RESOURCE INTERNATIONAL
ENGINEERING CONSULTANTS

REVIEW OF PCR METHODOLOGY

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16. Abstract

This study was conducted to review the Pavement Condition Rating (PCR) methodology currently used by the Ohio DOT. The results of the literature search conducted in this connection are described in the report. An analysis of the PCR data collected by the ODOT in the past 11 years (1985-95) indicated that there were some distresses which were rarely observed in the past. The reasons for such occurrences and the use of this information to enhance the current system are discussed in the report. Statistical method known as: Classification Tree, was used to analyze the PCR data for (1) rating the pavements, and (2) assigning the maintenance and/or rehabilitation (M&R) actions, when the distresses of the individual pavements were known. The results of this analysis indicated that due to non-linear nature of PCR, this model is able to assess the PCR better than the current linear model of estimating the PCR.

An expert opinion survey was designed and conducted to collect data for developing new weights of pavement distresses using a combination of statistical methods: "Classification Tree" and "Proportional Odds Model". The PCR values obtained from new and old distress weights were compared and the results of these comparisons are discussed in the report. Statistical analysis of the PCR data for the year 1996 was performed to determine a suitable sample size which can be used to survey the network for collecting the PCR data of the network for Pavement Management purposes and selecting the pavements for inclusion in the annual M&R program of ODOT.

This report contains recommendations for revising the list of distresses of each pavement type, developing a non-linear model to assess the pavement condition and M&R needs of a given pavement, a suitable sampling procedure for surveying the network and revising the definitions of some distresses of each pavement type.

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REVIEW OF PCR METHODOLOGY

FHWA/OH-99/001

EXECUTIVE SUMMARY

This study was conducted to review the Pavement Condition Rating (PCR) methodology currently used by the Ohio DOT. The results of the literature search in this connection indicated that many Highway agencies use a similar methodology to rate their pavements. However, due to the linear nature of the current PCR model, it is deficient in certain respects.

An analysis of the PCR data, which was collected by the ODOT in the past 11 years (1985-95), indicated that there were some distresses among each type of pavement (currently there are four types of pavements: Flexible, Composite, Jointed Concrete and Continuously Reinforced Concrete or CRCP) which were rarely observed in the past. The reasons for such occurrences and the use of this information to enhance the current system are discussed in the report.

A statistical method known as: Classification Tree, was used to analyze the available PCR and maintenance actions data for the purpose of (1) Rating the pavements, and (2) assigning a maintenance and/or rehabilitation (M&R) action when distresses of the pavement are known. The results of this analysis indicated that due to non-linear nature of pavement rating, this model was able to assess the pavement condition better than the current linear model of estimating the PCR.

An expert opinion survey was designed and conducted to collect data on the pavement ratings and recommended M&R actions. Several pavements of each pavement type were included in this survey. A combination of "Classification Tree" and "Proportional Odds Model" was used to analyze the data and develop new weights for the pavement distresses of each type of pavement. The PCR values of individual pavement sections, an entire route as well as the entire roadway network were calculated from new and old distress weights and the results were compared. These comparisons indicated that the Pavement Condition Ratings obtained from the new weights were able to delineate certain pavement conditions better than the old weights and the pavement Ratings were not dependent upon the type of pavement when new distress weights were used.

Statistical analysis of the PCR data collected by the ODOT for the year 1996 was performed to determine a suitable sample size which can be used to survey the NHS network for collecting the PCR data of the network for Pavement Management purposes and selecting the pavements for inclusion in the annual M&R program of the ODOT. If the recommended procedure is implemented, it can save some time in the annual PCR data collection.

The report contains recommendations for: (1) revising the list of distresses of each pavement type, (2) developing a non-linear model to assess the pavement condition Rating and M&R needs of any given pavement, (3) a suitable sampling procedure to survey the network, and (4) revising the definitions of some distresses of each pavement type.

DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Ohio Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

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TABLE OF CONTENTS

LIST OF TABLES

APPENDIX A

APPENDIX B

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND

The initial phase of a project to develop ODOT's Pavement Management System (PMS) was started in late 1970's and a method of **P**avement **C**ondition **R**ating (PCR) was developed. This method has been used by ODOT since 1985 to collect Pavement Condition data. The PCR database currently contains data for Interstate and divided highway network for a period of ten years. The undivided roads also have been surveyed since 1987 and PCR data is available in the database. These surveys covered 50% of the roads every year until the year 1995 and 100% of the network after this year.

The current PCR system is based on visual identification and measurement of pavement distresses. It combines the severity and extent of each distresses with its own weight (distress weight assigns relative importance to each distress) and arrive at a combined numerical index called "PCR". The PCR of a pavement is defined as follows:

$$\text{PCR} = 100 - \sum (\text{of the Deduct values for all observable distresses}). \quad (1)$$

where, the deduct value of each observable distress is calculated as follows:

$$\text{Deduct} = \text{product of (distress weight x severity weight x extent weight)}. \quad (2)$$

The weights of the distresses and their severity and extent for various pavement types were developed by the Ohio Department of Transportation (ODOT) and the consultant using the best experience and expertise available in the late 1970's and early 1980's when the system was developed [1]. An example of the weight factors for Flexible pavements is shown in Figure 1. Similar information is available for other pavement types (Rigid and Composite) in the ODOT's PCR Manual [1].

Due to the changes in vehicle types, maintenance techniques, traffic volume, etc. in the subsequent years, it is possible that the distress types and their weights may no longer be optimal. The primary purpose of this study, therefore, was to re-evaluate the distress weights of all types of pavements as well as the method of calculating the PCR value.

One of the objectives of using the combined index, PCR, was to estimate the overall condition of the roadway network, besides using this index to determine the condition of individual pavements. Therefore, the PCR values estimated for all types of pavements of the Ohio's Roadway Network are combined together to estimate the PCR of the network. However, while doing so, it was felt by many ODOT engineers that the PCR values estimated for pavements of different types may not be consistent, for example: a PCR value of 70 for a jointed pavement may not represent the same

Section: _____ Date: _____

Log mile: _____ to_____ Rated by: _____

Sta: _____ to_____ _____

FLEXIBLE

PAVEMENT CONDITION RATING FORM

DISTRESS	DISTRESS WEIGHT	SEVERITY WT.*			EXTENT WT.**			DEDUCT POINTS***
		L	M	H	O	F	E	
RAVELING	10	.3	.6	1	.5	.8	1	
BLEEDING	5	.8	.8	1	.6	.9	1	
PATCHING	5	.3	.6	1	.6	.8	1	
POTHOLES/DEBONDING	10	.4	.7	1	.5	.8	1 ✓	
CRACK SEALING DEFICIENCY	5	1	1	1	.5	.8	1	
RUTTING	10	.3	.7	1	.6	.8	1 ✓	
SETTLEMENT	10	.5	.7	1	.5	.8	1	
CORRUGATIONS	5	.4	.8	1	.5	.8	1	
WHEEL TRACK CRACKING	15	.4	.7	1	.5	.7	1 ✓	
BLOCK AND TRANSVERSE CRACKING	10	.4	.7	1	.5	.7	1 ✓	
LONGITUDINAL JOINT CRACKING	5	.4	.7	1	.5	.7	1	
EDGE CRACKING	5	.4	.7	1	.5	.7	1	
RANDOM CRACKING	5	.4	.7	1	.5	.7	1 ✓	

*L = LOW **O = OCCASIONAL

M = MEDIUM F = FREQUENT

H = HIGH E = EXTENSIVE

TOTAL DEDUCT =	
SUM OF STRUCTURAL DEDUCT (✓) =	
100 - TOTAL DEDUCT = PCR =	

*** DEDUCT POINTS = DISTRESS WEIGHT X SEVERITY WT. X EXTENT WT.

REMARKS:

Figure 1. The Distresses of Flexible Pavements and their Weights (from Ref. 1).

pavement condition as a PCR of 70 for a flexible pavement and so on. Therefore, it was considered desirable to have the PCR values independent of the pavement types. The scope of the study, therefore, included this objective also.

1.2 OBJECTIVES AND SCOPE OF THE STUDY

The objectives of the study were as follows:

1. Determine the significant pavement distresses which trigger maintenance and/or rehabilitation.

2. Determine the proper Distress Weights and their Severity and Extent Weights to normalize PCR numbers to insure that the Pavement Types (flexible, rigid and composite) are treated equally. Also, investigate how the workable range of PCR scale can be modified or enlarged to provide more sensitivity to small changes in pavement condition so that these changes can be related to the improvement costs.

3. Determine a statistically based PCR sampling frequency to determine if ODOT should increase or reduce the amount of PCR data collected for its Pavement Management System (PMS).

4. Develop a list of important pavement distresses (from the results of tasks 1 and 2) for each pavement type that should be emphasized during the visual PCR surveys. This information will also help in determining the pavement distresses that should be emphasized in automatic data collection system. Further, investigate to see if the recommended revision is compatible with the existing automatic data collection system(s).

5. Determine the effect proposed changes will have on all existing PCR data and the development of PCR trends using old and new PCR data.

In order to fulfil the above objectives, the scope of the study was divided into various tasks. These tasks are listed below:

1. Review of available condition survey procedures used by various states, FHWA, SHRP and others.

2. Analysis of PCR and Maintenance data.

3. Analysis of data collected from Expert opinion.

4. Design and conduct limited field tests to determine representative sample and uniformity of segments.

5. Update PCR Manual.

6. Study the impact of proposed changes in Distress weights on the results of PMS-II+ and PMS-III.

7. Final Report.

A description of the above tasks as was described in the proposal under Work Plan is enclosed in Appendix A.

1.3 STUDY APPROACH

The ODOT's Pavement Condition Rating data collected since 1985 for the Interstate and divided highway network was available to determine several quantities, some of which are as follows:

1. Types of distresses observed in pavements of various types.

2. The age of pavement (if new) or the age of treatment (if old) when a specific distress becomes visible in the pavement surface.

3. The frequency of various distresses in each pavement type.

4. Any relation between Maintenance and Rehabilitation (M&R) action and the types of distress which develop after the action.

5. Relationship between the M&R action used to treat the pavement and the distresses which were observed before the treatment.

The results of the analyses mentioned above, as well as the discussions with ODOT and Industry experts were used to identify those pavement distresses which influenced the selection of the roadway segment for inclusion in the maintenance program in the past. Also, appropriate statistical analysis was performed to determine the relative weights of each distress. The following statistical methods were used to analyze the data for this purpose:

1. Discriminant Analysis and Classification Tree Analysis, and

2. Regression Analysis,

The results of the data analyses were used to develop the following information:

1. Any modification needed to the existing definitions of pavement distresses based on the ODOT's experience. For example: raveling, patching, pothole, crack sealing, etc.

2. Any need to either combine, or add, or delete any distress(es) from the PCR list.

Expert Opinion surveys were conducted to collect data from various ODOT experts. The purpose of these surveys was to obtain data on the condition rating of pavements of various types having distresses of different types and severity and extent. This data was analyzed using the following statistical methods:

1. A combination of Classification Tree analysis and Regression analysis.

2. Proportional Odds Model.

The results of these analyses were used to recommend suitable weights for various distresses of different pavement types.

