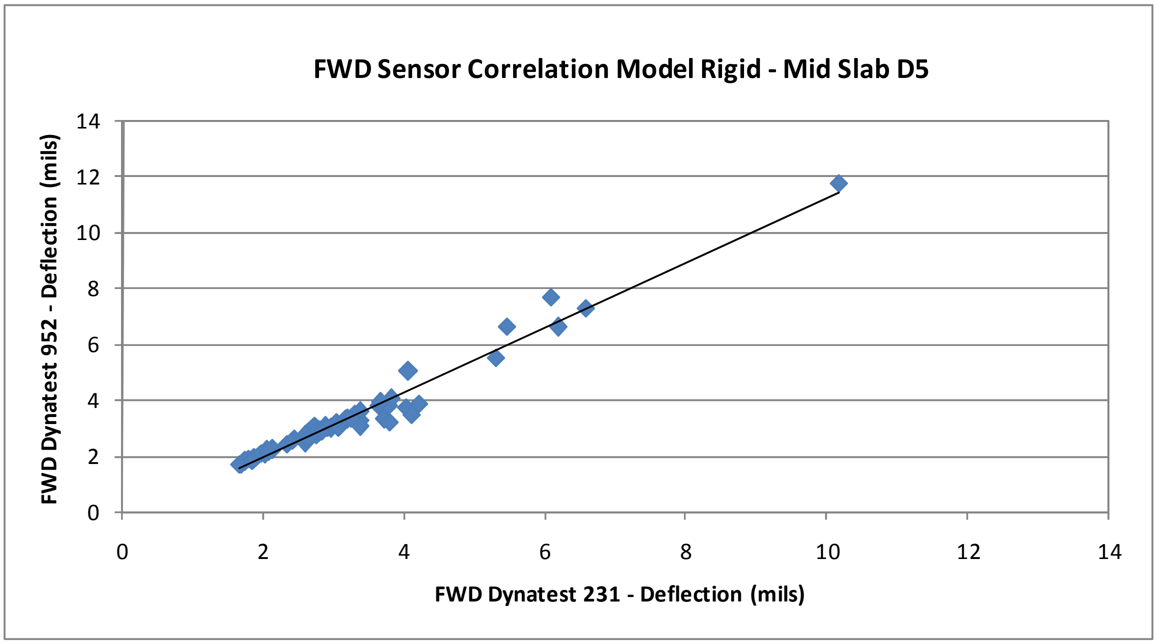

Figure 5-33: FWD Sensor Correlation Model, Rigid – D5

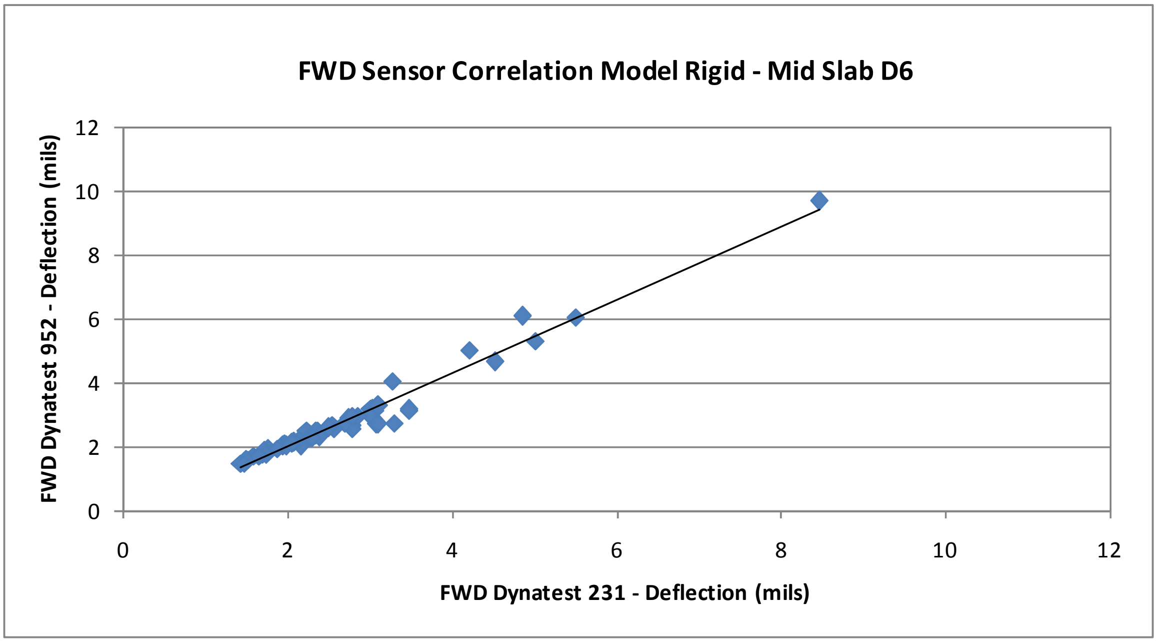

Figure 5-34: FWD Sensor Correlation Model, Rigid – D6

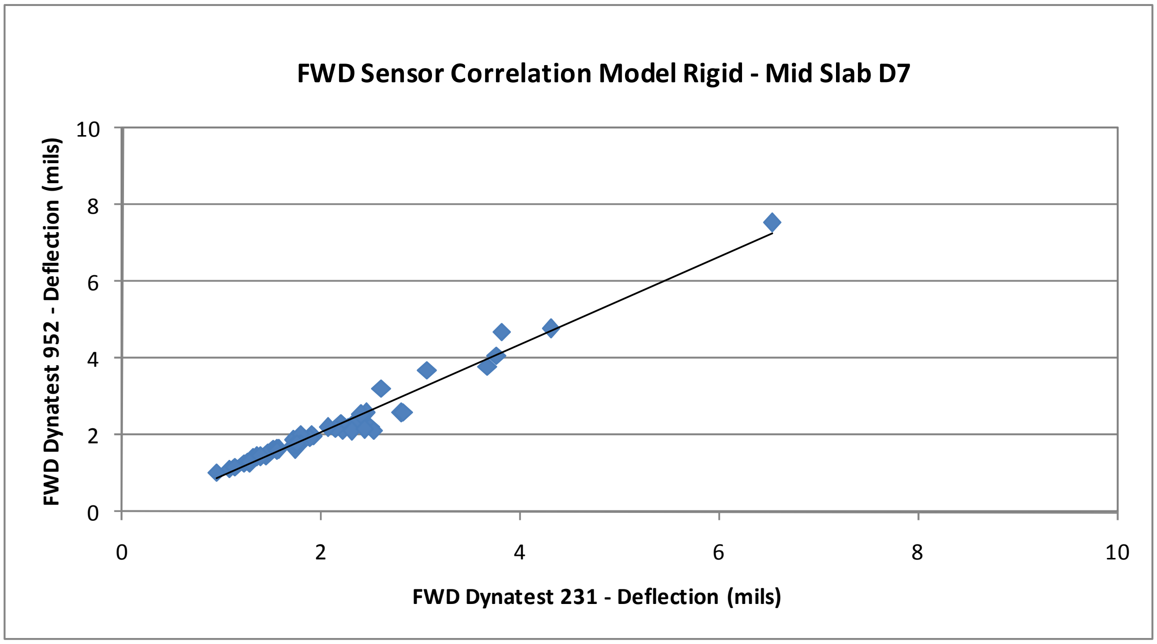

Figure 5-35: FWD Sensor Correlation Model, Rigid – D7

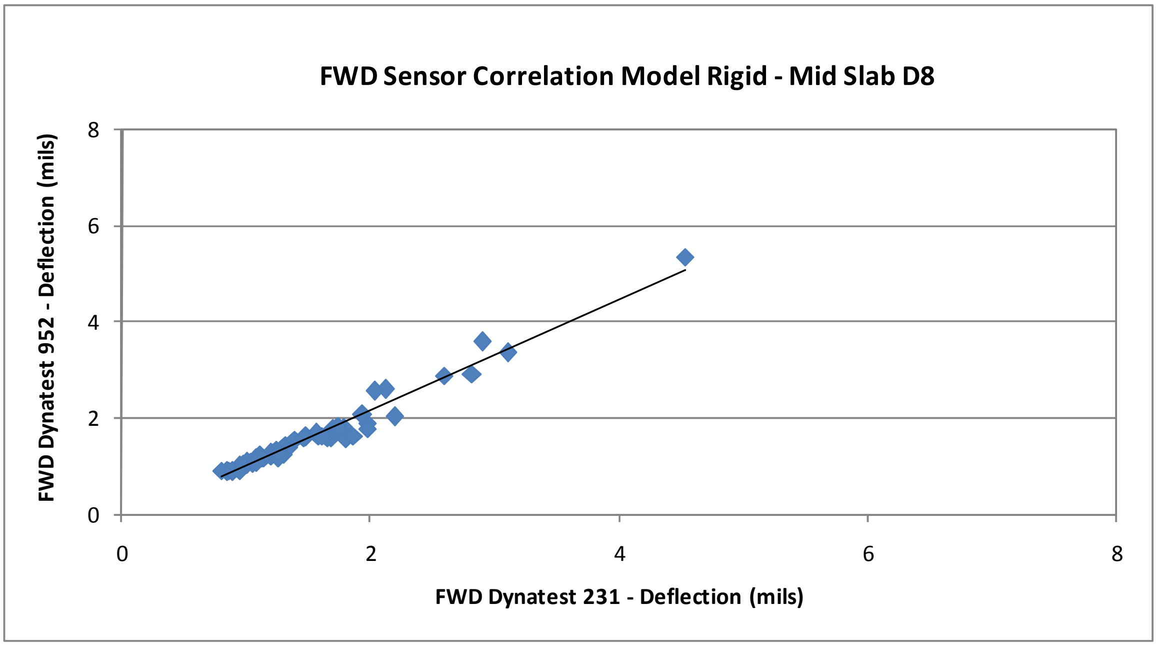

Figure 5-36: FWD Sensor Correlation Model, Rigid – D8

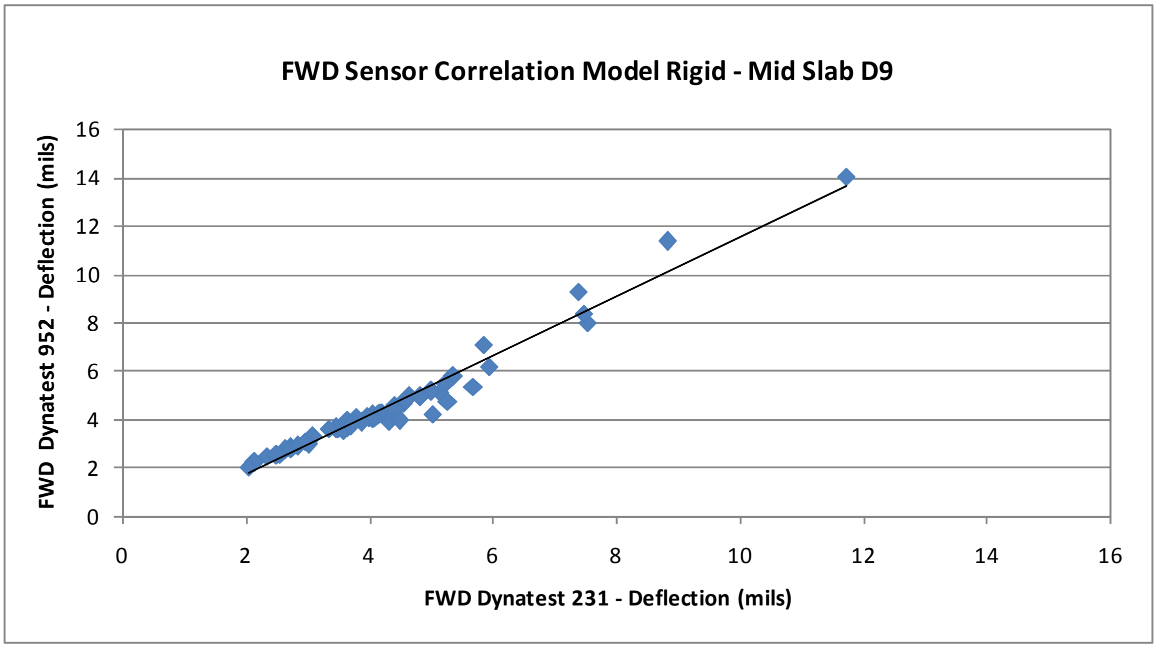

Figure 5-37: FWD Sensor Correlation Model, Rigid – D9

5.4 APPLICATION OF FWD CORRELATION MODELS TO PROJECT FWD DATA

The overall intention within the Pavement Performance Evaluation study was to ensure that no equipment-related error was introduced to the project's FWD data, i.e. to ensure that the differences between the deflections measured at the 1,500 test sections were due to differences in structural capacity, not to differences in equipment.

Two Dynatest FWD units were allocated for this project – FWD 952 and FWD 231. The ideal scenario was that only one unit would be used to test all sections to avoid any potential equipment-related issues. However, at the beginning of Phase II it could not be known for certain whether field testing practicalities would allow the use of only one unit. As such, the FWD Correlation Study sought to develop models that could be used to account for equipment-related differences should more than one FWD unit be used. The Correlation Study was performed during the course of the project and prior to completion of FWD testing within the Main and Seasonal Studies.

Upon completion of the project's FWD testing, the team had successfully achieved the primary goal of not using different units for testing – only the FWD 952 was used for the Main Study sections and only the FWD 231 was used in the Seasonal Study. As such, neither study required that the developed correlation models be implemented on the data.

Part II: Main Study Analysis

6.0 Analysis Procedure

Main Study analyses were performed on each of the different treatment groups (recycled asphalt, rubberized asphalt, etc.) covered in this project. The exact analyses performed depended on the data available for test sections in question. However, in general, the first round of analysis assessed the treatment's performance in each of the environmental zones in which it was located. The performance evaluation covered all aspects of pavement performance – structural, functional, and distresses. This analysis provides information regarding the impact that environmental zone has on the treatment's performance.

The intention of all analyses was to concentrate firmly on the actual in-situ performance of the treatment rather than on laboratory-predicted performance. This section looks at the procedures that were used throughout the Main Study analyses. The following sections of the report look at the results of the analyses performed on each treatment group.

6.1 PERFORMANCE INDICES

As mentioned above, these analyses examined structural and functional pavement performance, as well as distresses. Three performance indices were used for this purpose, which are described in more detail in the following subsections:

- Structural Adequacy Index (SAI)
- Roughness Index (RI)
- Distress Index (DI)

6.1.1 Structural Adequacy Index (SAI)

A pavement's structural capacity refers to its ability to support the traffic loads applied to it. In this project, the in-situ structural capacity of the test sections was evaluated through performance of backcalculation analysis on the measured FWD deflections, using layer thicknesses determined by the cores/bores. The backcalculated properties included:

- The subgrade Resilient Modulus (M_R)
- The pavement Effective Elastic Modulus (E_p)
- The Effective Structural Number (SN_{eff}) of the pavement structure
- The Effective Gravel Equivalent (GE_{eff}) of the pavement structure

A key factor during the design phase is to ensure that the pavement's structural capacity will be sufficient to carry the traffic expected during its service life. As a result, thicker pavements with higher quality materials are usually selected for roads that will be subjected to higher traffic loads, such as interstate highways. When comparing the structural capacity of two sections, it is therefore vital to also consider the traffic they were designed to hold. For instance, if a low volume rural road has a lower structural capacity than a major interstate highway, this will not of itself be an indication that the rural road has not performed as well as the interstate since the rural road would have been designed with a lower structural capacity to begin with. Therefore, to allow meaningful comparison of pavement structural capacity in this study, a measure was needed to evaluate each section's performance relative to its own original design. The Structural Adequacy Index (SAI) served exactly this purpose.

SAI was developed by normalizing the effective structural capacity of the pavement in its current condition (using the Gravel Equivalent (GE_{eff})), with respect to the structural capacity specified in the original design ($GE_{as\text{-}built}$). Expected traffic is always used as an input in the pavement design process. Therefore, normalizing the current structural capacity using the design structural capacity creates a relative index that can be used to evaluate the extent to which a pavement section's structural capacity has deteriorated since it was built. SAI was calculated using the following equation:

$$SAI = \frac{GE_{eff}}{GE_{as\text{-}built}} \qquad [6\text{-}1]$$

SAI uses a 0.0-to-1.0 scale, with a value of 1.0 representing the expected SAI value for a new pavement section. As time passes the pavement section would deteriorate due to traffic and environmental effects. A typical age deterioration model was developed for SAI, as shown in Figure 6-1. In this analysis, an SAI value of 0.5 was assumed to be the trigger value for rehabilitation.

The standard curve shown below was developed in Phase 1 using data from the 1,000 Phase 1 sections. The curve is used to account for the difference of age among different test sections, as described in Section 6.2.

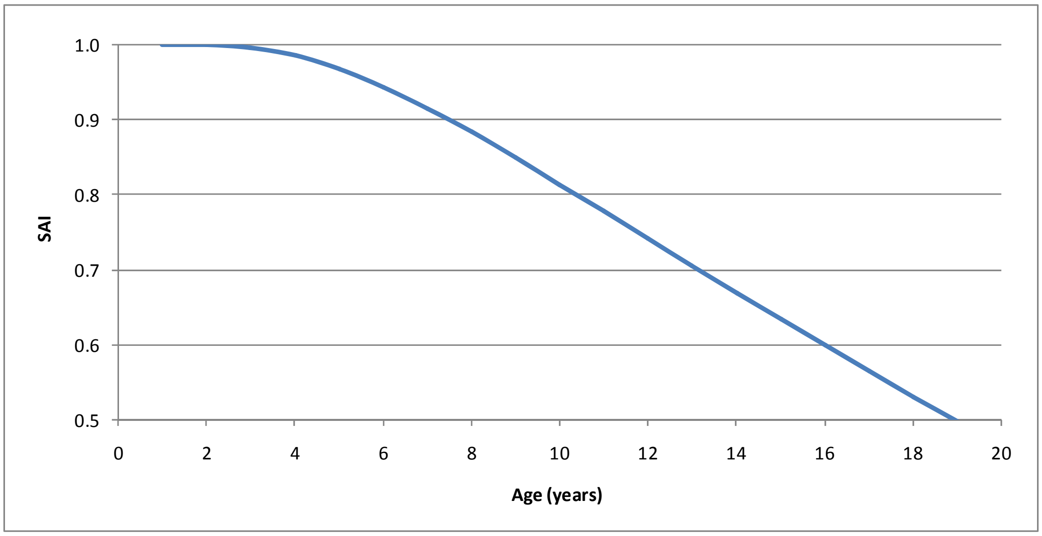

Figure 6-1: SAI Standard Age Deterioration Model

6.1.2 Distress Index (DI)

As described in the field testing section of this report, detailed distress data was collected from the test sections. A single index representing the overall distress condition of a section was required so that sections with different distress types, severities and extents could be compared within this analysis. The index used was a re-scaled version of the Pavement Condition Index (PCI). The developed index (the Distress Index (DI)) is calculated using the following equation:

$$DI = \frac{100 - (\Sigma \text{ Deduct Values Based on Distresses})}{100} \qquad [6\text{-}2]$$

As with SAI, DI uses a 0.0-to-1.0 scale; where 1.0 represents a perfect section. A standard age deterioration model, similar to the one developed for SAI, was also developed for DI using data from the 1,000 Phase 1 sections. Again, the value of 0.5 was assumed to be the trigger value for rehabilitation.

6.1.3 Roughness Index (RI)

IRI data was collected from all the Main Study test sections. However, to ensure consistency with the other performance indices used in this analysis, IRI data was re-scaled to fit a 0.0-to-1.0 scale. As with SAI and DI, a value of 1.0 represented a perfect section and a value of 0.5 was assumed to be the trigger level for rehabilitation. The re-scaled index is referred to as the Roughness Index (RI) and is calculated using the following equation:

$$RI = (a)e^{IRI^{(b)}} \qquad [6\text{-}3]$$

Where, a and b are constants

A standard age deterioration model, similar to the ones developed for SAI and DI, was also developed for RI using data from the 1,000 Phase 1 sections.

6.2 AGE ADJUSTMENT OF PERFORMANCE INDICES

Figure 6-1 shows that pavement condition deteriorates with time. Therefore, the SAI value, for example, of a pavement that has been in service for 8 years cannot be directly compared with one that has been in service for only 5. To allow a meaningful comparison, an adjustment needs to be made to the data to bring both pavements to the same standard age. As the test sections in this study had been in-service for differing numbers of years, age adjustment was performed on the SAI, RI, and DI values to bring all values to those of the pavement section at age 5 years. This would allow for fair comparison of performance.

6.2.1 Age Adjustments for SAI and RI

SAI and RI underwent the same age adjustment process. Figure 6-2 and the following steps outline the procedure using SAI as an example; the same process was applied to RI values. In this example, the pavement section has been in service for 8 years and has an SAI value of 0.78.

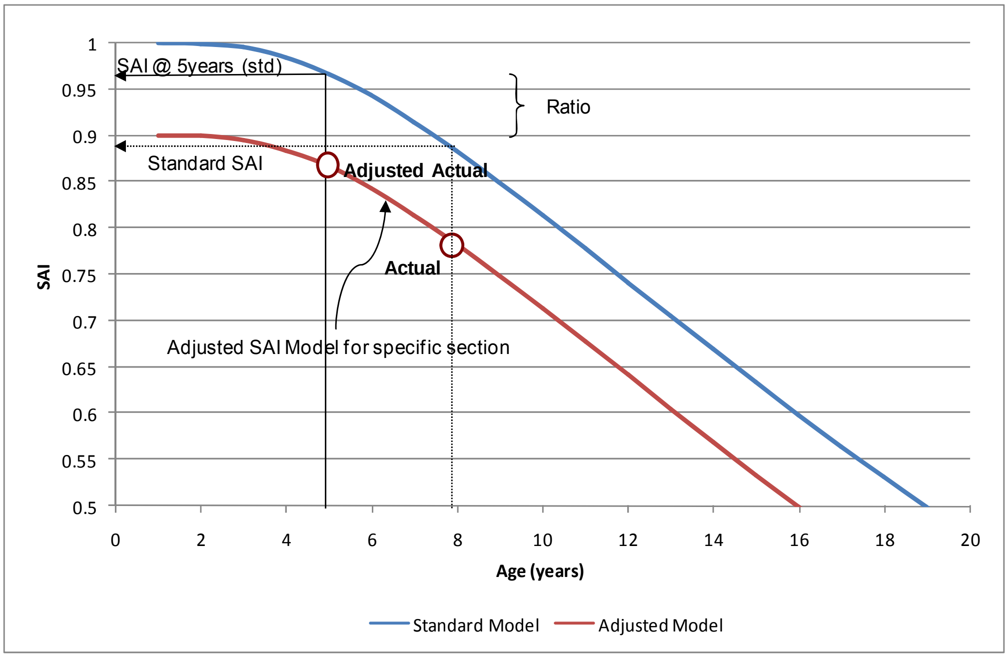

Figure 6-2: Age Adjustment Procedure for SAI and RI

- It was assumed that all pavement sections follow the standard SAI age deterioration model (Figure 6-1 and the upper line in Figure 6-2).
- The actual SAI value for the pavement section (0.78 at 8 years) was plotted on the graph (circle titled ‘Actual’).
- The actual SAI value for the section lay below the standard SAI age deterioration curve. As such, it was assumed that this section was built with an initial SAI < 1.0, and that its deterioration will therefore be different from the standard deterioration.
- The standard SAI age deterioration model was shifted to match the pavement section’s actual SAI value (0.78). This line is titled ‘Adjusted SAI Model for Specific Section’ in the figure.
- Using this adjusted model, the SAI value of this particular pavement section at age 5 years was determined (circle titled ‘Adjusted Actual’). The age adjusted SAI value (or ‘SAI_5’) is 0.87.

6.2.2 Age Adjustments for DI

With SAI and RI, it could be assumed that a value under the standard curve, as in the above example, meant that the section had begun with an initial SAI and/or RI value < 1.0. However, this could not be assumed with DI since pavements should always begin their service life in distress-free condition. As such, DI values required a different age adjustment process. Figure 6-3 and the following steps show this process. In the example, the pavement section has been in service for 2 years and has a DI value of 0.87.

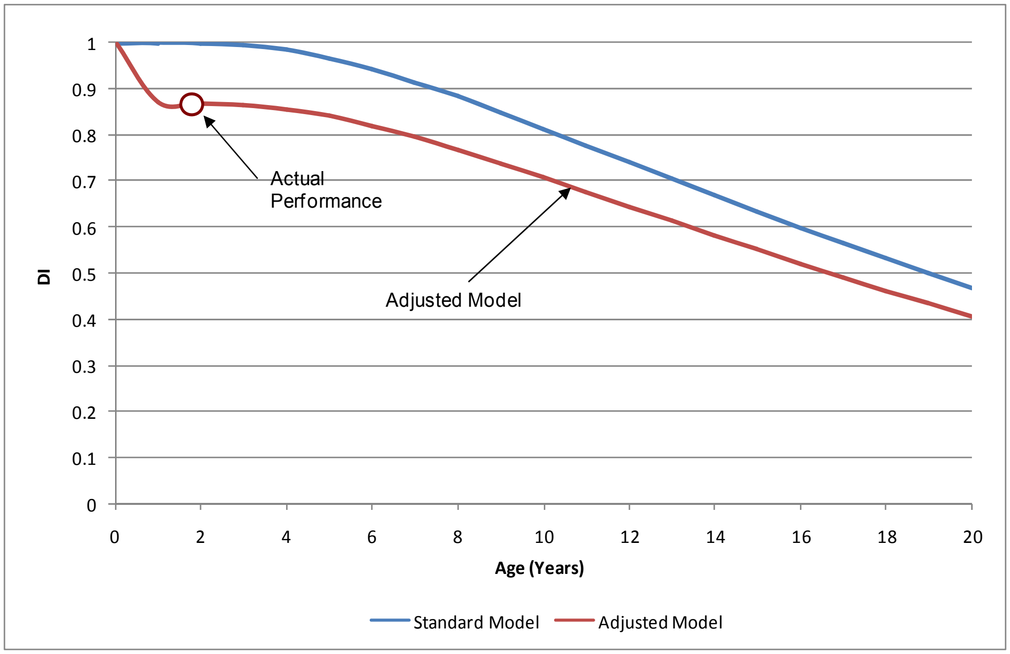

Figure 6-3: Age Adjustment Procedure for DI

- The standard DI age deterioration model was plotted on the graph (the upper line in Figure 6-3).
- The section's actual DI value was then added to the graph (circle titled 'Actual Performance').
- The actual DI value lay below the standard DI age deterioration curve. An assumption was made the pavement was in distress-free condition when it was built. Therefore, this section's actual deterioration was expected to be different from the standard deterioration, but still go through a DI value of 1.0 at age "0".
- A revised model reflecting this deterioration was added to the graph (titled 'Adjusted Model').
- Using this adjusted model, the DI value of this particular pavement section at age 5 years (or 'DI_5') was determined as being 0.85.

6.3 PERFORMANCE EVALUATION

Two measures were used to help evaluate and compare the performance of different pavement sections. These are described in the following subsections.

6.3.1 Performance Classes

Each section's SAI_5, RI_5, and DI_5 values were compared with those based on the ideal 20-year design life of a typical asphalt pavement section and classified as excellent, good, fair, or poor, depending on how well they matched this standard, as shown below.

Excellent	Performance Index ≥ 0.9
Good	Performance Index ≥ 0.7

Fair	Performance Index ≥ 0.5
Poor	Performance Index < 0.5

It should be noted that these classifications are used for the purposes of this report only; they are not Caltrans classifications.

6.3.2 Expected Service Lives

For each pavement section, the expected service lives based on SAI, RI, and DI were calculated, using the age adjusted deterioration models, as the age at which the index would reach the assumed trigger level of 0.5. This resulted in the measures of:

- Structural Service Life (SSL) based on SAI
- Distress Service Life (DSL) based on DI
- Roughness Service Life (RSL) based on RI

7.0 Recycled Asphalt Pavement

The performance of Recycled Asphalt Pavement (RAP) sections located in a number of environmental zones was evaluated to assess the treatment's performance and to determine the effect of environmental conditions on that performance[9].

This analysis evaluated sixty RAP sections located in three of California's environmental zones – North Coast (NC), Desert (DS), and Mountain (MT) – and four of Caltrans' districts (Districts 1, 7, 9, and 11). Caltrans' specifications allow the use of 15% reclaimed asphalt pavement as a substitute for virgin aggregate mix in hot asphalt concrete mix. This represents the default case for the RAP sections included in this study. Figures 7-1 to 7-3 show the in-situ layer thicknesses of these RAP sections by environmental zone. Five of these sections (those in the NC zone) had a Cement Treated Base (CTB), while the rest of the sections had an aggregate base course. The test sections covered a wide range of layer thicknesses:

- Total AC thickness from 5.76" to 10.8"
- Total aggregate thickness from 4" to 15.6"
- Total pavement thickness above the subgrade from 13" to 24"

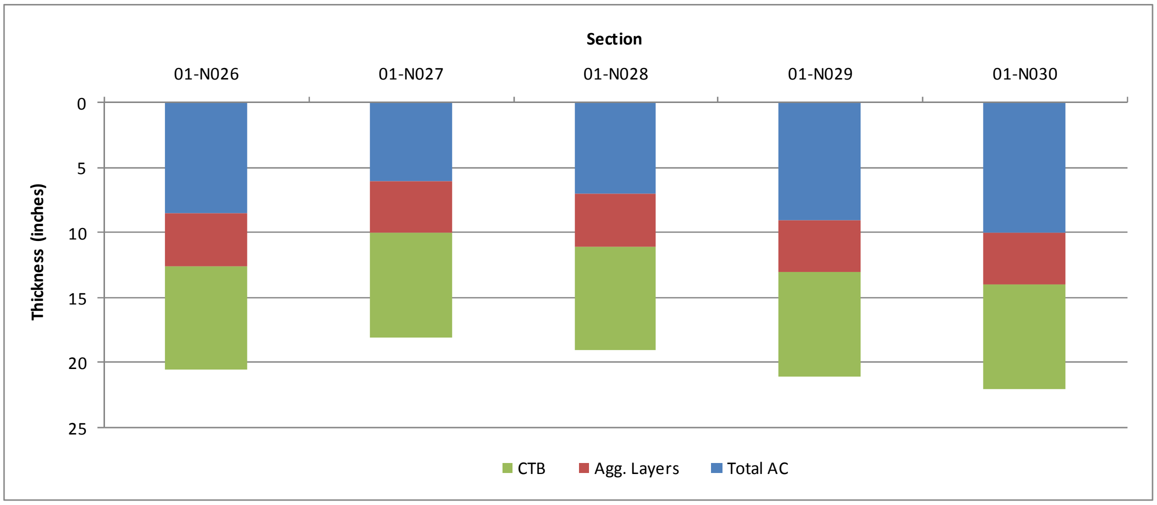

Figure 7-1: In-Situ Layer Thickness of RAP Sections – North Coast

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[9] Zaghloul et. al. *Evaluation of Performance of Recycled Asphalt Sections in California Environmental Zones*. Proceedings of Annual Transportation Research Board (TRB) Meeting, Washington, DC, 2007

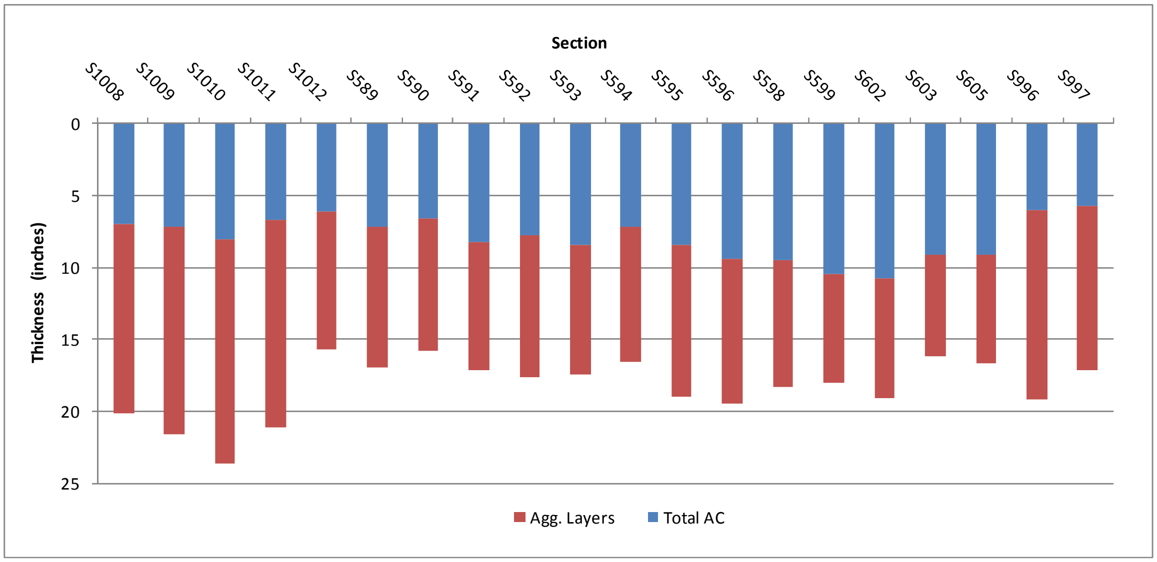

Figure 7-2: In-Situ Layer Thickness of RAP Sections – Desert

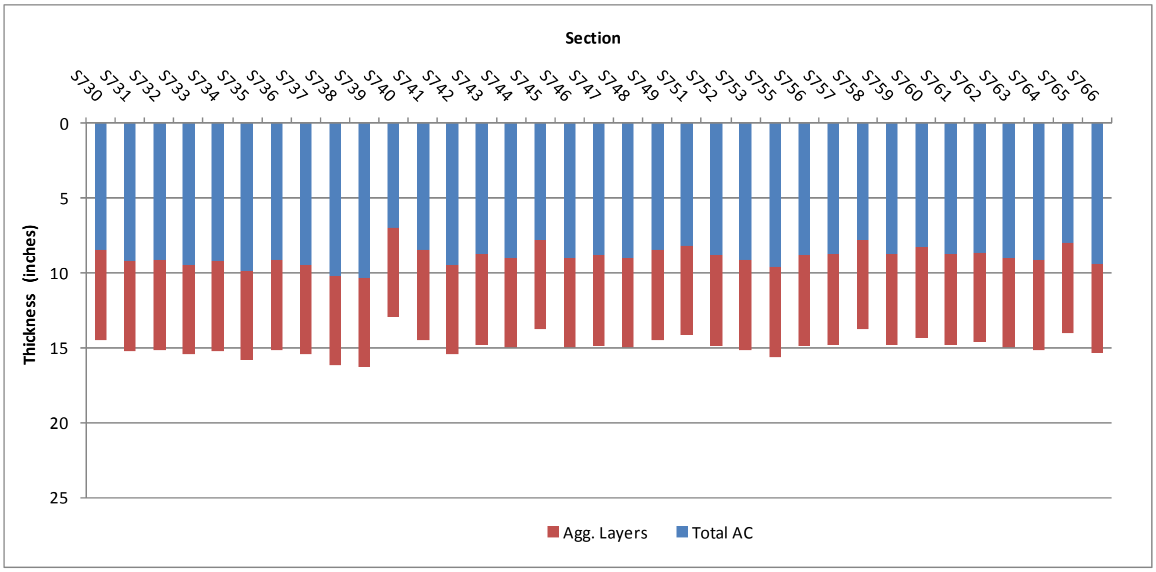

Figure 7-3: In-Situ Layer Thickness of RAP Sections – Mountain

7.1 IN-SITU STRUCTURAL PERFORMANCE – SAI

This analysis was initially run before the completion of the Seasonal Study and as such made use of the deflection data before the temperature adjustment models developed in this study were applied. After the Seasonal Study was completed and the developed temperature adjustment models had been applied to the deflection data, the analysis was re-run. It was decided to show the results of both analyses in the report to illustrate the necessity of the temperature adjustment models in giving a fair assessment of pavement structural performance.