1.4 OUTLINE OF THE REPORT

This report contains a description of various activities performed in connection with the study. Chapter 1 contains a description of the background of ODOT's PCR system, the objectives and scope of the study and the approach used to conduct the study. Chapter 2 summarizes the results of literature review conducted for this study. The analysis of ODOT's PCR and Maintenance data and the results of analysis are described in Chapter 3. The data collected, method of data analysis and the results of analysis for developing new distress weights of all four pavement types are described in Chapter 4. Statistical analysis performed to estimate the effect of sampling on the network PCR is described in Chapter 5. This chapter also contains recommendations for conducting PCR surveys to collect data from pavement sections which may be critical from maintenance point of view. Chapter 6 contains a summary of the study and recommendations.

CHAPTER 2
LITERATURE REVIEW

The purpose of this task was to familiarize with the different methods of Pavement Condition Rating used by various Highway and Transportation Agencies and the method of combining the data collected for the individual pavement distresses to obtain the Condition Index or Condition Rating. The pavement condition rating manuals published by various state Department of Transportation (DOT), FHWA and SHRP were reviewed for this purpose. The results of these reviews are described in this chapter.

2.1 PAVEMENT CONDITION SURVEYS

The published literature on Pavement Condition Surveys indicates that Highway Agencies have been using the observations of Pavement Distresses as an indicator of its Physical Condition (or Health). For example: The Highway agencies in the United States have been collecting the Pavement Condition data under the program called "Highway Performance Monitoring System" or "HPMS" for the past 25 years to monitor the condition of the National Highway System [2,17]. A trend towards the development of a formal procedure to conduct pavement condition surveys is evident from the Pavement Condition Rating Manuals published by various Highway agencies (including the manual developed by ODOT for this purpose) in the last two decades [1-18]. The Intermodal Surface Transportation Efficiency Act (ISTEA) passed in 1991 mandated the use of management systems, which included a Pavement Management System (PMS) also. Most of the PMS developed so far require the input of Pavement Condition to analyze the roadway network [9,19]. Therefore, the efforts towards developing a suitable Pavement Condition Rating system were accelerated during this period.

A NCHRP Synthesis on the "Current Practices in Determining the Pavement Condition" describes the results of the surveys conducted in this connection. These surveys indicated that there is a lack of standardization not only in the types of pavement distress data collected, but also in the methods used to collect the distress data [3]. Out of the 49 highway agencies, which responded to the surveys, 41 of them use survey manuals which are unique to each agency, 5 of them use SHRP manual [5,6], 2 of them use FHWA manual [18] and 1 of them uses the HPMS manual. The results of the surveys are summarized in this report in Table 8 [3]. The entire Table 8 is reproduced in Figures 2a and 2b.

The current Pavement Condition Rating systems generally include a definition of each pavement distress, a description of its severity levels and/or a description of its extent levels. [1,3-8,10-16,18]. The names of the distresses of various pavement types are generally same in most manuals with a slight difference in some cases. For example, a fatigue crack in the wheel path of a flexible or composite pavement is called as - Alligator Crack in Ref. [4], a Fatigue Crack in Ref. [5], and Wheel Path Crack in Ref. [1].

TABLE 8

DISTRESS SURVEY, UNITED STATES

Agency	Survey Method Used	Survey Manual	Method to Determine Distress Rating	Distress Rating Combined With?	Method or Formulae
Alabama	walk	yes	weight factors	roughness	formula
Alaska	shoulder	yes	distress state table	roughness, frost	compare with 240 condition states
Arizona	walk	yes	no response	roughness, structural, traffic	no response
Arkansas	walk	yes	deduct point system	roughness	Rigid=0.65 defects+0.35 ride, Flexible=1/2 power (ride x defects)
California	walk	yes	pavement condition category	roughness	over/under decisions
Colorado	windshield	no	no response	roughness	condition matrix
Connecticut	photo log	yes	weight factors	roughness, AADT	dr+ri+adt+class
Delaware	windshield	yes-SHRP	weight factors	Ride Comfort Index	PSI=75%(SDI)+25%(RCI), also safety and traffic
Dist. of Columbia	windshield	yes	table	no response	no response
Florida	shoulder	yes	deduct points	not used	seperate rating for ride, rutting, cracking.
Georgia	walk	yes-(flexible)	deduct from 100	not used	not used
Hawaii	windshield	yes-(Caltrans)	distress severity and extent	not used	not used
Idaho	shoulder	yes	cracking index	PSI (SDP)	50% roughness (0-5)+50% cracking (0-5)
Illinois	windshield, Int. walk	yes	CRS 0-9	na	na
Indiana	windshield	yes-HPMS	PSR 0-5, HPMS	not used	na
Iowa	shoulder	yes	PCR 0-100	roughness, friction, structural	formula with coefficient
Kansas	shoulder	yes	Woodward-Clyde methodology	roughness	based on distress state
Kentucky	windshield, shoulder	no	assigned demerits	roughness, friction, traffic	point assignment
Louisiana	video	yes-(draft)	under development	roughness	under development
Maine	video/ARAN	yes	PCR 0-5	not used	na
Maryland	shoulder	yes	weight factors, deduct values	roughness	priority matrix
Massachusetts	windshield/ARAN	no	formulae	roughness	PSI=0.65DI+0.35PSR
Michigan	semiautomatic	no	remaining service life (RSL)	not used	threshold values
Minnesota	shoulder	yes	weight scale 0-4	roughness	PQI= square root (PSR X SR)
Mississippi	video	yes-SHRP	formula	roughness	PCR=100*(12-IRI /12)*(Dmax-DP/Dmax)^2
Missouri	video	no	condition score 0-20	roughness	PSR= (2 x roughness score) + (condition score)
Montana	walk/shouder	yes	under development	roughness	PSI reduced by degree of rutting
Nebraska	windshield/walk	yes	NSI (similar to PCI)	roughness	PMS Manual procedure
Nevada	walk	yes	formula	roughness, friction	AASHO Road Test Formulas
New Hampshire	windshield/ARAN	yes	formula	no response	no response
New Jersey	windshield/ARAN	yes-SHRP	weighting factors 0-5	roughness, traffic	PI=0.6*RQI+0.3*SDI+0.1*TF
New Mexico	walk	yes-FHWA	tables	roughness, traffic, accidents	formulas
New York	windshield	yes	score summaries	not used	no response
North Carolina	windshield, shoulder, walk	yes	deduct values	roughness	deduct value in distress index
North Dakota	video	yes	deduct values	roughness	1/3 distress+1/3 ride+1/3 age=composite index (0-5)
Ohio	walk	yes	deduct values	roughness, friction	not combined, independent consideration
Oklahoma	automated	yes	no response	planning	no response

Figure 2a. Distress Survey Methods used by Highway Agencies (from Ref. 3)

TABLE 8 (CONTINUED)

Agency	Survey Method Used	Survey Manual	Method to Determine Distress Rating	Distress Rating Combined With?	Method or Formulae
Oregon	windshield, (Int.-shoulder)	yes	deduct values	not used	not used
Pennsylvania	shoulder	yes	deduct values	roughness	PSRcurve=OPI=.45RI+.30SI+.20DI+.05SFI
Rhode Island	windshield, walk	yes	formula	roughness	proprietory software
South Carolina	windshield	yes	distress values, models	roughness, structural values	PQI= 1.158+0.138(PDI)(PSI)
South Dakota	windshield	yes	distress data elements	roughness, structural, traffic	ranking process
Tennessee	walk	yes-FHWA	not used	not used	not used
Texas	windshield, walk	yes	utility factors	roughness	tables, equations
Utah	shoulder	yes-SHRP	DI=5.0 -0.13(C+P)1/2pwr.	roughness, structural, skid	under development
Vermont	automated	yes	no response	roughness, friction	formula
Virginia	windshield	yes	rating factors	ride rating	ride considered seperate
Washington	shoulder	yes	deduct values	no response	developing new process
West Virginia	windshield, shoulder	no	not used	not used	not used
Wisconsin	shoulder	yes	work factors	no response	no response
Wyoming	windshield	no (plan SHRP)	no response	none	not used

CANADIAN PROVINCES

Agency	Survey Method Used	Survey Manual	Method to Determine Distress Rating	Distress Rating Combined With?	Method or Formulae
Alberta	windshield, video log	yes-SHRP, Ontario	weight factors	roughness, structural	PQI=f(RCI+SAI+VCI)
British Columbia	walk	yes	proposed PI=RI+SI+DI	roughness, structural	developing
Manitoba	windshield	yes	condition ratings	not used	not used
New Brunswick	windshield, walk	yes	formula	roughness, structural	PN =0.4PN ride+0.35PN distress+0.25PN strength
Nova Scotia	windshield, shoulder, walk	yes-RTAC	weight factors	not used	roughness
Ontario	windshield	yes	formula	roughness	DMI=(Si+Di)Wi; severity, density, weighting
Prince Edward Isle	windshield	yes	formula, table	roughness, structural	PQI=composite pavement quality index
Quebec	windshield	no	expert system	roughness, structural, other	na
Saskatchewan	windshield, shoulder, walk	no	no response	no response	no response

Figure 2b. Distress Survey Methods used by Highway Agencies (from Ref. 3)

Although the general descriptions of various Pavement Distresses are similar in most of the manuals, sometimes there are significant differences in the definitions of their Severity and Extent levels. The methods of measurements are also often different as were observed in a study sponsored by FHWA [2]. Figures 3a, 3b, and 3c were reproduced from the condition survey manuals of the Wisconsin DOT, SHRP, and Ohio DOT to illustrate the differences in the definitions of the severity and/or extent of Alligator, Fatigue, and Wheel Track Cracks respectively.

The published literature also indicates that the Condition Surveys performed for Network Level data collection are generally based on the surveys performed on a sample of the entire Roadway section (the section may vary in length from a fraction of a mile to 5 or more miles in length, such as ODOT's PCR survey sections). However, the data collected for Project Level surveys generally includes the distresses observed along the entire length and may require the use of measuring devices, such as: a tape measure for the lengths of cracks, patches, etc., and a scale to measure the depth of rutting.

2.2 PAVEMENT CONDITION RATING

The observations of surface distresses are generally used to determine the Pavement Condition Rating or Pavement Condition Index. Examples of the formulae used by various Highway agencies are shown in the tables included in Figures 2a and 2b. These formulae show that different pavement distresses are combined either as a linear combination of various distresses (such as: ODOT's PCR formula) or some complex non-linear combinations of various distresses, as shown in Figures 2a and 2b. One of the manual contains a description of the Rating System which is based on the visible distresses and the maintenance required [10]. According to this manual, the pavements are rated from 1 to 10, 10 being the new pavement and 1 being the failed pavement which requires Reconstruction. The Rating System tables from this manual are reproduced in Figures 4a and 4b.

2.3 AUTOMATED DISTRESS DATA COLLECTION EQUIPMENT

The recent advancements in the video image processing and other related technologies have attracted the attention of many researchers and entrepreneurs to develop automated distress data collection equipments. The main emphasis in this connection has been to identify and classify the cracks of various types, rutting and roughness [20-26]. As a result, currently there are some vendors who are marketing these devices or Automated Data Collection Vans which are equipped with the sensors, video cameras, computers and other electronic devices to collect the data from the pavements. A study sponsored by FHWA to test and evaluate four types of Automated Pavement Distress Survey Equipments indicated that the results of the evaluation do not provide a single conclusion because each agency has different needs, network characteristics, and PMS features [24]. This study was designed to evaluate the ability of the equipment to measure the type, extent, and severity of cracks in flexible and rigid pavements. Most of the automated data collection equipments are generally equipped with rutting and roughness measuring devices also.

ALLIGATOR CRACKING

Description: Alligator cracking is the interconnecting of cracks forming a series of small polygons that resemble an alligator's hide or chicken wire.

Cause: Alligator cracking[5] is generally caused by an unstable base or road bed. The cracks start at the bottom of the asphalt surface and propagate to the surface as longitudinal cracks. As traffic loading continues, the cracks form many-sided, sharp-angled pieces that develop a pattern resembling chicken wire or the skin of an alligator. The pieces are usually less than one (1) foot on the side.

1 = Block Cracking
2 = Alligator Cracking

Severity

The main difficulty in measuring alligator cracking is that in many cases more than one type of distress exists at any given time and at varying levels of extent and severity. The predominant type of cracking (by surface area) should be rated.

0 = None

1 = cracks less than 1/2-inch in width (cracks are not spalled).

2 = cracks greater than 1/2-inch in width (some loss of aggregate particles).

3 = cracks causing dislodgement of a significant number of pavement pieces.

Extent

The extent of alligator cracking is based on the percentage of the surface area of the survey segment. Alligator cracking is measured[6] in square feet of surface area.

0 = None
1 = 10 to 24%
2 = 25 to 49%
3 = 50 to 74%
4 = 75% +

---

[5] *Alligator cracking occurs only in areas that are subjected to repeated traffic loadings. Cracking which occurs in an area that is not subject to traffic loading should be rated as block cracking. Alligator cracking is a major structural distress.*

[6] *If a segment has 26% Alligator Cracking, and 20% Block cracking, rate as Alligator Cracking. However, if the segment has 100% Alligator cracking, rate as Alligator cracking only (do not rate other distresses). In all cases of overlapping distress types, rate the worst.*

Figure 3a. Definitions of Alligator Cracking and its Severity and Extent (from Ref. 4).

1

FATIGUE CRACKING

Description

Occurs in areas subjected to repeated traffic loadings (wheel paths).

Can be a series of interconnected cracks in early stages of development. Develops into many-sided, sharp-angled pieces, usually less than 0.3 m (1 ft) on the longest side, characteristically with a chicken wire/alligator pattern, in later stages.

Must have a quantifiable area.

Severity Levels

LOW
An area of cracks with no or only a few connecting cracks; cracks are not spalled or sealed; pumping is not evident.

MODERATE
An area of interconnected cracks forming a complete pattern; cracks may be slightly spalled; cracks may be sealed; pumping is not evident.

HIGH
An area of moderately or severely spalled interconnected cracks forming a complete pattern; pieces may move when subjected to traffic; cracks may be sealed; pumping may be evident.

How to Measure

Record square meters (square feet) of affected area at each severity level.

If different severity levels existing within an area cannot be distinguished, rate the entire area at the highest severity present.

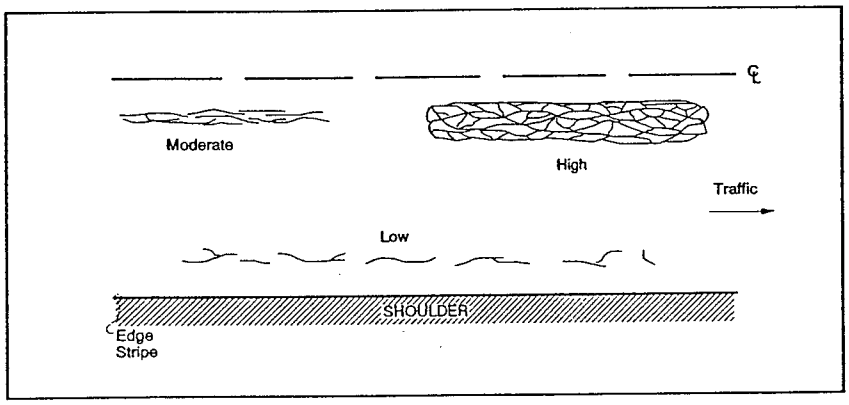

FIGURE 3
ACP 1. Fatigue Cracking

Figure 3b. Definitions of Fatigue Cracking and its Severity Levels (From Ref. 5).

FLEXIBLE PAVEMENT

Distress Type: **Wheel Track Cracking**

Description: Cracks located within or near the wheel tracks. For evaluation purposes each wheel track shall be considered 1 m (3 feet) in width. Wheel track cracking usually starts as intermittent, single longitudinal cracks progressing to multiple longitudinal cracking, and eventually interconnected or alligator cracking. Wheel track cracking usually results from fatigue failure of the asphaltic layer.

Severity Level: Severity is based upon both crack width and multiplicity of the cracking. Both criteria must be satisfied when assigning severity level.

Low-- single or intermittent multiple cracking with average crack width less than 6 mm (1/4 inch).

Medium-- single or multiple cracking (may also include regions of intermittent alligator cracking) with average crack width greater than 6 mm (1/4 inch) with little spalling or loose pieces.

High-- multiple cracking with extensive alligator cracking. Spalling is fairly common, with average crack width greater than 6 mm (1/4 inch), and some alligator blocks are easily removed.

Extent Level: Extent is based upon percentage of the wheel track length within the section which exhibits cracking.

Occasional-- less than 20 percent.

Frequent-- between 20 and 50 percent.

Extensive-- more than 50 percent.

Figure 3c. Definitions of Wheel Track Cracking and its Severity and Extent (from Ref. 1)

Rating System

Surface Rating	Visible Distress*	General Condition/ Treatment Measures
10 Excellent	None.	New construction.
9 Excellent	None.	Recent overlay, like new.
8 Very Good	No longitudinal cracks except reflection of paving joints. Occasional transverse cracks, widely spaced (40' or greater). All cracks sealed or tight (open 1/4" or less).	Recent sealcoat or new road mix. Little or no maintenance required.
7 Good	Very slight or no ravelling, surface shows some traffic wear. Longitudinal cracks (open 1/4") due to reflection or paving joints. Transverse cracks (open 1/4") spaced 10 feet or more apart, little or slight crack ravelling. No patching or very few patches in excellent condition.	First signs of aging. Maintain with routine crack filling.
6 Good	Slight ravelling (loss of fines) and traffic wear. Longitudinal cracks (open 1/4"–1/2") due to reflection and paving joints. Transverse cracking (open 1/4" to 1/2") some spaced less than 10 feet. Slight to moderate flushing or polishing. Occasional patching in good condition.	Show signs of aging, sound structural condition. Could extend life with sealcoat.

*** *Note*: Individual pavements will *not* have all of the types of distress listed for any particular rating. They may have only one or two types.**

Figure 4a. Pavement Rating System (from Ref. 10)

Surface Rating	Visible Distress*	General Condition/ Treatment Measures
5 Fair	Moderate to severe ravelling (loss of fine and coarse aggregate). Longitudinal cracks (open 1/2") show some slight ravelling and secondary cracks. First signs of longitudinal cracks near wheel path or edge. Transverse cracking and first signs of block cracking. Slight crack ravelling (open 1/2"). Extensive to severe flushing or polishing. Some patching or edge wedging in good condition.	Surface aging, sound structural condition. Needs sealcoat or nonstructural overlay.
4 Fair	Severe surface ravelling. Multiple longitudinal and transverse cracking. with slight ravelling. Block cracking (over 25–50% of surface). Patching in fair condition. Slight rutting or distortions (1" deep or less).	Significant aging and first signs of need for strengthening. Would benefit from recycling or overlay.
3 Poor	Closely spaced longitudinal and transverse cracks often showing ravelling and crack erosion. Block cracking over 50% of surface. Some alligator cracking (less than 25% of surface). Patches in fair to poor condition. Moderate rutting or distortion (1" or 2" deep). Occasional potholes.	Needs patching and major overlay or complete recycling.
2 Very Poor	Alligator cracking (over 25% of surface). Severe distortions (over 2" deep). Extensive patching in poor condition. Potholes.	Severe deterioration. Needs reconstruction with extensive base repair.
1 Failed	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

*** *Note*: Individual pavements will *not* have all of the types of distress listed for any particular rating. They may have only one or two types.**

19

Figure 4b. Pavement Rating System (from Ref. 10)

CHAPTER 3
ANALYSIS OF PCR AND MAINTENANCE DATA

3.1 INTRODUCTION

The purpose of the existing PCR and maintenance data analysis was to determine various trends which were observed in the past in relation to pavement distresses observed and maintenance performed. The details of the analysis performed and the trends observed from the data analysis are described in this chapter.

The data for the analysis was obtained from one of the ODOT's databases which contained yearly PCR data for the Divided Highway System starting from the year 1985. The maintenance data for these years was also available in another ODOT's database.

3.2 ANALYSIS OF PCR DATA

PCR data for each year (starting from 1985) was analyzed to determine the distresses observed in each pavement type and the number of pavement segments which were observed to have developed various types of distresses. The results of this analysis are listed in Tables 1- 4. A key to various pavement distresses (D1-D14) is shown in Table 5. From the analysis of PCR data it was observed that:

- the total number of pavements of each type (there are 4 types of pavements in this database) changed since the year 1985. A decrease in the total number was observed in the CRCP and the JRCP/JCP pavements and an increase in the total number was observed in the Flexible and the Composite pavements (see last column of Tables 1 to 4). A similar trend was observed in the "total miles" of each pavement type, as shown in Table 6.

- in any given year, the frequencies of various distress occurrences were not same for a given pavement type. Some distresses occurred more frequently than others. This trend applied to all pavement types. For example, in the year 1995, Raveling was observed in 467 Flexible Pavements (see Table 3), Bleeding in none, and so on.

- the tables listing the "percentages of Pavements with indicated distress" (see Tables 1 to 4) show that year after year the percentages of pavements with a given distress were almost same in many cases. For example, the percentages of pavements with Raveling and Patching in Flexible Pavements and the percentages of pavements with Raveling in Composite Pavements were almost same between the years 1985 and 1995. Sometimes these percentages increased for some distresses and decreased for others. These trends reflect the changes in the maintenance policy, changes in the characteristics of the materials of construction, traffic patterns, etc..

Table 1. Frequency of Observed Distresses in CRC Pavements
ODOT PCR Data, 1985-95.