7.1.1 Prior to Application of Temperature Adjustment Models

The age of the RAP sections considered in this study ranged from 5 to 9 years. As described in Section 6, the SAI values for all sections were adjusted to age five years. Figure 7-4 shows the overall average SAI_5 values of the RAP sections grouped by environmental zone. The RAP sections in the NC zone, with an average of 0.95, show higher SAI_5 than the sections in the other two environmental zones. Since SAI takes into account the as-built pavement structure, the NC zone's higher performance should not be a direct reflection of the CTB base course used in these sections.

The NC's zone SAI_5 of 0.95 means that these sections are in the excellent performance category, i.e. they are performing as would be expected for a typical asphalt pavement section. The average SAI_5 values for the RAP sections in the DS and MT environmental zones are 0.82 and 0.7, respectively, putting them both in the good performance category. Figure 7-5 shows the performance category classifications for each environmental zone, based on the average SAI_5 for that zone.

Figure 7-6 provides a more detailed look at the structural performance by giving the percentage of individual sections within each zone that fell into the different performance categories. In the NC zone, all the RAP sections are in the good or excellent categories, with 80% (4 out of 5 sections) in the excellent category. In the DS zone, 95% of the sections are in either the good or excellent categories, but with 25% (5 out of 20 sections) being considered excellent. Only 11% (4 out of 35) of the MT zone sections are in the excellent category, with more than 50% of the sections in the fair or poor categories.

Additional analysis was performed on the SAI data to predict each section's Structural Service Life (SSL) – the age at which each section would reach the trigger value for rehabilitation (SAI = 0.5). Results of this analysis are shown in Figure 7-7. The average SSL for the NC zone RAP sections is more than 18 years. The corresponding SSLs for the RAP sections in the DS and MT zones are about 15 and 11 years, respectively.

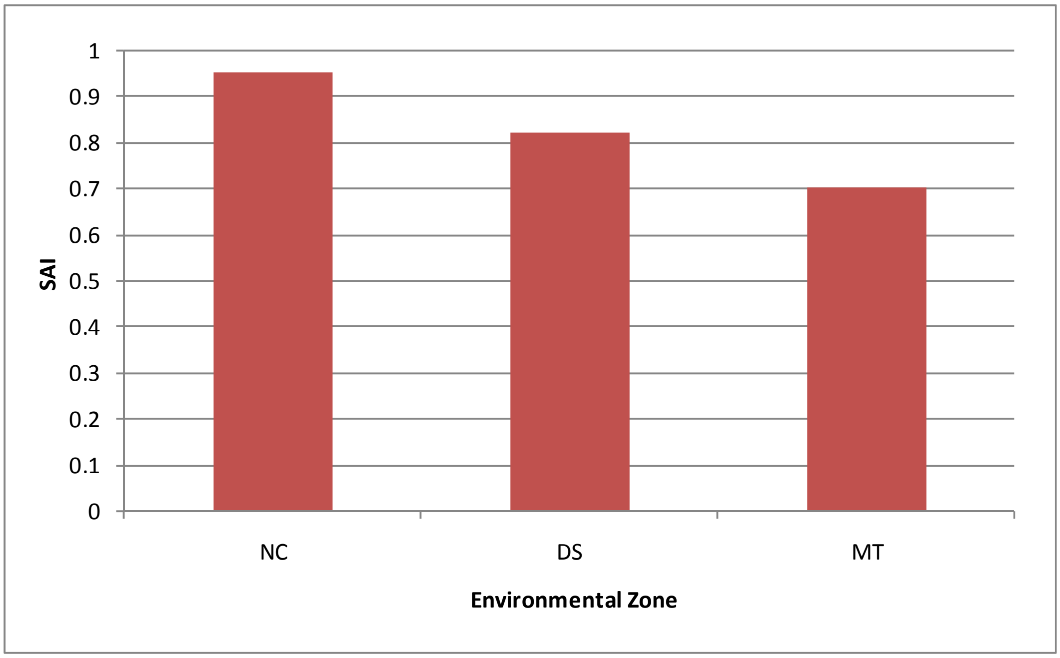

Figure 7-4: Average SAI5 by Environmental Zone – Before Seasonal Adjustment

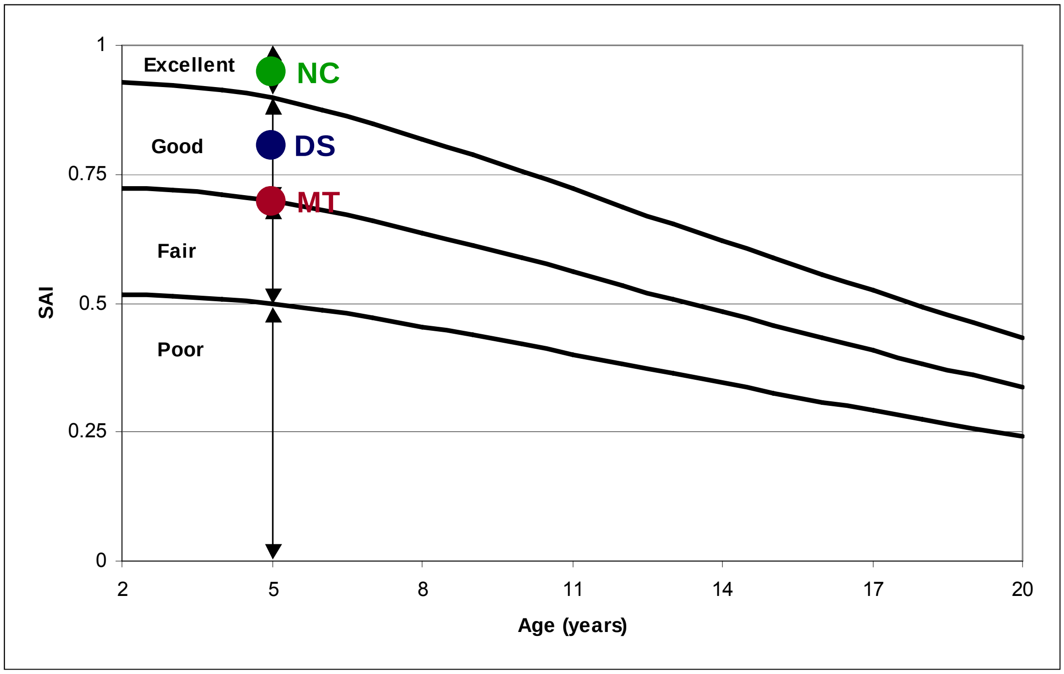

Figure 7-5: Average SAI_5 by Performance Class

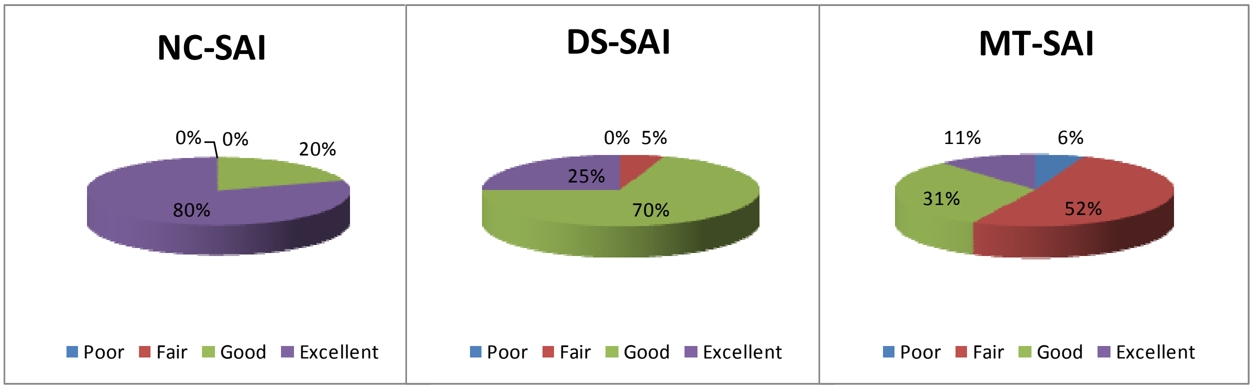

Figure 7-6: Distribution of SAI_5

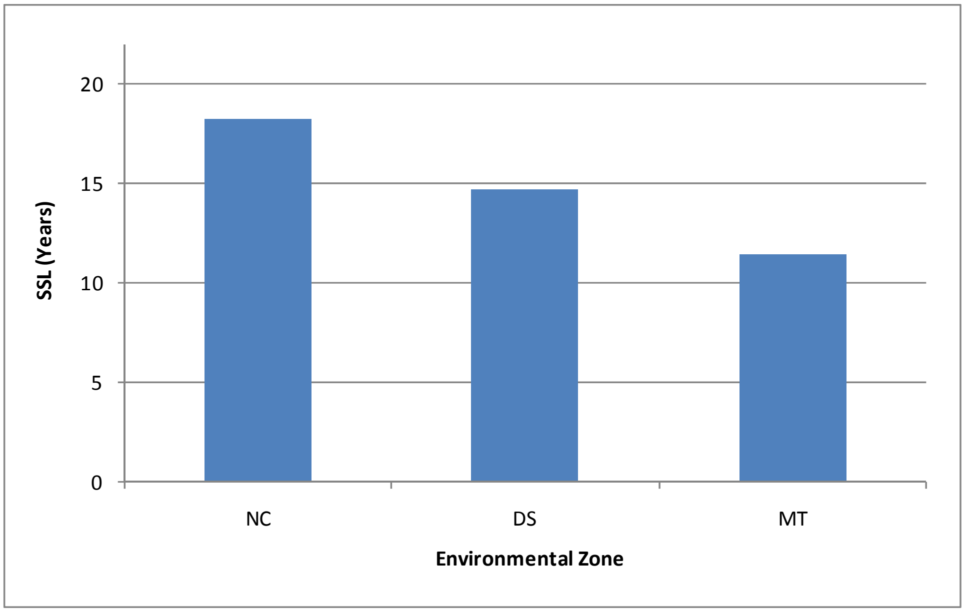

Figure 7-7: Structural Service Life – Before Seasonal Adjustment

7.1.2 After Application of Temperature Adjustment Models

The results presented above are based on FWD data that was collected from the selected test sections at different times of the year and at different pavement and air temperatures. Since there is no doubt about the significant impact of temperature on pavement response to FWD testing, the temperature adjustment models developed in this study and presented earlier in this report were applied to the deflection data. The exact steps in the analysis described above were then repeated, but this time the temperature corrected deflection data was used. Figures 7-8 to 7-11 show the data presented earlier in Figures 7-4 to 7-7, but show the results both before and after applying the temperature adjustment models. As can be seen, the conclusions derived from the non-temperature corrected deflection data do not necessarily stand once temperature adjustment models are applied. For example, the RAP sections in the MT environmental zone, which before temperature correction had the lowest average SAI, now show the best structural performance followed by those in the NC and DS environmental zones. The SSL in the NC, DS, and MT zones is now 19, 19, and 20 years respectively.

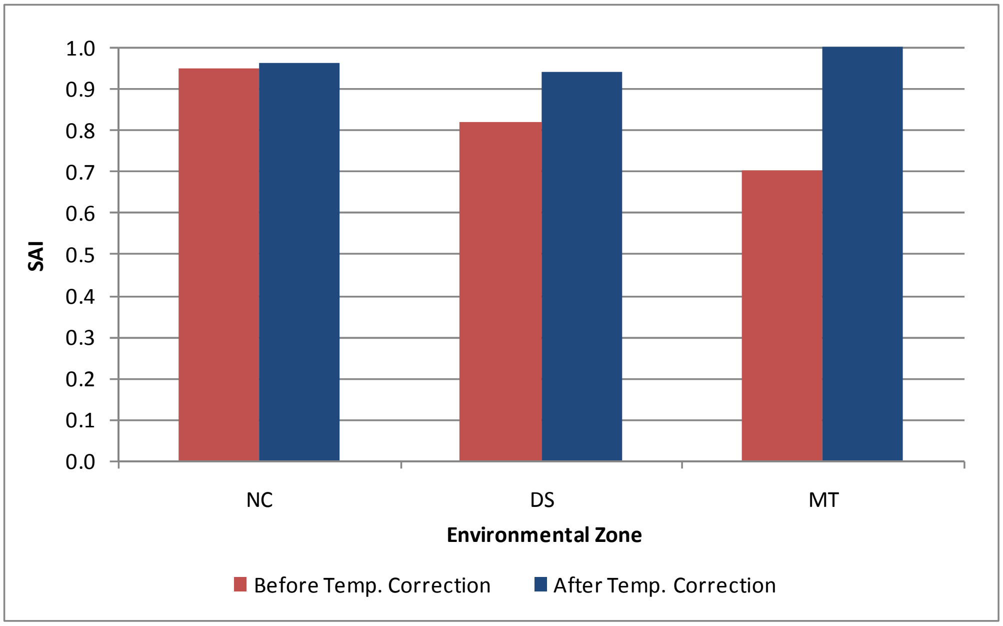

Figure 7-8: Average SAI_5 by Environmental Zone – Before & After Temperature Adjustment

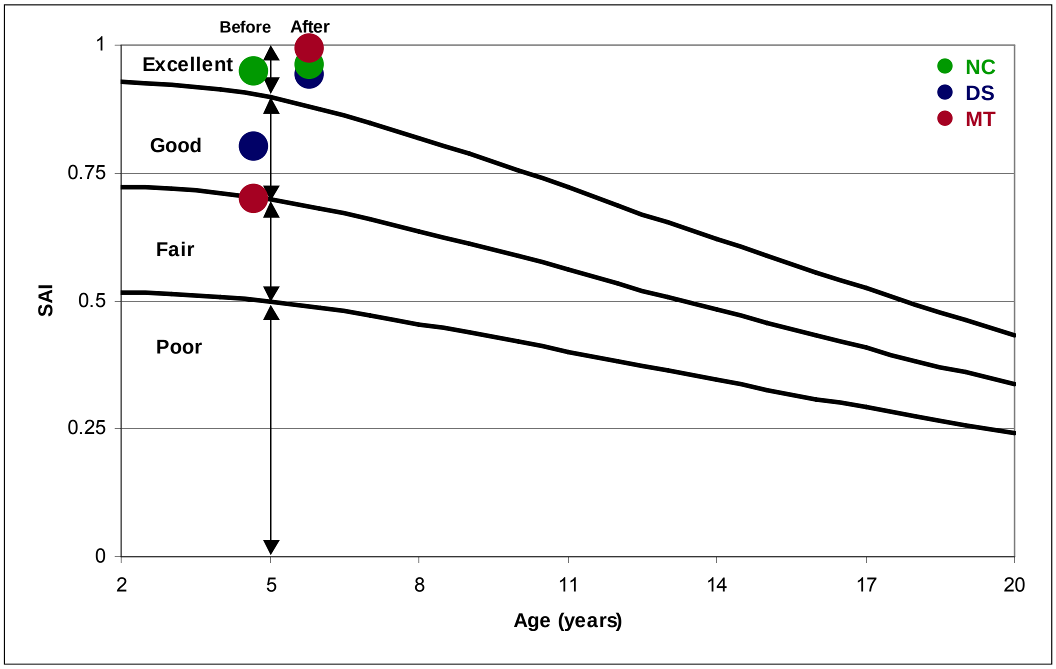

Figure 7-9: Average SAI_5 by Performance Class – Before & After Temperature Adjustment

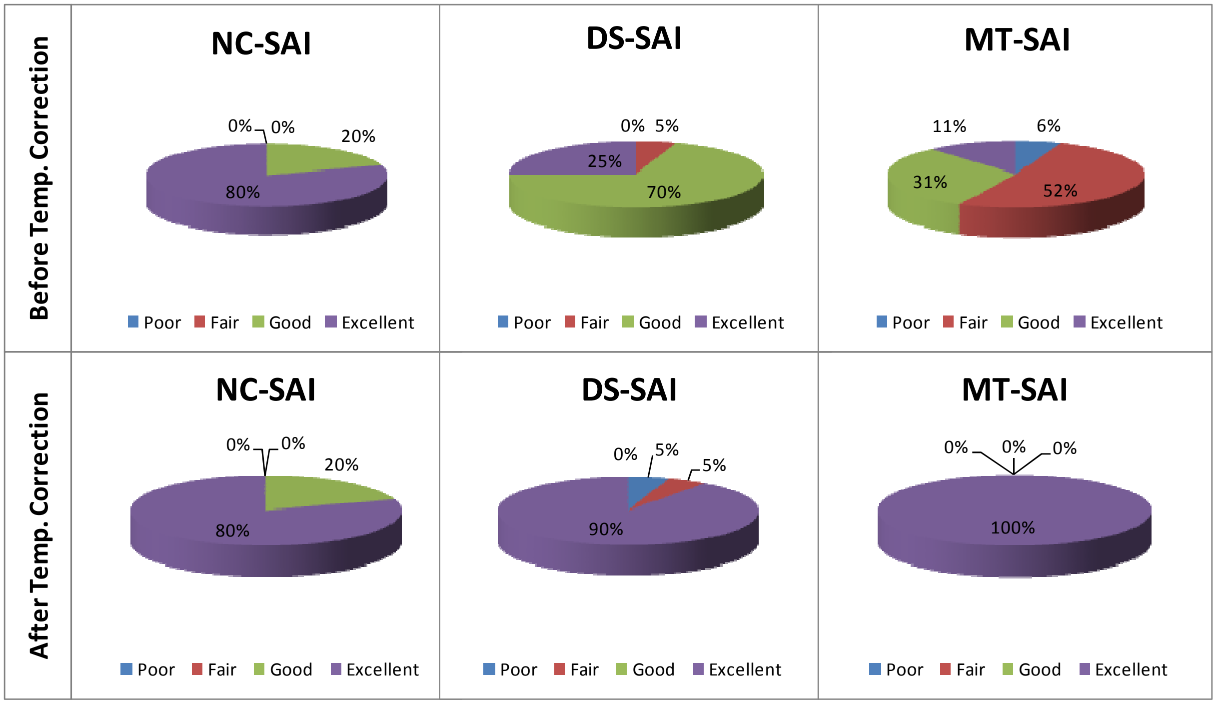

Figure 7-10: Distribution of SAI_5 – Before & After Temperature Adjustment

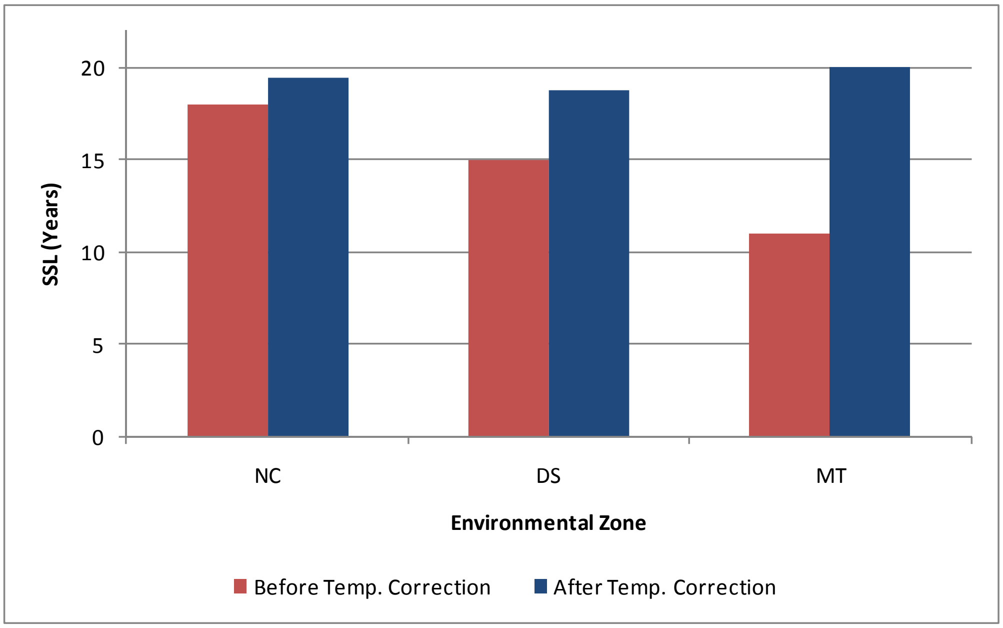

Figure 7-11: Structural Service Life – Before & After Temperature Adjustment

To appreciate why this shift in results is taking place, it is important to examine the pavement temperature during the testing for the sections included in the analysis. Figure 7-12 shows the temperature distribution for the sections considered in the analysis. As can be seen, the pavement temperature during testing for the MT sections is much higher than for the DS and NC sections. Therefore, it is expected that the apparent stiffness at this high temperature is much lower than that at the standard temperature (68°F). As a result, when the temperature adjustment models were implemented, the backcalculated stiffness was increased, i.e. the stiffness of a section @ 68°F is expected to be higher than at @ 100°F.

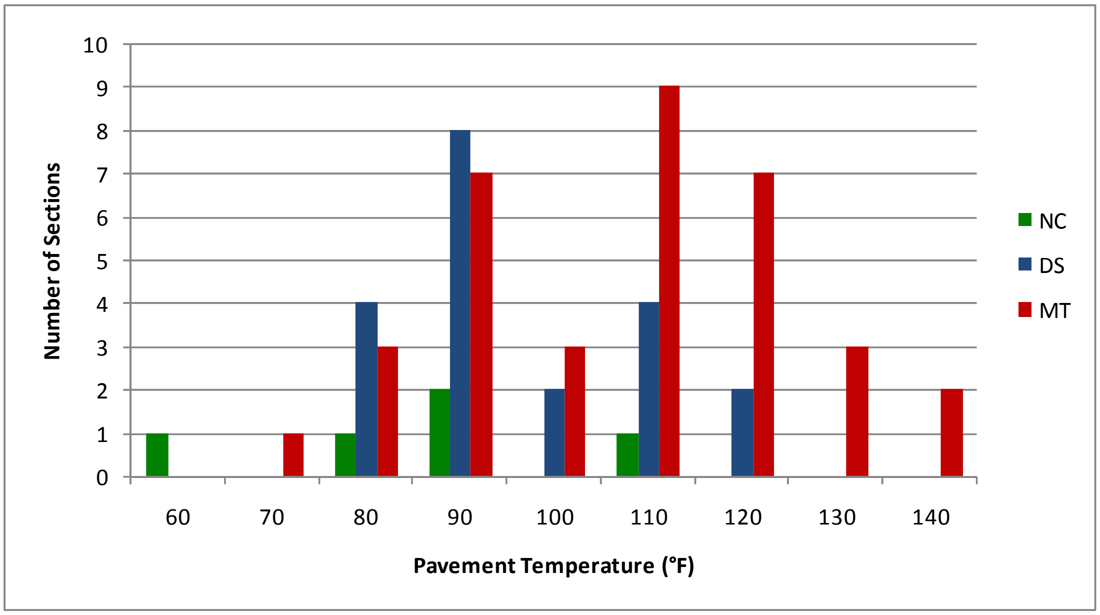

Figure 7-12: Temperature during Pavement Testing

7.2 DISTRESS PERFORMANCE – DI

The second evaluation measure applied to the RAP test sections was concerned with their performance in terms of surface distresses using the Distress Index. As with SAI, age adjustment was applied to estimate the DI values of the sections at age 5 years (DI_5). Figure 7-13 shows a summary of the sections' average DI_5 values by environmental zone. DI_5 is highest in the NC zone at just over 0.9. In the DS and MT zones, the average DI_5 is just under 0.5 and just over 0.7, respectively.

The performance classes that the RAP sections fall into, by environmental zone, is shown in Figure 7-14. The average distress performance of the RAP sections located in the NC environmental zone is considered excellent. The performance of the MT zone sections would be classified as good. The RAP sections located in the DS zone, however, fall marginally into the poor performance category.

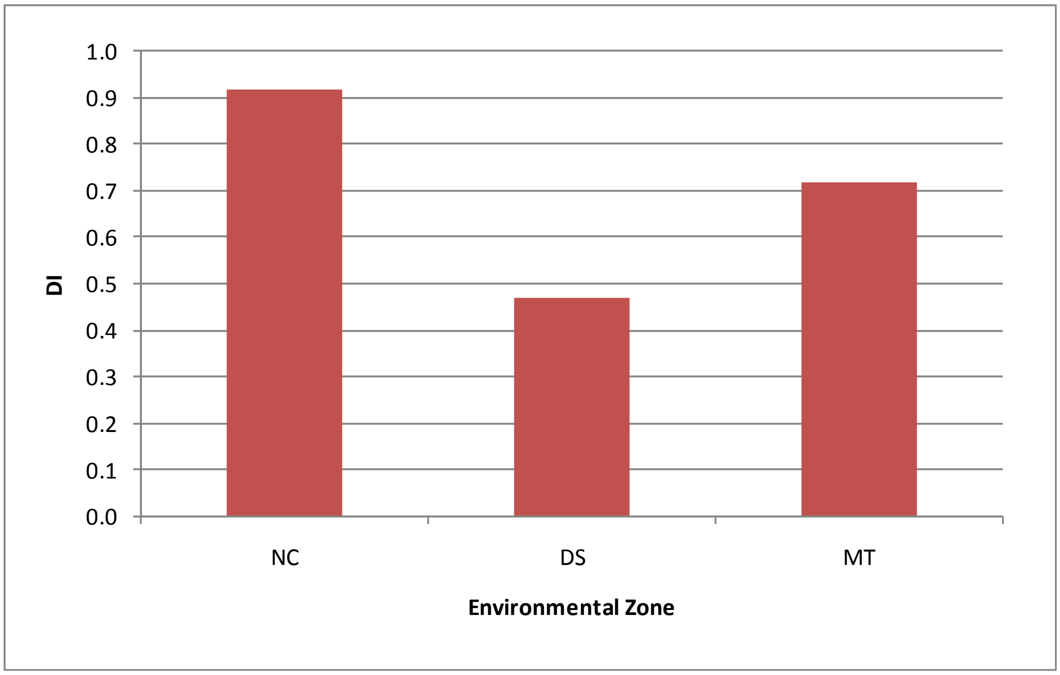

Figure 7-13: Average DI_5 by Environmental Zone

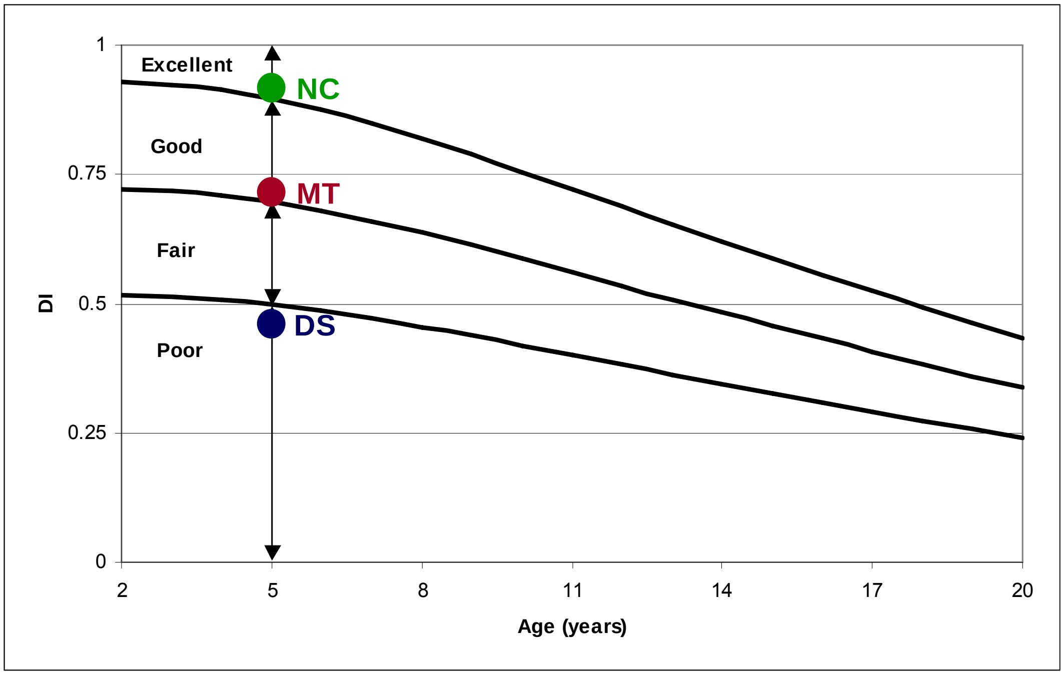

Figure 7-14: Average DI_5 by Performance Class

Figure 7-15 gives a more detailed breakdown of the distress performance in each environmental zone. In the NC zone, 80% the RAP sections (4 out of 5) are in the excellent category. In comparison, 55% of the RAP sections (11 out of 20) in the DS zone are in the poor category and none are in the excellent. All 35 of the MT zone RAP sections are in the good category.

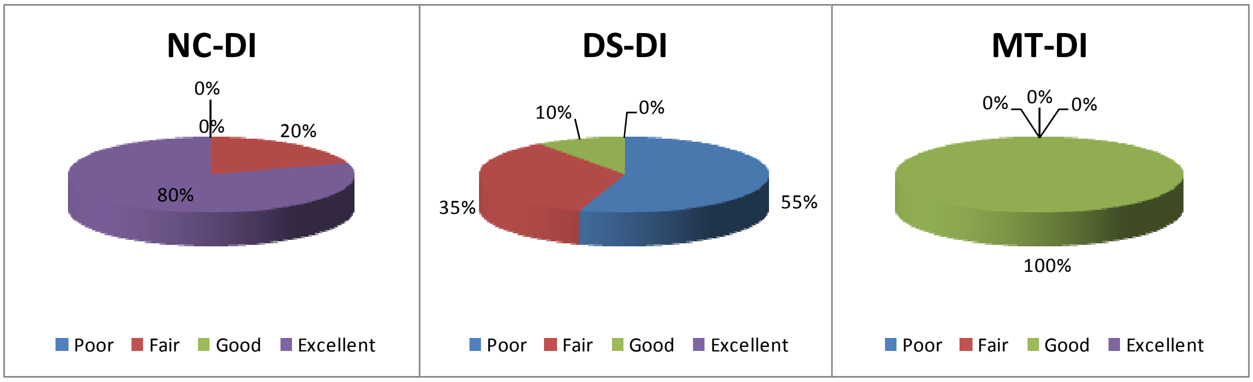

Figure 7-15: Distribution of DI$_5$

The expected service life of the sections in terms of distress (the Distress Service Life), was calculated as the age at which a section's DI value will reach the trigger level of 0.5. Results of this analysis are summarized in Figure 7-16. The expected average DSL for the NC zone RAP sections is approximately 18 years. The DSLs for the RAP sections in the DS and MT zones are noticeably less - about 9 and 14 years, respectively.

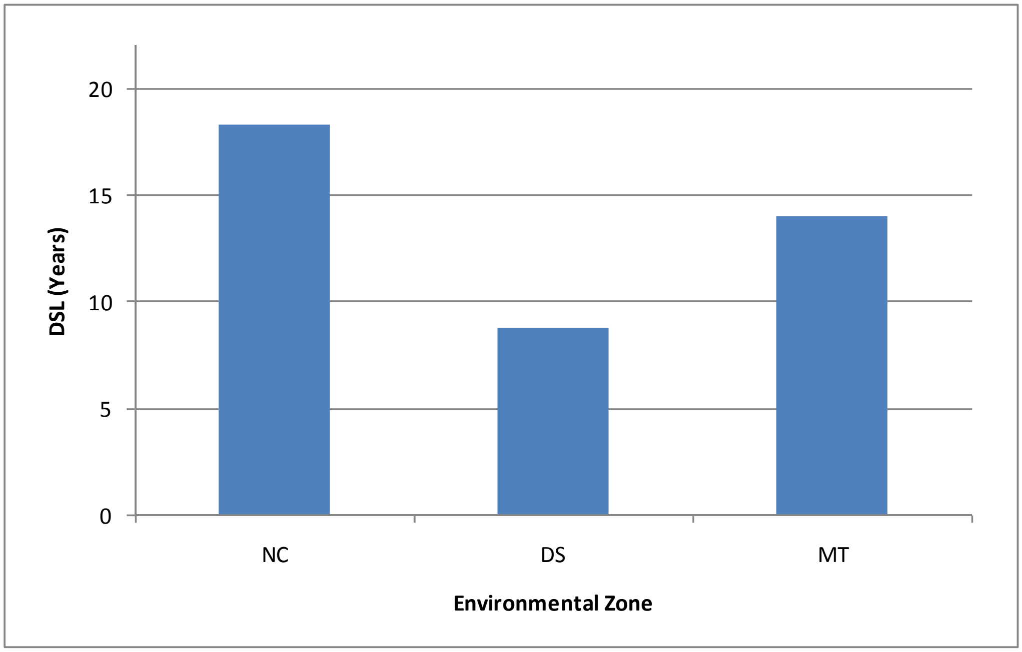

Figure 7-16: Distress Service Life

In this analysis, DSLs were calculated based on the assumption that no maintenance will be performed during the pavement's service life. However, in reality, a pavement's DSL can be significantly increased if appropriate and timely maintenance is performed throughout its service life. Figure 7-17 shows some of the possible impacts on distress performance that can be realized by maintenance activities. For an activity such as crack sealing, for example, the pavement may show:

1. A slight improvement in DI, because cracks previously considered 'moderate severity' will now be considered 'low severity', which has less impact on the DI score.
2. A temporary prevention of further deterioration in the crack condition, which would maintain DI at the same level.
3. A slower rate of deterioration.

Any of these scenarios would have the effect of increasing a section's DSL.

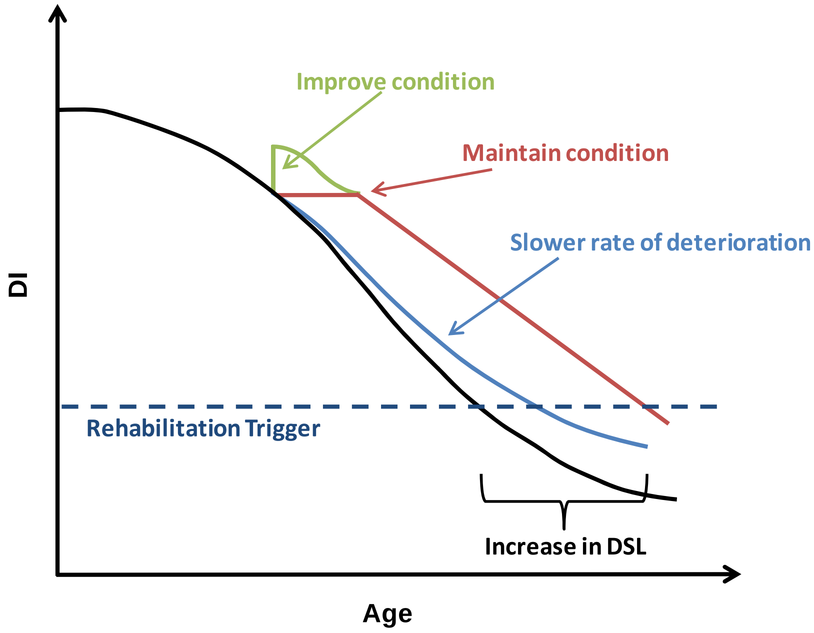

Figure 7-17: Impact of Maintenance on DSL

7.3 RIDE QUALITY PERFORMANCE – RI

The next step in the analysis of the RAP sections was to use RI as a measure to evaluate their ride quality performance. As with SAI and DI, the RI at age 5 years (RI_5) was estimated for all sections. Figure 7-18 shows the average RI_5 values of the RAP sections by environmental zone. The average RI_5 for the RAP sections is above 0.85 in all environmental zones, with the NC zone sections having the highest average RI_5 at 1.0. In terms of performance class, the NC and DS zone sections are in the excellent category, while the MT sections are in the good category, as shown in Figure 7-19.

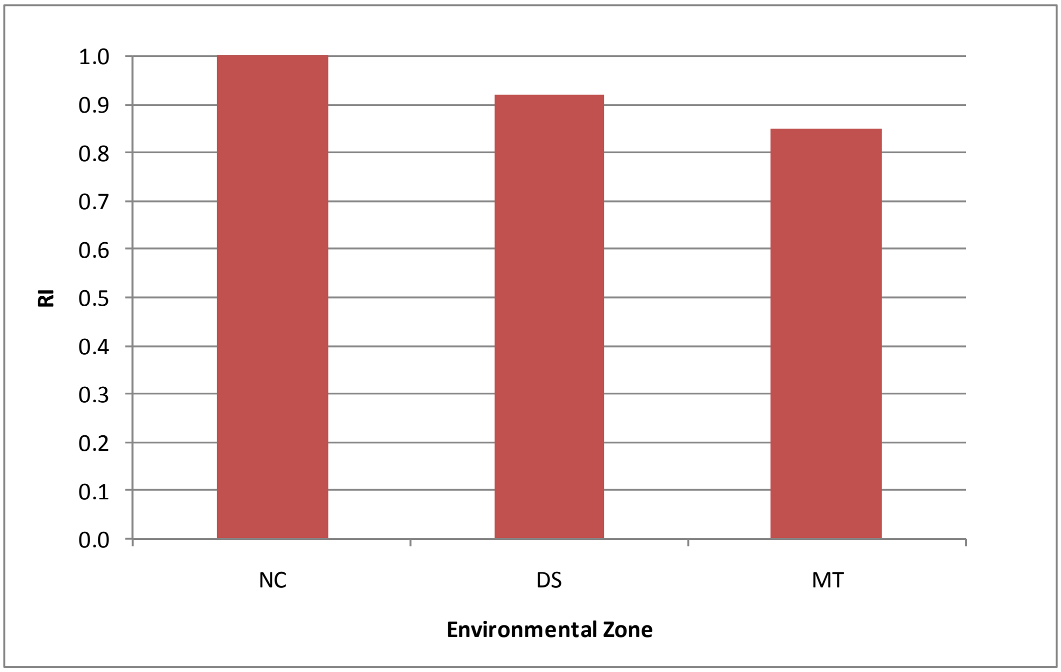

Figure 7-18: Average RI_5 by Environmental Zone

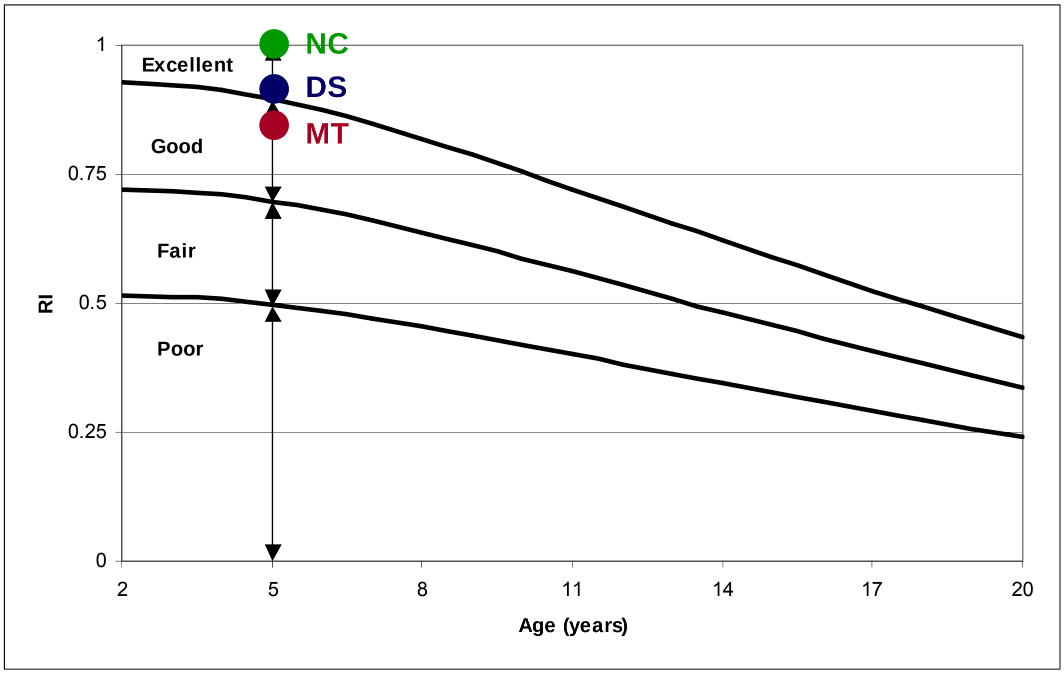

Figure 7-19: Average RI_5 by Performance Class

Figure 7-20 gives a more detailed breakdown of ride quality performance in the three environmental zones. All the NC zone RAP sections (5 sections) are in the excellent category. All the DS zone sections (20 sections) are either in the excellent or good categories. Ninety-seven percent of the MT zone RAP sections (34 of the 35 sections) are in the good category; the remaining section is in the excellent category.

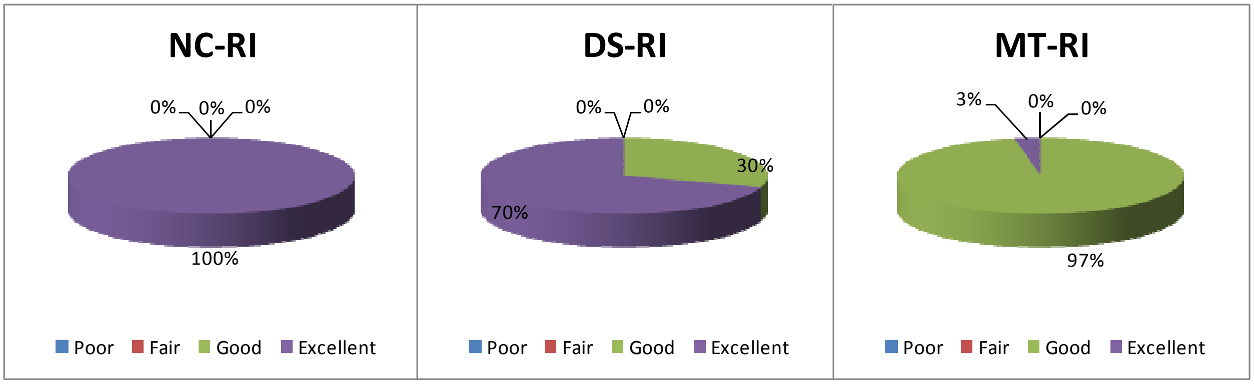

Figure 7-20: Distribution of RI_5

The Roughness Service Life of each section was determined as the age at which the section would reach the rehabilitation trigger level of RI = 0.5. The average RSLs for each environmental zone are shown in Figure 7-21. The expected average RSL is in the 19 to 20 year range for all three environmental zones.

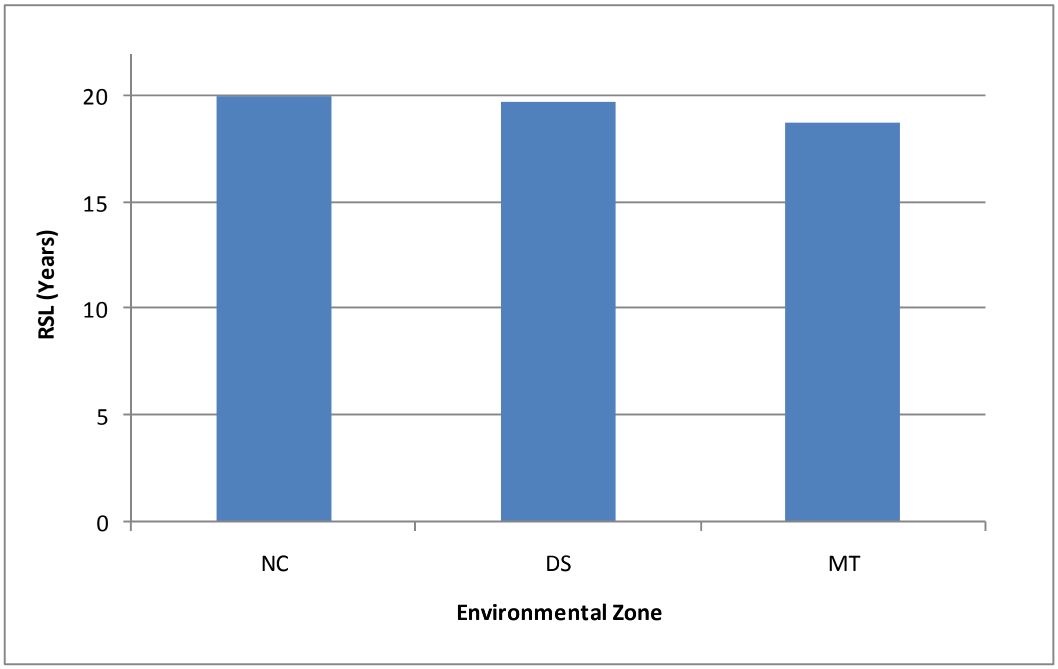

Figure 7-21: Roughness Service Life

7.4 CONCLUSIONS

In this evaluation of 60 RAP sections in three environmental zones, the expected SSL, DSL, and RSL for the NC zone sections were 19, 18, and 20 years, respectively. If the shortest of the 3 service lives will control when rehabilitation is required, then the RAP sections will be triggered for distresses first, after 18 years. However, if appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. In this case, the RAP sections would instead be triggered for structural performance, after 19 years.

In the DS zone, the expected SSL, DSL, and RSL for the RAP sections were 19, 9, and 20 years, respectively. Therefore, the RAP sections will be triggered for distresses first, after 9 years. If appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. In this case, the RAP sections would instead be triggered for structural performance, after 19 years.

The SSL, DSL, and RSL for the MT zone RAP sections were 20, 14, and 19 years, respectively. Therefore, the RAP sections will be triggered for distresses first, after 14 years. If appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. RAP sections would then be triggered for ride quality, after 19 years.

It should be noted that the effect of different accumulated traffic levels at these sections has not yet been taken into account in these analyses.

8.0 Rubberized Asphalt Concrete

The performance of Rubberized Asphalt Concrete (RAC) pavement sections located in a number of environmental zones was evaluated to assess the treatment's performance and to determine the effect of environmental conditions on that performance[x].

This analysis evaluated sixty-nine RAC sections located in five of California's environmental zones – Central Valley (CV), North Coast (NC), Bay Area (BA), Desert (DS), and South Coast (SC) – and five Caltrans' districts (Districts 1, 4, 6, 8, and 10). Figures 8-1 to 8-5 show the in-situ layer thicknesses of these RAC sections by environmental zone. The test sections covered a wide range of layer thicknesses:

- Total AC thickness from 1" to 17"
- Total aggregate thickness from 3" to 32"
- Total pavement thickness above the subgrade from 7" to 47"

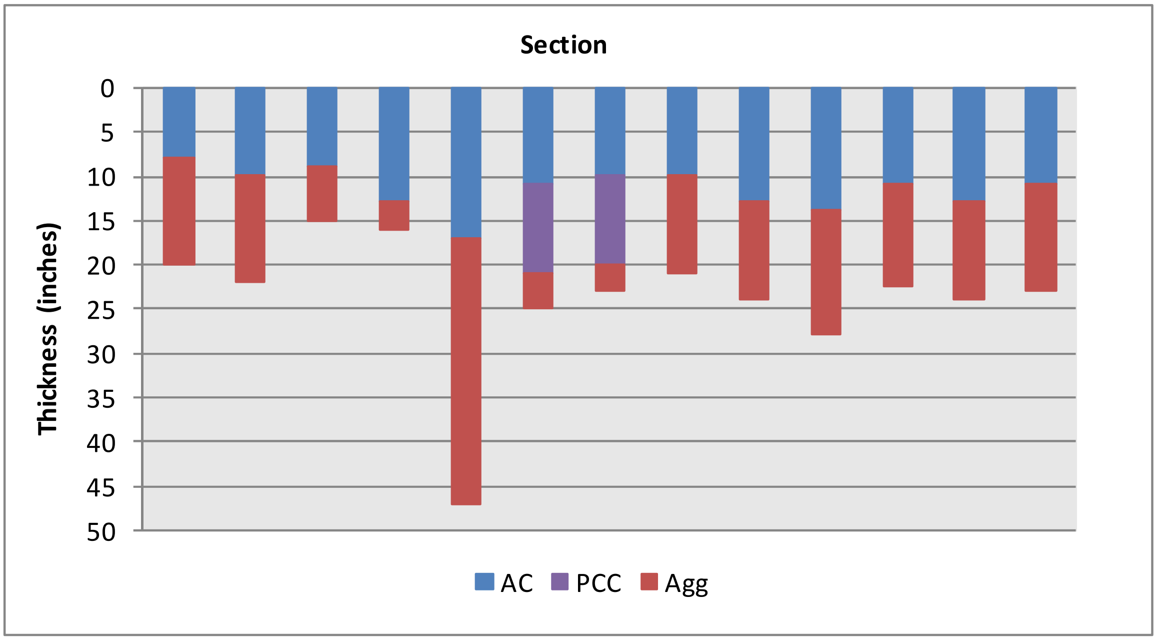

Figure 8-1: In-Situ Layer Thickness of RAC Sections – Central Valley

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[x] Zaghloul et.al. *Evaluation and Comparative Analysis of Rubberized Asphalt Performance in California*, Proceedings of Annual Meeting of Transportation Research Board (TRB), Washington DC, 2008.

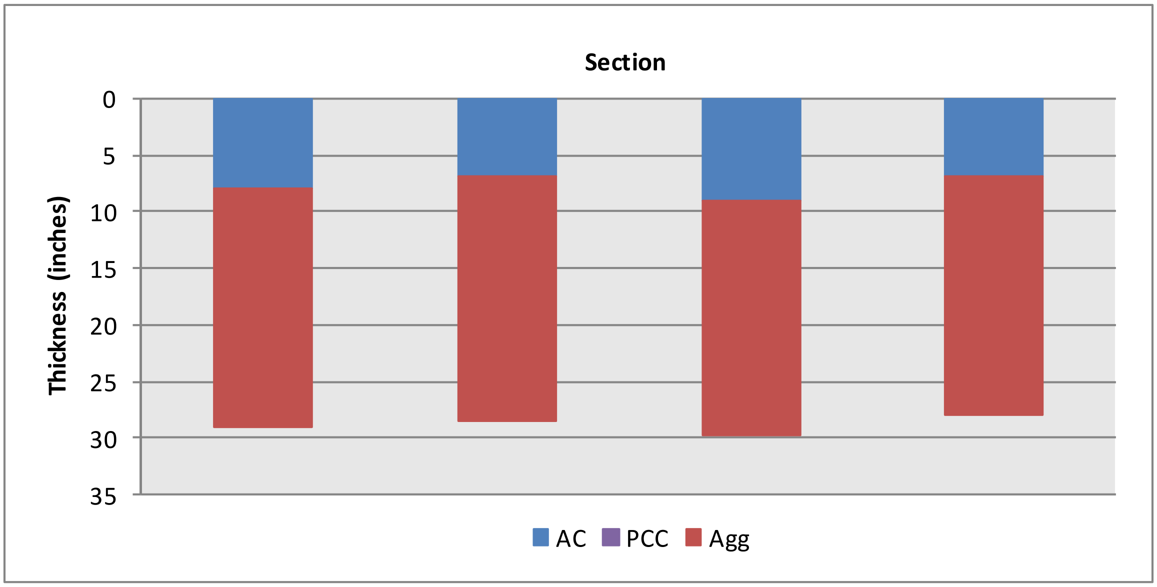

Figure 8-2: In-Situ Layer Thickness of RAC Sections – North Coast

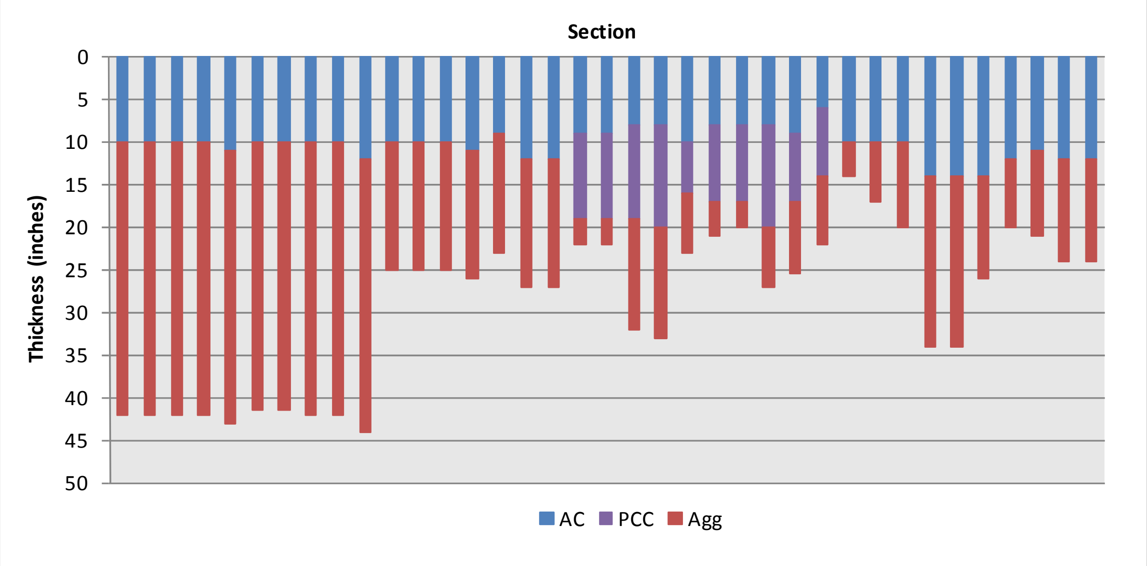

Figure 8-3: In-Situ Layer Thickness of RAC Sections – Bay Area

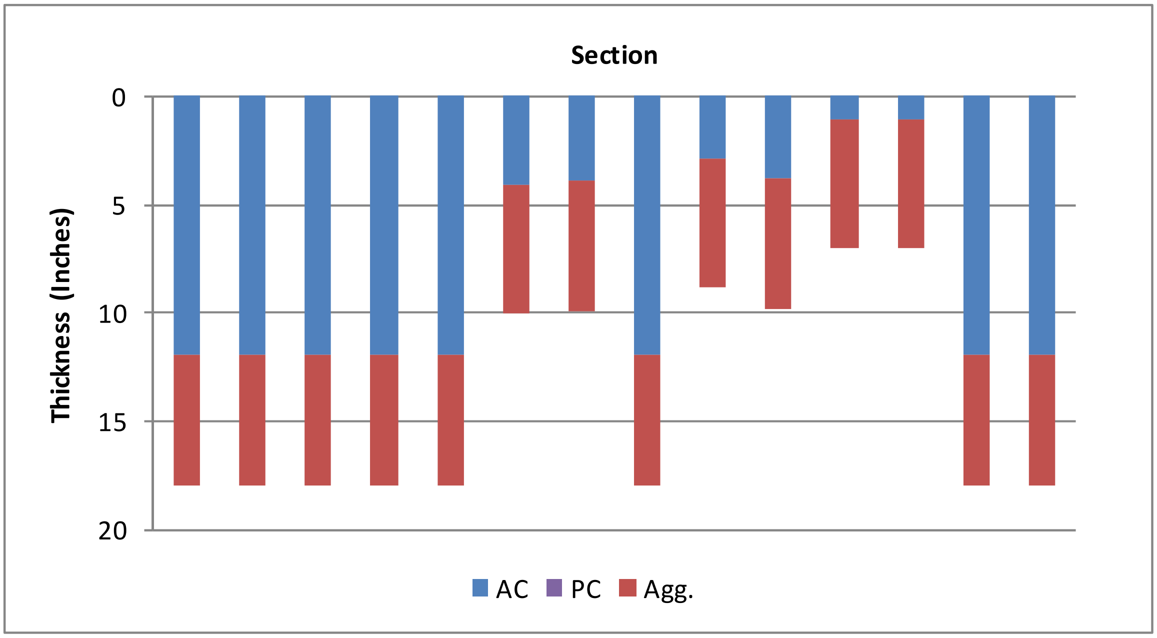

Figure 8-4: In-Situ Layer Thickness of RAC Sections – Desert

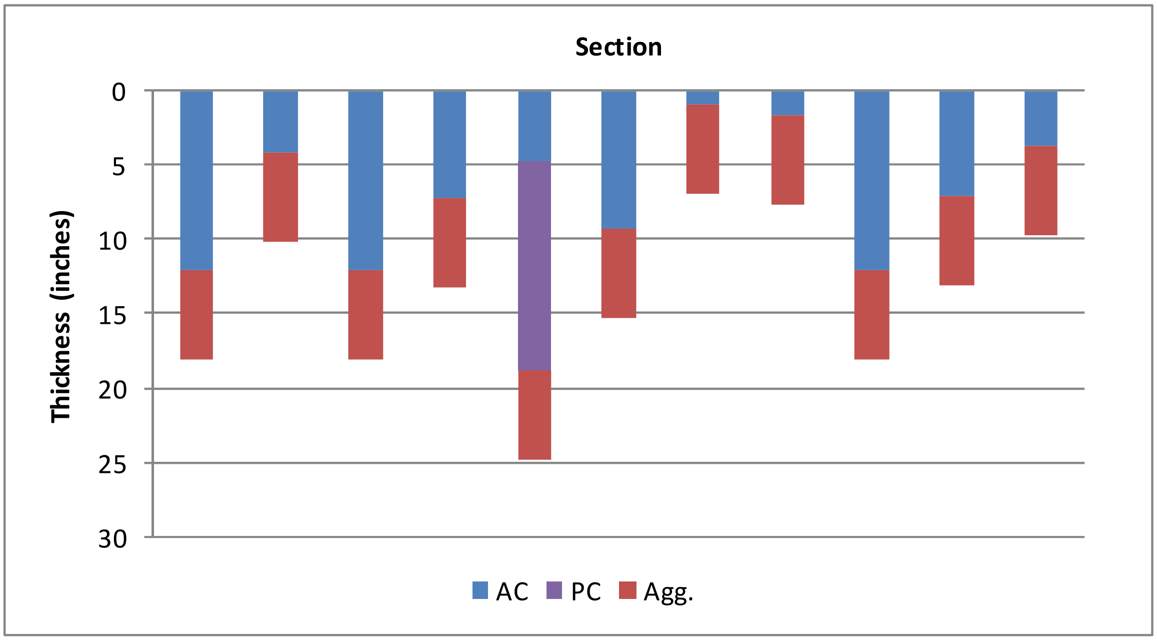

Figure 8-5: In-Situ Layer Thickness of RAC Sections – South Coast

8.1 IN-SITU STRUCTURAL PERFORMANCE - SAI

The temperature adjusted deflections and backcalculation results were used in the analysis to calculate the SAI for each section. As the 69 RAC sections considered had been in service from 1994 to 1998, the calculated SAI values were adjusted to age five years, as described in Section 6. Figure 8-6 shows the temperature adjusted overall average SAI_5 values of the RAC sections grouped by environmental zone. The RAC sections in all zones show reasonable structural performance with the NC zone sections having the lowest average value at just over 0.7. The SC sections show the highest average SAI_5 of 1.0, while CV, BA, and DS zone sections have average SAI_5 values of 0.9, or higher.

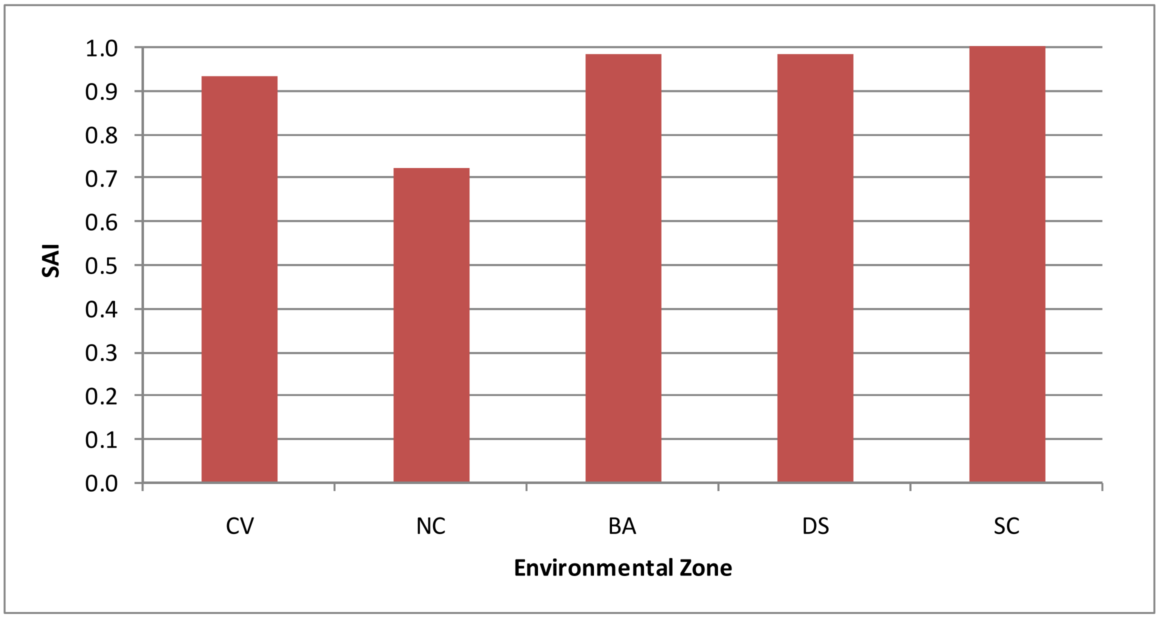

Figure 8-6: Average SAI_5 by Environmental Zone

The average SAI_5 values of the CV, BA, DS and SC sections are in the range of 0.9 to 1.0, which means that these sections are in the excellent performance category, i.e. they are performing as would be ideally expected for a typical asphalt pavement section. The average SAI_5 value for the NC zone RAC sections falls in the good category. Figure 8-7 shows the performance category classifications for each environmental zone, based on the average SAI_5 for that zone.

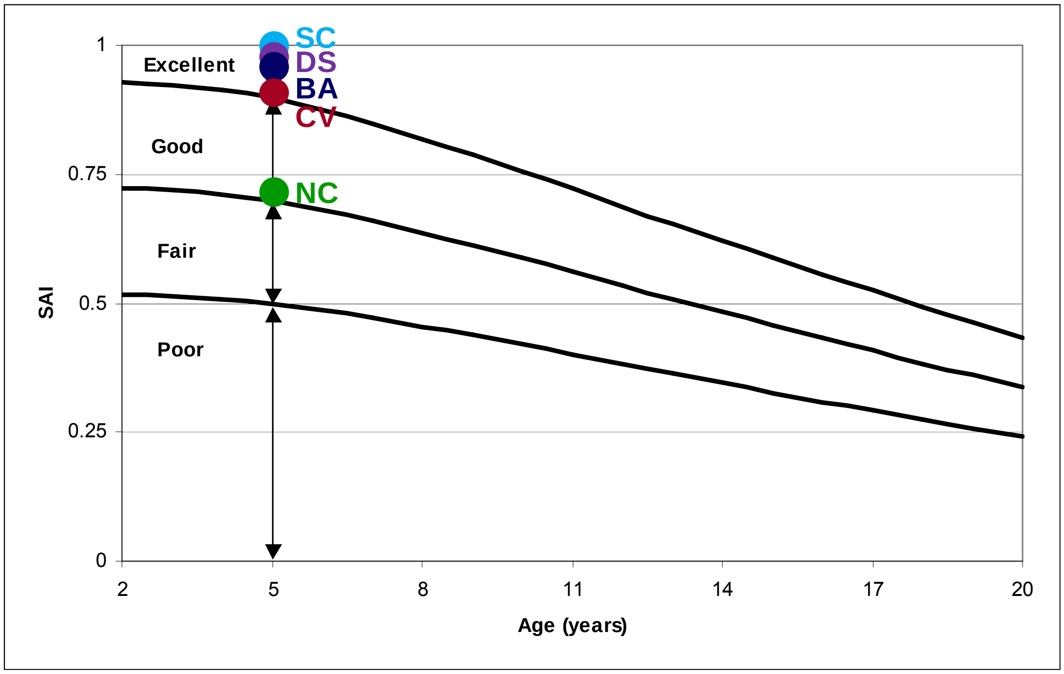

Figure 8-7: Average SAI_5 by Performance Class

Figure 8-8 provides a more detailed look at the structural performance by giving the percentage of individual sections within each zone that fall into the different performance categories. In the CV zone, 84% of the sections (11 out of 13 sections) are in the excellent category with one section in the fair category and one section in the poor category. In the NC zone, half of the sections (2 out of 4 sections) are considered excellent, while the other half are considered poor. Ninety-two percent of the BA zone sections (25 out of 27 sections) are in the excellent category, with one section in the good category and one in the fair category. In the DS zone, 93% (13 out of 14 sections) are in the excellent category; the remaining section is in the fair category. All eleven of the SC zone RAC sections are in the excellent category.