YR	FORM	Surface Deterioration D1	Popout D2	Patching D3	Pumping D4	Settlement & Waves D5	Transverse Crack Spacing D6	Longitudinal Cracking D7	Punchouts or Edge Breaks D8	Spalling D9	Pressure Damage D10	TOTAL
Number of Pavements with indicated Distress												
85	1	0	34	14	25	9	34	31	7	9	2	34
86	1	3	33	24	27	12	34	30	15	12	3	34
87	1	4	27	14	18	0	27	21	4	8	2	34
88	1	3	32	17	28	1	32	30	9	10	2	32
89	1	5	23	3	18	1	23	16	6	5	0	31
90	1	3	22	8	13	2	22	20	6	5	0	24
91	1	5	16	8	10	1	18	14	6	6	1	20
92	1	11	15	14	6	0	17	11	1	13	0	17
93	1	7	12	8	2	0	13	8	4	5	2	15
94	1	12	9	7	5	2	13	9	0	7	0	14
95	1	3	12	8	9	2	13	8	5	7	0	13
Percent of Pavements with indicated Distress												
85	1	0	100	41	74	26	100	91	21	26	6	100
86	1	9	97	71	79	35	100	88	44	35	9	100
87	1	12	79	41	53	0	79	62	12	24	6	100
88	1	9	100	53	88	3	100	94	28	31	6	100
89	1	16	74	10	58	3	74	52	19	16	0	100
90	1	13	92	33	54	8	92	83	25	21	0	100
91	1	25	80	40	50	5	90	70	30	30	5	100
92	1	65	88	82	35	0	100	65	6	76	0	100
93	1	47	80	53	13	0	87	53	27	33	13	100
94	1	86	64	50	36	14	93	64	0	50	0	100
95	1	23	92	62	69	15	100	62	38	54	0	100

Table 2. Frequency of Observed Distresses in Jointed Concerete Pavements
ODOT PCR Data, 1985-95.

YR	FORM	Surface Deterioration D1	Popouts D2	Patching D3	Pumping D4	Faulting D5	Settlements D6	Joint Spalling / D-Cracking D7	Joint Sealant Damage D8	Pressure Damage D9	Transverse Cracking D10	Longitudinal Cracking D11	Corner Breaks D12	TOTAL
Number of Pavements with indicated Distress														
85	2	29	497	230	138	479	82	341	466	24	493	112	161	526
86	2	47	464	258	109	382	13	319	458	14	447	58	130	467
87	2	25	464	250	96	370	0	294	446	4	448	46	132	472
88	2	42	431	190	75	284	2	237	388	3	385	39	83	467
89	2	60	385	161	30	223	0	209	340	2	368	46	74	417
90	2	68	346	128	6	220	1	184	312	0	333	49	39	414
91	2	103	286	130	8	164	9	169	226	3	281	64	66	355
92	2	190	283	186	5	116	5	173	249	18	278	50	28	329
93	2	218	247	158	10	102	4	165	194	11	225	66	25	293
94	2	180	220	132	16	79	7	171	198	7	207	62	66	263
95	2	215	284	159	20	88	4	213	219	4	258	83	63	306
Percent of Pavements with indicated Distress														
85	2	6	94	44	26	91	16	65	89	5	94	21	31	100
86	2	10	99	55	23	82	3	68	98	3	96	12	28	100
87	2	5	98	53	20	78	0	62	94	1	95	10	28	100
88	2	9	92	41	16	61	0	51	83	1	82	8	18	100
89	2	14	92	39	7	53	0	50	82	0	88	11	18	100
90	2	16	84	31	1	53	0	44	75	0	80	12	9	100
91	2	29	81	37	2	46	3	48	64	1	79	18	19	100
92	2	58	86	57	2	35	2	53	76	5	84	15	9	100
93	2	74	84	54	3	35	1	56	66	4	77	23	9	100
94	2	68	84	50	6	30	3	65	75	3	79	24	25	100
95	2	70	93	52	7	29	1	70	72	1	84	27	21	100

Table 3. Frequency of Observed Distresses in Flexible Pavements
ODOT PCR Data, 1985-95.

YR	FORM	Raveling D1	Bleeding D2	Patching D3	Potholes D4	Crack Sealing Deficiency D5	Rutting D6	Settlement D7	Corrugations D8	Wheel Track Cracking D9	Block & Transverse Cracking D10	Longitudinal Joint Cracking D11	Edge Cracking D12	Random Cracking D13	TOTAL
Number of Pavements with indicated Distress															
85	3	365	41	63	30	204	197	21	1	98	226	211	56	270	365
86	3	285	55	26	4	175	157	3	0	46	144	118	18	178	285
87	3	347	35	43	1	237	193	0	1	38	194	132	9	223	351
88	3	364	24	23	3	257	237	0	3	36	224	233	48	252	366
89	3	392	34	29	2	269	296	0	0	32	250	222	16	259	404
90	3	447	9	21	1	331	386	2	0	54	291	256	35	322	453
91	3	433	1	28	5	239	318	1	3	44	249	223	37	186	442
92	3	437	2	57	10	260	364	11	2	42	233	228	28	190	448
93	3	435	0	53	5	275	378	2	4	27	275	276	38	200	443
94	3	442	1	76	16	348	366	4	4	41	328	330	54	229	452
95	3	476	0	68	6	385	423	2	6	26	354	389	63	284	486
Percent of Pavements with indicated Distress															
85	3	100	11	17	8	56	54	6	0	27	62	58	15	74	100
86	3	100	19	9	1	61	55	1	0	16	51	41	6	62	100
87	3	99	10	12	0	68	55	0	0	11	55	38	3	64	100
88	3	99	7	6	1	70	65	0	1	10	61	64	13	69	100
89	3	97	8	7	0	67	73	0	0	8	62	55	4	64	100
90	3	99	2	5	0	73	85	0	0	12	64	57	8	71	100
91	3	98	0	6	1	54	72	0	1	10	56	50	8	42	100
92	3	98	0	13	2	58	81	2	0	9	52	51	6	42	100
93	3	98	0	12	1	62	85	0	1	6	62	62	9	45	100
94	3	98	0	17	4	77	81	1	1	9	73	73	12	51	100
95	3	98	0	14	1	79	87	0	1	5	73	80	13	58	100

Table 4. Frequency of Observed Distresses in Composite Pavements
ODOT PCR Data, 1985-95.

YR	FORM	Raveling D1	Bleeding D2	Patching D3	Surface Disintegration / Debonding D4	Rutting D5	Pumping D6	Shattered Slab D7	Settlement D8	Transverse Cracking Unjointed Base D9	Jointed Base Joint Reflection Cracks D10	Jointed Base Other Cracking D11	Longitudinal Cracking D12	Pressure Damage / Upheaval D13	Crack Sealing Deficiency D14	TOTAL
Number of Pavements with indicated Distress																
85	4	1182	29	160	16	772	120	11	37	11	978	655	812	102	844	1198
86	4	1191	74	154	3	681	95	5	3	15	986	611	776	89	850	1193
87	4	1304	27	192	1	886	75	1	4	16	1120	836	901	87	1079	1326
88	4	1453	40	214	6	1122	44	13	4	37	1215	810	1033	198	1164	1490
89	4	1508	34	240	4	1253	32	4	0	38	1223	831	1082	128	1175	1548
90	4	1601	12	226	4	1374	9	1	2	69	1221	857	1058	95	1217	1668
91	4	1696	6	320	4	1345	8	24	9	14	1224	658	973	266	1121	1745
92	4	1755	2	421	80	1521	9	3	35	31	1333	784	1044	368	1293	1811
93	4	1806	3	458	42	1520	11	3	7	32	1368	894	1251	494	1384	1842
94	4	1826	2	614	129	1551	18	1	5	35	1529	1060	1531	539	1571	1883
95	4	1988	7	620	128	1805	11	1	10	31	1620	1209	1670	608	1641	2037
Percent of Pavements with indicated Distress																
85	4	99	2	13	1	64	10	1	3	1	82	55	68	9	70	100
86	4	100	6	13	0	57	8	0	0	1	83	51	65	7	71	100
87	4	98	2	14	0	67	6	0	0	1	84	63	68	7	81	100
88	4	98	3	14	0	75	3	1	0	2	82	54	69	13	78	100
89	4	97	2	16	0	81	2	0	0	2	79	54	70	8	76	100
90	4	96	1	14	0	82	1	0	0	4	73	51	63	6	73	100
91	4	97	0	18	0	77	0	1	1	1	70	38	56	15	64	100
92	4	97	0	23	4	84	0	0	2	2	74	43	58	20	71	100
93	4	98	0	25	2	83	1	0	0	2	74	49	68	27	75	100
94	4	97	0	33	7	82	1	0	0	2	81	56	81	29	83	100
95	4	98	0	30	6	89	1	0	0	2	80	59	82	30	81	100

TABLE 5. List of Distresses of Various Types of Pavements

Distress	CRC (1)	JCP (2)	Flexible (3)	Composite (4)
D1	Surface Deterioration	Surface Deterioration	Raveling	Raveling
D2	Popouts	Popouts	Bleeding	Bleeding
D3	Patching	Patching	Patching	Patching
D4	Pumping	Pumping	Potholes	Surface Disintegration, Debonding
D5	Settlements & Waves	Faulting	Crack Sealing Deficiency	Rutting
D6	Transverse Crack Spacing	Settlements	Rutting	Pumping
D7	Longitudinal Cracking	Joint Spalling	Settlements	Shattered Slab
D8	Punchouts	Joint Sealant Damage	Corrugations	Settlements
D9	Spalling	Pressure Damage	Wheel Track Cracking	Transverse Cracking, Unjointed Base
D10	Pressure Damage	Transverse Cracking	Block and Transverse Cracking	Joint Reflection Cracking, Jointed Base
D11	-	Longitudinal Cracking	Longitudinal Joint Cracking	Other Cracking, Jointed base
D12	-	Corner Breaks	Edge Cracking	Longitudinal Cracking
D13	-	-	Random Cracking	Pressure Damage Upheaval
D14	-	-	-	Crack Sealing deficiency

TABLE 6. Total Miles of each Pavement Type in the network of Ohio divided Highways (from PCR Database)

Year	Up/ Down	Form 1 (CRCP)		Form 2 (Jointed)		Form 3 (Flexible)		Form 4 (compos.)		ALL	
		No. of Segment	Total Miles	No. of Segment	Total Miles	No. of Segment	Total Miles	No. of Segment	Total Miles	No. of Segment	Total Miles
1985	Up	18	51	260	678	179	570	597	1,565	1,054	2,865
	Down	16	48	266	686	186	568	601	1,606	1,069	2,908
	Total	**34**	**99**	**526**	**1,364**	**365**	**1,138**	**1,198**	**3,171**	**2,123**	**5,773**
1986	Up	17	53	233	599	143	438	601	1,654	994	2,744
	Down	17	53	233	595	142	446	592	1,735	984	2,828
	Total	**34**	**106**	**466**	**1,194**	**285**	**884**	**1,193**	**3,389**	**1,978**	**5,572**
1987	Up	14	44	230	564	171	473	670	1,779	1,085	2,861
	Down	14	47	232	548	176	488	651	1,740	1,073	2,823
	Total	**28**	**91**	**462**	**1,112**	**347**	**961**	**1,321**	**3,519**	**2,158**	**5,684**
1988	Up	17	47	235	521	187	471	749	1,901	1,188	2,940
	Down	15	46	232	503	179	452	741	1,842	1,167	2,843
	Total	**32**	**93**	**467**	**1,024**	**366**	**923**	**1,490**	**3,743**	**2,355**	**5,783**
1989	Up	16	46	206	455	201	508	791	2,005	1,214	3,014
	Down	15	45	211	454	203	507	757	1,841	1,186	2,847
	Total	**31**	**91**	**417**	**909**	**404**	**1,015**	**1,548**	**3,846**	**2,400**	**5,861**

TABLE 6. (Contd...) Total Miles of each Pavement Type in the network of Ohio divided Highways (from PCR Database)