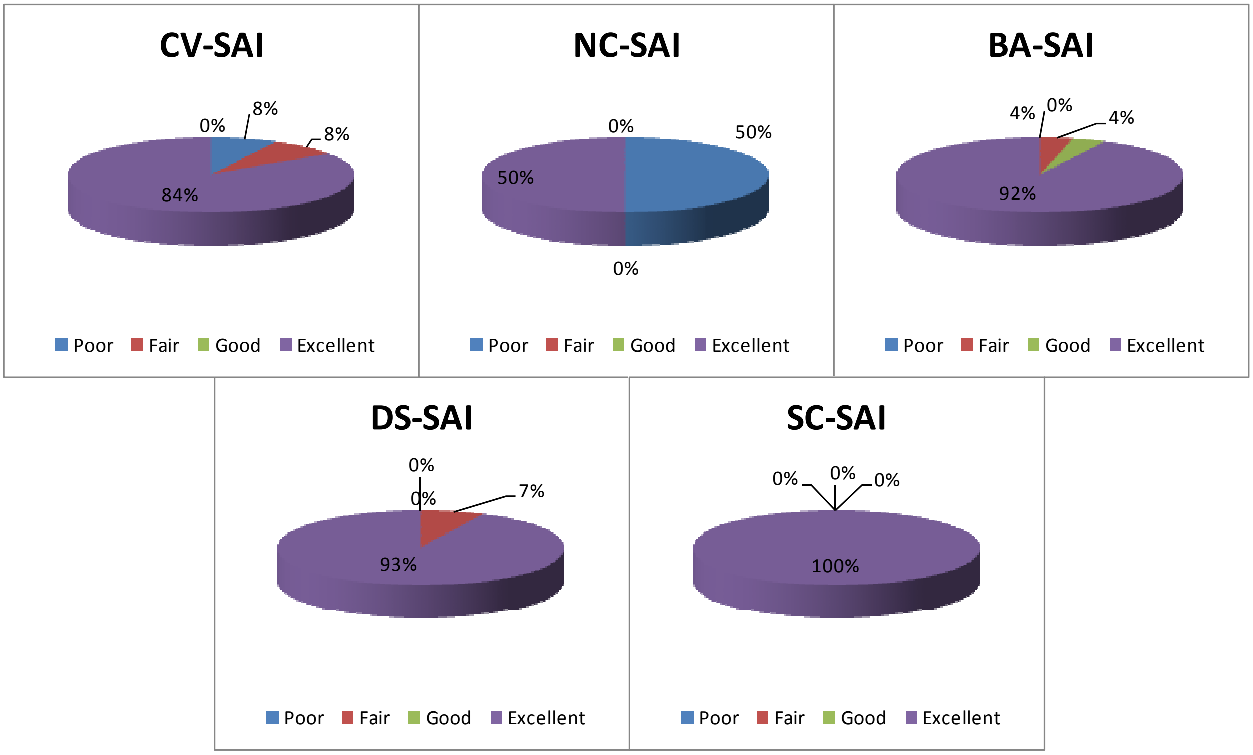

Figure 8-8: Distribution of SAI_5

Additional analysis was performed on the SAI data to predict each section's Structural Service Life (SSL) – the age at which each section would reach the trigger value for rehabilitation (SAI = 0.5). Results of this analysis are shown in Figure 8-9. The NC zone's RAC sections have the shortest expected average SSL – 16 years – and the SC zone's the longest – 20 years. The average expected SSL for the CV zone is 18 years. In the BA and DS zones, the average expected SSL is 19 years.

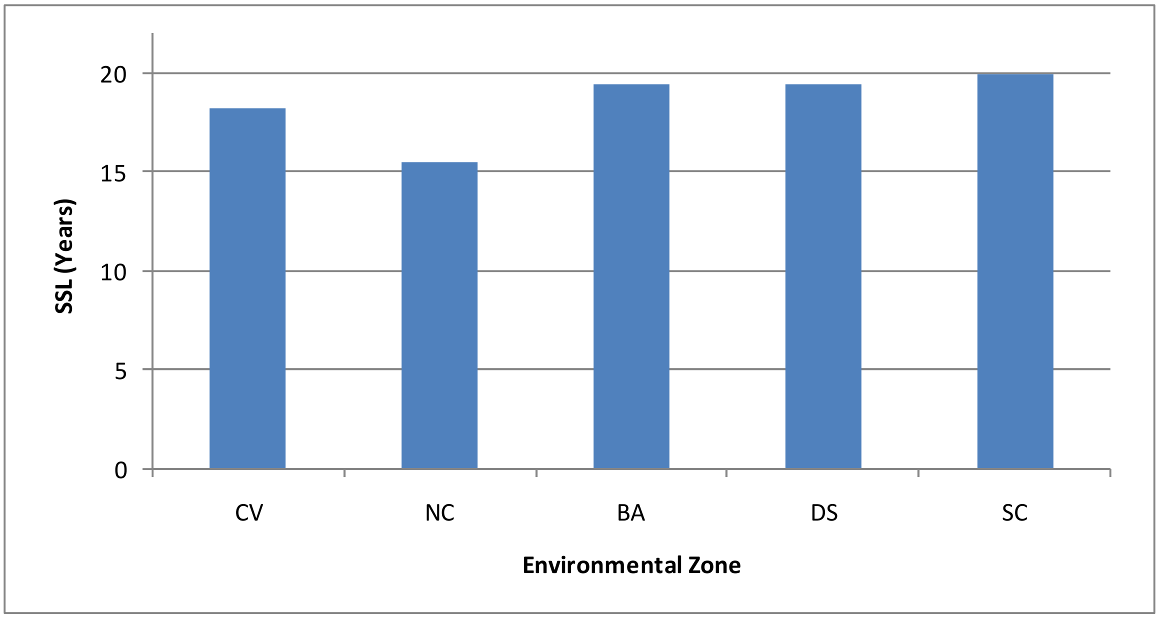

Figure 8-9: Structural Service Life

8.2 DISTRESS PERFORMANCE – DI

The second evaluation measure applied to the RAC test sections was concerned with their performance in terms of surface distresses using the Distress Index. As with SAI, age adjustment was applied to estimate the DI values of the sections at age 5 years (DI_5). Figure 8-10 shows a summary of the sections' DI_5 values by environmental zone. The BA zone sections have the highest average DI_5 of 0.95. The average DI_5 for the SC zone, in contrast, is extremely low at 0.23 (this is discussed in more detail below). Values in the remaining three zones – CV, NC, and DS – are all in the 0.7 to 0.8 range.

The performance classes that the RAC sections fall into, by environmental zone, is shown in Figure 8-11. As would be expected, performance in the SC zone falls into the poor category, while the BA zone is in the excellent category. Performance in the CV, NC, and DS zones is in the good category.

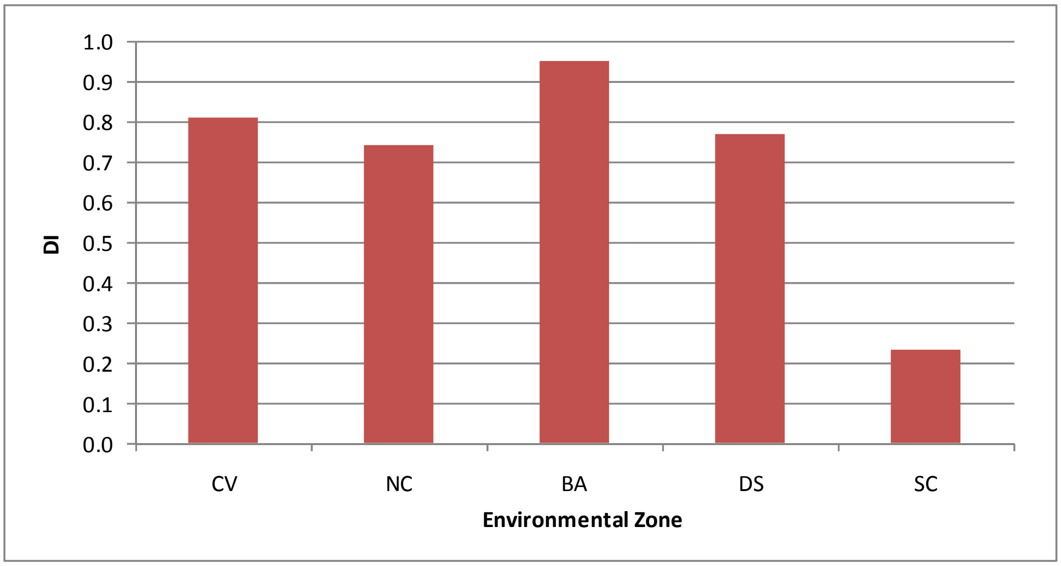

Figure 8-10: Average DI_5 by Environmental Zone

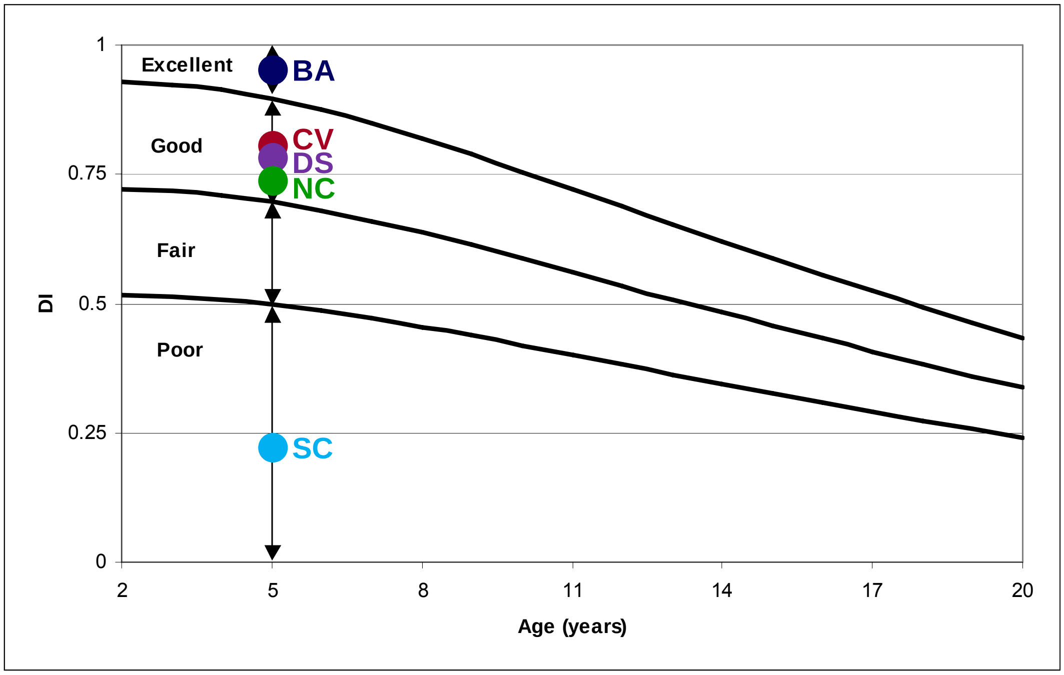

Figure 8-11: Average DI_5 by Performance Class

Figure 8-12 gives a more detailed breakdown of the distress performance in each environmental zone. Sections in the CV zone fall into all four performance categories, with 84% (11 out of 13 sections) being in either the good or excellent categories. Two of the NC zone's four sections are in the excellent category, with one each in the fair and poor categories. All 27 sections in the BA zone are in the good or excellent categories. In the DS zone, 64% of sections (9 out of 14 sections) are in the good or excellent categories; 22% (3 sections) are in the poor category, and 14% (2 sections) are in the fair category. All but one of the SC zone's 11 sections is in the poor category; the performance of the remaining section is considered good.

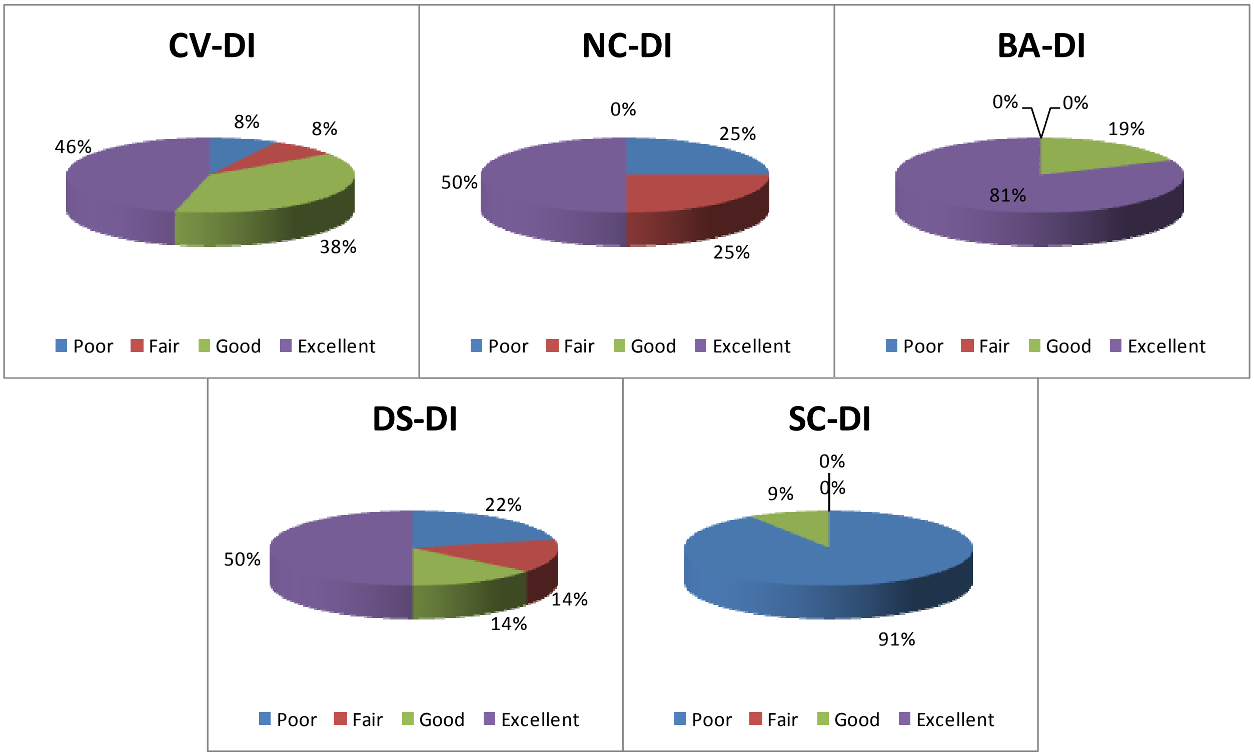

Figure 8-12: Distribution of DI_5

As can be seen, the average DI_5 for the SC zone is extremely low. The reasons for such low DI values were investigated and were found to be a result of the significant cracking exhibited by the RAC sections in SC zone. Figure 8-13 shows the distress distribution of the SC zone RAC sections. The vertical axis of this graph shows the total extent of each distress at all severity levels for the SC sections. Almost 30% of the total length of the 11 sections have wheel path longitudinal cracks. Figures 8-14 to 8-16 show some of the images taken from these sections.

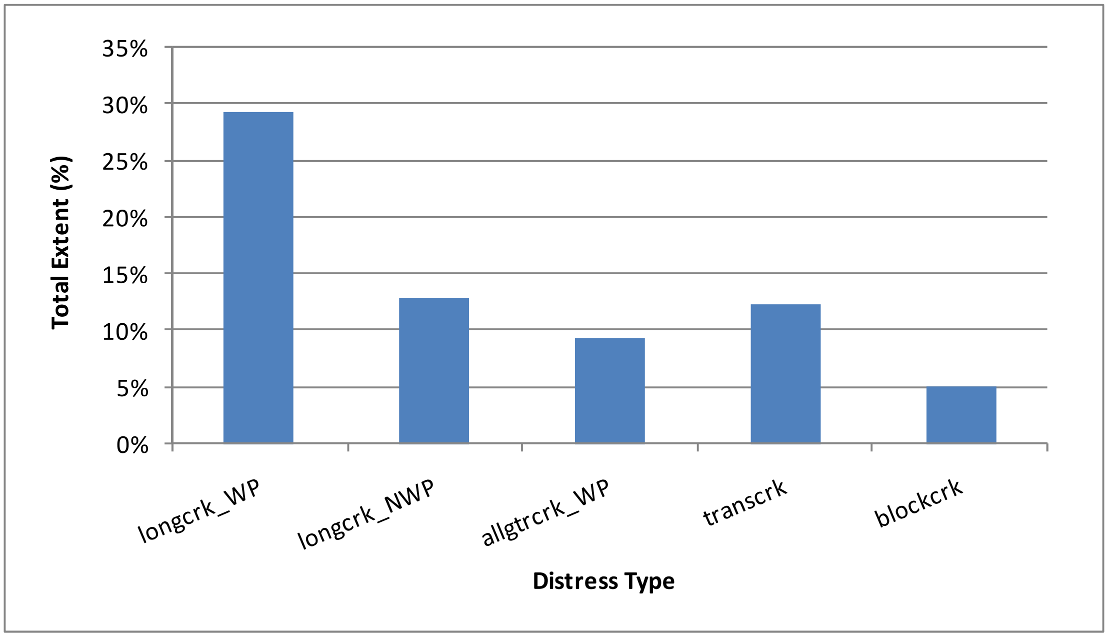

Figure 8-13: Extent of Distresses – SC Zone RAC sections

Figure 8-14: Example Distresses on SC Zone RAC Sections

Figure 8-15: Example Distresses on SC Zone RAC Sections

Figure 8-16: Example Distresses on SC Zone RAC Sections

The expected service life of the sections in terms of distress (the Distress Service Life), was calculated as the age at which the section's DI value will reach the trigger level of 0.5. Results of this analysis are summarized in Figure 8-17. The BA zone has the highest average RSL of 19 years. The expected average DSLs for the RAC sections in DS, NC and CV environmental zones are very similar – approximately 15-16 years. However, the expected service life of the RAC sections in SC is only just over 10 years. It is very clear that the performance of the RAC sections considered from the SC zone is significantly lower than that of RAC sections considered from other environmental zones. Further investigations into the reasons for this difference are recommended. It should be noted that since the RAC sections in the SC zone were close to failure when they were inspected, but were still in service, the expected service life was set to the age when they were inspected (10 years).

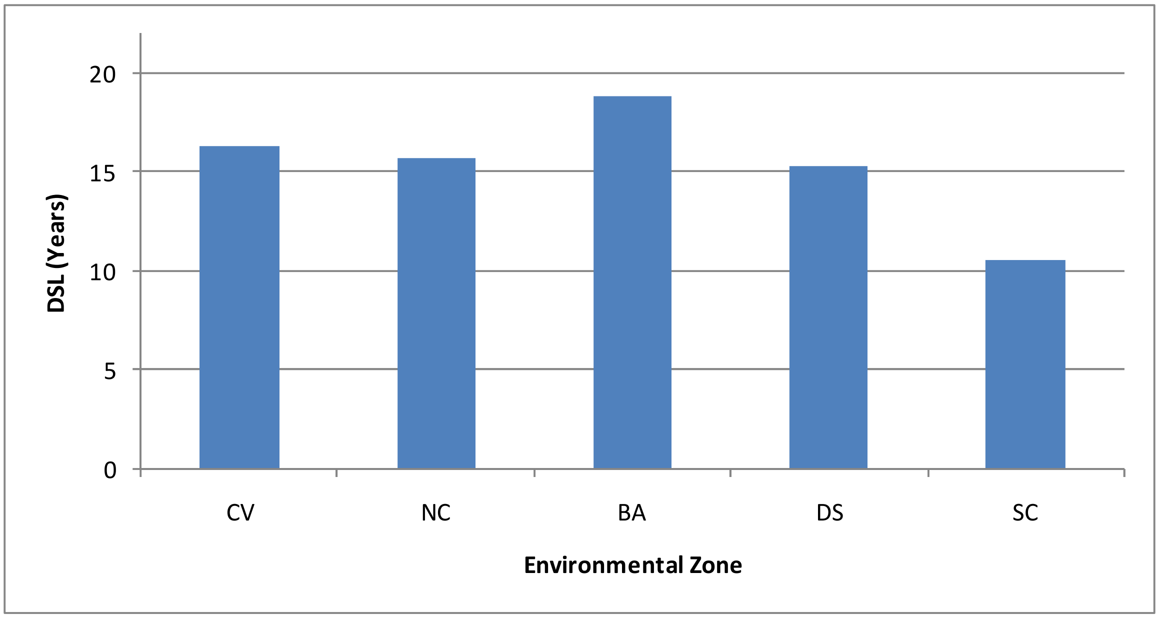

Figure 8-17: Distress Service Life

8.3 RIDE QUALITY PERFORMANCE – RI

The next step in the analysis of the RAC sections was to use RI as a measure to evaluate their ride quality performance. As with SAI and DI, the RI at age 5 years (RI_5) was estimated for all sections. Figure 8-18 shows the average RI_5 values of the RAC sections by environmental zone. The average RI_5 in all zones is extremely similar – all being within the 0.8 to 0.9 range. These RI_5 values put the performance in the CV, BA, and DS zones into the good category, and performance in the NC and SC zones into the excellent category, as shown in Figure 8-19.

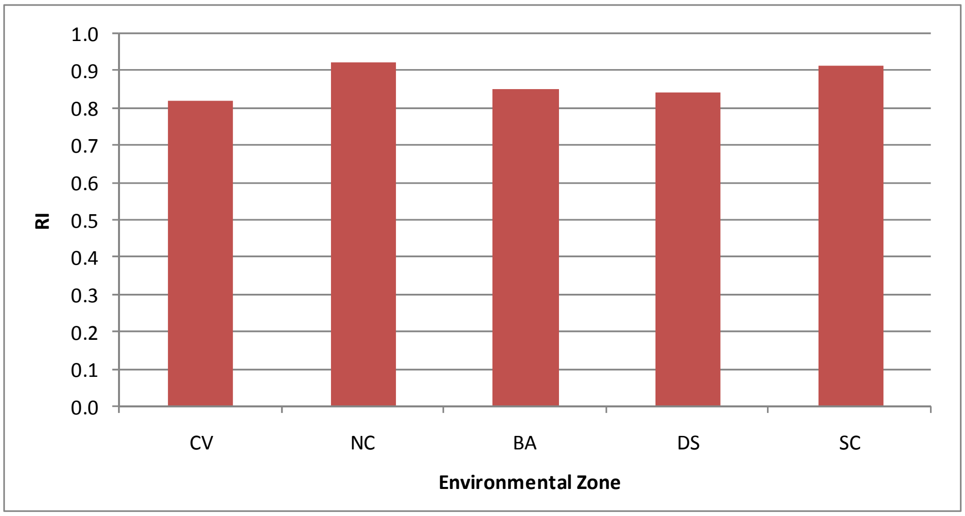

Figure 8-18: Average RI_5 by Environmental Zone

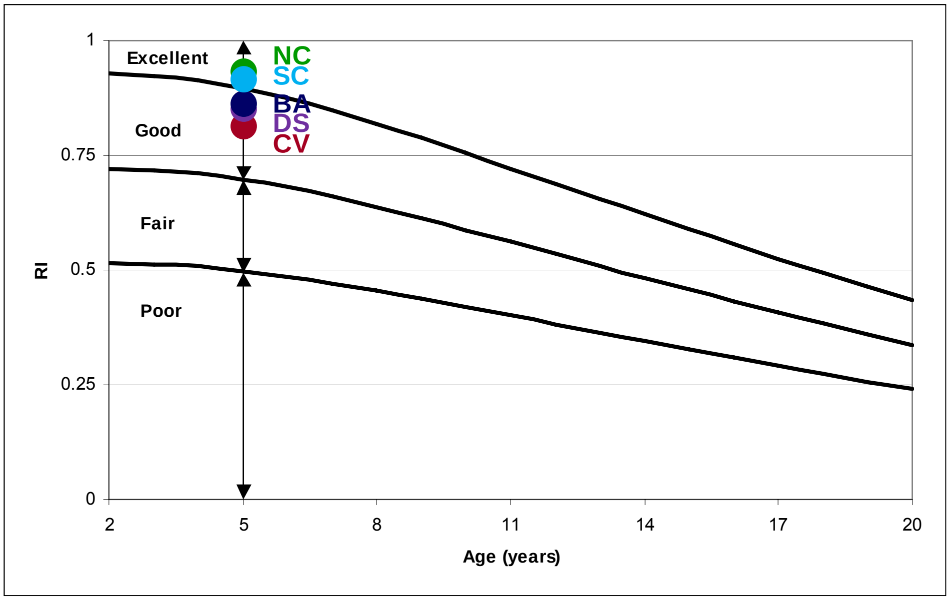

Figure 8-19: Average RI_5 by Performance Class

Figure 8-20 gives a more detailed breakdown of ride quality performance in the three environmental zones. In the CV, NC, DS, and SC zones, all sections are in either the good or excellent categories. However, in the NC and SC zones, the majority (75% and 79%, respectively) are in the excellent category, whereas in the CV and DS zones, the majority (92% and 93%, respectively) are in the good category. In the BA zone, 37% of sections (10 of 27 sections) are classified as excellent; 56% (15 sections) are classified as good; and 7% (2 sections) are classified as fair.

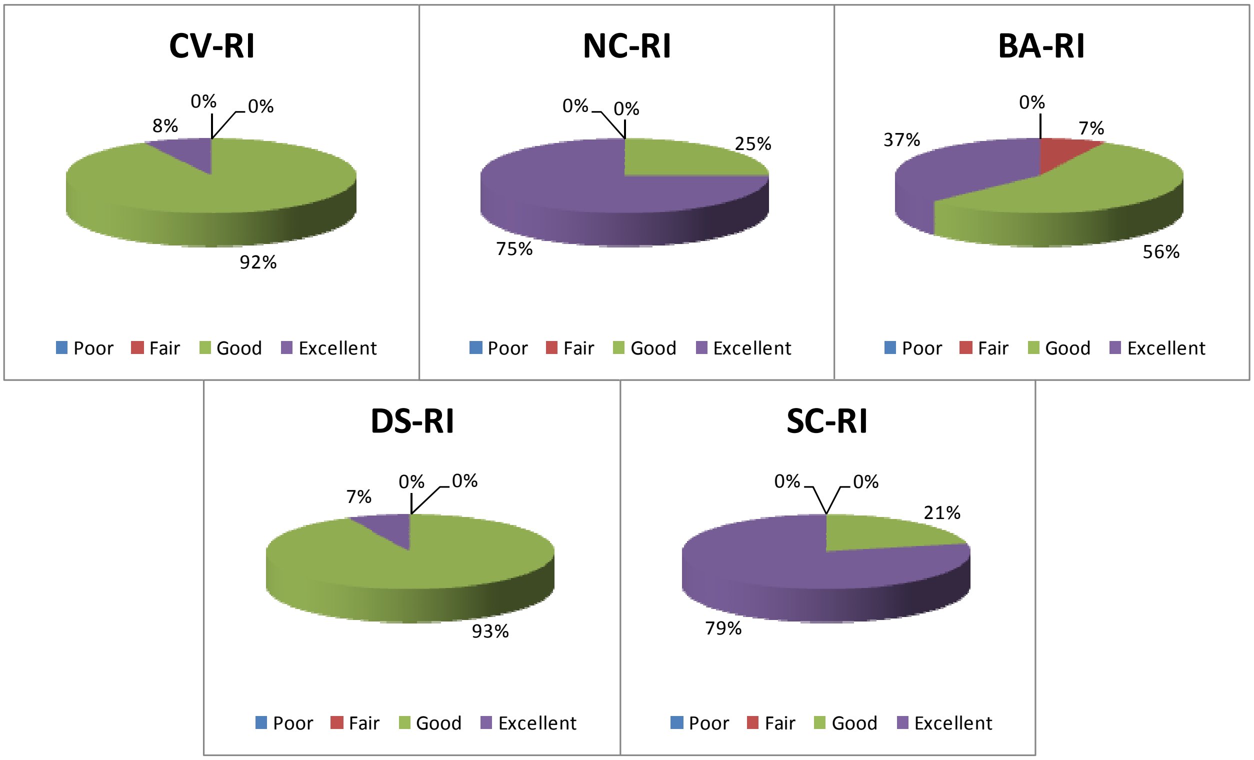

Figure 8-20: Distribution of RI_5

The Roughness Service Life of each section was determined as the age at which the section would reach the rehabilitation trigger level of RI = 0.5. The average RSLs for each environmental zone are shown in Figure 8-21. The expected average RSL of the RAC sections located in the CV zone is marginally the lowest at about 18 years. For the BA and DS zones the expected average RSLs are about 19 years. The SC and NC zones show very slightly longer expected RSLs at approximately 20 years.

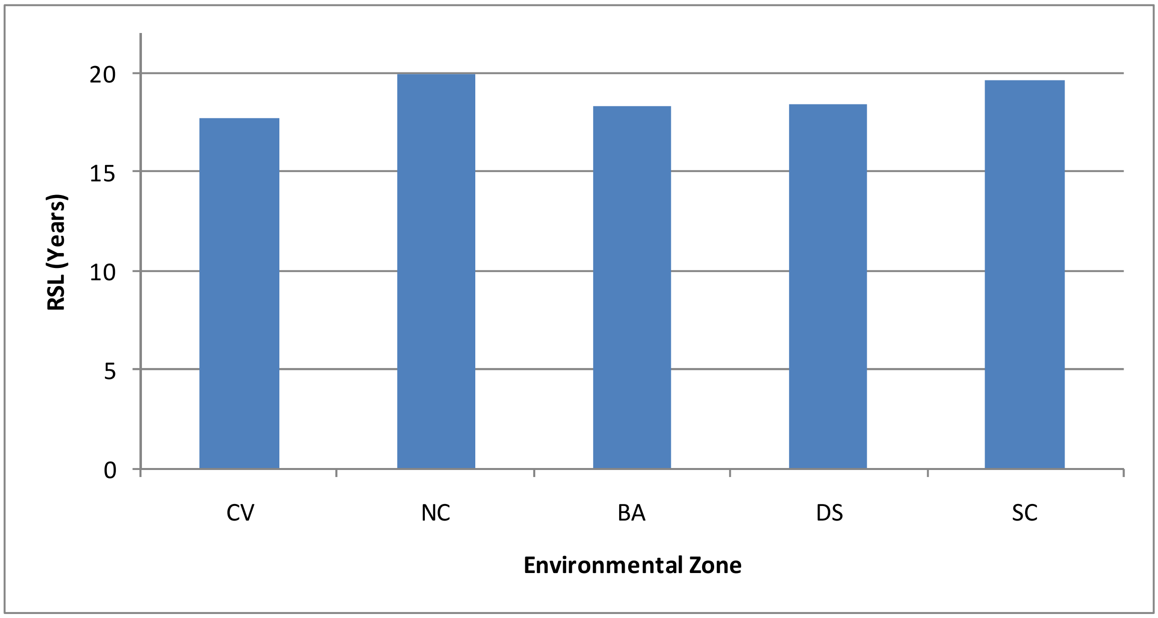

Figure 8-21: Roughness Service Life

8.4 CONCLUSIONS

In this evaluation of 69 RAC sections in five environmental zones the following average expected service lives were found:

- In the CV zone, the expected SSL, DSL, and RSL for the RAC sections were 18, 16, and 18 years, respectively. If the shortest of the 3 service lives will control when rehabilitation is required, then the RAC sections will be triggered for distresses first, after 16 years. However, if appropriate and timely maintenance is performed, the DSL of these sections could be increased. In this case, the sections would be triggered instead for ride quality or structural performance after 18 years.
- In the NC zone, the expected SSL, DSL, and RSL for the RAC sections were 16, 16, and 20 years, respectively. Therefore, the RAC sections will be triggered for structural adequacy or distresses first after 16 years. It should be noted that the application of appropriate and timely maintenance could increase the DSL of these sections. However, the overall average expected service life would remain at 16 years due to structural performance.
- In the BA zone, the expected SSL, DSL, and RSL for the RAC sections were 19, 19, and 19 years, respectively. Therefore, the RAC sections may be triggered for structural adequacy, distresses or ride quality first, after 19 years.
- In the DS zone, the expected SSL, DSL, and RSL for the RAC sections were 19, 15, and 19 years, respectively. Therefore, the RAC sections will be triggered for distresses first, after 15 years. However, if appropriate and timely maintenance is performed, the DSL of these sections could be greatly increased. In this case, the sections would be triggered instead for ride quality or structural performance after 19 years.

- In the SC zone, the expected SSL, DSL, and RSL for the RAC sections were 20, 10, and 20 years, respectively. Therefore, the RAC sections will be triggered for distresses first, after 10 years. It should be noted that if appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. In this case, the sections would instead be triggered for ride quality or structural performance after 20 years.

Based on the sections considered in this study, RAC sections in the CV, BA, and DS zones have a very similar average overall service life of 18 to 19 years. The NC zone has a lower average overall service of 16 years. The SC zone could have an average overall expected service life of 20 years; however, this is based on the timely performance of appropriate maintenance for distresses. Without this, the average service life for the sections would be as little as 10 years. The noticeably lower distress performance of the SC zone RAC sections was noted earlier in this section and further investigation is recommended in this area.

It should be noted that the effect of different accumulated traffic levels at these sections has not yet been taken into account in these analyses.

9.0 Summary, Conclusions & Recommendations

9.1 SUMMARY

In 2000, Caltrans initiated Pavement Performance Evaluation - Phase I research project. The overall goals were to evaluate the performance of different pavement types and treatments across California and investigate the impact of different factors (design parameters, materials, construction variables, and environmental effects) on actual pavement performance. The Pavement Performance Evaluation - Phase II project was initiated in 2004 to expand the Phase I investigations and analyses. Phase II analyses can be grouped into four studies: the Main Study (the expansion of the Phase I dataset and analysis), the Seasonal Study, the Traffic Study, and the FWD Correlation Study.

In the Seasonal Study, temperature adjustment models for deflection data were developed for flexible and rigid pavements. These models were applied to the collected Phase I and II Main Study data to bring all measured deflections to the same standard temperature.

In the Traffic Study, axle weight data was collected for the Main Study test sections. Using the collected data and Caltrans permanent weigh station data, the total accumulated traffic carried since the last rehabilitation was estimated for 888 sections.

In the FWD Correlation Study, models were developed that would account for any differences in the measured deflections attributable to use of the different FWD units.

In the Phase II Main Study, 537 additional sections were tested using ostensibly the same data collection and QC/QA procedures as in Phase I. Analyses were then conducted on two individual treatments – Recycled Asphalt Pavement (RAP) and Rubberized Asphalt Concrete (RAC). Each treatment was evaluated in a number of environmental zones to assess the treatment’s performance and to determine the effect of environmental conditions on that performance.

9.2 CONCLUSIONS

For each of the RAP and RAC pavement sections considered in this analysis, the expected service lives were calculated based on structural, distress, and roughness indices. This resulted in the measures of Structural Service Life (SSL), Distress Service Life (DSL), and Roughness Service Life (RSL).

For the 60 RAP sections considered, the average expected SSL, DSL, and RSL for each environmental zone are shown in Table 9-1.

Table 9-1: Average Expected Service Lives of RAP Sections by Environmental Zone

	SSL (years)	DSL (years)	RSL (years)
North Coast	19	18	20
Desert	19	9	20
Mountain	20	14	19

If the shortest of the 3 service lives will control when rehabilitation is required, then the RAP sections in the North Coast, Desert, Mountain zones would all be triggered for distresses first, after 18, 9, and 14 years, respectively. However, if appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. In this case, the RAP sections in the North Coast and Desert zones would instead be triggered for structural performance, both after 19 years. RAP sections in the Mountain zone would be triggered for ride quality, again after 19 years.

For the 69 RAC sections considered, the average expected SSL, DSL, and RSL for each environmental zone are shown in Table 9-2.

Table 9-2: Average Expected Service Lives of RAC Sections by Environmental Zone

	SSL (years)	DSL (years)	RSL (years)
Central Valley	18	16	18
North Coast	16	16	20
Bay Area	19	19	19
Desert	19	15	19
South Coast	20	10	20

If the shortest of the 3 service lives will control when rehabilitation is required, then RAC sections in the Central Valley, Desert, and South Coast zones would be triggered for distresses first, after 16, 15, and 10 years, respectively. However, if appropriate and timely maintenance is performed, the DSL of these sections could be significantly increased. In this case, RAC sections in these zones would instead be triggered for ride quality or structural performance after 18, 19 or 20 years, respectively. In the North Coast zone, the RAC sections will be triggered for structural adequacy or distresses first after 16 years. In the Bay Area zone, the RAC sections may be triggered for structural adequacy, distresses or ride quality first, after 19 years.

The noticeably lower distress performance of the South Coast zone RAC sections was noted in the report and further investigation is recommended in this area.

It should be noted that the effect of different accumulated traffic levels at the test sections has not yet been taken into account in the analysis of RAP and RAC performance.

Analysis of the sections' structural performance was based on FWD data that had been corrected using the temperature adjustment models developed in the Seasonal Study. Section 7 showed results from the structural performance analysis of the RAP sections both before and after applying the temperature adjustment models. The conclusions derived from the non-temperature corrected deflection data did not always stand once temperature adjustment models were applied. For example, the RAP sections in the Mountain environmental zone, which before temperature correction had the lowest average structural performance, showed the best structural performance after temperature correction. This highlighted the importance of bringing deflections collected at different temperatures to one standard temperature in order to give a real indication of a pavement section's structural performance.

9.3 RECOMMENDATIONS

A substantial amount of data has been collected and analyzed in this study so far. The analyses have produced good results; however additional analyses are required to fully complete the Phase II project. In comparison with the significant effort already expended to collect the statewide data and initiate analysis techniques and procedures, the effort required to complete these additional analyses is minimal. Therefore, it is expected that a very positive return can be made on the limited effort required to finish the Phase II analyses.

A further beneficial step would be to test and monitor a number of additional test sections within the Seasonal Study to enhance the developed temperature adjustment models. As discussed above, these models are of great importance for the accuracy of structural performance analyses.

The data collected in Phase I and II from more than 1,500 test sections statewide, located in all Districts and all environmental zones, and covering many different pavement types, can be used as a good base data for any future enhancement of Caltrans' Pavement Management System. In addition, it would be very beneficial for Caltrans to continue monitoring some of the Main Study sections to gain additional long-term data.

Appendix A: Phase II Test Sections

Table A-1: Phase II Test Sections

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
01-N001	Tested	1	HUM	96	E	8.78	8.88	NC	01-351604	AC Overlay	AC	Stantec Proposed	01-Hum-96-8.6/14.2
01-N002	Tested	1	HUM	96	E	9.76	9.87	NC	01-351604	AC Overlay	AC	Stantec Proposed	01-Hum-96-8.6/14.2
01-N003	Tested	1	HUM	96	E	10.90	11.00	NC	01-351604	AC Overlay	AC	Stantec Proposed	01-Hum-96-8.6/14.2
01-N004	Tested	1	HUM	96	E	11.88	11.98	NC	01-351604	AC Overlay	AC	Stantec Proposed	01-Hum-96-8.6/14.2
01-N005	Tested	1	HUM	96	E	13.08	13.18	NC	01-351604	AC Overlay	AC	Stantec Proposed	01-Hum-96-8.6/14.2
01-N006	Tested	1	HUM	101	N	14.75	14.86	NC	01-344804	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-R14.3/R18.3
01-N007	Tested	1	HUM	101	N	15.81	15.91	NC	01-344804	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-R14.3/R18.3
01-N008	Tested	1	HUM	101	N	16.83	16.93	NC	01-344804	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-R14.3/R18.3
01-N009	Tested	1	HUM	101	N	17.35	17.45	NC	01-344804	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-R14.3/R18.3
01-N010	Tested	1	HUM	101	N	18.10	18.20	NC	01-344804	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-R14.3/R18.3
01-N011	Tested	1	HUM	101	N	18.38	18.49	NC	01-297104	AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R18.1/R22.4
01-N012	Tested	1	HUM	101	N	19.14	19.24	NC	01-297104	AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R18.1/R22.4
01-N013	Tested	1	HUM	101	N	20.41	20.51	NC	01-297104	AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R18.1/R22.4
01-N014	Tested	1	HUM	101	N	21.10	21.20	NC	01-297104	AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R18.1/R22.4
01-N016	Tested	1	HUM	101	N	28.64	28.74	NC	01-2975U4	AC Overlay	AC	Stantec Proposed	01-Hum-101-28.5/35.7
01-N017	Tested	1	HUM	101	N	29.47	29.57	NC	01-2975U4	AC Overlay	AC	Stantec Proposed	01-Hum-101-28.5/35.7
01-N018	Tested	1	HUM	101	N	30.61	30.71	NC	01-2975U4	AC Overlay	AC	Stantec Proposed	01-Hum-101-28.5/35.7
01-N019	Tested	1	HUM	101	N	31.78	31.88	NC	01-2975U4	AC Overlay	AC	Stantec Proposed	01-Hum-101-28.5/35.7
01-N020	Tested	1	HUM	101	N	32.82	32.93	NC	01-2975U4	AC Overlay	AC	Stantec Proposed	01-Hum-101-28.5/35.7
01-N021	Tested	1	HUM	101	N	39.49	39.59	NC	01-294004	AC Overlay	AC	Stantec Proposed	01-Hum-101-39.2/R43.0
01-N022	Tested	1	HUM	101	N	40.50	40.61	NC	01-294004	AC Overlay	AC	Stantec Proposed	01-Hum-101-39.2/R43.0
01-N023	Tested	1	HUM	101	N	41.41	41.52	NC	01-294004	AC Overlay	AC	Stantec Proposed	01-Hum-101-39.2/R43.0
01-N024	Tested	1	HUM	101	N	42.10	42.20	NC	01-294004	AC Overlay	AC	Stantec Proposed	01-Hum-101-39.2/R43.0
01-N025	Tested	1	HUM	101	N	42.77	42.87	NC	01-294004	AC Overlay	AC	Stantec Proposed	01-Hum-101-39.2/R43.0
01-N026	Tested	1	HUM	101	N	43.63	43.73	NC	01-194034	Recycled + AC Overlay	AC	Stantec Proposed	01-Hum-101-R43.0/R48.3

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
01-N027	Tested	1	HUM	101	N	44.75	44.86	NC	01-194034	Recycled + AC Overlay	AC	Stantec Proposed	01-Hum-101-R43.0/R48.3
01-N028	Tested	1	HUM	101	N	45.25	45.35	NC	01-194034	Recycled + AC Overlay	AC	Stantec Proposed	01-Hum-101-R43.0/R48.3
01-N029	Tested	1	HUM	101	N	46.49	46.59	NC	01-194034	Recycled + AC Overlay	AC	Stantec Proposed	01-Hum-101-R43.0/R48.3
01-N030	Tested	1	HUM	101	N	47.12	47.23	NC	01-194034	Recycled + AC Overlay	AC	Stantec Proposed	01-Hum-101-R43.0/R48.3
01-N031	Tested	1	HUM	101	N	61.86	61.96	NC	01-344704	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-61.5/64.3
01-N032	Tested	1	HUM	101	N	62.60	62.71	NC	01-344704	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-61.5/64.3
01-N033	Tested	1	HUM	101	N	63.21	63.31	NC	01-344704	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-61.5/64.3
01-N034	Tested	1	HUM	101	N	63.65	63.75	NC	01-344704	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-61.5/64.3
01-N035	Tested	1	HUM	101	N	64.06	64.17	NC	01-344704	AC Overlay	AC	QA/QC (Updated)	01-Hum-101-61.5/64.3
01-N036	Tested	1	HUM	101	N	96.90	97.01	NC	01-297304	Mill + AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R96.9/100.7
01-N037	Tested	1	HUM	101	N	97.82	97.93	NC	01-297304	Mill + AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R96.9/100.7
01-N038	Tested	1	HUM	101	N	98.45	98.55	NC	01-297304	Mill + AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R96.9/100.7
01-N039	Tested	1	HUM	101	N	99.59	99.70	NC	01-297304	Mill + AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R96.9/100.7
01-N040	Tested	1	HUM	101	N	100.20	100.30	NC	01-297304	Mill + AC Overlay + Fabric	AC	Stantec Proposed	01-Hum-101-R96.9/100.7
01-N041	Tested	1	HUM	101	N	106.45	106.55	NC	01-350804	AC Overlay	AC	Stantec Proposed	01-Hum-101-R106/108.9
01-N042	Tested	1	HUM	101	N	106.83	106.93	NC	01-350804	AC Overlay	AC	Stantec Proposed	01-Hum-101-R106/108.9
01-N043	Tested	1	HUM	101	N	107.20	107.30	NC	01-350804	AC Overlay	AC	Stantec Proposed	01-Hum-101-R106/108.9
01-N044	Tested	1	HUM	101	N	107.87	107.97	NC	01-350804	AC Overlay	AC	Stantec Proposed	01-Hum-101-R106/108.9
01-N045	Tested	1	HUM	101	N	108.42	108.52	NC	01-350804	AC Overlay	AC	Stantec Proposed	01-Hum-101-R106/108.9
01-N081	Tested	1	HUM	299	N	6.16	6.26	NC	01-351204	Mill + AC Overlay	AC	Stantec Proposed	01-Hum-299-R5.9/7.2
01-N082	Tested	1	HUM	299	N	6.33	6.43	NC	01-351204	Mill + AC Overlay	AC	Stantec Proposed	01-Hum-299-R5.9/7.2
01-N083	Tested	1	HUM	299	N	6.76	6.87	NC	01-351204	Mill + AC Overlay	AC	Stantec Proposed	01-Hum-299-R5.9/7.2
01-N084	Tested	1	HUM	299	N	6.96	7.06	NC	01-351204	Mill + AC Overlay	AC	Stantec Proposed	01-Hum-299-R5.9/7.2
01-N085	Tested	1	HUM	299	N	11.71	11.81	NC	01-276604	RAC Overlay	AC	Stantec Proposed	01-Hum-299-R10.9/R17.1
01-N086	Tested	1	HUM	299	N	12.78	12.89	NC	01-276604	RAC Overlay	AC	Stantec Proposed	01-Hum-299-R10.9/R17.1
01-N087	Tested	1	HUM	299	N	13.75	13.85	NC	01-276604	RAC Overlay	AC	Stantec Proposed	01-Hum-299-R10.9/R17.1

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
01-N088	Tested	1	HUM	299	N	14.74	14.85	NC	01-276604	RAC Overlay	AC	Stantec Proposed	01-Hum-299-R10.9/R17.1
01-N090	Tested	1	LAK	20	E	11.52	11.62	CV	01-2974U4	AC Overlay + OGAC	AC	Stantec Proposed	01-Lak-20,29-11.1/18,R34.4/R40.1
01-N091	Tested	1	LAK	20	E	11.90	12.01	CV	01-2974U4	AC Overlay + OGAC	AC	Stantec Proposed	01-Lak-20,29-11.1/18,R34.4/R40.1
01-N092	Tested	1	LAK	20	E	13.96	14.06	CV	01-2974U4	AC Overlay + OGAC	AC	Stantec Proposed	01-Lak-20,29-11.1/18,R34.4/R40.1
01-N093	Tested	1	LAK	20	E	14.40	14.51	CV	01-2974U4	AC Overlay + OGAC	AC	Stantec Proposed	01-Lak-20,29-11.1/18,R34.4/R40.1
01-N094	Tested	1	LAK	20	E	15.40	15.50	CV	01-2974U4	AC Overlay + OGAC	AC	Stantec Proposed	01-Lak-20,29-11.1/18,R34.4/R40.1
01-N095	Tested	1	LAK	20	E	16.95	17.06	CV	01-2974U4	Mill + AC Overlay	AC	Stantec Proposed	01-Lak-20-16.8/17.8
01-N096	Tested	1	LAK	20	E	17.60	17.70	CV	01-2974U4	Mill + AC Overlay	AC	Stantec Proposed	01-Lak-20-16.8/17.8
01-N097	Tested	1	LAK	20	E	19.22	19.33	CV	01-331304	AC Overlay	AC	Stantec Proposed	01-Lak-20-19.1/34.5
01-N098	Tested	1	LAK	20	E	19.73	19.83	CV	01-331304	AC Overlay	AC	Stantec Proposed	01-Lak-20-19.1/34.5
01-N099	Tested	1	LAK	20	E	20.96	21.06	CV	01-331304	AC Overlay	AC	Stantec Proposed	01-Lak-20-19.1/34.5
01-N100	Tested	1	LAK	20	E	23.20	23.31	CV	01-331304	AC Overlay	AC	Stantec Proposed	01-Lak-20-19.1/34.5
01-N101	Tested	1	LAK	20	E	23.57	23.67	CV	01-331304	AC Overlay	AC	Stantec Proposed	01-Lak-20-19.1/34.5
01-N102	Tested	1	MEN	1	N	0.14	0.25	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N103	Tested	1	MEN	1	N	1.53	1.64	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N104	Tested	1	MEN	1	N	3.60	3.70	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N105	Tested	1	MEN	1	N	4.03	4.14	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N106	Tested	1	MEN	1	N	5.80	5.90	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N107	Tested	1	MEN	1	N	8.50	8.61	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N108	Tested	1	MEN	1	N	9.00	9.10	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N109	Tested	1	MEN	1	N	9.92	10.02	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N110	Tested	1	MEN	1	N	12.09	12.20	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N111	Tested	1	MEN	1	N	12.45	12.56	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N112	Tested	1	MEN	1	N	21.14	21.24	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N113	Tested	1	MEN	1	N	21.75	21.86	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
01-N114	Tested	1	MEN	1	N	23.01	23.12	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N115	Tested	1	MEN	1	N	23.47	23.57	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N116	Tested	1	MEN	1	N	24.00	24.10	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N117	Tested	1	MEN	1	N	25.22	25.32	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N118	Tested	1	MEN	1	N	25.77	25.87	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N119	Tested	1	MEN	1	N	26.40	26.51	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N120	Tested	1	MEN	1	N	27.07	27.18	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N121	Tested	1	MEN	1	N	28.41	28.51	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N122	Tested	1	MEN	1	N	38.83	38.93	BA	01-197674	AC Overlay + Fabric	AC	Stantec Proposed	01-Men-1-38.7/40.2
01-N123	Tested	1	MEN	1	N	39.08	39.19	BA	01-197674	AC Overlay + Fabric	AC	Stantec Proposed	01-Men-1-38.7/40.2
01-N124	Tested	1	MEN	1	N	39.23	39.34	BA	01-197674	AC Overlay + Fabric	AC	Stantec Proposed	01-Men-1-38.7/40.2
01-N125	Tested	1	MEN	1	N	39.60	39.71	BA	01-197674	AC Overlay + Fabric	AC	Stantec Proposed	01-Men-1-38.7/40.2
01-N126	Tested	1	MEN	1	N	39.97	40.08	BA	01-197674	AC Overlay + Fabric	AC	Stantec Proposed	01-Men-1-38.7/40.2
01-N127	Tested	1	MEN	1	S	12.70	12.80	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N128	Tested	1	MEN	1	S	13.08	13.18	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N129	Tested	1	MEN	1	S	13.38	13.49	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N130	Tested	1	MEN	1	S	13.97	14.07	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N131	Tested	1	MEN	1	S	14.20	14.31	BA	01-350904	AC Overlay	AC	Stantec Proposed	01-Men-1-0.1/15.2
01-N132	Tested	1	MEN	1	S	32.10	32.20	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N133	Tested	1	MEN	1	S	33.07	33.17	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N134	Tested	1	MEN	1	S	34.23	34.34	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N135	Tested	1	MEN	1	S	35.90	36.00	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N136	Tested	1	MEN	1	S	37.54	37.64	BA	01-350204	AC Overlay	AC	QA/QC (Updated)	01-Men-1-20.8/38.7
01-N137	Tested	1	MEN	101	N	0.84	0.95	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N138	Tested	1	MEN	101	N	1.18	1.29	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N139	Tested	1	MEN	101	N	1.74	1.85	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
01-N140	Tested	1	MEN	101	N	1.97	2.07	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N141	Tested	1	MEN	101	N	2.33	2.43	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N142	Tested	1	MEN	101	N	2.75	2.85	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N143	Tested	1	MEN	101	N	3.16	3.27	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N144	Tested	1	MEN	101	N	3.85	3.95	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N145	Tested	1	MEN	101	N	4.11	4.21	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N146	Tested	1	MEN	101	N	4.52	4.62	BA	01-322104	RAC Overlay	AC	Stantec Proposed	01-Men-101-0.8/5.0
01-N147	Tested	1	MEN	101	N	55.50	55.61	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N148	Tested	1	MEN	101	N	56.17	56.28	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N149	Tested	1	MEN	101	N	57.21	57.31	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N150	Tested	1	MEN	101	N	58.53	58.64	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N151	Tested	1	MEN	101	N	59.11	59.21	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N152	Tested	1	MEN	101	N	60.18	60.28	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N153	Tested	1	MEN	101	N	60.99	61.10	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N154	Tested	1	MEN	101	N	61.61	61.71	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N155	Tested	1	MEN	101	N	62.16	62.26	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N156	Tested	1	MEN	101	N	63.11	63.21	NC	01-287304	AC Overlay + SAMI	AC	Stantec Proposed	01-Men-101-55.1/64.7
01-N157	Tested	1	MEN	101	S	19.19	19.29	BA	01-397604	AC Overlay	AC	Stantec Proposed	01-Men-101-19.0/21.1
01-N158	Tested	1	MEN	101	S	19.58	19.69	BA	01-397604	AC Overlay	AC	Stantec Proposed	01-Men-101-19.0/21.1
01-N159	Tested	1	MEN	101	S	20.31	20.42	BA	01-397604	AC Overlay	AC	Stantec Proposed	01-Men-101-19.0/21.1
01-N160	Tested	1	MEN	101	S	20.64	20.75	BA	01-397604	AC Overlay	AC	Stantec Proposed	01-Men-101-19.0/21.1
01-N161	Tested	1	MEN	101	S	20.89	20.99	BA	01-397604	AC Overlay	AC	Stantec Proposed	01-Men-101-19.0/21.1
01-S24	Tested	1	HUM	299	N	0.97	1.07	NC	01-346004	AC Overlay	AC	QA/QC (Updated)	01-Hum-299-0.0/5.9
01-S26	Tested	1	HUM	299	N	1.94	2.05	NC	01-346004	AC Overlay	AC	QA/QC (Updated)	01-Hum-299-0.0/5.9
01-S28	Tested	1	HUM	299	N	2.76	2.86	NC	01-346004	AC Overlay	AC	QA/QC (Updated)	01-Hum-299-0.0/5.9
01-S30	Tested	1	HUM	299	N	4.67	4.77	NC	01-346004	AC Overlay	AC	QA/QC (Updated)	01-Hum-299-0.0/5.9

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
01-S33	Tested	1	HUM	299	N	5.82	5.93	NC	01-346004	AC Overlay	AC	QA/QC (Updated)	01-Hum-299-0.0/5.9
01-S51	Tested	1	LAK	29	N	40.94	41.04	CV	01-349704	AC Overlay + Leveling	AC	Stantec Proposed	01-Lak-29-R40/53
01-S53	Tested	1	LAK	29	N	41.90	42.01	CV	01-349704	AC Overlay + Leveling	AC	Stantec Proposed	01-Lak-29-R40/53
01-S59	Tested	1	LAK	29	N	46.51	46.61	CV	01-349704	AC Overlay + Leveling	AC	Stantec Proposed	01-Lak-29-R40/53
01-S61	Tested	1	LAK	29	N	47.58	47.68	CV	01-349704	AC Overlay + Leveling	AC	Stantec Proposed	01-Lak-29-R40/53
01-S67452	Tested	1	LAK	29	N	44.58	44.69	CV	01-349704	LTPP Section	AC	LTPP	01-Lak-29-R40/53
01-S68	Tested	1	MEN	101	S	88.57	88.67	NC	01-297804	AC Overlay	AC	Stantec Proposed	01-Men-101-R87/91
01-S69	Tested	1	MEN	101	S	89.02	89.13	NC	01-297804	AC Overlay	AC	Stantec Proposed	01-Men-101-R87/91
01-S70	Tested	1	MEN	101	S	90.10	90.21	NC	01-297804	AC Overlay	AC	Stantec Proposed	01-Men-101-R87/91
01-S72	Tested	1	MEN	101	S	90.57	90.67	NC	01-297804	AC Overlay	AC	Stantec Proposed	01-Men-101-R87/91
02-N167	Tested	2	SHA	5	N	29.18	29.28	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N168	Tested	2	SHA	5	N	29.91	30.01	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N169	Tested	2	SHA	5	N	30.34	30.45	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N170	Tested	2	SHA	5	N	31.03	31.14	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N171	Tested	2	SHA	5	N	31.64	31.74	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N172	Tested	2	SHA	5	N	36.88	36.98	MT	02-310304	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R36.8/40.2
02-N173	Tested	2	SHA	5	N	37.85	37.95	MT	02-310304	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R36.8/40.2
02-N174	Tested	2	SHA	5	N	38.64	38.74	MT	02-310304	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R36.8/40.2
02-N175	Tested	2	SHA	5	N	39.80	39.91	MT	02-310304	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R36.8/40.2
02-N177	Tested	2	SHA	5	S	29.53	29.63	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N178	Tested	2	SHA	5	S	29.90	30.01	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N179	Tested	2	SHA	5	S	30.95	31.05	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
02-N180	Tested	2	SHA	5	S	31.61	31.71	MT	02-342404	C&S + AC Overlay	AC	Stantec Proposed	02-Sha-5-R28.8/32.2
03-S184	Tested	3	ED	50	E	34.23	34.34	MT	03-366304	Milling + AC Overlay	AC	PMS List	03-ED-50-34.0/39.3
03-S187	Tested	3	ED	50	E	35.30	35.41	MT	03-366304	Milling + AC Overlay	AC	PMS List	03-ED-50-34.0/39.3
03-S190	Tested	3	ED	50	E	36.10	36.20	MT	03-366304	Milling + AC Overlay + Fabric	AC	PMS List	03-ED-50-34.0/39.3

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
03-S192	Tested	3	ED	50	E	37.60	37.71	MT	03-366304	Milling + AC Overlay	AC	PMS List	03-ED-50-34.0/39.3
03-S195	Tested	3	ED	50	E	38.30	38.41	MT	03-366304	Milling + AC Overlay	AC	PMS List	03-ED-50-34.0/39.3
03-S196	Tested	3	ED	50	E	38.91	39.02	MT	03-366304	Milling + AC Overlay	AC	PMS List	03-ED-50-34.0/39.3
04-L62051	Tested	4	NAP	29	N	9.41	9.50	BA	LTPP	LTPP Section - GPS	AC	LTPP	04-nap-29-9/11
04-L62053	Tested	4	SM	280	E	5.75	5.84	BA	LTPP	LTPP Section - GPS	AC	LTPP	04-sm-280-5/7
04-N181	Tested	4	ALA	84	E	11.61	11.71	BA	04-0C0104	RAC Overlay	AC	PMS List	04-Ala-84-10.9/18.0
04-N182	Tested	4	ALA	84	E	12.07	12.18	BA	04-0C0104	RAC Overlay	AC	PMS List	04-Ala-84-10.9/18.0
04-N183	Tested	4	ALA	84	E	12.32	12.42	BA	04-0C0104	RAC Overlay	AC	PMS List	04-Ala-84-10.9/18.0
04-N186	Tested	4	ALA	84	E	15.28	15.38	BA	04-0C0104	RAC Overlay	AC	PMS List	04-Ala-84-10.9/18.0
04-N187	Tested	4	ALA	84	E	16.08	16.18	BA	04-0C0104	RAC Overlay	AC	PMS List	04-Ala-84-10.9/18.0
04-N188	Tested	4	ALA	84	E	16.42	16.52	BA	04-0C0104	RAC Overlay	AC	PMS List	04-Ala-84-10.9/18.0
04-N189	Tested	4	ALA	84	E	16.58	16.69	BA	04-0C0104	RAC Overlay	AC	PMS List	04-Ala-84-10.9/18.0
04-N191	Tested	4	CC	4	E	40.52	40.63	CV	04-0C0204	RAC Overlay	AC	PMS List	04-CC-4-40.4/48.3
04-N192	Tested	4	CC	4	E	41.96	42.06	CV	04-0C0204	RAC Overlay	AC	PMS List	04-CC-4-40.4/48.3
04-N196	Tested	4	MRN	101	S	19.19	19.29	BA	04-0C0604	RAC Overlay	AC	PMS List	04-Mrn-101-18.9/23.3
04-N197	Tested	4	MRN	101	S	20.89	20.99	BA	04-0C0604	RAC Overlay	AC	PMS List	04-Mrn-101-18.9/23.3
04-N198	Tested	4	MRN	101	S	22.02	22.12	BA	04-0C0604	RAC Overlay	AC	PMS List	04-Mrn-101-18.9/23.3
04-N199	Tested	4	MRN	101	S	22.23	22.33	BA	04-0C0604	RAC Overlay	AC	PMS List	04-Mrn-101-18.9/23.3
04-N200	Tested	4	MRN	101	S	23.04	23.14	BA	04-0C0604	RAC Overlay	AC	PMS List	04-Mrn-101-18.9/23.3
04-N201	Tested	4	SCL	85	N	13.90	14.01	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N202	Tested	4	SCL	85	N	14.37	14.47	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N203	Tested	4	SCL	85	N	14.51	14.61	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N204	Tested	4	SCL	85	N	14.74	14.84	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N205	Tested	4	SCL	85	N	15.07	15.17	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N206	Tested	4	SCL	85	S	13.52	13.63	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N207	Tested	4	SCL	85	S	14.01	14.11	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
04-N208	Tested	4	SCL	85	S	14.45	14.56	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N209	Tested	4	SCL	85	S	14.66	14.76	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N210	Tested	4	SCL	85	S	14.82	14.92	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N211	Tested	4	SCL	85	S	15.08	15.18	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N212	Tested	4	SCL	85	S	15.31	15.42	BA	04-437794	PCC	PC	Stantec Proposed	04-SCl-85-13.5/15.6
04-N215	Tested	4	SCL	152	W	32.37	32.47	BA	04-0C0904	Mill + RAC Overlay	AC	PMS List	04-SCl-152-30.3/35.2
04-N216	Tested	4	SCL	152	W	32.53	32.63	BA	04-0C0904	Mill + RAC Overlay	AC	PMS List	04-SCl-152-30.3/35.2
04-N217	Tested	4	SCL	152	W	32.84	32.95	BA	04-0C0904	Mill + RAC Overlay	AC	PMS List	04-SCl-152-30.3/35.2
04-N220	Tested	4	SCL	152	W	34.39	34.50	BA	04-0C0904	Mill + RAC Overlay	AC	PMS List	04-SCl-152-30.3/35.2
04-N221	Tested	4	SCL	152	W	34.78	34.89	BA	04-0C0904	Mill + RAC Overlay	AC	PMS List	04-SCl-152-30.3/35.2
04-N224	Tested	4	SCR	17	N	2.05	2.15	BA	04-132164	Mill + RAC Overlay	AC	Stantec Proposed	04-SCr-17-0.0/6.0
04-N225	Tested	4	SCR	17	N	2.63	2.74	BA	04-132164	Mill + RAC Overlay	AC	Stantec Proposed	04-SCr-17-0.0/6.0
04-N226	Tested	4	SCR	17	N	2.96	3.06	BA	04-132164	Mill + RAC Overlay	AC	Stantec Proposed	04-SCr-17-0.0/6.0
04-N227	Tested	4	SCR	17	N	3.25	3.35	BA	04-132164	Mill + RAC Overlay	AC	Stantec Proposed	04-SCr-17-0.0/6.0
04-N228	Tested	4	SCR	17	N	3.96	4.06	BA	04-132164	Mill + RAC Overlay	AC	Stantec Proposed	04-SCr-17-0.0/6.0
04-N229	Tested	4	SCR	17	N	4.19	4.29	BA	04-132164	Mill + RAC Overlay	AC	Stantec Proposed	04-SCr-17-0.0/6.0
04-N235	Tested	4	SM	1	S	11.40	11.51	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N236	Tested	4	SM	1	S	12.49	12.60	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N237	Tested	4	SM	1	S	13.00	13.11	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N238	Tested	4	SM	1	S	14.86	14.96	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N240	Tested	4	SM	1	S	15.82	15.93	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N241	Tested	4	SM	1	S	16.74	16.85	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N242	Tested	4	SM	1	S	17.14	17.24	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N243	Tested	4	SM	1	S	17.34	17.44	BA	04-121874	AC Overlay + Fabric	AC	Stantec Proposed	04-SM-1-10.5/17.9
04-N244	Tested	4	SOL	12	E	0.13	0.24	CV	04-0C2604	RAC Overlay	AC	PMS List	04-Sol-12-0.0/3
04-N245	Tested	4	SOL	12	E	0.75	0.85	CV	04-0C2604	RAC Overlay	AC	PMS List	04-Sol-12-0.0/3

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
04-N247	Tested	4	SOL	12	E	2.50	2.60	CV	04-0C2604	RAC Overlay	AC	PMS List	04-Sol-12-0.0/3
04-N248	Tested	4	SOL	80	E	18.46	18.56	CV	04-0C5104	PCC	PC	Stantec Proposed	04-Sol-80-R18.3/49.2 (km)
04-N249	Tested	4	SOL	80	E	19.56	19.67	CV	04-0C5104	PCC	PC	Stantec Proposed	04-Sol-80-R18.3/49.2 (km)
04-N250	Tested	4	SOL	80	E	20.52	20.63	CV	04-0C5104	PCC	PC	Stantec Proposed	04-Sol-80-R18.3/49.2 (km)
04-N251	Tested	4	SOL	80	E	25.59	25.69	CV	04-0C5104	PCC	PC	Stantec Proposed	04-Sol-80-R18.3/49.2 (km)
04-N252	Tested	4	SOL	80	E	26.75	26.86	CV	04-0C5104	PCC	PC	Stantec Proposed	04-Sol-80-R18.3/49.2 (km)
04-N253	Tested	4	SOL	80	E	30.83	30.94	CV	04-0C2504	PCC	PC	PMS List	04-Sol-80-30.6/42.0
04-N254	Tested	4	SOL	80	E	31.91	32.02	CV	04-0C2504	PCC	PC	PMS List	04-Sol-80-30.6/42.0
04-N255	Tested	4	SOL	80	E	33.53	33.64	CV	04-0C2504	PCC	PC	PMS List	04-Sol-80-30.6/42.0
04-N256	Tested	4	SOL	80	E	34.23	34.34	CV	04-0C2504	PCC	PC	PMS List	04-Sol-80-30.6/42.0
04-N257	Tested	4	SOL	80	E	35.12	35.23	CV	04-0C2504	PCC	PC	PMS List	04-Sol-80-30.6/42.0
04-N259	Tested	4	SOL	80	W	39.01	39.11	CV	04-0C2504	RAC Overlay	AC	PMS List	04-Sol-80-30.6/42.0
04-N260	Tested	4	SOL	80	W	40.18	40.28	CV	04-0C2504	RAC Overlay	AC	PMS List	04-Sol-80-30.6/42.0
04-N261	Tested	4	SOL	80	W	41.34	41.45	CV	04-0C2504	RAC Overlay	AC	PMS List	04-Sol-80-30.6/42.0
04-N263	Tested	4	SON	1	N	31.39	31.50	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N264	Tested	4	SON	1	N	31.60	31.70	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N265	Tested	4	SON	1	N	32.94	33.04	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N266	Tested	4	SON	1	N	33.07	33.17	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N267	Tested	4	SON	1	N	33.41	33.51	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N268	Tested	4	SON	1	N	33.55	33.66	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N269	Tested	4	SON	1	N	33.96	34.06	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N270	Tested	4	SON	1	N	34.59	34.70	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N271	Tested	4	SON	1	N	35.03	35.13	BA	04-0C6704	AC Overlay	AC	Stantec Proposed	04-Son-1-30.5/35.5
04-N272	Tested	4	SON	12	E	22.69	22.79	BA	04-1037U4	AC Overlay	AC	QA/QC (Updated)	04-Son-12-22.0/25.8
04-N273	Tested	4	SON	12	E	23.84	23.94	BA	04-1037U4	AC Overlay	AC	QA/QC (Updated)	04-Son-12-22.0/25.8
04-N274	Tested	4	SON	12	E	24.45	24.56	BA	04-1037U4	AC Overlay	AC	QA/QC (Updated)	04-Son-12-22.0/25.8