Year	Up/ Down	Form 1 (CRCP)		Form 2 (Jointed)		Form 3 (Flexible)		Form 4 (compos.)		ALL	
		No. of Segment	Total Miles	No. of Segment	Total Miles	No. of Segment	Total Miles	No. of Segment	Total Miles	No. of Segment	Total Miles
1990	Up	13	39	206	428	228	535	832	1,997	1,279	2,999
	Down	11	36	208	425	225	543	836	1,992	1,280	2,996
	Total	**24**	**75**	**414**	**853**	**453**	**1,078**	**1,668**	**3,989**	**2,559**	**5,995**
1991	Up	10	31	176	359	221	530	872	2,062	1,279	2,983
	Down	10	33	179	365	221	536	873	2,050	1,283	2,985
	Total	**20**	**64**	**355**	**724**	**442**	**1,066**	**1,745**	**4,112**	**2,562**	**5,968**
1992	Up	9	26	166	311	223	542	906	2,115	1,304	2,995
	Down	8	24	163	307	225	556	905	2,107	1,301	2,995
	Total	**17**	**50**	**329**	**618**	**448**	**1,098**	**1,811**	**4,222**	**2,605**	**5,990**
1993	Up	8	20	147	283	222	538	923	2,155	1,300	2,997
	Down	7	19	146	284	221	543	919	2,143	1,293	2,988
	Total	**15**	**39**	**293**	**567**	**443**	**1,081**	**1,842**	**4,298**	**2,593**	**5,985**
1994	Up	7	19	133	278	224	547	943	2,169	1,307	3,013
	Down	7	18	130	276	228	557	940	2,164	1,305	3,014
	Total	**14**	**37**	**263**	**554**	**452**	**1,104**	**1,883**	**4,333**	**2,612**	**6,027**
1995	Up	7	20	152	269	244	543	1,021	2,219	1,424	3,050
	Down	6	17	154	278	242	530	1,016	2,226	1,418	3,051
	Total	**13**	**37**	**306**	**547**	**486**	**1,073**	**2,037**	**4,445**	**2,842**	**6,101**

- when relatively low percentages of pavements were observed to have certain pavement distresses year after year, these distresses were considered **rare** under the prevailing design, traffic, environmental and other conditions. On the other hand, the pavement distresses with relatively high percentage of pavements were considered part of the normal pavement performance characteristics under the prevailing conditions. If some of these or many of these prevailing conditions changed, it is expected that there will be a change in the percentages of the segments with one or more distresses. For example, surface disintegration/debonding in composite pavements (See Table 4) was almost nonexistent until the year 1991, but started showing up in increasing percentages after this year.

Based on the above observations and the assumption that there are no major changes planned for some time in future in the design, maintenance and rehabilitation of the pavements, it is anticipated that the frequencies of various distresses will remain same as observed in the past. Also, as a result of these observation, it can be assumed that the distresses with very low frequency of occurrence are **nonsignificant**. Or, in other words, it can be assumed that these distresses will not contribute to the **PCR value** of the pavement. Thus, a zero (0) weights can be assigned to these distresses . The results of this analysis are summarized in Tables 7 to 10. The distresses with relatively high frequency of occurrence are indicated with a check mark (✓) in these tables.

The next step in the analysis of PCR data was aimed at gathering information regarding the distresses which may have prompted ODOT Engineers in the past to include the pavement sections in the list of Rehabilitation Projects. The data for this analysis was obtained by combining data files from PCR database and Maintenance database. Maintenance actions which were selected for this analysis were those actions which represented Minor Rehabilitation, Major Rehabilitation and Reconstruction. According to the ODOT's Maintenance and Rehabilitation (M&R) Action numbering system, these actions are currently numbered from 50 to 130, as shown in Table 11. Discussions with ODOT Engineers indicated that due to limited availability of funds for Rehabilitation Projects, all the projects which may have been in the list of Rehabilitation Projects may not have been funded in any given year. Therefore, the database used in this analysis was limited to only those pavement sections which were funded and constructed and were available from the ODOT records (database).

3.3 COMBINING THE PCR DATA WITH MAINTENANCE DATA FOR ANALYSIS

In order to combine PCR data with the Maintenance data, the pavement sections of the PCR database corresponding to the pavement sections of the Maintenance database were searched and when a match was found, the data from PCR record was combined with the maintenance data so that the resulting data file contained PCR data as well as maintenance data for each pavement section in the database. During the discussions with the ODOT engineers it was discovered that generally it takes 1-3 years from the time a Rehabilitation Project is initially selected to the time it is constructed in the field, because each project has to go through several steps, such as: preparation of plans, preparation of bid documents, selling the job, etc. Therefore, the PCR data which was collected at

TABLE 7. Mostly Observed/Significant Distresses of CRC Pavements as determined from various sources/methods

Distress No.	Description of Distress	Mostly Observed Distress	Statistical Analysis*		ODOT Engineers	Concrete Industry*	Distress Weight Level
			Numeric	Coded			
1	Surface Deterioration	✔			✔		H
2	Popouts	✔					L
3	Patching (Deterioration)	✔			✔		H
4	Pumping	✔			✔		H
5	Settlements & Waves						L
6	Transverse Crack Spacing	✔			✔		H
7	Longitudinal Cracking	✔			✔		H
8	Punchouts & Edge Breaks	✔			✔		H
9	Spalling	✔			✔		H
10	Pressure Damage						L

✔ = Distress considered significant.
* = Analysis not performed/no opinion.

TABLE 8. Mostly Observed/Significant Distresses of Jointed Concrete Pavements as determined from various sources/methods

Distress No.	Description of Distress	Mostly Observed Distress	Statistical Analysis		ODOT Engineers	Concrete Industry	Distress Weight Level
			Numeric	Coded			
1	Surface Deterioration	✔			✔		M
2	Popouts	✔					L
3	Patching	✔	✔	✔	✔	✔	H
4	Pumping		✔	✔		✔	H
5	Faulting (joints & cracks)	✔	✔		✔	✔	H
6	Settlements					✔	M
7	Transverse Joint Spalling	✔	✔	✔	✔	✔	H
8	Joint Sealant Damage	✔			✔	✔	M
9	Pressure Damage						L
10	Transverse Cracking	✔	✔	✔	✔	✔	H
11	Longitudinal Cracking		✔	✔	✔	✔	H
12	Corner Breaks		✔	✔	✔	✔	H

✔ = Distress considered significant.

TABLE 9. Mostly Observed/Significant Distresses of Flexible Pavements as determined from various sources/methods

Distress No.	Description of Distress	Mostly Observed Distress	Statistical Analysis		ODOT Engineers	Industry	Distress Weight Level
			Numeric	Coded			
1	Raveling	✔			✔	✔	H
2	Bleeding				✔		M
3	Patching (deterioration)	✔			✔		M
4	Potholes				✔	✔	M
5	Crack Sealing Deficiency	✔		✔	✔		H
6	Rutting	✔	✔	✔	✔	✔	H
7	Settlements						L
8	Corrugations						L
9	Wheel Track Cracking		✔		✔	✔	H
10	Block & Transverse Cracking	✔	✔		✔	✔	H
11	Longitudinal Joint Cracking	✔	✔		✔	✔	H
12	Edge Cracking						L
13	Random Cracking	✔	✔	✔	✔	✔	H

✔ = Distress considered significant.

TABLE 10. Mostly Observed/Significant Distresses of Composite Pavements as determined from various sources/methods

Distress No.	Description of Distress		Mostly Observed Distress	Statistical Analysis		ODOT Engineers	Industry*	Distress Weight Level
				Numeric	Coded			
1	Raveling		✔			✔		M
2	Bleeding			✔	✔	✔		H
3	Patching (deterioration)		✔	✔	✔	✔		H
4	Surface Disintegration, Debonding					✔		M
5	Rutting		✔	✔	✔	✔		H
6	Pumping			✔	✔			M
7	Shattered Slab							L
8	Settlements							L
9	CRCP Base	Transv. Cracks						L
10	Jointed Base Cracks	Joint Reflectn.	✔	✔	✔	✔		H
11		Others	✔	✔	✔	✔		H
12	Longitudinal Cracking		✔	✔	✔	✔		H
13	Pressure Damage/ Upheaval		✔		✔			H
14	Crack Sealing deficiency		✔			✔		M

✔ = Distress considered significant; * = Analysis not performed/no opinion.

TABLE 11. List of M&R Actions and Their Applicability to Various Types of ODOT Pavements

Maint. Cat.	Description	Action Code	Rigid	Flexible	Compos.
Do Nothing	Do Nothing	000	Y	Y	Y
Preventive Mainten.	Routine Maintenance	010	Y	Y	Y
	Seal Coat	020	N	Y	Y
	Joint Crack and Underseal Repair	030	Y	N	Y
	CPR-Concrete Pavement Restoration	040	Y	N	N
Minor Rehab.	Non-structural AC Overlay with Minimum Repairs	050	Y	Y	Y
	Non-structural AC Overlay with Repairs	060	Y	Y	Y
Major Rehab.	Structural AC Overlays with Minimum Repairs	070	Y	Y	Y
	Structural AC Overlay with Repairs	080	Y	Y	Y
	Crack and Seat (C&S) or Break and Seat (B&S)	090	Y	N	Y
	PCC Structural Overlay	100	Y	Y	Y
Reconstruct	Reconstruction with Flexible	110	Y	Y	Y
	Reconstruction with Rigid	120	Y	Y	Y
	Reconstruction with Composite	130	Y	Y	Y

Y = Yes (applicable); N = No (not applicable)

least 2 or 3 years before the construction year was considered to represent the PCR which may have prompted its inclusion in the list of Maintenance/ Rehabilitation Projects. These guidelines were, therefore, used in the selection of PCR data for this analysis.

3.4 ANALYSIS OF COMBINED MAINTENANCE AND PCR DATA

The purpose of this analysis was to find the distresses of each pavement type along with their severity and extent which may have been responsible for prompting a M&R Action. Statistical method called "Classification Trees"(for the details of this method, please see Ref. 27) was used for this purpose. The results of this analysis produced a decision tree which could be used to determine a M&R action based on the types of distresses present in the pavement section. Figure 5 illustrates a typical decision tree for flexible pavements. Similar trees were obtained for other pavement types also, as shown in Figures 6 and 7.

The "Classification Tree" produces a number of consecutive splits or partitions in the data. Each split uses the distress which at this point is best suited to create more homogeneous subsets with respect to the category of the dependent variable (M&R Action in this case). Ideally, each end-node (last branch) of the tree would only contain observations in the same category. Observations that do not fall in the main category (category with the highest number of observations) of this end-node are considered misclassified and their proportion is called the misclassification rate. The criterion used for finding the best distresses for each split is misclassification rate and deviance reduction. Each split creates 2 branches which then may again be split. The branching is stopped at the point when further deviance reduction could only be attributed to random elements in the data rather than underlying structure (similar to linear regression when adding more variables does not significantly increase R^2 any more). Cross validation was used to determine the optimal stopping point.

"Growing" a classification tree results in a partitioning of the data such that each observation falls into exactly one end-node of the tree. Each end-node is associated with N number of empirical probabilities for the number of observations that fall into this node from the N levels of the response variable (M&R Actions) and a main classification category (the M&R Action with the highest probability). Again, in a perfectly classifying tree, one of the probabilities in each end-node would be 1 and the others 0. For further details of this method of analysis, please see Reference [27].