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
04-N277	Tested	4	SON	101	N	4.02	4.12	BA	04-0C0004	RAC Overlay	AC	Stantec Proposed	04-Son-101-3.6/8.1
04-N278	Tested	4	SON	101	N	4.89	4.99	BA	04-0C0004	RAC Overlay	AC	Stantec Proposed	04-Son-101-3.6/8.1
04-N279	Tested	4	SON	101	N	5.49	5.60	BA	04-0C0004	RAC Overlay	AC	Stantec Proposed	04-Son-101-3.6/8.1
04-N280	Tested	4	SON	101	N	6.40	6.51	BA	04-0C0004	RAC Overlay	AC	Stantec Proposed	04-Son-101-3.6/8.1
04-N281	Tested	4	SON	101	N	7.89	7.99	BA	04-0C0004	RAC Overlay	AC	Stantec Proposed	04-Son-101-3.6/8.1
04-N282	Tested	4	SON	101	N	50.52	50.63	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N283	Tested	4	SON	101	N	50.87	50.98	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N284	Tested	4	SON	101	N	51.69	51.79	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N285	Tested	4	SON	101	N	52.83	52.94	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N286	Tested	4	SON	101	S	50.84	50.95	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N287	Tested	4	SON	101	S	51.43	51.53	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N288	Tested	4	SON	101	S	51.75	51.86	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N289	Tested	4	SON	101	S	52.39	52.49	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N290	Tested	4	SON	101	S	52.92	53.02	BA	04-163014	PCC	PC	QA/QC (Updated)	04-Son-101-50.4/53.2
04-N292	Tested	4	SON	116	W	43.42	43.52	BA	04-121914	AC Overlay	AC	Stantec Proposed	04-Son-116-41.8/45.1
04-N293	Tested	4	SON	116	W	44.03	44.14	BA	04-121914	AC Overlay	AC	Stantec Proposed	04-Son-116-41.8/45.1
04-N294	Tested	4	SON	116	W	44.58	44.69	BA	04-121914	AC Overlay	AC	Stantec Proposed	04-Son-116-41.8/45.1
05-N295	Tested	5	SB	101	N	17.91	18.01	SC	05-399014	Mill + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-17.5/18.5
05-N296	Tested	5	SB	101	N	18.32	18.43	SC	05-399014	Mill + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-17.5/18.5
05-N300	Tested	5	SB	101	N	23.61	23.71	SC	05-383904	C&S + RAC Overlay	AC	PMS List	05-SB-101-21.0/24.5
05-N301	Tested	5	SB	101	N	24.29	24.39	SC	05-383904	C&S + RAC Overlay	AC	PMS List	05-SB-101-21.0/24.5
05-N302	Tested	5	SB	101	N	25.31	25.42	SC	05-312104	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-24.6/R36.0
05-N303	Tested	5	SB	101	N	25.58	25.68	SC	05-312104	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-24.6/R36.0
05-N304	Tested	5	SB	101	N	26.20	26.31	SC	05-312104	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-24.6/R26.9
05-N305	Tested	5	SB	101	N	26.74	26.85	SC	05-312104	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-24.6/R26.9
05-N306	Tested	5	SB	101	N	27.27	27.38	SC	05-402304	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-27.2/28.6

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
05-N307	Tested	5	SB	101	N	27.66	27.77	SC	05-402304	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-27.2/28.6
05-N308	Tested	5	SB	101	N	28.04	28.14	SC	05-402304	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-27.2/28.6
05-N309	Tested	5	SB	101	N	28.33	28.44	SC	05-402304	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-27.2/28.6
05-N310	Tested	5	SB	101	N	33.77	33.87	SC	05-384604	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-33.5/R36.0
05-N311	Tested	5	SB	101	N	34.05	34.16	SC	05-384604	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-33.5/R36.0
05-N315	Tested	5	SB	101	N	36.24	36.35	SC	05-399504	AC Overlay	AC	QA/QC (Updated)	05-SB-101-36/45.8
05-N316	Tested	5	SB	101	N	37.18	37.28	SC	05-399504	AC Overlay	AC	QA/QC (Updated)	05-SB-101-36/45.8
05-N317	Tested	5	SB	101	N	38.61	38.71	SC	05-399504	AC Overlay	AC	QA/QC (Updated)	05-SB-101-36/45.8
05-N318	Tested	5	SB	101	N	39.58	39.69	SC	05-399504	AC Overlay	AC	QA/QC (Updated)	05-SB-101-36/45.8
05-N319	Tested	5	SB	101	N	40.69	40.80	SC	05-399504	AC Overlay	AC	QA/QC (Updated)	05-SB-101-36/45.8
05-N320	Tested	5	SB	101	N	80.24	80.34	SC	05-339404	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-78.7/84.3
05-N321	Tested	5	SB	101	N	81.13	81.23	SC	05-339404	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-78.7/84.3
05-N322	Tested	5	SB	101	N	82.06	82.17	SC	05-339404	C&S + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-78.7/84.3
05-N331	Tested	5	SB	154	E	12.41	12.51	SC	05-343104	AC Overlay	AC	Stantec Proposed	05-SB-154-12.2/14.8
05-N332	Tested	5	SB	154	E	12.86	12.96	SC	05-343104	AC Overlay	AC	Stantec Proposed	05-SB-154-12.2/14.8
05-N333	Tested	5	SB	154	E	13.18	13.29	SC	05-343104	AC Overlay	AC	Stantec Proposed	05-SB-154-12.2/14.8
05-N335	Tested	5	SB	154	E	14.03	14.13	SC	05-343104	AC Overlay	AC	Stantec Proposed	05-SB-154-12.2/14.8
05-N337	Tested	5	SLO	1	N	23.93	24.03	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0
05-N338	Tested	5	SLO	1	N	24.24	24.35	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0
05-N339	Tested	5	SLO	1	N	24.92	25.02	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0
05-N340	Tested	5	SLO	1	N	25.34	25.45	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0
05-N341	Tested	5	SLO	1	N	26.50	26.60	SC	05-402504	AC Overlay	AC	Stantec Proposed	05-SLO-1-26.0/34.4
05-N343	Tested	5	SLO	1	N	28.41	28.51	SC	05-402504	AC Overlay	AC	Stantec Proposed	05-SLO-1-26.0/34.4
05-N344	Tested	5	SLO	1	N	29.03	29.14	SC	05-402504	AC Overlay	AC	Stantec Proposed	05-SLO-1-26.0/34.4
05-N345	Tested	5	SLO	1	N	30.46	30.57	SC	05-402504	AC Overlay	AC	Stantec Proposed	05-SLO-1-26.0/34.4
05-N346	Tested	5	SLO	1	S	21.84	21.94	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
05-N347	Tested	5	SLO	1	S	22.70	22.80	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0
05-N348	Tested	5	SLO	1	S	23.22	23.32	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0
05-N349	Tested	5	SLO	1	S	24.42	24.53	SC	05-364704	AC Overlay	AC	Stantec Proposed	05-SLO-1-21.7/26.0
05-N351	Tested	5	SLO	1	S	29.22	29.33	SC	05-402504	AC Overlay	AC	Stantec Proposed	05-SLO-1-26.0/34.4
05-N352	Tested	5	SLO	1	S	30.62	30.72	SC	05-402504	AC Overlay	AC	Stantec Proposed	05-SLO-1-26.0/34.4
05-N366	Tested	5	SLO	101	N	21.83	21.93	SC	05-382904	AC Overlay	AC	Stantec Proposed	05-SLO-101-R21.5/R24.6
05-N367	Tested	5	SLO	101	N	22.13	22.24	SC	05-382904	AC Overlay	AC	Stantec Proposed	05-SLO-101-R21.5/R24.6
05-N368	Tested	5	SLO	101	N	22.95	23.05	SC	05-382904	AC Overlay	AC	Stantec Proposed	05-SLO-101-R21.5/R24.6
05-N369	Tested	5	SLO	101	N	23.67	23.77	SC	05-382904	AC Overlay	AC	Stantec Proposed	05-SLO-101-R21.5/R24.6
05-N376	Tested	5	SLO	166	E	9.28	9.38	SC	05-440804	AC Overlay	AC	QA/QC (Updated)	05-SLO-166-8.9/16.4
05-N377	Tested	5	SLO	166	E	9.58	9.69	SC	05-440804	AC Overlay	AC	QA/QC (Updated)	05-SLO-166-8.9/16.4
05-N378	Tested	5	SLO	166	E	10.52	10.63	SC	05-440804	AC Overlay	AC	QA/QC (Updated)	05-SLO-166-8.9/16.4
05-N379	Tested	5	SLO	166	E	12.55	12.65	SC	05-440804	AC Overlay	AC	QA/QC (Updated)	05-SLO-166-8.9/16.4
05-N380	Tested	5	SLO	166	E	15.04	15.14	SC	05-440804	AC Overlay	AC	QA/QC (Updated)	05-SLO-166-8.9/16.4
05-NA01	Tested	5	SB	101	N	18.32	18.43	SC	05-399015	Mill + AC Overlay + Fabric	AC	Stantec Proposed	05-SB-101-17.5/18.6
06-N386	Tested	6	FRE	33	N	69.25	69.36	CV	06-331304	Mill + AC Overlay + SAMI	AC	Stantec Proposed	06-FRE-33-69.2/70.6
06-N387	Tested	6	FRE	33	N	69.42	69.53	CV	06-331304	Mill + AC Overlay + SAMI	AC	Stantec Proposed	06-FRE-33-69.2/70.6
06-N388	Tested	6	FRE	33	N	69.60	69.71	CV	06-331304	Mill + AC Overlay + SAMI	AC	Stantec Proposed	06-FRE-33-69.2/70.6
06-N391	Tested	6	FRE	33	S	69.30	69.40	CV	06-331304	Mill + AC Overlay + SAMI	AC	Stantec Proposed	06-FRE-33-69.2/70.6
06-N392	Tested	6	FRE	33	S	69.64	69.74	CV	06-331304	Mill + AC Overlay + SAMI	AC	Stantec Proposed	06-FRE-33-69.2/70.6
06-N394	Tested	6	FRE	33	S	70.20	70.30	CV	06-331304	Mill + AC Overlay + SAMI	AC	Stantec Proposed	06-FRE-33-69.2/70.6
06-N395	Tested	6	FRE	33	S	70.45	70.56	CV	06-331304	Mill + AC Overlay + SAMI	AC	Stantec Proposed	06-FRE-33-69.2/70.6
06-N396	Tested	6	MAD	41	S	0.42	0.52	CV	06-305514	Construction (PCC)	PC	QA/QC (Updated)	06-Mad-41-R0.0/R3.2
06-N397	Tested	6	MAD	41	S	1.26	1.36	CV	06-305514	Construction (PCC)	PC	QA/QC (Updated)	06-Mad-41-R0.0/R3.2
06-N398	Tested	6	MAD	41	S	1.51	1.62	CV	06-305514	Construction (PCC)	PC	QA/QC (Updated)	06-Mad-41-R0.0/R3.2
06-N399	Tested	6	MAD	41	S	1.69	1.79	CV	06-305514	Construction (PCC)	PC	QA/QC (Updated)	06-Mad-41-R0.0/R3.2

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
06-N400	Tested	6	MAD	41	S	2.10	2.21	CV	06-305514	Construction (AC)	AC	QA/QC (Updated)	06-Mad-41-R0.0/R3.2
06-N401	Tested	6	MAD	41	S	2.77	2.88	CV	06-305514	Construction (AC)	AC	QA/QC (Updated)	06-Mad-41-R0.0/R3.2
06-N402	Tested	6	MAD	41	S	3.07	3.17	CV	06-305514	Construction (AC)	AC	QA/QC (Updated)	06-Mad-41-R0.0/R3.2
06-N405	Tested	6	FRE	41	S	32.44	32.55	CV	06-305514	Construction (PCC)	PC	QA/QC (Updated)	06-Fre-41-R29.9/R33.5
06-N406	Tested	6	FRE	41	S	32.88	32.98	CV	06-305514	Construction (PCC)	PC	QA/QC (Updated)	06-Fre-41-R29.9/R33.5
06-N407	Tested	6	KER	46	E	50.10	50.20	CV	06-312104	Mill + RAC Overlay + SAMI	AC	Stantec Proposed	06-ker-46-49.8/50.9
06-N408	Tested	6	KER	46	E	50.36	50.46	CV	06-312104	Mill + RAC Overlay + SAMI	AC	Stantec Proposed	06-ker-46-49.8/50.9
06-N409	Tested	6	KER	46	E	50.57	50.67	CV	06-312104	Mill + RAC Overlay + SAMI	AC	Stantec Proposed	06-ker-46-49.8/50.9
06-N410	Tested	6	KER	46	W	50.11	50.22	CV	06-312104	Mill + RAC Overlay + SAMI	AC	Stantec Proposed	06-ker-46-49.8/50.9
06-N411	Tested	6	KER	58	E	31.89	32.00	CV	06-387504	RAC Overlay	AC	PMS List	06-Ker-58-31.4/40.0
06-N412	Tested	6	KER	58	E	32.73	32.83	CV	06-387504	RAC Overlay	AC	PMS List	06-Ker-58-31.4/40.0
06-N413	Tested	6	KER	58	E	33.49	33.60	CV	06-387504	RAC Overlay	AC	PMS List	06-Ker-58-31.4/40.0
06-N414	Tested	6	KER	58	E	34.42	34.53	CV	06-387504	RAC Overlay	AC	PMS List	06-Ker-58-31.4/40.0
06-N415	Tested	6	KER	58	E	37.04	37.14	CV	06-387504	RAC Overlay	AC	PMS List	06-Ker-58-31.4/40.0
06-N416	Tested	6	KER	58	E	82.91	83.01	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N417	Tested	6	KER	58	E	83.97	84.07	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N418	Tested	6	KER	58	E	84.57	84.68	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N419	Tested	6	KER	58	E	85.99	86.09	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N420	Tested	6	KER	58	E	86.43	86.53	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N421	Tested	6	KER	58	E	142.14	142.24	DS	06-427604	RAC Overlay + SAMI	AC	Stantec Proposed	06-Ker-58-142/142.5
06-N422	Tested	6	KER	58	W	70.90	71.00	CV	06-318914	C&S + RAC Overlay + SAMI	CO	Stantec Proposed	06-Ker-58-70/77
06-N423	Tested	6	KER	58	W	71.88	71.99	CV	06-318914	C&S + RAC Overlay + SAMI	CO	Stantec Proposed	06-Ker-58-70/77
06-N424	Tested	6	KER	58	W	72.77	72.88	CV	06-318914	C&S + RAC Overlay + SAMI	CO	Stantec Proposed	06-Ker-58-70/77
06-N425	Tested	6	KER	58	W	73.58	73.69	CV	06-318914	C&S + RAC Overlay + SAMI	CO	Stantec Proposed	06-Ker-58-70/77
06-N426	Tested	6	KER	58	W	74.42	74.53	CV	06-318914	C&S + RAC Overlay + SAMI	CO	Stantec Proposed	06-Ker-58-70/77
06-N427	Tested	6	KER	58	W	75.77	75.87	CV	06-318914	C&S + RAC Overlay + SAMI	CO	Stantec Proposed	06-Ker-58-70/77

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
06-N428	Tested	6	KER	58	W	87.19	87.29	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N429	Tested	6	KER	58	W	88.24	88.34	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N430	Tested	6	KER	58	W	89.23	89.34	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N431	Tested	6	KER	58	W	89.93	90.04	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N432	Tested	6	KER	58	W	90.37	90.47	DS	06-421404	Mill + AC Overlay + Fabric	AC	QA/QC (RFP)	06-Ker-58-82.7/90.7
06-N433	Tested	6	KER	58	W	142.06	142.17	DS	06-427604	RAC Overlay + SAMI	AC	Stantec Proposed	06-Ker-58-142/142.5
06-N434	Tested	6	KER	65	N	0.34	0.45	CV	06-353704	Mill + AC Overlay	AC	QA/QC (RFP)	06-Ker-65-0.0/2.9
06-N435	Tested	6	KER	65	N	1.09	1.19	CV	06-353704	Mill + AC Overlay	AC	QA/QC (RFP)	06-Ker-65-0.0/2.9
06-N436	Tested	6	KER	65	N	1.73	1.84	CV	06-353704	Mill + AC Overlay	AC	QA/QC (RFP)	06-Ker-65-0.0/2.9
06-N437	Tested	6	KER	65	N	2.22	2.32	CV	06-353704	Mill + AC Overlay	AC	QA/QC (RFP)	06-Ker-65-0.0/2.9
06-N438	Tested	6	KER	65	N	2.62	2.73	CV	06-353704	Mill + AC Overlay	AC	QA/QC (RFP)	06-Ker-65-0.0/2.9
06-N439	Tested	6	KIN	198	E	9.52	9.62	CV	06-338904	Mill + AC Overlay	AC	Stantec Proposed	06-Kin-198-9.2/14.0
06-N440	Tested	6	KIN	198	E	10.63	10.73	CV	06-338904	Mill + AC Overlay	AC	Stantec Proposed	06-Kin-198-9.2/14.0
06-N441	Tested	6	KIN	198	E	11.70	11.80	CV	06-338904	Mill + AC Overlay	AC	Stantec Proposed	06-Kin-198-9.2/14.0
06-N442	Tested	6	KIN	198	E	12.83	12.94	CV	06-338904	Mill + AC Overlay	AC	Stantec Proposed	06-Kin-198-9.2/14.0
06-N443	Tested	6	KIN	198	E	13.69	13.80	CV	06-338904	Mill + AC Overlay	AC	Stantec Proposed	06-Kin-198-9.2/14.0
06-N455	Tested	6	TUL	65	N	5.69	5.80	CV	06-401504	Mill + RAC Overlay	AC	Stantec Proposed	06-Tul-65-5.1/14.0
06-N456	Tested	6	TUL	65	N	6.67	6.77	CV	06-401504	Mill + RAC Overlay	AC	Stantec Proposed	06-Tul-65-5.1/14.0
06-N457	Tested	6	TUL	65	N	7.52	7.62	CV	06-401504	Mill + RAC Overlay	AC	Stantec Proposed	06-Tul-65-5.1/14.0
06-N458	Tested	6	TUL	65	N	8.60	8.70	CV	06-401504	Mill + RAC Overlay	AC	Stantec Proposed	06-Tul-65-5.1/14.0
06-N459	Tested	6	TUL	65	N	9.75	9.86	CV	06-401504	Mill + RAC Overlay	AC	Stantec Proposed	06-Tul-65-5.1/14.0
06-N460	Tested	6	TUL	65	N	22.27	22.38	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-N461	Tested	6	TUL	65	N	23.59	23.69	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-N462	Tested	6	TUL	65	N	24.78	24.89	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-N463	Tested	6	TUL	65	N	25.93	26.03	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-N464	Tested	6	TUL	65	N	26.94	27.05	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
06-N465	Tested	6	TUL	65	S	25.47	25.58	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-N466	Tested	6	TUL	65	S	26.19	26.30	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-N467	Tested	6	TUL	65	S	27.31	27.42	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-N468	Tested	6	TUL	65	S	29.19	29.29	CV	06-367114	AC Overlay + Fabric	AC	Stantec Proposed	06-Tul-65-22.2/30
06-S424	Tested	6	KER	58	W	67.24	67.35	CV	06-318914	C_&_S + AC Overlay	CO	Stantec Proposed	06-Ker-58-67.0/69
06-S426	Tested	6	KER	58	W	68.04	68.14	CV	06-318914	C_&_S + AC Overlay	CO	Stantec Proposed	06-Ker-58-67.0/69
06-S428	Tested	6	KER	58	W	68.58	68.68	CV	06-318914	C_&_S + AC Overlay	CO	Stantec Proposed	06-Ker-58-67.0/69
06-S445	Tested	6	KER	58	E	67.50	67.60	CV	06-318914	C_&_S + AC Overlay	CO	Stantec Proposed	06-Ker-58-67.0/69.0
06-S447	Tested	6	KER	58	E	68.53	68.64	CV	06-318914	C_&_S + AC Overlay	CO	Stantec Proposed	06-Ker-58-67.0/69.0
06-S451	Tested	6	KER	58	E	77.92	78.02	CV	06-318914	C_&_S + AC Overlay + Fabric	CO	Stantec Proposed	06-Ker-58-77/82.7
06-S455	Tested	6	KER	58	E	79.28	79.38	CV	06-318914	C_&_S + AC Overlay + Fabric	CO	Stantec Proposed	06-Ker-58-77/82.7
08-N478	Tested	8	RIV	10	E	13.29	13.39	DS	08-399504	PCC	PC	Stantec Proposed	08-Riv-10-13.2/R26.2
08-N479	Tested	8	RIV	10	E	13.94	14.04	DS	08-399504	PCC	PC	Stantec Proposed	08-Riv-10-13.2/R26.2
08-N481	Tested	8	RIV	10	E	14.92	15.02	DS	08-399504	PCC	PC	Stantec Proposed	08-Riv-10-13.2/R26.2
08-N489	Tested	8	RIV	74	W	44.96	45.07	DS	08-000414	RAC Overlay	AC	PMS List	08-Riv-74-37.8/46.9
08-N490	Tested	8	RIV	74	W	45.43	45.53	DS	08-000414	RAC Overlay	AC	PMS List	08-Riv-74-37.8/46.9
08-N491	Tested	8	RIV	74	W	46.01	46.12	DS	08-000414	RAC Overlay	AC	PMS List	08-Riv-74-37.8/46.9
08-N492	Tested	8	RIV	74	W	46.51	46.62	DS	08-000414	RAC Overlay	AC	PMS List	08-Riv-74-37.8/46.9
08-N503	Tested	8	SBD	15	N	124.05	124.16	DS	08-437804	AC Overlay	AC	QA/QC (Updated)	08-SBd-15-R124/138.5
08-N504	Tested	8	SBD	15	N	125.10	125.21	DS	08-437804	AC Overlay	AC	QA/QC (Updated)	08-SBd-15-R124/138.5
08-N505	Tested	8	SBD	15	N	125.39	125.49	DS	08-437804	AC Overlay	AC	QA/QC (Updated)	08-SBd-15-R124/138.5
08-N506	Tested	8	SBD	15	N	127.05	127.15	DS	08-437804	AC Overlay	AC	QA/QC (Updated)	08-SBd-15-R124/138.5
08-N507	Tested	8	SBD	15	N	127.53	127.63	DS	08-437804	AC Overlay	AC	QA/QC (Updated)	08-SBd-15-R124/138.5
08-N513	Tested	8	SBD	83	N	4.18	4.28	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-N514	Tested	8	SBD	83	N	4.63	4.74	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-N515	Tested	8	SBD	83	N	5.04	5.14	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
08-N518	Tested	8	SBD	83	S	4.03	4.14	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-N519	Tested	8	SBD	83	S	4.48	4.58	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-N520	Tested	8	SBD	83	S	4.70	4.80	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-N521	Tested	8	SBD	83	S	5.10	5.21	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-N522	Tested	8	SBD	83	S	6.14	6.24	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-N523	Tested	8	SBD	395	N	18.17	18.28	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N524	Tested	8	SBD	395	N	19.27	19.38	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N525	Tested	8	SBD	395	N	20.45	20.55	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N526	Tested	8	SBD	395	N	21.77	21.88	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N527	Tested	8	SBD	395	N	23.40	23.50	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N528	Tested	8	SBD	395	S	37.76	37.87	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N529	Tested	8	SBD	395	S	38.82	38.92	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N530	Tested	8	SBD	395	S	39.72	39.82	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N531	Tested	8	SBD	395	S	41.21	41.32	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-N532	Tested	8	SBD	395	S	42.43	42.54	DS	08-360704	RAC Overlay	AC	PMS List	08-SBd-395-18.1/42.7
08-NX01	Tested	8	RIV	10	E	13.73	13.83	DS	08-399504	PCC	PC	Stantec Proposed	08-Riv-10-13.2/R26.2
08-NX03	Tested	8	RIV	74	W	45.35	45.35	DS	08-000414	RAC Overlay	AC	PMS List	08-Riv-74-37.8/46.9
08-NX12	Tested	8	SBD	83	N	4.41	4.51	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-NX13	Tested	8	SBD	83	S	4.33	4.23	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-NX14	Tested	8	SBD	83	S	5.00	4.90	SC	08-359504	RAC Overlay	AC	PMS List	08-SBd-83-0/6.5
08-NX30	Tested	8	RIV	10	E	14.60	14.70	DS	08-399504	PCC	PC	Stantec Proposed	08-Riv-10-13.2/R26.2
08-NXXX	Tested	8	RIV	10	E	13.41	13.51	DS	08-399504	PCC	PC	Stantec Proposed	08-Riv-10-13.2/R26.2
09-N533	Tested	9	INY	395	N	15.18	15.28	DS	09-272604	Mill + AC Overlay + Fabric	AC	Stantec Proposed	09-Iny-395-11.8/20.4
09-N534	Tested	9	INY	395	N	15.57	15.67	DS	09-272604	Mill + AC Overlay + Fabric	AC	Stantec Proposed	09-Iny-395-11.8/20.4
09-N535	Tested	9	INY	395	N	15.95	16.05	DS	09-272604	Mill + AC Overlay + Fabric	AC	Stantec Proposed	09-Iny-395-11.8/20.4
09-N536	Tested	9	INY	395	N	16.54	16.65	DS	09-272604	Mill + AC Overlay + Fabric	AC	Stantec Proposed	09-Iny-395-11.8/20.4

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
09-N537	Tested	9	INY	395	N	17.08	17.19	DS	09-272604	Mill + AC Overlay + Fabric	AC	Stantec Proposed	09-Iny-395-11.8/20.4
09-N543	Tested	9	KER	14	E	42.10	42.21	DS	09-214704	AC Overlay	AC	QA/QC (Updated)	09-Ker-14-42.0/46.2
09-N544	Tested	9	KER	14	E	43.00	43.11	DS	09-214704	AC Overlay	AC	QA/QC (Updated)	09-Ker-14-42.0/46.2
09-N545	Tested	9	KER	14	E	44.21	44.31	DS	09-214704	AC Overlay	AC	QA/QC (Updated)	09-Ker-14-42.0/46.2
09-N546	Tested	9	KER	14	E	45.23	45.33	DS	09-214704	AC Overlay	AC	QA/QC (Updated)	09-Ker-14-42.0/46.2
09-N547	Tested	9	KER	14	E	45.70	45.81	DS	09-214704	AC Overlay	AC	QA/QC (Updated)	09-Ker-14-42.0/46.2
09-N558	Tested	9	KER	58	E	128.91	129.02	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N559	Tested	9	KER	58	E	129.92	130.03	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N560	Tested	9	KER	58	E	130.92	131.02	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N561	Tested	9	KER	58	E	131.99	132.09	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N562	Tested	9	KER	58	E	132.94	133.04	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N563	Tested	9	KER	58	W	138.15	138.26	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N564	Tested	9	KER	58	W	139.08	139.19	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N565	Tested	9	KER	58	W	139.65	139.75	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N566	Tested	9	KER	58	W	140.81	140.92	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N567	Tested	9	KER	58	W	141.41	141.52	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N568	Tested	9	KER	58	W	141.83	141.93	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N569	Tested	9	KER	58	W	142.44	142.55	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N570	Tested	9	KER	58	W	143.07	143.17	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N571	Tested	9	KER	58	W	143.50	143.61	DS	09-2639U4	RAC Overlay + SAMI	AC	Stantec Proposed	09-Ker,SBd-58-R128.0/R143.9, 0.0/0.8
09-N572	Tested	9	KER	395	N	24.03	24.13	DS	09-250004	AC Overlay	AC	QA/QC (Updated)	09-Ker-395-23.6/47.2
09-N573	Tested	9	KER	395	N	26.22	26.33	DS	09-250004	AC Overlay	AC	QA/QC (Updated)	09-Ker-395-23.6/47.2

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
09-N574	Tested	9	KER	395	N	26.81	26.91	DS	09-250004	AC Overlay	AC	QA/QC (Updated)	09-Ker-395-23.6/47.2
09-N575	Tested	9	KER	395	N	29.03	29.14	DS	09-250004	AC Overlay	AC	QA/QC (Updated)	09-Ker-395-23.6/47.2
09-N576	Tested	9	KER	395	N	30.06	30.16	DS	09-250004	AC Overlay	AC	QA/QC (Updated)	09-Ker-395-23.6/47.2
09-NA02	Tested	9	INY	395	N	17.59	17.70	DS	09-272605	Mill + AC Overlay + Fabric	AC	Stantec Proposed	09-Iny-395-11.8/20.5
10-L60201	Tested	10	MER	99	N	32.40	33.79	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.6
10-L60202	Tested	10	MER	99	N	32.40	33.07	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.6
10-L60203	Tested	10	MER	99	N	32.40	32.49	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.7
10-L60204	Tested	10	MER	99	N	32.40	33.21	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.8
10-L60205	Tested	10	MER	99	N	32.40	33.55	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.7
10-L60206	Tested	10	MER	99	N	32.40	32.84	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.10
10-L60207	Tested	10	MER	99	N	32.40	32.73	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.11
10-L60208	Tested	10	MER	99	N	32.40	33.45	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.8
10-L60209	Tested	10	MER	99	N	32.40	33.68	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.10
10-L60210	Tested	10	MER	99	N	32.40	32.96	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.14
10-L60211	Tested	10	MER	99	N	32.40	32.61	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.15
10-L60212	Tested	10	MER	99	N	32.40	33.33	CV	LTPP	SPS-2: Structural Factors for Rigid Pavements	PC	LTPP	10-Mer-99-32.4/37.16
10-L62647	Tested	10	TUO	120	E	4.58	4.67	CV	LTPP	GPS-2: AC on Bound Base	AC	LTPP	10-TUO-120-3/5
10-L63042	Tested	10	SJ	5	N	48.60	48.69	CV	LTPP	GPS-3: Jointed Plain Concrete Pavement (JPCP)	PC	LTPP	10-SJ-5-47/49
10-N582	Tested	10	SJ	580	E	5.02	5.12	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0
10-N583	Tested	10	SJ	580	E	6.16	6.26	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0
10-N584	Tested	10	SJ	580	E	7.06	7.16	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0
10-N585	Tested	10	SJ	580	E	7.72	7.82	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0
10-N588	Tested	10	SJ	580	W	6.21	6.32	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
10-N589	Tested	10	SJ	580	W	6.59	6.70	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0
10-N590	Tested	10	SJ	580	W	7.70	7.80	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0
10-N591	Tested	10	SJ	580	W	8.60	8.70	CV	10-495904	C&S + AC Overlay + Fabric	AC	QA/QC (RFP)	10-SJ-580-4.5/9.0
10-N592	Tested	10	STA	132	E	5.23	5.33	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N593	Tested	10	STA	132	E	5.63	5.73	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N594	Tested	10	STA	132	E	5.88	5.99	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N595	Tested	10	STA	132	E	6.71	6.81	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N596	Tested	10	STA	132	E	7.03	7.13	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N597	Tested	10	STA	132	E	7.26	7.37	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N598	Tested	10	STA	132	E	7.77	7.87	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N599	Tested	10	STA	132	E	8.25	8.35	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N600	Tested	10	STA	132	E	8.67	8.77	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-N601	Tested	10	STA	132	E	8.85	8.95	BA	10-484204	RAC Overlay	AC	PMS List	10-Sta-132-5/9
10-S984	Tested	10	SJ	120	E	18.61	18.71	CV	10-296614	AC Overlay + SAMI	AC	Stantec Proposed	10-SJ-120-17.3/21.2
10-S988	Tested	10	SJ	120	E	19.38	19.49	CV	10-296614	AC Overlay + SAMI	AC	Stantec Proposed	10-SJ-120-17.3/21.2
10-S989	Tested	10	SJ	120	E	20.36	20.46	CV	10-296614	AC Overlay + SAMI	AC	Stantec Proposed	10-SJ-120-17.3/21.2
10-S990	Tested	10	SJ	120	E	20.73	20.83	CV	10-296614	AC Overlay + SAMI	AC	Stantec Proposed	10-SJ-120-17.3/21.2
11-N602	Tested	11	IMP	8	E	76.81	76.91	DS	11-093504	AC Overlay	AC	QA/QC (Updated)	11-Imp-8-76.6/83.3
11-N603	Tested	11	IMP	8	E	77.50	77.60	DS	11-093504	AC Overlay	AC	QA/QC (Updated)	11-Imp-8-76.6/83.3
11-N604	Tested	11	IMP	8	E	78.47	78.57	DS	11-093504	AC Overlay	AC	QA/QC (Updated)	11-Imp-8-76.6/83.3
11-N605	Tested	11	IMP	8	E	79.81	79.92	DS	11-093504	AC Overlay	AC	QA/QC (Updated)	11-Imp-8-76.6/83.3
11-N606	Tested	11	IMP	8	E	80.35	80.45	DS	11-093504	AC Overlay	AC	QA/QC (Updated)	11-Imp-8-76.6/83.3
11-N619	Tested	11	IMP	86	E	25.75	25.85	DS	11-194834	Construction (AC)	AC	QA/QC (Updated)	11-Imp-86-21.8/27.3
11-N620	Tested	11	IMP	86	E	26.60	26.70	DS	11-194834	Construction (AC)	AC	QA/QC (Updated)	11-Imp-86-21.8/27.3
11-N621	Tested	11	IMP	86	E	27.82	27.93	DS	11-194854	Construction (AC)	AC	PMS List	11-Imp-86-27.7/33.6
11-N622	Tested	11	IMP	86	E	28.41	28.51	DS	11-194854	Construction (AC)	AC	PMS List	11-Imp-86-27.7/33.6

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
11-N624	Tested	11	IMP	86	E	31.71	31.82	DS	11-194854	Construction (PCC)	PC	PMS List	11-Imp-86-27.7/33.6
11-N625	Tested	11	IMP	86	W	19.73	19.84	DS	11-188374	Mill + RAC Overlay	AC	PMS List	11-Imp-86-19.5/20.6
11-N626	Tested	11	IMP	86	W	20.11	20.22	DS	11-188374	Mill + RAC Overlay	AC	PMS List	11-Imp-86-19.5/20.6
11-N627	Tested	11	IMP	86	W	20.45	20.56	DS	11-188374	Mill + RAC Overlay	AC	PMS List	11-Imp-86-19.5/20.6
11-N628	Tested	11	IMP	86	W	23.11	23.21	DS	11-194834	Construction (PCC)	PC	QA/QC (Updated)	11-Imp-86-21.8/27.3
11-N629	Tested	11	IMP	86	W	23.84	23.95	DS	11-194834	Construction (PCC)	PC	QA/QC (Updated)	11-Imp-86-21.8/27.3
11-N630	Tested	11	IMP	86	W	25.13	25.24	DS	11-194834	Construction (PCC)	PC	QA/QC (Updated)	11-Imp-86-21.8/27.3
11-N632	Tested	11	IMP	86	W	26.75	26.86	DS	11-194834	Construction (PCC)	PC	QA/QC (Updated)	11-Imp-86-21.8/27.3
11-N633	Tested	11	IMP	86	W	29.45	29.56	DS	11-194854	Construction (PCC)	PC	PMS List	11-Imp-86-27.7/33.6
11-N635	Tested	11	IMP	86	W	31.87	31.98	DS	11-194854	Construction (PCC)	PC	PMS List	11-Imp-86-27.7/33.6
11-N636	Tested	11	IMP	86	W	32.97	33.08	DS	11-194854	Construction (PCC)	PC	PMS List	11-Imp-86-27.7/33.6
11-N637	Tested	11	IMP	86	W	51.12	51.22	DS	11-182664	Mill + AC Overlay + Fabric	AC	Stantec Proposed	11-imp-86-50.4/55.7
11-N638	Tested	11	IMP	86	W	52.04	52.14	DS	11-182664	Mill + AC Overlay + Fabric	AC	Stantec Proposed	11-imp-86-50.4/55.7
11-N639	Tested	11	IMP	86	W	52.38	52.48	DS	11-182664	Mill + AC Overlay + Fabric	AC	Stantec Proposed	11-imp-86-50.4/55.7
11-N640	Tested	11	IMP	86	W	52.73	52.83	DS	11-182664	Mill + AC Overlay + Fabric	AC	Stantec Proposed	11-imp-86-50.4/55.7
11-N641	Tested	11	IMP	86	W	55.01	55.11	DS	11-182664	Mill + AC Overlay + Fabric	AC	Stantec Proposed	11-imp-86-50.4/55.7
11-N642	Tested	11	SD	8	E	26.13	26.23	SC	11-174314	Mill + AC Overlay	AC	Stantec Proposed	11-SD-8-R25.7/32.0
11-N643	Tested	11	SD	8	E	27.23	27.33	SC	11-174314	Mill + AC Overlay	AC	Stantec Proposed	11-SD-8-R25.7/32.0
11-N644	Tested	11	SD	8	E	28.36	28.47	SC	11-174314	Mill + AC Overlay	AC	Stantec Proposed	11-SD-8-R25.7/32.0
11-N645	Tested	11	SD	8	E	29.63	29.74	SC	11-174314	Mill + AC Overlay	AC	Stantec Proposed	11-SD-8-R25.7/32.0
11-N646	Tested	11	SD	8	E	30.88	30.99	SC	11-174314	Mill + AC Overlay	AC	Stantec Proposed	11-SD-8-R25.7/32.0
11-N652	Tested	11	SD	15	N	10.30	10.41	SC	11-076104	PCC	PC	Stantec Proposed	11-SD-15-R16.1/M31.4
11-N653	Tested	11	SD	15	N	11.55	11.66	SC	11-076104	PCC	PC	Stantec Proposed	11-SD-15-R16.1/M31.4
11-N654	Tested	11	SD	15	N	12.39	12.49	SC	11-076104	PCC	PC	Stantec Proposed	11-SD-15-R16.1/M31.4
11-N683	Tested	11	SD	76	E	23.39	23.49	SC	11-217604	AC Overlay	AC	QA/QC (Updated)	11-SD-76-17.3/32.8
11-N684	Tested	11	SD	76	E	24.55	24.65	SC	11-217604	AC Overlay	AC	QA/QC (Updated)	11-SD-76-17.3/32.8

Section ID	Status	District No	County	Route No	Dir	Begin MP	End MP	Env	EA Number	Activity	Pave Type	Source	Location
11-N685	Tested	11	SD	76	E	25.44	25.54	SC	11-217604	AC Overlay	AC	QA/QC (Updated)	11-SD-76-17.3/32.8
11-N686	Tested	11	SD	79	N	20.72	20.82	DS	11-217704	AC Overlay	AC	QA/QC (Updated)	11-SD-79-20.2/31.7
11-N687	Tested	11	SD	79	N	21.09	21.19	DS	11-217704	AC Overlay	AC	QA/QC (Updated)	11-SD-79-20.2/31.7
11-N688	Tested	11	SD	79	N	21.41	21.52	DS	11-217704	AC Overlay	AC	QA/QC (Updated)	11-SD-79-20.2/31.7
11-N689	Tested	11	SD	79	N	22.57	22.67	DS	11-217704	AC Overlay	AC	QA/QC (Updated)	11-SD-79-20.2/31.7
11-NA03	Tested	11	IMP	86	W	51.50	51.60	DS	11-182665	Mill + AC Overlay + Fabric	AC	Stantec Proposed	11-imp-86-50.4/55.8
11-NA04	Tested	11	SD	8	E	28.36	28.47	SC	11-174315	Mill + AC Overlay	AC	Stantec Proposed	11-SD-8-R25.7/32.1
11-NX15	Tested	11	SD	79	N	21.97	22.07	DS	11-217704	AC Overlay	AC	QA/QC (Updated)	11-SD-79-20.2/31.7
11-NX19	Tested	11	SD	76	E	23.05	23.15	SC	11-217604	AC Overlay	AC	QA/QC (Updated)	11-SD-76-17.3/32.8
11-NX21	Tested	11	SD	78	E	25.34	25.44	SC	11-187834	Milling + AC Overlay	AC	Stantec Proposed	11-SD-78-24.4/26.8
11-NX23	Tested	11	IMP	78	E	23.71	23.81	DS	11-067604	Milling + AC Overlay	AC	PMS List	11-Imp-78-21.2/27.3
11-NX24	Tested	11	IMP	78	E	24.18	24.28	DS	11-067604	Milling + AC Overlay	AC	PMS List	11-Imp-78-21.2/27.3
11-NX25	Tested	11	IMP	78	E	24.68	24.78	DS	11-067604	Milling + AC Overlay	AC	PMS List	11-Imp-78-21.2/27.3
11-NX26	Tested	11	IMP	86	E	26.15	26.25	DS	11-194854	Construction (AC)	AC	PMS List	11-Imp-86-27.7/33.6
11-NX32	Tested	11	IMP	86	E	26.84	26.94	DS	11-194854	Construction (AC)	AC	PMS List	11-Imp-86-27.7/33.6
11-NX33	Tested	11	IMP	86	E	28.63	28.73	DS	11-194854	Construction (AC)	AC	PMS List	11-Imp-86-27.7/33.6
11-NX34	Tested	11	IMP	86	W	23.50	23.40	DS	11-194834	Construction (PCC)	PC	QA/QC (Updated)	11-Imp-86-21.8/27.3
11-NX35	Tested	11	IMP	86	W	26.12	26.02	DS	11-194854	Construction (PCC)	PC	PMS List	11-Imp-86-27.7/33.6
11-NX36	Tested	11	IMP	86	W	31.21	31.11	DS	11-194854	Construction (PCC)	PC	PMS List	11-Imp-86-27.7/33.6
11-S1000	Tested	11	IMP	78	E	21.57	21.68	DS	11-067604	Milling + AC Overlay	AC	PMS List	11-Imp-78-21.2/27.3
11-S1002	Tested	11	IMP	78	E	23.30	23.40	DS	11-067604	Milling + AC Overlay	AC	PMS List	11-Imp-78-21.2/27.3
11-S1004	Tested	11	IMP	78	E	25.21	25.31	DS	11-067604	Milling + AC Overlay	AC	PMS List	11-Imp-78-21.2/27.3
11-S1006	Tested	11	IMP	78	E	26.19	26.30	DS	11-067604	Milling + AC Overlay	AC	PMS List	11-Imp-78-21.2/27.3
11-S1065	Tested	11	SD	78	E	25.01	25.11	SC	11-187834	AC Overlay	AC	Stantec Proposed	11-SD-78-24.4/26.8
11-S1068	Tested	11	SD	78	E	25.63	25.74	SC	11-187834	AC Overlay	AC	Stantec Proposed	11-SD-78-24.4/26.8
11-S1069	Tested	11	SD	78	E	26.08	26.18	SC	11-187834	AC Overlay	AC	Stantec Proposed	11-SD-78-24.4/26.8

Appendix B: Database Tables

Table B-1: Database Tables

Table	Field	Description
PPE_Activity Type		
	Section ID	Section ID (unique key)
	Activity Type	Applied activity
PPE_Adjusted Average Deflection		
	SectionID	Section ID (unique key)
	Average of Adjusted_D1	FWD deflections after applying correlation and temperature adjusted models averaged for the section
	Average of Adjusted_D2	
	Average of Adjusted_D3	
	Average of Adjusted_D4	
	Average of Adjusted_D5	
	Average of Adjusted_D6	
	Average of Adjusted_D7	
	Average of Adjusted_D8	
	Average of Adjusted_D9	
PPE_Adjusted Backcalculation		
	Section ID	Section ID (unique key)
	Average _ Adjusted Ep	Backcalculation results after applying correlation and temperature adjusted models averaged for the section
	Average MR	
	Average_Kstatic	
	Average_Epcc	
PPE_Cores		
	SectionID	Section ID (unique key)
	Source	Core ID
	Station	Core location

Table	Field	Description
	CoreDate	Date
	CoreDiameter	Diameter (in)
PPE_County (Code Table)		
	CountyCode	County Code
	CountyName	County Name
PPE_Distress		
	ID	Record ID
	SectionID	Section ID (unique key)
	BeginStation	Begin Station
	EndStation	End Station
	TestDate	Test Date
	Pave Type	Pave Type
	Distress Index	PCI
PPE_Distress_Phase2All_Final		
	no	Record ID
	Date	Test Date
	CloudCover	Clear, cloud,..
	Section ID	Section ID (unique key)
	Weather	Warm, …
	Temp	Air temperature
	District	Section physical location
	County	
	Route	
	Direction	
	PictureNo	Picture #, if applicable
	Surf_Type	Pavement type
	Stationfrom	Begin Station
	StationTo	End Station
	MpTo	Begin MP
	MpFrom	End MP
	Distress_Type	Distress type*
	Severity	Distress severity*
	Extent	Distress extent*
	Comments	
PPE_Distress_Types		
	ID	Number used to refer to distress in PPE_Distress tables

Table	Field	Description
	Surf_Type	Pavement type – AC or PC
	Distress_Type	Distress referenced by number and pavement type
	Severity Levels	Meaning of low (L), medium (M), and high (H) severity
	Extent	How extent of distress measured
PPE_ESAL		
	Section ID	Section ID (unique key)
	Traffic ID Group	Sections located in the same traffic segments have the same Traffic ID Group
	Project ID Group	Sections located within the same project have the same Project ID Group
	Acc ESAL 2004	Total ESAL from 2004 (year of roughness measurements and year of WIM measurement)
	Acc ESAL 2005	Total ESAL from 2004 (year of FWD measurements and year of WIM measurement)
PPE_FWD		
	SectionID	Section ID (unique key)
	Path	Wheel path
	Station	Test station
	JointNo	for PCC pavements
	TestType	F for flexible and A,L or M for PCC pavements
	LoadSize	Applied load
	Deflect1	Recorded deflections
	Deflect2	
	Deflect3	
	Deflect4	
	Deflect5	
	Deflect6	
	Deflect7	
	Deflect8	
	Deflect9	
	SurfaceTemp	Pavement surface temperature
	PavTemp	N/A
	AirTemp	Air temperature
	LTE1	Load Transfer Efficiency (LTE) calculated using 2 models
	LTE2	
	DeflArea	PCC pavement backcalculation results
	Kstatic	

Table	Field	Description
	EPCC	Flexible pavement backcalculation results
	MR	
	Ep	
	Egranular	
	SNeff	
	GrvlThick	
PPE_FWDDesc		
	SectionId	Section ID (unique key)
	Path	FWD setup used during the testing
	FileName	
	TestDate	
	PlateRadius	
	Distance1	
	Distance2	
	Distance3	
	Distance4	
	Distance5	
	Distance6	
	Distance7	
	Distance8	
	Distance9	
PPE_HighwayID		
	RouteLink	
	SectionID	Section ID (unique key)
	RouteNo	Basic information about the section physical location
	RouteType	
	DistrictNo	
	County	
	EnvZone	
	Rte_ID	
	BeginMP	
	EndMP	
	LaneDesc	
	LaneNo	
	Phase	
	PaveType	

Table	Field	Description
	WimSite	
	TrafficID	
PPE_Images		
	SectionID	Section ID (unique key)
	Station	Image identification
	Forward	
	Back	
PPE_Layers		
	SectionID	Section ID (unique key)
	Source	Source of the information (as-built or core)
	LayerNo	Basic layer information and laboratory test results
	LayerType	
	LayerMaterial	
	LayerThickness	
	LayerDesc	
	ACType	
	ACContent	
	AggContent	
	AggGrad_1500	
	AggGrad_0750	
	AggGrad_0375	
	AggGrad_4	
	AggGrad_8	
	AggGrad_16	
	AggGrad_30	
	AggGrad_50	
	AggGrad_100	
	AggGrad_200	
	ACVoid	
	BulkGravity	
	RiceGravity	
	UnitWeight	
PPE_Projects		
	SectionID	Section ID (unique key)
	Source	As-built information
	ConstructYear	

Table	Field	Description
	SurfType	
	Comments	
PPE_Roughness		
	SectionID	Section ID (unique key)
	BeginStation	Begin Station
	EndStation	End Station
	TestDate	Test Date
	L_IRI	Left IRI
	R_IRI	Right IRI
	Avg_IRI	Average IRI
	L_Rut	Left rut depth
	R_Rut	Right rut depth
	Avg_Rut	Average rut depth
PPE_Site_Characterization_Phase2All_final		
	ID	Section ID (unique key)
	Time	Site characterization data
	Sec_ID	
	Weather	
	CloudCover	
	Temp	
	District	
	County	
	StationFrom	
	Route	
	Direction	
	StationTo	
	PictureNo	
	PaveType	
	Geometry	
	Drive_Int	
	TrfcLighOverCables	
	Substructure	
	ShldType	
	ShldCondition	
	ShoulderWidth	
	Ditch	

Table	Field	Description
	Culvert	
	Manholes	
	Catchbasin	
	Comments	
PPE_Study1		
	Section ID	Section ID (unique key)
	Sample Type	Laboratory results for the additional tests performed on the sections included in Study 1 (Construction Quality)
	Status	
	Moisture Content (%)	
	sieve 2(Inch)	
	sieve 1,5(Inch)	
	sieve 1(Inch)	
	sieve 0,75(Inch)	
	sieve 0,50(Inch)	
	sieve 0,375(Inch)	
	sieve # 4	
	sieve # 8	
	sieve # 16	
	sieve # 30	
	sieve # 50	
	sieve # 100	
	sieve # 200	

*See Table 2-1.

Appendix C: Dates of Seasonal FWD Testing

Table C-1: Dates of Seasonal FWD Testing

Site ID	Surface Type	Test Date
ALISO_S	AC	23-Mar-05
ALISO_S	AC	28-Apr-05
ALISO_S	AC	23-Jun-05
ALISO_S	AC	30-Jul-05
ALISO_S	AC	18-Aug-05
ALISO_S	AC	01-Oct-05
ALISO_S	AC	19-Oct-05
ALISO_S	AC	23-Nov-05
ALISO_S	AC	14-Dec-05
ALISO_S	AC	28-Jan-06
ALISO_S	AC	08-Mar-06
ALISO_S	AC	23-Mar-06
ALISO_S	AC	27-Apr-06
ANT_E	AC	03-Feb-05
ANT_E	AC	02-May-05
ANT_E	AC	28-Jun-05
ANT_E	AC	25-Jul-05
ANT_E	AC	22-Aug-05
ANT_E	AC	26-Sep-05
ANT_E	AC	18-Nov-05
ANT_E	AC	20-Dec-05
ANT_E	AC	01-Feb-06
ANT_E	AC	01-Mar-06
ANT_E	AC	03-Apr-06
ANT_E	AC	21-Apr-06
ANT_E	AC	01-Mar-06
BUCK_W	AC	16-Feb-05
BUCK_W	AC	05-May-05
BUCK_W	AC	30-Jun-05
BUCK_W	AC	26-Jul-05
BUCK_W	AC	24-Aug-05
BUCK_W	AC	27-Sep-05
BUCK_W	AC	26-Oct-05
BUCK_W	AC	19-Nov-05
BUCK_W	AC	19-Dec-05
BUCK_W	AC	31-Jan-06

Site ID	Surface Type	Test Date
BUCK_W	AC	04-Mar-06
BUCK_W	AC	05-Apr-06
BUCK_W	AC	24-Apr-06
CAM_W	AC	15-Feb-05
CAM_W	AC	04-May-05
CAM_W	AC	29-Jun-05
CAM_W	AC	24-Jul-05
CAM_W	AC	23-Aug-05
CAM_W	AC	25-Sep-05
CAM_W	AC	24-Oct-05
CAM_W	AC	17-Nov-05
CAM_W	AC	21-Dec-05
CAM_W	AC	02-Feb-06
CAM_W	AC	01-Apr-06
CAM_W	AC	22-Apr-06
DES_W	AC	23-Mar-05
DES_W	AC	29-Apr-05
DES_W	AC	24-Jun-05
DES_W	AC	29-Jul-05
DES_W	AC	19-Aug-05
DES_W	AC	30-Sep-05
DES_W	AC	20-Oct-05
DES_W	AC	23-Nov-05
DES_W	AC	15-Dec-05
DES_W	AC	28-Jan-06
DES_W	AC	07-Mar-06
DES_W	AC	24-Mar-06
DES_W	AC	27-Apr-06
DUN_N	AC	02-Feb-05
DUN_N	AC	02-May-05
DUN_N	AC	30-Jun-05
DUN_N	AC	25-Jul-05
DUN_N	AC	23-Aug-05
DUN_N	AC	26-Sep-05
DUN_N	AC	25-Oct-05
DUN_N	AC	18-Nov-05
DUN_N	AC	18-Dec-05
DUN_N	AC	30-Jan-06
DUN_N	AC	02-Mar-06
DUN_N	AC	03-Apr-06

Site ID	Surface Type	Test Date
DUN_N	AC	23-Apr-06
GOLD_W	AC	04-Feb-05
GOLD_W	AC	03-May-05
GOLD_W	AC	28-Jun-05
GOLD_W	AC	23-Aug-05
GOLD_W	AC	25-Sep-05
GOLD_W	AC	24-Oct-05
GOLD_W	AC	17-Nov-05
GOLD_W	AC	21-Dec-05
GOLD_W	AC	02-Feb-06
GOLD_W	AC	01-Apr-06
GOLD_W	AC	22-Apr-06
GOLD_W	AC	24-Jul-05
IRV_N	AC	05-May-05
IRV_N	AC	30-Jun-05
IRV_N	AC	26-Jul-05
IRV_N	AC	24-Aug-05
IRV_N	AC	28-Sep-05
IRV_N	AC	25-Oct-05
IRV_N	AC	19-Nov-05
IRV_N	AC	18-Dec-05
IRV_N	AC	03-Mar-06
IRV_N	AC	15-Feb-05
IRV_N	AC	05-May-05
TRIN_N	AC	16-Feb-05
TRIN_N	AC	05-May-05
TRIN_N	AC	01-Jul-05
TRIN_N	AC	27-Jul-05
TRIN_N	AC	24-Aug-05
TRIN_N	AC	27-Sep-05
TRIN_N	AC	26-Oct-05
TRIN_N	AC	19-Nov-05
TRIN_N	AC	19-Dec-05
TRIN_N	AC	31-Jan-06
TRIN_N	AC	03-Mar-06
TRIN_N	AC	05-Apr-06
TRIN_N	AC	24-Apr-06
WHITE_E	AC	22-Mar-05
WHITE_E	AC	22-Mar-05
WHITE_E	AC	29-Apr-05

Site ID	Surface Type	Test Date
WHITE_E	AC	24-Jun-05
WHITE_E	AC	19-Aug-05
WHITE_E	AC	30-Sep-05
WHITE_E	AC	20-Oct-05
WHITE_E	AC	22-Nov-05
WHITE_E	AC	15-Dec-05
WHITE_E	AC	28-Jan-06
WHITE_E	AC	07-Mar-06
WHITE_E	AC	24-Mar-06
WHITE_E	AC	27-Apr-06
WHITE_W	AC	22-Mar-05
WHITE_W	AC	29-Apr-05
WHITE_W	AC	24-Jun-05
WHITE_W	AC	29-Jul-05
WHITE_W	AC	19-Aug-05
WHITE_W	AC	30-Sep-05
WHITE_W	AC	20-Oct-05
WHITE_W	AC	27-Apr-06
WHITE_W	AC	22-Nov-05
WHITE_W	AC	15-Dec-05
WHITE_W	AC	28-Jan-06
WHITE_W	AC	07-Mar-06
WHITE_W	AC	24-Mar-06
ANT_E	PC	03-Feb-05
ANT_E	PC	02-May-05
ANT_E	PC	28-Jun-05
ANT_E	PC	25-Jul-05
ANT_E	PC	21-Apr-06
ANT_E	PC	22-Aug-05
ANT_E	PC	26-Sep-05
ANT_E	PC	18-Nov-05
ANT_E	PC	20-Dec-05
ANT_E	PC	01-Feb-06
ANT_E	PC	01-Mar-06
ANT_E	PC	03-Apr-06
ANT_W	PC	03-Feb-05
ANT_W	PC	22-Aug-05
ANT_W	PC	26-Sep-05
ANT_W	PC	24-Oct-05
ANT_W	PC	17-Nov-05

Site ID	Surface Type	Test Date
ANT_W	PC	20-Dec-05
ANT_W	PC	02-Feb-06
ANT_W	PC	01-Mar-06
ANT_W	PC	03-Apr-06
ANT_W	PC	28-Jun-05
ANT_W	PC	25-Jul-05
ANT_W	PC	21-Apr-06
ANT_W	PC	02-May-05
BUCK_W	PC	16-Feb-05
BUCK_W	PC	30-Jun-05
BUCK_W	PC	26-Jul-05
BUCK_W	PC	24-Aug-05
BUCK_W	PC	27-Sep-05
BUCK_W	PC	26-Oct-05
BUCK_W	PC	19-Nov-05
BUCK_W	PC	19-Dec-05
BUCK_W	PC	31-Jan-06
BUCK_W	PC	04-Mar-06
BUCK_W	PC	05-Apr-06
BUCK_W	PC	05-May-05
BUCK_W	PC	24-Apr-06
CAM_W	PC	15-Feb-05
CAM_W	PC	24-Jul-05
CAM_W	PC	23-Aug-05
CAM_W	PC	25-Sep-05
CAM_W	PC	24-Oct-05
CAM_W	PC	17-Nov-05
CAM_W	PC	21-Dec-05
CAM_W	PC	02-Feb-06
CAM_W	PC	01-Apr-06
CAM_W	PC	29-Jun-05
CAM_W	PC	04-May-05
CAM_W	PC	22-Apr-06
CORD_W	PC	05-Feb-05
CORD_W	PC	24-Jul-05
CORD_W	PC	26-Jun-05
CORD_W	PC	02-May-05
CORD_W	PC	22-Apr-06
CORD_W	PC	21-Aug-05
CORD_W	PC	25-Sep-05

Site ID	Surface Type	Test Date
CORD_W	PC	23-Oct-05
CORD_W	PC	20-Nov-05
CORD_W	PC	17-Dec-05
CORD_W	PC	29-Jan-06
CORD_W	PC	05-Mar-06
CORD_W	PC	02-Apr-06
CORD_W	PC	05-Mar-06
NIM_S	PC	17-Feb-05
NIM_S	PC	29-Sep-05
NIM_S	PC	21-Oct-05
NIM_S	PC	20-Nov-05
NIM_S	PC	17-Dec-05
NIM_S	PC	30-Jan-06
NIM_S	PC	05-Mar-06
NIM_S	PC	02-Apr-06
NIM_S	PC	26-Jun-05
NIM_S	PC	01-May-05
NIM_S	PC	25-Apr-06
PER_E	PC	29-Jul-05
PER_E	PC	22-Nov-05
PER_E	PC	16-Dec-05
PER_E	PC	28-Jan-06
PER_E	PC	07-Mar-06
PER_E	PC	23-Mar-06
PER_E	PC	24-Jun-05
PER_E	PC	19-Aug-05
PER_E	PC	30-Sep-05
PER_E	PC	20-Oct-05
PER_E	PC	22-Mar-05
PER_E	PC	29-Apr-05
PER_E	PC	27-Apr-06

Appendix D: Traffic Study Results

Table D-1: Results of Traffic Study

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
01-N006	1233	2	1,593,451	1,229,689
01-N007	1233	2	1,593,451	1,229,689
01-N008	1233	2	1,593,451	1,229,689
01-N009	1233	2	1,593,451	1,229,689
01-N010	1233	2	1,593,451	1,229,689
01-N011	1233	3	1,593,451	1,229,689
01-N012	1233	3	1,593,451	1,229,689
01-N013	1233	3	1,593,451	1,229,689
01-N014	1233	3	1,593,451	1,229,689
01-N016	1234	4	2,837,023	2,189,372
01-N017	1234	4	2,837,023	2,189,372
01-N018	1234	4	2,837,023	2,189,372
01-N019	1234	4	2,837,023	2,189,372
01-N020	1234	4	2,837,023	2,189,372
01-N021	1235	5	4,564,213	3,608,115
01-N022	1235	5	4,564,213	3,608,115
01-N023	1235	5	4,564,213	3,608,115
01-N024	1235	5	4,564,213	3,608,115
01-N025	1235	5	4,564,213	3,608,115
01-N026	1235	6	4,564,213	3,608,115
01-N027	1235	6	4,564,213	3,608,115
01-N028	1235	6	4,564,213	3,608,115
01-N029	1235	6	4,564,213	3,608,115
01-N030	1235	6	4,564,213	3,608,115
01-N031	1236	7	1,863,570	1,461,555
01-N032	1237	7	1,863,570	1,461,555
01-N033	1237	7	1,863,570	1,461,555
01-N034	1237	7	1,863,570	1,461,555
01-N035	1237	7	1,863,570	1,461,555
01-N036	1238	8	1,863,570	1,461,555
01-N037	1238	8	1,863,570	1,461,555
01-N038	1238	8	1,863,570	1,461,555
01-N039	1238	8	1,863,570	1,461,555
01-N040	1238	8	1,863,570	1,461,555

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
01-N041	1239	9	254,923	196,728
01-N042	1239	9	254,923	196,728
01-N043	1239	9	254,923	196,728
01-N044	1239	9	254,923	196,728
01-N045	1239	9	254,923	196,728
01-N081	1257	9	3,698,942	2,854,527
01-N082	1257	9	3,698,942	2,854,527
01-N083	1257	9	3,698,942	2,854,527
01-N084	1257	9	3,698,942	2,854,527
01-N085	1258	10	3,210,323	2,524,538
01-N086	1258	10	3,210,323	2,524,538
01-N087	1258	10	3,210,323	2,524,538
01-N088	1258	10	3,210,323	2,524,538
01-N090	1172	11	4,312,803	3,328,252
01-N091	1172	11	4,312,803	3,328,252
01-N092	1172	11	4,312,803	3,328,252
01-N093	1172	11	4,312,803	3,328,252
01-N094	1172	11	4,312,803	3,328,252
01-N095	1172	11	4,312,803	3,328,252
01-N096	1172	11	4,312,803	3,328,252
01-N097	1172	12	3,635,606	2,729,167
01-N098	1172	12	3,635,606	2,729,167
01-N099	1172	12	3,635,606	2,729,167
01-N100	1172	12	3,635,606	2,729,167
01-N101	1172	12	3,635,606	2,729,167
01-N102	1149	13	447,398	345,263
01-N103	1149	13	447,398	345,263
01-N104	1149	13	447,398	345,263
01-N105	1149	13	447,398	345,263
01-N106	1149	13	447,398	345,263
01-N107	1149	13	447,398	345,263
01-N108	1149	13	447,398	345,263
01-N109	1149	13	447,398	345,263
01-N110	1149	13	447,398	345,263
01-N111	1149	13	447,398	345,263
01-N112	1150	14	139,020	108,887
01-N113	1150	14	139,020	108,887
01-N114	1150	14	139,020	108,887

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
01-N115	1150	14	139,020	108,887
01-N116	1150	14	139,020	108,887
01-N117	1150	14	139,020	108,887
01-N118	1150	14	139,020	108,887
01-N119	1150	14	139,020	108,887
01-N120	1150	14	139,020	108,887
01-N121	1150	14	139,020	108,887
01-N122	1151	15	167,548	129,757
01-N123	1151	15	167,548	129,757
01-N124	1151	15	167,548	129,757
01-N125	1151	15	167,548	129,757
01-N126	1151	15	167,548	129,757
01-N127	1153	16	167,548	129,757
01-N128	1153	16	167,548	129,757
01-N129	1153	16	167,548	129,757
01-N130	1153	16	167,548	129,757
01-N131	1153	16	167,548	129,757
01-N132	1152	17	167,548	129,757
01-N133	1152	17	167,548	129,757
01-N134	1152	17	167,548	129,757
01-N135	1152	17	167,548	129,757
01-N136	1152	17	167,548	129,757
01-N137	1231	18	9,549,820	7,539,052
01-N138	1231	18	9,549,820	7,539,052
01-N139	1231	18	9,549,820	7,539,052
01-N140	1231	18	9,549,820	7,539,052
01-N141	1231	18	9,549,820	7,539,052
01-N142	1231	18	9,549,820	7,539,052
01-N143	1231	18	9,549,820	7,539,052
01-N144	1231	18	9,549,820	7,539,052
01-N145	1231	18	9,549,820	7,539,052
01-N146	1231	18	9,549,820	7,539,052
01-N147	1232	19	7,576,555	5,958,061
01-N148	1232	19	7,576,555	5,958,061
01-N149	1232	19	7,576,555	5,958,061
01-N150	1232	19	7,576,555	5,958,061
01-N151	1232	19	7,576,555	5,958,061
01-N152	1232	19	7,576,555	5,958,061

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
01-N153	1232	19	7,576,555	5,958,061
01-N154	1232	19	7,576,555	5,958,061
01-N155	1232	19	7,576,555	5,958,061
01-N156	1232	19	7,576,555	5,958,061
01-N157	1241	20	214,202	165,303
01-N158	1241	20	214,202	165,303
01-N159	1241	20	214,202	165,303
01-N160	1241	20	214,202	165,303
01-N161	1241	20	214,202	165,303
01-S24	1256	21	1,662,217	1,339,399
01-S26	1256	21	1,662,217	1,339,399
01-S28	1256	21	1,662,217	1,339,399
01-S30	1257	21	4,821,884	3,803,772
01-S33	1257	21	4,821,884	3,803,772
01-S51	1174	22	234,715	181,133
01-S53	1174	22	234,715	181,133
01-S59	1174	22	234,715	181,133
01-S61	1174	22	234,715	181,133
01-S67452	1174	22	234,715	181,133
01-S68	1240	22	17,132,816	13,221,642
01-S69	1240	22	17,132,816	13,221,642
01-S70	1240	22	17,132,816	13,221,642
01-S72	1240	22	17,132,816	13,221,642
02-N167	1158	23	28,780,824	22,542,549
02-N168	1158	23	28,780,824	22,542,549
02-N169	1158	23	28,780,824	22,542,549
02-N170	1158	23	28,780,824	22,542,549
02-N171	1158	23	28,780,824	22,542,549
02-N172	1159	23	29,944,608	25,674,531
02-N173	1159	23	29,944,608	25,674,531
02-N174	1159	23	29,944,608	25,674,531
02-N175	1159	23	29,944,608	25,674,531
02-N177	1160	23	14,939,999	11,701,738
02-N178	1160	23	14,939,999	11,701,738
02-N179	1160	23	14,939,999	11,701,738
02-N180	1160	23	14,939,999	11,701,738
04-N181	1209	26	12,444,443	9,747,097
04-N182	1209	26	12,444,443	9,747,097

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
04-N183	1209	26	12,444,443	9,747,097
04-N186	1209	26	12,444,443	9,747,097
04-N187	1209	26	12,444,443	9,747,097
04-N188	1209	26	12,444,443	9,747,097
04-N189	1209	26	12,444,443	9,747,097
04-N196	1245	28	2,580,682	2,035,786
04-N197	1244	28	2,580,682	2,035,786
04-N198	1243	28	4,301,137	3,392,977
04-N199	1243	28	4,301,137	3,392,977
04-N200	1243	28	4,301,137	3,392,977
04-N201	1210	28	560,845	442,426
04-N202	1210	28	560,845	442,426
04-N203	1210	28	560,845	442,426
04-N204	1210	28	560,845	442,426
04-N205	1210	28	560,845	442,426
04-N206	1212	28	773,836	610,445
04-N207	1211	28	316,692	249,825
04-N208	1211	28	316,692	249,825
04-N209	1211	28	316,692	249,825
04-N210	1211	28	316,692	249,825
04-N211	1211	28	316,692	249,825
04-N212	1211	28	316,692	249,825
04-N215	1250	28	11,472,584	9,050,214
04-N216	1250	28	11,472,584	9,050,214
04-N217	1250	28	11,472,584	9,050,214
04-N220	1250	28	11,472,584	9,050,214
04-N221	1250	28	11,472,584	9,050,214
04-N235	1153	30	695,904	547,246
04-N236	1154	30	795,319	625,424
04-N237	1154	30	795,319	625,424
04-N238	1154	30	795,319	625,424
04-N240	1154	30	795,319	625,424
04-N241	1154	30	795,319	625,424
04-N242	1154	30	795,319	625,424
04-N243	1154	30	795,319	625,424
04-N248	1200	32	4,104,019	3,199,115
04-N249	1201	32	7,045,695	5,437,265
04-N250	1201	32	7,045,695	5,437,265