The method of determining the M&R Action(s) for a given pavement using a "Classification Tree" can be illustrated with the help of Figure 5. Starting from the top of the page of Figure 5, the presence or absence of pavement distress, D11 (Longitudinal Joint Cracking) is determined first. If this distress is either absent or the product of its severity and extent weight (numerical value) is less than 0.48, then, the left side of the tree will be followed, otherwise, the right side of the tree will be followed. At the bottom of right side branch, two numbers, 50 and 60 are printed. These number are the M&R action codes which will be recommended if D11 is present and the product of its severity and extent is $\geq$ 0.48. The numbers in the parentheses are the probabilities associated with each M&R action recommended. According to this convention, the results will be interpreted as:

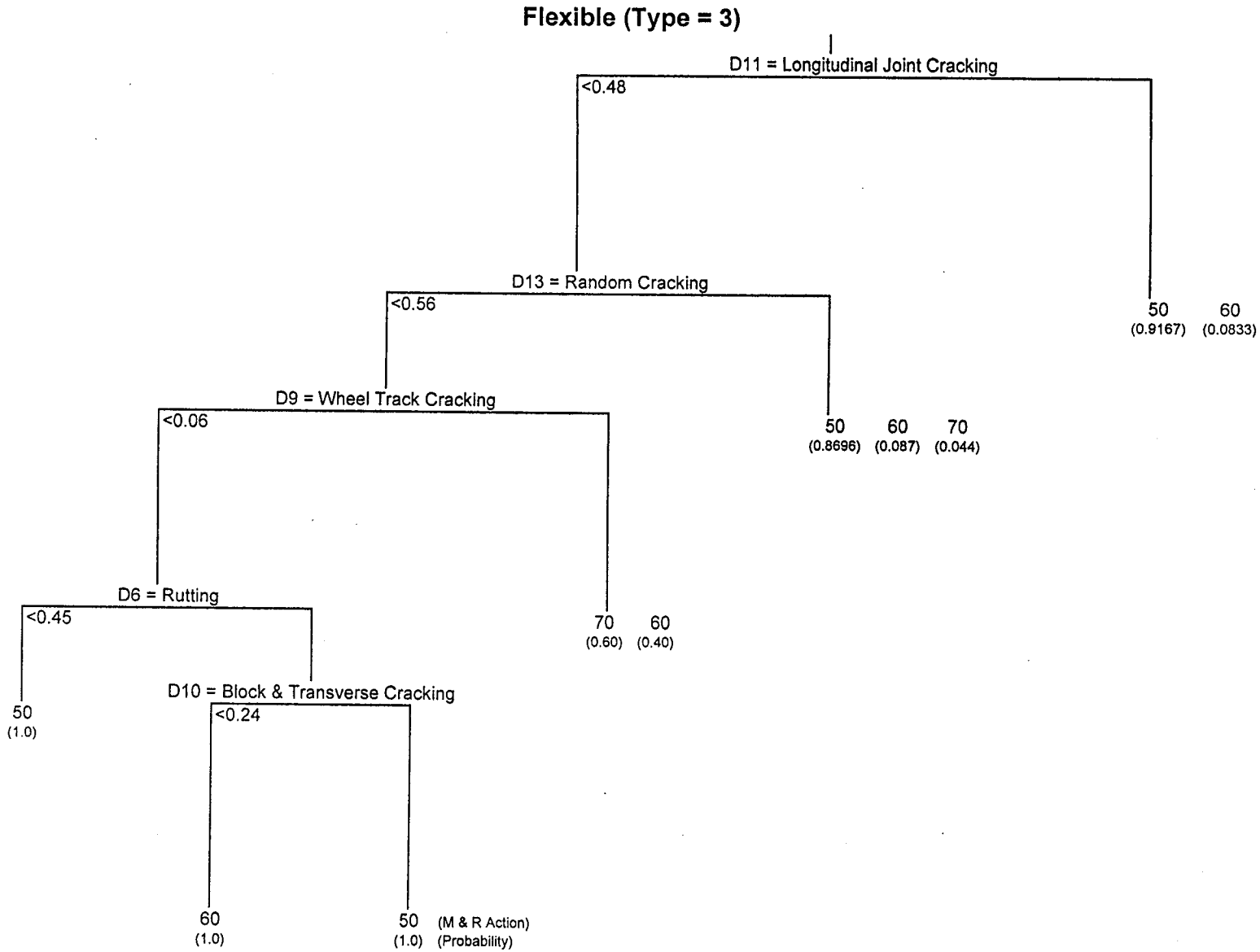

Figure 5. Classification Tree for Flexible Pavements

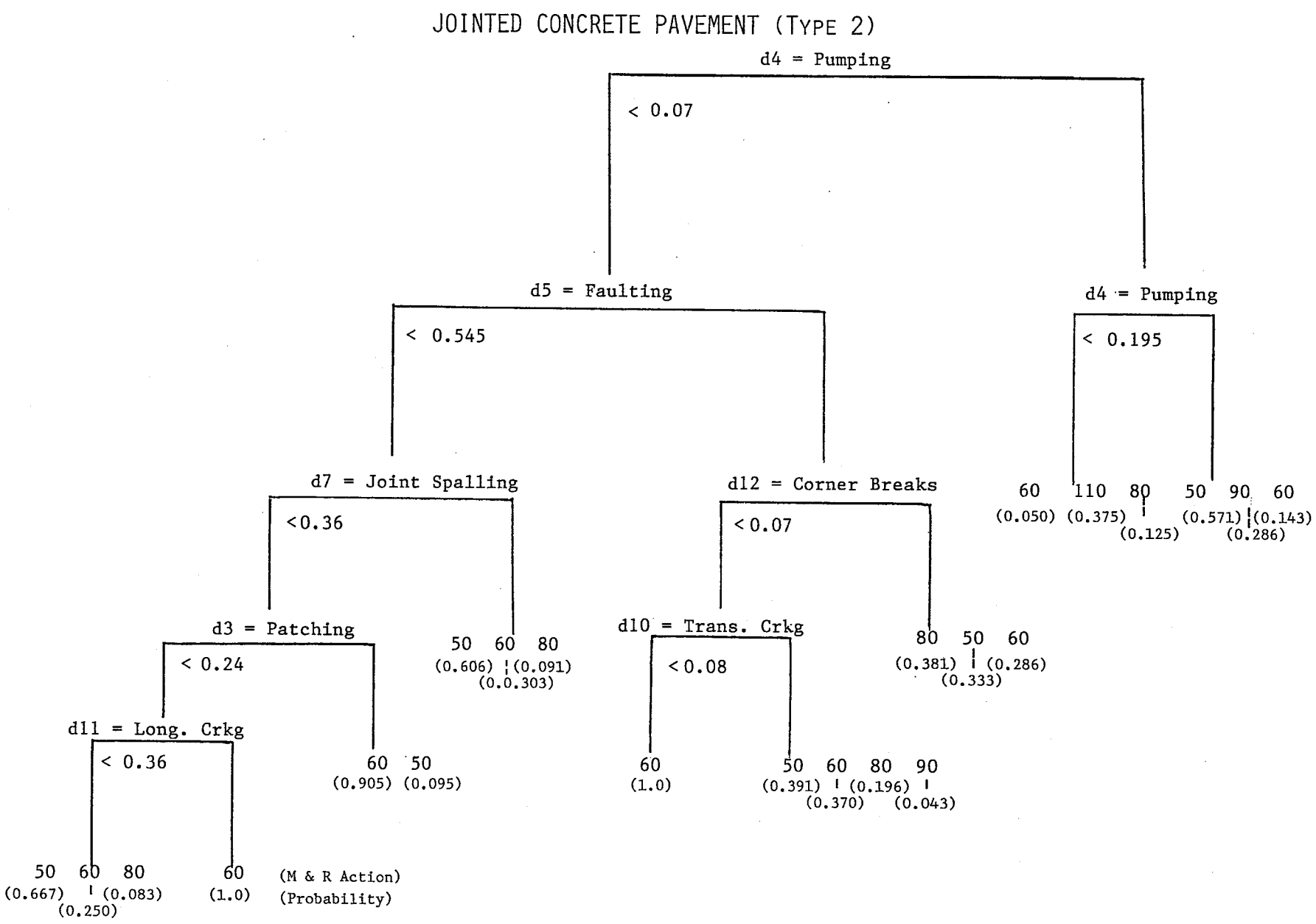

Figure 6. Classification Tree for Jointed Concrete Pavements (JCP/JRCP)

COMPOSITE PAVEMENT (Type = 4)

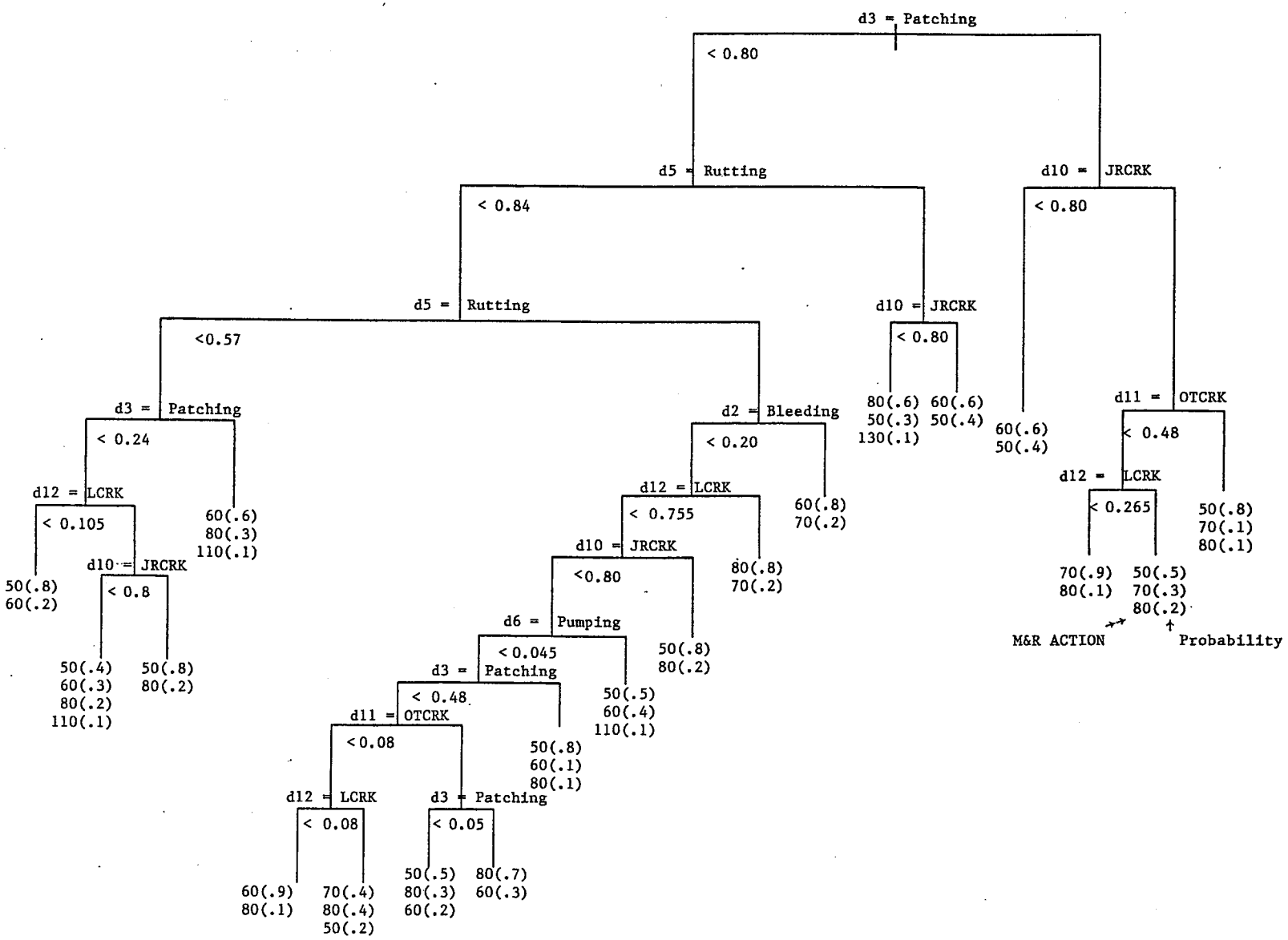

Figure 7. Classification Tree for Composite Pavements

if the Longitudinal Joint Cracking is ≥ 0.48, then M&R action 50 will be recommended with a probability of 0.9167 and M&R action 60 will be recommended with a probability of 0.0833. On the other hand, if D11 is < 0.48, then the left side of the tree will be followed. The presence or absence of next distress will be treated in the same manner as described above for D11 (follow the left side if the product of severity and extent is less than the number indicated for the distress, or right side, if it is greater than or equal to the number indicated on the left side).

It is evident from Figure 5 that all pavement sections were treated with M&R = 50, if all the distresses were at their relatively lower levels, as indicated at the last end-node on the left. However, when one of the distress was at a higher level, higher level actions were also considered, as shown by the end-nodes on the right hand side of this node. The results of this analysis provide a visual means of systematically looking at the decisions made by various experts in assigning the M&R actions to pavements with various distresses and display any inconsistency in the assignments of M&R actions. For example, the two end-nodes at the bottom indicate that when Block and Transverse Cracking (D10) was < 0.24, M&R action 60 was assigned, whereas, when this distress was > 0.24, M&R action 50 was assigned. This assignment of M&R actions may not be consistent with the general thinking that higher level distresses will require higher level M&R action. This example illustrates the use of the Classification Tree analysis in developing an expert system which is consistent and rational.

PCR data using the letter codes for severity weights (L, M and H) and number codes for extent weights (1 = Occasional, 2 = Frequent and 3 = Extensive) were also used in this analysis and decision trees similar to Figure 5 were obtained for different pavement types. The results of both types of data analysis are summarized in Tables 7 - 10 for all types of pavements in the columns of statistical analysis. The column with the heading "Numeric" lists the results obtained from the data using the product of (Severity X Extent) and column with the heading "Coded" lists the results obtained from the data using the Codes of distress Severity and Extent individually.

3.5 ODOT ENGINEERS' ASSESSMENT OF IMPORTANT DISTRESSES

While having discussions on the activities of the Project, the ODOT Engineers were asked to indicate their opinions regarding the distresses which they considered important for inclusion in the list of each pavement type. The results of their opinions are listed in Tables 7 - 10 under the column heading "ODOT Engineers". The Experts from industry were also asked to express their opinions regarding the important distresses of each pavement type. The column with the heading "Industry" in Tables 7 - 10 lists the results of their opinion. The Industry Experts did not include CRC and Composite Pavements in their responses.

3.6 RESULTS OF DATA ANALYSIS

The analysis of PCR data collected in the past 11 years indicated that some pavement distress were rarely observed in the Ohio pavements. If the methods of roadway construction and maintenance and traffic patterns along with the environmental conditions remain reasonably the

same as in the past, it is expected that these distresses will not develop in the Ohio Pavements in future. The weights of theses distresses, therefore, should be Low or Zero in the calculations of PCR values.

Among the distresses which were observed frequently in the Pavements in the past 11 years, there were some distresses which affected the selection of M&R actions, as indicated by Classification Tree analysis. These distresses, therefore, should be assigned relatively higher weights (say High) for the purpose of calculating the PCR values. The remaining distresses should be assigned weights between Low and High (say Medium).

Based on the results of analysis stated above as well as the inputs in this regard from various sources (ODOT Engineers, Industry, Consultant), each distress of the pavement was assigned a weight (L = Low; M = Medium; H = High), as recorded in the last columns of Tables 7 - 10.

3.7 PAVEMENT DISTRESSES WHICH MAY BE THE CANDIDATES FOR THE REVISION OF THEIR PRESENT DEFINITIONS

There was some concern expressed by ODOT field personnel (who collect the PCR data for ODOT) as well as the ODOT engineers that some distresses do not get recorded properly because of the way they were defined in the ODOT's PCR Manual [1]. For example, Patching in Flexible and Composite pavements is not recorded if the Patches are in good condition. Experts feel that the Patches in a pavement indicate insufficient structural integrity of pavement, therefore, they should be recorded whether are not they are in good condition. Some modifications in the definitions of this and other distresses were considered while revising the PCR Manual [1].

The other concern is related to definitions of the levels of severity and extent. For example, the severity of Rutting in the Flexible Pavements is currently defined as follows:

Low	=	< 1/4",
Medium	=	1/4 - 1", and
High	=	> 1".

Field personnel felt that the definition of Medium Rutting may need some changes because the upper limit of 1" depth may be such that very few pavements will ever exceed this limit, thus making the high severity range inappropriate for the conditions in Ohio.

To investigate the possible revisions of the severity and/or extent levels of each pavement distress, the frequencies of various levels of severity and extent were calculated for each pavement distress using the PCR data for the years 1985- 95. It was hypothesized that if the frequency of a certain level of severity or extent is relatively low, then, it is possible that the range for this level is not appropriate, because this level changes quickly to the next level, and the next level may have such a wide range that it will include almost all conditions making it ineffective for defining this level. The results of the frequency calculations are shown in Tables 12 to 15. After reviewing the

frequency distributions of severity and extent levels of each pavement distress, the possible revisions needed for either severity or extent levels or both were determined. The results of this analysis are summarized in the last column of Tables 12 - 15. Revisions required in these distresses were discussed with the ODOT engineers during project meetings. It was, however, suggested that any changes needed in this connection should be deferred until the time for the next revision of the PCR Manual.

TABLE 12. Frequencies of Severity and Extent Levels recorded in PCR database (1985-95), CRCP

Distress No.	Description	Severity				Extent				Possible Revision
		None	L	M	H	None	O	F	E	
1	Surface Deterioration	79	20	1	0	79	0	1	20	S, E
2	Popouts	N/A	N/A	N/A	N/A	12	4	6	78	E
3	Patching (Deterioration)	53	9	11	27	53	18	20	9	
4	Pumping	40	24	33	3	40	20	21	19	
5	Settlements & Waves	89	4	6	1	89	8	3	0	
6	Transverse Crack Spacing	8	16	50	26	8	1	3	88	S, E
7	Longitudinal Cracking	26	2	47	25	26	15	28	31	S
8	Punchouts & Edge Breaks	76	2	10	12	76	16	6	2	
9	Joint Spalling	68	5	12	15	67	13	10	9	
10	Pressure Damage	N/A	N/A	N/A	N/A	95	5	0	0	

TABLE 13. Frequencies of Severity and Extent Levels recorded in PCR database (1985-95), JRCP/JCP

Distress No.	Description	Severity				Extent				Possible Revision
		None	L	M	H	None	O	F	E	
1	Surface Deterioration	72	26	1	1	72	1	1	26	S, E
2	Popouts	N/A	N/A	N/A	N/A	9	3	3	85	E
3	Patching	54	7	15	24	54	14	12	20	
4	Pumping	87	8	4	1	88	8	3	1	
5	Faulting (joints & cracks)	42	10	47	1	42	3	5	50	S, E
6	Settlements	96	2	1	1	96	2	1	1	
7	Transverse Joint Spalling	43	18	28	11	43	23	16	18	
8	Joint Sealant Damage	N/A	N/A	N/A	N/A	19	5	8	68	E
9	Pressure Damage	N/A	N/A	N/A	N/A	97	1	1	1	
10	Transverse Cracking	14	11	66	9	14	49	34	3	S, E
11	Longitudinal Cracking	84	1	10	5	84	7	5	4	S
12	Corner Breaks	80	1	15	4	80	9	5	6	5

TABLE 14. Frequencies of Severity and Extent Levels recorded in PCR database (1985-95), Flexible Pavements

Distress No.	Description	Severity				Extent				Possible Revision
		None	L	M	H	None	O	F	E	
1	Raveling	2	94	3	1	2	1	1	97	S, E
2	Bleeding	95	1	2	2	95	1	2	2	
3	Patching (deterioration)	89	2	3	6	89	4	2	5	
4	Potholes	97	1	1	1	97	1	1	1	
5	Crack Sealing Deficiency	N/A	N/A	N/A	N/A	34	5	7	54	E
6	Rutting	26	43	29	2	26	1	2	71	S, E
7	Settlements	97	1	1	1	97	1	1	1	
8	Corrugations	97	1	1	1	97	1	1	1	
9	Wheel Track Cracking	89	2	8	1	89	5	4	2	
10	Block & Transverse Cracking	38	8	45	9	38	7	12	42	S, E
11	Longitudinal Joint Cracking	42	11	35	12	42	7	14	37	
12	Edge Cracking	91	2	4	3	91	5	3	1	
13	Random Cracking	42	6	48	4	42	10	17	31	5

TABLE 15. Frequencies of Severity and Extent Levels recorded in PCR database (1985-95), Composite Pavements

Distress No.	Description	Severity				Extent				Possible Revision
		None	L	M	H	None	O	F	E	
1	Raveling	2	92	5	1	2	1	1	96	S, E
2	Bleeding	97	1	1	1	97	1	1	1	
3	Patching (deterioration)	90	2	5	13	80	5	4	11	
4	Surface Disintegration, Debonding	96	2	1	1	96	2	1	1	
5	Rutting	22	39	36	3	22	1	2	75	S, E
6	Pumping	97	1	1	1	97	1	1	1	
7	Shattered Slab	97	1	1	1	97	1	1	1	
8	Settlements	97	1	1	1	97	1	1	1	
9	Joint Refl., CRCP base	97	1	1	1	97	1	1	1	
10	Joint Refl., JCP base	22	7	43	28	22	4	6	68	S, E
11	Other Cracks, JCP base	48	3	38	11	48	34	16	2	S, E
12	Longitudinal Cracking	32	10	44	14	32	22	34	12	S, E
13	Pressure Damage/ Upheaval	83	3	13	1	83	8	5	4	5
14	Crack Sealing deficiency	N/A	N/A	N/A	N/A	25	4	8	63	E

CHAPTER 4
REVISION OF PAVEMENT DISTRESS WEIGHTS

4.1 INTRODUCTION

The investigations which were conducted to determine the important distresses of each ODOT pavement type were described in previous chapter. The results of these investigations clearly indicated that none of the pavements surveyed in the past (since 1985) developed all the distresses listed in the PCR data recording forms. Therefore, the part of the PCR scale below 40 was generally not utilized. In order to utilize this part of the PCR scale, therefore, a revision of the pavement distress weights is necessary so that the pavements rated as "Failed" from serviceability point of view can be placed at the lower end of the PCR scale. With this objective in mind, a survey was conducted to collect data related to the Pavement Condition Ratings. This survey included pavements of all four types (CRCP, JRCP/JCP, Flexible and Composite) in various surface conditions. The pavements for this survey were selected from the ODOT's PCR database. Therefore, none of the Pavements included in this survey were hypothetical. Figure 8 shows a typical page of the survey forms used for Composite Pavements. Similar forms were used for other pavement types.