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
04-N251	1202	32	4,104,019	3,199,115
04-N252	1203	32	8,004,822	6,177,437
04-N253	1204	33	2,399,600	1,862,523
04-N254	1204	33	2,399,600	1,862,523
04-N255	1204	33	2,399,600	1,862,523
04-N256	1204	33	2,399,600	1,862,523
04-N257	1204	33	2,399,600	1,862,523
04-N259	1205	34	6,419,343	5,074,638
04-N260	1205	34	6,419,343	5,074,638
04-N261	1205	34	6,419,343	5,074,638
04-N263	1148	35	73,149	57,294
04-N264	1148	35	73,149	57,294
04-N265	1148	35	73,149	57,294
04-N266	1148	35	73,149	57,294
04-N267	1148	35	73,149	57,294
04-N268	1148	35	73,149	57,294
04-N269	1148	35	73,149	57,294
04-N270	1148	35	73,149	57,294
04-N271	1148	35	73,149	57,294
04-N277	1229	37	5,656,779	4,462,383
04-N278	1229	37	5,656,779	4,462,383
04-N279	1229	37	5,656,779	4,462,383
04-N280	1229	37	5,656,779	4,462,383
04-N281	1229	37	5,656,779	4,462,383
04-N282	1230	38	2,020,278	1,593,708
04-N283	1230	38	2,020,278	1,593,708
04-N284	1230	38	2,020,278	1,593,708
04-N285	1230	38	2,020,278	1,593,708
04-N286	1242	38	2,020,278	1,593,708
04-N287	1242	38	2,020,278	1,593,708
04-N288	1242	38	2,020,278	1,593,708
04-N289	1242	38	2,020,278	1,593,708
04-N290	1242	38	2,020,278	1,593,708
05-N295	1221	40	1,092,183	847,731
05-N296	1222	40	1,092,183	847,731
05-N300	1223	41	1,092,183	847,731
05-N301	1223	41	1,092,183	847,731
05-N302	1224	42	6,280,053	4,874,454

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
05-N303	1224	42	6,280,053	4,874,454
05-N304	1224	42	6,280,053	4,874,454
05-N305	1224	42	6,280,053	4,874,454
05-N306	1225	43	1,092,183	847,731
05-N307	1225	43	1,092,183	847,731
05-N308	1225	43	1,092,183	847,731
05-N309	1225	43	1,092,183	847,731
05-N310	1226	44	1,092,183	847,731
05-N311	1226	44	1,092,183	847,731
05-N315	1226	44	1,092,183	847,731
05-N316	1226	44	1,092,183	847,731
05-N317	1226	44	1,092,183	847,731
05-N318	1226	44	1,092,183	847,731
05-N319	1226	44	1,092,183	847,731
05-N320	1227	45	1,092,183	847,731
05-N321	1227	45	1,092,183	847,731
05-N322	1227	45	1,092,183	847,731
05-N331	1251	46	1,272,004	1,004,177
05-N332	1251	46	1,272,004	1,004,177
05-N333	1251	46	1,272,004	1,004,177
05-N335	1251	46	1,272,004	1,004,177
05-N337	1147	46	28,969,820	22,870,063
05-N338	1147	46	28,969,820	22,870,063
05-N339	1147	46	28,969,820	22,870,063
05-N340	1147	46	28,969,820	22,870,063
05-N341	1147	47	18,173,295	14,024,594
05-N343	1147	47	18,173,295	14,024,594
05-N344	1147	47	18,173,295	14,024,594
05-N345	1147	47	18,173,295	14,024,594
05-N346	1155	48	2,353,699	1,858,114
05-N347	1155	48	2,353,699	1,858,114
05-N348	1155	48	2,353,699	1,858,114
05-N349	1155	48	2,353,699	1,858,114
05-N351	1155	49	1,476,518	1,139,450
05-N352	1155	49	1,476,518	1,139,450
05-N366	1228	50	41,183,217	32,511,861
05-N367	1228	50	41,183,217	32,511,861
05-N368	1228	50	41,183,217	32,511,861

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
05-N369	1228	50	41,183,217	32,511,861
05-NA01	1222	52	1,092,183	847,731
06-N396	1178	54	74,097	57,182
06-N397	1178	54	74,097	57,182
06-N398	1178	54	74,097	57,182
06-N399	1178	54	74,097	57,182
06-N400	1178	54	74,097	57,182
06-N401	1178	54	74,097	57,182
06-N402	1178	54	74,097	57,182
06-N405	1177	54	57,631	44,475
06-N406	1177	54	57,631	44,475
06-N411	1182	56	919,223	726,667
06-N412	1182	56	919,223	726,667
06-N413	1182	56	919,223	726,667
06-N414	1182	56	919,223	726,667
06-N415	1182	56	919,223	726,667
06-N416	1184	57	11,061,288	8,536,156
06-N417	1184	57	11,061,288	8,536,156
06-N418	1184	57	11,061,288	8,536,156
06-N419	1184	57	11,061,288	8,536,156
06-N420	1184	57	11,061,288	8,536,156
06-N421	1186	57	8,095,882	6,917,261
06-N422	1189	58	13,669,629	10,791,412
06-N423	1189	58	13,669,629	10,791,412
06-N424	1189	58	13,669,629	10,791,412
06-N425	1189	58	13,669,629	10,791,412
06-N426	1189	58	13,669,629	10,791,412
06-N427	1189	58	13,669,629	10,791,412
06-N428	1188	59	8,095,882	6,917,261
06-N429	1188	59	8,095,882	6,917,261
06-N430	1188	59	8,095,882	6,917,261
06-N431	1188	59	8,095,882	6,917,261
06-N432	1188	59	8,095,882	6,917,261
06-N433	1187	59	8,095,882	6,917,261
06-N434	1190	59	8,095,882	6,917,261
06-N435	1191	59	8,095,882	6,917,261
06-N436	1191	59	8,095,882	6,917,261
06-N437	1191	59	8,095,882	6,917,261

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
06-N438	1191	59	8,095,882	6,917,261
06-N439	1254	59	8,095,882	6,917,261
06-N440	1254	59	8,095,882	6,917,261
06-N441	1254	59	8,095,882	6,917,261
06-N442	1254	59	8,095,882	6,917,261
06-N443	1254	59	8,095,882	6,917,261
06-N455	1192	60	1,447,008	1,086,237
06-N456	1192	60	1,447,008	1,086,237
06-N457	1192	60	1,447,008	1,086,237
06-N458	1192	60	1,447,008	1,086,237
06-N459	1192	60	1,447,008	1,086,237
06-N460	1193	61	1,076,510	829,481
06-N461	1193	61	1,076,510	829,481
06-N462	1193	61	1,076,510	829,481
06-N463	1193	61	1,076,510	829,481
06-N464	1193	61	1,076,510	829,481
06-N465	1194	61	1,959,025	1,545,388
06-N466	1194	61	1,959,025	1,545,388
06-N467	1194	61	1,959,025	1,545,388
06-N468	1194	61	1,959,025	1,545,388
06-S424	1189	62	13,669,629	10,791,412
06-S426	1189	62	13,669,629	10,791,412
06-S428	1189	62	13,669,629	10,791,412
06-S445	1183	62	8,095,882	6,917,261
06-S447	1183	62	8,095,882	6,917,261
06-S451	1184	62	17,632,660	13,920,005
06-S455	1184	62	17,632,660	13,920,005
08-N478	1163	63	3,907,232	3,213,871
08-N479	1163	63	3,907,232	3,213,871
08-N481	1163	63	3,907,232	3,213,871
08-NX01	1163	68	3,907,232	3,213,871
08-NX30	1163	71	3,907,232	3,213,871
08-NXXX	1163	71	3,907,232	3,213,871
09-N533	1261	71	3,907,232	3,213,871
09-N534	1261	71	3,907,232	3,213,871
09-N535	1261	71	3,907,232	3,213,871
09-N536	1261	71	3,907,232	3,213,871
09-N537	1261	71	3,907,232	3,213,871

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
09-N558	1185	73	8,095,882	6,917,261
09-N559	1185	73	8,095,882	6,917,261
09-N560	1185	73	8,095,882	6,917,261
09-N561	1185	73	8,095,882	6,917,261
09-N562	1185	73	8,095,882	6,917,261
09-N563	1187	73	8,095,882	6,917,261
09-N564	1187	73	8,095,882	6,917,261
09-N565	1187	73	8,095,882	6,917,261
09-N566	1187	73	8,095,882	6,917,261
09-N567	1187	73	8,095,882	6,917,261
09-N568	1187	73	8,095,882	6,917,261
09-N569	1187	73	8,095,882	6,917,261
09-N570	1187	73	8,095,882	6,917,261
09-N571	1187	73	8,095,882	6,917,261
10-L60201	1220	76	9,645,530	8,458,952
10-L60202	1220	76	9,645,530	8,458,952
10-L60203	1220	76	9,645,530	8,458,952
10-L60204	1220	76	9,645,530	8,458,952
10-L60205	1220	76	9,645,530	8,458,952
10-L60206	1220	76	9,645,530	8,458,952
10-L60207	1220	76	9,645,530	8,458,952
10-L60208	1220	76	9,645,530	8,458,952
10-L60209	1220	76	9,645,530	8,458,952
10-L60210	1220	76	9,645,530	8,458,952
10-L60211	1220	76	9,645,530	8,458,952
10-L60212	1220	76	9,645,530	8,458,952
10-L62647	1248	76	9,645,530	8,458,952
10-L63042	1157	76	5,308,144	4,187,360
11-N642	1161	85	534,117	495,372
11-N643	1161	85	534,117	495,372
11-N644	1161	85	534,117	495,372
11-N645	1161	85	534,117	495,372
11-N646	1161	85	534,117	495,372
11-N652	1167	86	11,214,532	9,328,303
11-N653	1168	86	11,214,532	9,328,303
11-N654	1168	86	11,214,532	9,328,303
11-NA04	1161	89	534,117	495,372
11-NX21	1197	91	153,505	126,265

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
11-S1065	1197	95	153,505	126,265
11-S1068	1197	95	153,505	126,265
11-S1069	1197	95	153,505	126,265
S1000	1084	98	954,811	785,374
S1001	1084	98	954,811	785,374
S1002	1084	98	954,811	785,374
S1003	1084	98	954,811	785,374
S1004	1084	98	954,811	785,374
S1006	1084	98	954,811	785,374
S1007	1084	98	954,811	785,374
S1008	1083	99	954,811	785,374
S1009	1083	99	954,811	785,374
S101	1121	100	6,158,601	5,317,393
S1011	1083	101	954,811	785,374
S1012	1083	101	24,649,687	21,617,321
S1013	1083	101	24,649,687	21,617,321
S102	1010	101	6,158,601	5,317,393
S1028	1039	102	24,649,687	21,617,321
S1029	1039	102	24,649,687	21,617,321
S103	1012	103	6,158,601	5,317,393
S1032	1039	104	24,649,687	21,617,321
S1033	1039	104	24,649,687	21,617,321
S1034	1040	104	24,649,687	21,617,321
S1035	1040	104	9,645,530	8,458,952
S1036	1040	104	9,645,530	8,458,952
S1037	1040	104	5,308,144	4,187,360
S1038	1040	104	5,308,144	4,187,360
S1039	1040	104	5,308,144	4,187,360
S104	1012	105	6,158,601	5,317,393
S1040	1040	106	5,308,144	4,187,360
S1041	1040	106	5,308,144	4,187,360
S1042	1040	106	5,308,144	4,187,360
S1043	1040	106	5,308,144	4,187,360
S1044	1040	106	5,308,144	4,187,360
S1045	1040	106	5,308,144	4,187,360
S1046	1040	106	5,308,144	4,187,360
S1047	1040	106	5,308,144	4,187,360
S1048	1040	106	5,308,144	4,187,360

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S1049	1040	106	5,308,144	4,187,360
S105	1012	107	6,158,601	5,317,393
S1050	1040	108	5,308,144	4,187,360
S1051	1040	108	5,308,144	4,187,360
S1052	1040	108	5,308,144	4,187,360
S1053	1040	108	5,334,345	4,783,001
S106	1011	109	6,158,601	5,317,393
S1066	1082	110	5,334,345	4,783,001
S1067	1082	110	5,334,345	4,783,001
S1068	1082	110	5,334,345	4,783,001
S1069	1082	110	5,334,345	4,783,001
S107	1011	111	6,158,601	5,317,393
S1070	1082	112	5,334,345	4,783,001
S1071-1	1082	112	5,334,345	4,783,001
S1071-2	1082	112	5,334,345	4,783,001
S108	1011	113	14,855,947	13,320,474
S109	1009	115	6,158,601	5,317,393
S110	1008	118	6,158,601	5,317,393
S111	1008	121	6,158,601	5,317,393
S112	1008	123	6,158,601	5,317,393
S113	1008	126	6,158,601	5,317,393
S114	1008	128	6,158,601	5,317,393
S115	1008	130	6,158,601	5,317,393
S116	1007	131	6,158,601	5,317,393
S117	1007	131	14,855,947	13,320,474
S118	1007	131	14,855,947	13,320,474
S119	1007	131	14,855,947	13,320,474
S120	1007	133	14,855,947	13,320,474
S121	1007	133	14,855,947	13,320,474
S124	1023	134	14,855,947	13,320,474
S125	1023	134	12,023,345	10,674,443
S126	1023	134	12,023,345	10,674,443
S127	1023	134	12,023,345	10,674,443
S128	1023	134	12,023,345	10,674,443
S130	1023	136	12,023,345	10,674,443
S131	1024	136	12,023,345	10,674,443
S132	1024	136	12,023,345	10,674,443
S133	1024	136	13,458,803	11,948,857

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S134	1024	136	13,458,803	11,948,857
S135	1024	136	13,458,803	11,948,857
S136	1024	136	13,458,803	11,948,857
S137	1024	136	13,458,803	11,948,857
S138	1024	136	13,458,803	11,948,857
S139	1025	137	13,458,803	11,948,857
S141	1026	139	13,458,803	11,948,857
S142	1026	139	14,855,947	13,320,474
S143	1093	139	14,855,947	13,320,474
S144	1093	140	14,855,947	13,320,474
S145	1093	140	14,855,947	13,320,474
S146	1093	140	14,855,947	13,320,474
S147	1093	140	14,855,947	13,320,474
S148	1093	140	14,855,947	13,320,474
S149	1095	140	14,855,947	13,320,474
S150	1095	142	12,023,345	10,674,443
S152	1095	142	12,023,345	10,674,443
S153	1094	142	12,023,345	10,674,443
S154	1094	142	12,023,345	10,674,443
S155	1094	142	12,023,345	10,674,443
S166	1022	146	837,375	722,998
S177	1057	147	837,375	722,998
S18	1125	148	13,458,803	11,948,857
S189	1062	149	837,375	722,998
S19	1125	150	11,797,672	9,704,107
S190	1062	151	9,912,443	7,340,313
S191	1062	151	9,912,443	7,340,313
S192	1062	151	9,912,443	7,340,313
S193	1062	151	9,912,443	7,340,313
S194	1062	151	9,912,443	7,340,313
S195	1062	151	9,912,443	7,340,313
S196	1062	151	9,912,443	7,340,313
S197	1085	152	9,912,443	7,340,313
S198	1086	152	9,912,443	7,340,313
S199	1086	152	9,912,443	7,340,313
S20	1125	154	11,797,672	9,704,107
S200	1059	155	18,927,141	16,341,870
S201	1059	155	837,375	722,998

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S202	1059	155	837,375	722,998
S203	1059	155	837,375	722,998
S204	1058	155	837,375	722,998
S205	1058	155	837,375	722,998
S206	1060	155	837,375	722,998
S207	1060	155	837,375	722,998
S208	1060	155	837,375	722,998
S21	1125	156	13,458,803	11,948,857
S210	1061	156	837,375	722,998
S22	1125	156	11,797,672	9,704,107
S23	1126	156	11,797,672	9,704,107
S24	1126	156	11,797,672	9,704,107
S25	1126	156	11,797,672	9,704,107
S26	1126	156	11,797,672	9,704,107
S27	1126	156	11,797,672	9,704,107
S28	1126	156	11,797,672	9,704,107
S29	1126	156	11,797,672	9,704,107
S30	1126	158	11,797,672	9,704,107
S31	1126	158	11,797,672	9,704,107
S32	1126	158	13,458,803	11,948,857
S33	1126	158	11,797,672	9,704,107
S34	1047	159	11,797,672	9,704,107
S35	1047	159	11,797,672	9,704,107
S36	1047	159	11,797,672	9,704,107
S37	1046	159	11,797,672	9,704,107
S38	1045	159	11,797,672	9,704,107
S39	1045	159	11,797,672	9,704,107
S395	1103	160	837,375	722,998
S396	1103	160	837,375	722,998
S397	1103	160	234,715	181,133
S398	1103	160	234,715	181,133
S399	1103	160	234,715	181,133
S40	1045	161	11,797,672	9,704,107
S400	1103	162	234,715	181,133
S401	1103	162	234,715	181,133
S402	1103	162	234,715	181,133
S403	1103	162	8,161,002	6,903,530
S404	1103	162	8,161,002	6,903,530

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S405	1103	162	8,161,002	6,903,530
S406	1111	162	8,161,002	6,903,530
S407	1111	162	8,161,002	6,903,530
S409	1111	162	234,715	181,133
S41	1045	163	13,458,803	11,948,857
S410	1111	164	8,161,002	6,903,530
S411	1111	164	8,161,002	6,903,530
S412	1111	164	8,161,002	6,903,530
S413	1111	164	8,161,002	6,903,530
S414	1111	164	8,161,002	6,903,530
S415	1111	164	8,161,002	6,903,530
S416	1111	164	8,161,002	6,903,530
S417	1111	164	8,161,002	6,903,530
S42	1045	165	11,797,672	9,704,107
S424	1064	166	8,161,002	6,903,530
S425	1064	166	234,715	181,133
S426	1064	166	8,161,002	6,903,530
S427	1064	166	8,161,002	6,903,530
S428	1064	166	8,161,002	6,903,530
S429-1	1064	166	12,964,676	11,510,166
S429-2	1064	166	12,964,676	11,510,166
S43	1045	167	11,797,672	9,704,107
S430	1063	168	8,161,002	6,903,530
S431	1063	168	8,161,002	6,903,530
S432	1063	168	8,161,002	6,903,530
S433	1063	168	8,161,002	6,903,530
S434	1063	168	8,161,002	6,903,530
S435	1063	168	234,715	181,133
S436	1063	168	12,964,676	11,510,166
S437	1063	168	12,964,676	11,510,166
S438	1063	168	12,964,676	11,510,166
S439	1063	168	12,964,676	11,510,166
S44	1045	169	11,797,672	9,704,107
S440	1063	170	12,964,676	11,510,166
S441	1063	170	919,223	726,667
S442	1063	170	919,223	726,667
S443	1065	170	234,715	181,133
S444	1065	170	12,964,676	11,510,166

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S445	1065	170	12,964,676	11,510,166
S446	1065	170	12,964,676	11,510,166
S447	1065	170	12,964,676	11,510,166
S448	1065	170	12,964,676	11,510,166
S45	1044	171	11,797,672	9,704,107
S450	1066	172	12,964,676	11,510,166
S451	1066	172	12,964,676	11,510,166
S452	1066	172	12,964,676	11,510,166
S453	1066	172	12,964,676	11,510,166
S454	1066	172	12,964,676	11,510,166
S455	1066	172	234,715	181,133
S456	1066	172	12,964,676	11,510,166
S457	1066	172	12,964,676	11,510,166
S458	1066	172	12,964,676	11,510,166
S459	1066	172	12,964,676	11,510,166
S46	1044	173	13,458,803	11,948,857
S460	1066	174	12,964,676	11,510,166
S461-1	1066	174	12,964,676	11,510,166
S461-2	1066	174	12,964,676	11,510,166
S465	1101	175	12,964,676	11,510,166
S466	1101	175	12,964,676	11,510,166
S467	1101	175	12,964,676	11,510,166
S468	1100	175	12,964,676	11,510,166
S469	1100	175	234,715	181,133
S47	1044	176	307,010	252,529
S470	1100	177	12,964,676	11,510,166
S48	1044	178	307,010	252,529
S481	1099	179	12,964,676	11,510,166
S482	1099	179	12,964,676	11,510,166
S483	1099	179	12,964,676	11,510,166
S484	1099	179	234,715	181,133
S485	1099	179	12,964,676	11,510,166
S486	1099	179	919,223	726,667
S487	1099	179	919,223	726,667
S488	1099	179	17,563,874	15,164,813
S489	1099	179	17,563,874	15,164,813
S49	1044	180	307,010	252,529
S490	1099	181	17,563,874	15,164,813

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S491	1099	181	17,910,030	15,463,687
S492	1099	181	17,910,030	15,463,687
S493	1099	181	234,715	181,133
S494	1099	181	17,910,030	15,463,687
S495	1099	181	234,715	181,133
S496	1099	181	17,746,903	15,563,707
S497	1099	181	17,746,903	15,563,707
S498	1099	181	17,746,903	15,563,707
S499	1099	181	17,746,903	15,563,707
S50	1044	182	307,010	252,529
S500	1099	183	17,746,903	15,563,707
S501	1099	183	17,746,903	15,563,707
S502	1099	183	17,746,903	15,563,707
S503	1099	183	17,746,903	15,563,707
S504	1099	183	17,746,903	15,563,707
S505	1099	183	234,715	181,133
S506	1099	183	17,746,903	15,563,707
S507	1099	183	17,746,903	15,563,707
S508	1099	183	17,746,903	15,563,707
S509	1099	183	17,746,903	15,563,707
S51	1048	184	307,010	252,529
S510	1099	185	17,746,903	15,563,707
S511	1099	185	17,746,903	15,563,707
S512	1099	185	17,746,903	15,563,707
S513	1099	185	17,746,903	15,563,707
S514	1099	185	17,746,903	15,563,707
S515	1099	185	17,746,903	15,563,707
S517	1019	186	17,746,903	15,563,707
S518	1019	186	17,746,903	15,563,707
S519	1019	186	17,746,903	15,563,707
S52	1048	186	13,458,803	11,948,857
S520	1019	186	17,746,903	15,563,707
S521	1019	186	17,746,903	15,563,707
S522	1019	186	17,746,903	15,563,707
S523	1019	186	17,746,903	15,563,707
S524	1019	186	17,746,903	15,563,707
S525	1019	186	17,746,903	15,563,707
S526	1019	186	17,746,903	15,563,707

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S53	1048	186	307,010	252,529
S531	1018	186	234,715	181,133
S532	1018	186	17,746,903	15,563,707
S533	1018	186	17,746,903	15,563,707
S534	1018	186	17,746,903	15,563,707
S535	1018	186	17,746,903	15,563,707
S536	1018	186	17,746,903	15,563,707
S537	1018	186	17,746,903	15,563,707
S538	1018	186	17,746,903	15,563,707
S539	1018	186	12,592,276	10,357,703
S54	1048	186	153,505	126,265
S540	1018	186	12,592,276	10,357,703
S541	1018	186	12,592,276	10,357,703
S542	1018	186	234,715	181,133
S543	1018	186	12,592,276	10,357,703
S544	1018	186	12,592,276	10,357,703
S545	1018	186	12,592,276	10,357,703
S546	1017	186	12,592,276	10,357,703
S547	1017	186	12,592,276	10,357,703
S548	1017	186	12,592,276	10,357,703
S549	1017	186	12,592,276	10,357,703
S55	1048	186	153,505	126,265
S550	1017	186	234,715	181,133
S551	1017	186	12,592,276	10,357,703
S553	1019	186	12,592,276	10,357,703
S554	1019	186	12,592,276	10,357,703
S555	1019	186	12,592,276	10,357,703
S556	1019	186	12,592,276	10,357,703
S557	1019	186	12,592,276	10,357,703
S558	1019	186	12,592,276	10,357,703
S559	1019	186	12,592,276	10,357,703
S56	1049	186	13,458,803	11,948,857
S578	1112	187	12,592,276	10,357,703
S579	1112	187	234,715	181,133
S580	1112	189	12,592,276	10,357,703
S582	1112	189	12,592,276	10,357,703
S583	1112	189	12,592,276	10,357,703
S585	1113	189	12,592,276	10,357,703

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S586	1113	189	12,592,276	10,357,703
S587	1113	189	12,592,276	10,357,703
S589	1117	190	12,592,276	10,357,703
S590	1117	192	12,592,276	10,357,703
S591	1117	192	12,592,276	10,357,703
S592	1117	192	12,592,276	10,357,703
S593	1117	192	234,715	181,133
S594	1117	192	12,592,276	10,357,703
S595	1117	192	12,592,276	10,357,703
S596	1116	192	12,592,276	10,357,703
S598	1116	192	12,592,276	10,357,703
S599	1116	192	12,592,276	10,357,703
S602	1116	194	12,592,276	10,357,703
S603	1116	194	12,592,276	10,357,703
S605	1116	194	12,592,276	10,357,703
S60501	1051	195	15,804,511	14,286,944
S60502	1051	195	15,804,511	14,286,944
S60503	1051	195	15,804,511	14,286,944
S60504	1051	196	15,804,511	14,286,944
S60505	1051	197	15,804,511	14,286,944
S60506	1051	197	15,804,511	14,286,944
S60507	1051	198	15,804,511	14,286,944
S60508	1051	198	15,804,511	14,286,944
S60509	1051	198	15,804,511	14,286,944
S60559	1051	198	15,804,511	14,286,944
S60560	1051	199	15,804,511	14,286,944
S60561	1051	200	234,715	181,133
S60563	1051	202	234,715	181,133
S60566	1051	204	1,593,451	1,229,689
S60567	1051	204	963,441	844,920
S60569	1051	204	234,715	181,133
S60570	1051	204	20,215,503	18,678,591
S60571	1051	204	9,006,512	8,353,183
S60607	1023	204	837,375	722,998
S62040	1105	208	11,797,672	9,704,107
S62041	1109	209	11,797,672	9,704,107
S62647	1114	210	234,715	181,133
S63017	1005	213	12,592,276	10,357,703

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S63019	1041	213	15,804,511	14,286,944
S63021	1029	213	5,334,345	4,783,001
S63024	1043	213	15,804,511	14,286,944
S63030	1013	213	6,158,601	5,317,393
S638	1031	214	234,715	181,133
S639	1031	214	234,715	181,133
S642	1031	216	234,715	181,133
S65	1049	217	13,458,803	11,948,857
S650	1031	218	234,715	181,133
S66044	1056	220	837,375	722,998
S661	1033	221	234,715	181,133
S67493	1038	224	5,334,345	4,783,001
S68153	1124	226	8,161,002	6,903,530
S68156	1122	227	837,375	722,998
S68201	1123	227	12,964,676	11,510,166
S68202	1052	227	12,964,676	11,510,166
S68534	1030	229	24,649,687	21,617,321
S68535	1027	229	24,649,687	21,617,321
S69048	1028	233	5,334,345	4,783,001
S6A310	1050	235	837,375	722,998
S6A350	1050	237	33,865,190	29,239,522
S6A351	1050	237	33,865,190	29,239,522
S6A352	1050	237	33,865,190	29,239,522
S6A353	1050	237	33,865,190	29,239,522
S6A361	1050	237	33,865,190	29,239,522
S6A362	1050	237	837,375	722,998
S6A363	1050	237	33,865,190	29,239,522
S6A411	1029	238	5,334,345	4,783,001
S718	1088	248	9,006,512	8,353,183
S719	1088	248	17,700,106	16,416,148
S720	1088	250	534,117	495,372
S721	1088	250	8,639,050	8,012,377
S722	1087	250	41,041,287	38,064,169
S723	1087	250	3,907,232	3,213,871
S724	1087	250	3,907,232	3,213,871
S725	1089	250	234,715	181,133
S726	1089	250	3,907,232	3,213,871
S727	1089	250	3,907,232	3,213,871

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S728	1089	250	3,907,232	3,213,871
S729	1090	250	3,907,232	3,213,871
S730	1127	252	3,907,232	3,213,871
S731	1127	252	3,907,232	3,213,871
S732	1127	252	3,907,232	3,213,871
S733	1127	252	3,907,232	3,213,871
S734	1127	252	3,907,232	3,213,871
S735	1127	252	3,907,232	3,213,871
S736	1127	252	234,715	181,133
S737	1127	252	3,907,232	3,213,871
S738	1127	252	3,907,232	3,213,871
S739	1127	252	3,907,232	3,213,871
S74	1110	253	14,855,947	13,320,474
S740	1127	254	3,907,232	3,213,871
S741	1127	254	3,907,232	3,213,871
S742	1127	254	11,396,094	9,373,791
S743	1127	254	11,396,094	9,373,791
S744	1127	254	11,396,094	9,373,791
S745	1127	254	11,396,094	9,373,791
S746	1128	254	11,396,094	9,373,791
S747	1128	254	234,715	181,133
S748	1128	254	11,396,094	9,373,791
S750	1139	256	11,396,094	9,373,791
S751	1139	256	11,396,094	9,373,791
S752	1139	256	11,396,094	9,373,791
S753	1139	256	11,396,094	9,373,791
S754	1139	256	11,396,094	9,373,791
S755	1139	256	11,396,094	9,373,791
S756	1139	256	9,549,820	7,539,052
S757	1139	256	234,715	181,133
S758	1139	256	234,715	181,133
S759	1139	256	5,308,144	4,187,360
S760	1139	258	5,308,144	4,187,360
S761	1139	258	29,696,471	27,542,301
S762	1139	258	9,549,820	7,539,052
S763	1139	258	2,892,946	2,568,386
S764	1139	258	3,157,180	2,917,151
S765	1138	258	3,157,180	2,917,151

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S766	1138	258	3,157,180	2,917,151
S767	1138	259	31,764,770	30,285,426
S768	1139	259	31,764,770	30,285,426
S769	1139	259	31,764,770	30,285,426
S772	1129	261	31,764,770	30,285,426
S773	1129	261	31,764,770	30,285,426
S774	1129	261	31,764,770	30,285,426
S775	1129	261	9,549,820	7,539,052
S776	1129	261	31,764,770	30,285,426
S777	1129	261	10,148,217	9,412,070
S778	1129	261	31,764,770	30,285,426
S779	1129	261	31,764,770	30,285,426
S780	1129	263	31,764,770	30,285,426
S781	1129	263	31,764,770	30,285,426
S782	1130	264	31,764,770	30,285,426
S783	1130	264	31,764,770	30,285,426
S784	1130	264	31,764,770	30,285,426
S785	1130	264	31,764,770	30,285,426
S786	1130	264	31,764,770	30,285,426
S79	1110	264	1,131,666	930,845
S80	1110	267	1,131,666	930,845
S800	1132	268	534,117	495,372
S801	1132	268	534,117	495,372
S802	1132	268	534,117	495,372
S803	1132	268	534,117	495,372
S804	1132	268	534,117	495,372
S805	1132	268	534,117	495,372
S806	1132	268	534,117	495,372
S807	1132	268	534,117	495,372
S808	1137	269	534,117	495,372
S809	1137	269	534,117	495,372
S81	1119	270	1,131,666	930,845
S810	1137	271	534,117	495,372
S811	1136	272	5,308,144	4,187,360
S812	1136	272	5,308,144	4,187,360
S813	1135	272	5,308,144	4,187,360
S814	1135	272	5,308,144	4,187,360
S815	1135	272	5,308,144	4,187,360

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S816	1135	272	5,308,144	4,187,360
S817	1135	272	5,308,144	4,187,360
S818	1135	272	5,308,144	4,187,360
S819	1134	273	5,308,144	4,187,360
S82	1119	274	1,131,666	930,845
S820	1134	275	5,308,144	4,187,360
S821	1134	275	5,308,144	4,187,360
S822	1134	275	5,308,144	4,187,360
S823	1134	275	5,308,144	4,187,360
S824	1134	275	5,308,144	4,187,360
S826	1134	275	9,549,820	7,539,052
S827	1134	275	31,764,770	30,285,426
S828	1134	275	31,764,770	30,285,426
S829	1134	275	31,764,770	30,285,426
S83	1119	276	1,131,666	930,845
S830	1134	277	9,549,820	7,539,052
S831	1134	277	4,958,763	4,446,238
S832	1134	277	4,958,763	4,446,238
S833	1133	278	9,549,820	7,539,052
S834	1133	278	4,958,763	4,446,238
S835	1133	278	4,958,763	4,446,238
S836	1133	278	4,958,763	4,446,238
S837	1133	278	4,958,763	4,446,238
S838	1133	278	4,958,763	4,446,238
S839	1133	278	4,958,763	4,446,238
S84	1119	278	1,131,666	930,845
S840	1133	278	4,958,763	4,446,238
S841	1133	278	4,958,763	4,446,238
S842	1133	278	4,958,763	4,446,238
S843	1091	279	4,958,763	4,446,238
S844	1091	279	9,549,820	7,539,052
S85	1119	280	1,131,666	930,845
S855	1053	282	9,549,820	7,539,052
S86	1118	283	14,855,947	13,320,474
S866	1055	284	9,549,820	7,539,052
S87	1118	285	1,131,666	930,845
S876	1067	286	9,549,820	7,539,052
S88	1118	287	1,131,666	930,845

Section ID	Traffic ID Group	Project Group	Acc ESAL 2005	Acc ESAL 2004
S89	1118	289	1,131,666	930,845
S896	1098	291	9,549,820	7,539,052
S90	1120	293	1,131,666	930,845
S906	1015	295	9,549,820	7,539,052
S91	1120	295	1,131,666	930,845
S917	1021	295	9,549,820	7,539,052
S92	1120	297	1,131,666	930,845
S929	1036	298	9,549,820	7,539,052
S93	1120	299	1,131,666	930,845
S94	1120	302	1,131,666	930,845
S95	1120	305	1,131,666	930,845
S96	1120	307	1,131,666	930,845
S97	1121	309	14,855,947	13,320,474
S98	1121	311	1,131,666	930,845
S996	1079	314	954,811	785,374
S997	1079	314	954,811	785,374
S998	1079	314	954,811	785,374
S999	1079	314	954,811	785,374