4.2 DESIGN OF EXPERT OPINION SURVEY FORMS

The forms designed for the survey included a description of pavement distresses, its severity and extent, type of pavement and blank spaces to record the responses of the experts. For each pavement, the experts were asked to answer the following four questions:

1. What is the pavement condition rating (PCR) when the pavement is a part of 4-lane divided system?

2. What maintenance is recommended when the pavement is a part of 4-lane divided system?

3. What is the PCR when the pavement is a part of 2-lane system?

4. What maintenance is recommended when the pavement is a part of 2-lane undivided system?

4.3 SCALES OF PCR AND MAINTENANCE ACTIONS USED WITH SURVEY FORMS

A simple PCR scale, as shown in Figure 9 was used to rate each Pavement, irrespective of its Type. This scale ranged from 0-5 and the experts were asked to use integers if they could not provide ratings in fractions. For example, if the pavement was Rated as "**Failed**", the Rating would be recorded as "**1**", and so on. The recommended maintenance was also coded from 1-5 as shown

Composite Pavement		
Pavement Distress	Severity	Extent
Raveling	Rough or pitted	>50%
Patching	Needs replaced	10-30%
Rutting	1/4-1 in	>50%
Shattered Slab	Some spalling	<2/mi
Joint Reflection	>1 in spalled (>.5	>50%
Other Cracking	>1 in spalled (>.5	>5 yd
Longitudinal	1 in (spalled .5)	50-150 ft per 100 ft
Pressure	1/2-1 in Fair ride	<20%
Crack Sealing		>50%

4 Lane & Interstates Pavement Condition Rating	1
4 Lane & Interstates Maintenance Action	3
2 Lane & Others Pavement Condition Rating	1
2 Lane & Others Maintenance Action	3

376

Composite Pavement		
Pavement Distress	Severity	Extent
Raveling	Slight loss of sand	>50%
Rutting	<1/4 in	>50%
Joint Reflection	>1 in spalled (>.5	>50%
Other Cracking	>1 in spalled (>.5	>5 yd
Longitudinal	1/8-1 in (spalled .5)	<50 ft per 100 ft
Pressure	1/2-1 in Fair ride	<20%

4 Lane & Interstates Pavement Condition Rating	3
4 Lane & Interstates Maintenance Action	3
2 Lane & Others Pavement Condition Rating	4
2 Lane & Others Maintenance Action	3

377

Composite Pavement		
Pavement Distress	Severity	Extent
Raveling	Slight loss of sand	>50%
Patching	Moderate	>30%
Rutting	1/4-1 in	>50%
Joint Reflection	>1 in spalled (>.5	>50%
Other Cracking	>1 in spalled (>.5	3-5 yd
Longitudinal	1 in (spalled .5)	50-150 ft per 100 ft
Crack Sealing		>50%

4 Lane & Interstates Pavement Condition Rating	3
4 Lane & Interstates Maintenance Action	3
2 Lane & Others Pavement Condition Rating	3
2 Lane & Others Maintenance Action	3

378

Figure 8. A Typical Expert Opinion Survey Form Completed by an Expert

Maintenance Actions

1. Reconstruction
2. Major Rehabilitation
3. Minor Rehabilitation
4. Preventive Maintenance
5. Do Nothing

Pavement Condition Rating Scale

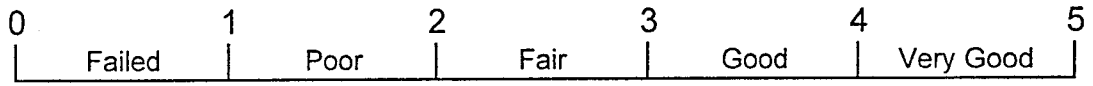

Figure 9. Pavement Condition Rating Scale and Maintenance Action Codes used in the Expert Opinion Surveys

in Figure 9. A verbal description of maintenance codes allowed experts to record their responses conveniently as numbers 1 - 5. Figure 8 shows typical responses from an expert.

4.4 SELECTION OF EXPERTS FOR THE SURVEYS

ODOT engineers from Districts 1, 4, 6 and 8 and the Central Office were invited to participate in this survey. The engineers from the selected districts were contacted in the early phase of this project and a meeting was held to discuss the objectives of the study as well as some related background of PCR surveys and the use of PCR data in Prioritizing the pavements for maintenance and/or rehabilitation purposes. The survey forms were given to the experts during the second meeting. At this time the participants were informed about the purpose and goals of the surveys and the guidelines to complete the survey forms similar to the form illustrated in Figure 8 and the scales of PCR and maintenance shown in Figure 9. The listing of the data collected from the experts for 4-lane system is enclosed in Appendix A.

4.5 GENERAL NOTES REGARDING THE SURVEYS

#1 The survey forms for each type of pavement included examples of 96 pavements. These examples covered pavements which ranged in conditions from "Failed" to "Very Good". It was anticipated that some pavements included in the survey forms may be difficult to rate, therefore, they will not be rated by the Experts. Thus, each Expert will still have opportunity to rate sufficient number of pavements to perform the analysis of data. This was explained to the Experts during the meeting before they completed the Surveys Forms.

#2 During the meetings with various ODOT District engineers, the engineers expressed their full support and cooperation in their participation and completion of these surveys. However, when contacted later on, they expressed their inability to complete the survey forms due to their commitments in the office. Therefore, responses from Districts 1, 4 and 8 could not be obtained at this time. The data used in this analysis was obtained from three (3) Central Office Engineers and two (2) Engineers of District 6.

4.6 THE DATABASE USED IN THE ANALYSIS

The database used in this analysis consists of the following records:

1.	Continuously Reinforced Concrete Pavements (CRCP)	-	282 records
2.	Jointed Concrete Pavements (JRCP/JCP)	-	336 records
3.	Flexible Pavements	-	336 records
4.	Composite Pavements	-	337 records.

The listings of the pavements of each type with their distress severity and extent identified

as S1, E1, etc., are enclosed in Appendix A. Tables A-1 to A-4 of this appendix also include the Expert Ratings for 4-lane system along with the PCR calculated by the current ODOT formula for each pavement type.

4.7 ANALYSIS OF SURVEY DATA

The survey data collected for this study was analyzed to determine: (1) the pavement distresses which were considered important from Pavement Rating point of view and (2) the distress weights assigned (indirectly) by the experts in assessing the Pavement Rating. Preliminary analysis of the survey data was performed using a Linear Regression Method of data analysis. The results of this analysis indicated that due to large variations in the expert opinions in Rating the pavements, the fit to the data (as assessed by R^2) was very poor. Therefore, other alternate methods were used to analyze the data. Two methods, which were considered suitable for this purpose are described below along with the results of analysis.

4.7.1 Method #1

A review of survey data collected from the experts indicated that for any given pavement the experts did not have the same ratings. Therefore, to reduce the variability in the numerical ratings of a given pavement by different experts, a statistical method called "Classification Tree" was used to determine the most probable Pavement Condition Rating Category of each pavement. This method of data analysis is described in Chapter 3, Section 4, page 29 and will not be repeated here. However, it should be noted here that this method of analysis is an appropriate (descriptive) technique for our scenario since it is perfectly suited to categorical responses as well as categorical covariates (Linear regression or Discriminant analysis have significant limitations in such cases). Also, the resulting classification probabilities in each end-node can be utilized nicely in further analysis, as will be explained later.

The results of this analysis provided a means to arrange all expert data in the order of their distress severity and extent weights, similar to the trees shown in Figures 5-7. With the help of the results of this analysis, it was possible to assign each pavement section one single Rating. The data compiled for this purpose is enclosed in Appendix B. This Rating was assumed to represent the opinions of the **majority** (experts).

To illustrate the above statement, let us consider a sample of data selected from Appendix B. This data is shown in Table 16. An examination of this data indicates that all experts did not have the same Rating for a given Pavement. Therefore, with the help of this procedure it was possible to determine one single rating for each pavement, as shown in column 3 of Table 16. The next item in this analysis was to assign a representative PCR value to each Pavement Section. The procedure to obtain this value is described below.

The PCR Scale between 0 and 100 was divided into 5 equal parts, as shown in Figure 10. Each part of the scale, which had a range of 20 PCR numbers, represented one of the five conditions.

Table 16. Results of Regrouping the Survey Data of Pavement Condition Rating

Pavement No.	Expert Rating	Classification Tree		ODOT PCR	Assigned PCR
		Rating	Probability		
319	1	1	0.478	48	10
	2				
	2				
	1				
398	2	2	0.588	53	28
	3				
	2				
	2				
321	3	3	0.556	72	48
	4				
	3				
	3				
343	4	5	0.447	91	89
	5				
	5				
	5				

PCR SCALE

PCR Scale	Range	DESCRIPTION OF CONDITION	CONDITION RATING
100 81		VERY GOOD	5
80 61		GOOD	4
60 41		FAIR	3
40 21		POOR	2
20 0		FAILED	1

Figure 10. New Pavement Condition Rating (PCR) Scale

For example, the scale from 0 - 20 PCR represented "Failed", from 21 - 40 PCR represented "Poor", and so on, as shown in Figure 10. A specific value of PCR corresponding to a given rating was determined by proportioning the PCR range according to the probability associated with its rating. A probability close to 1 represented the value near its lowest range and probability close to zero (0) represented its value near the highest range. For example, if the rating was 1 (for this rating, the PCR ranges from 0 to 20) and the probability associated with this rating was 0.75, then a PCR of 5 was assigned to this Pavement. Similar concepts were applied to determine the PCR numbers for other Ratings. This procedure was generally followed for almost all cases with few exceptions. The resulting data was then analyzed using the Linear Regression Analysis (Stepwise) to obtain an equation of the following form:

$$PCR = A0 + A1 * D1 + A2 * D2 + A3 * D3 + ... \quad (3)$$

Where,

PCR	=	estimate of PCR value of a given pavement section,
A0	=	Regression constant, as obtained from the data analysis,
A1, A2, ...	=	weights of the distresses D1, D2, ..., and
D1, D2, ...	=	numerical values of the product of distress severity and extent weights for the distresses D1, D2, etc..

The results of this analysis provided the NEW Weights for each distress of all four (4) types of pavements. The Stepwise method used in this analysis eliminated the distresses which were not considered significant according to the criteria used in this analysis. The results of this analysis (New Weights) are listed in Table 17 for Rigid Pavements and Table 18 for Flexible and Composite Pavements.

4.7.2 Method #2

Statistical method called "Proportional Odds Model" was used to analyze the expert survey data. To use this method of analysis, we have to work under certain constraints, because we had a categorical (ordinal) response and needed to find a continuous pavement condition rating that is a linear function of the distresses.

This analysis was performed in 2 stages. First, a proportional odds model was fitted (see explanation below) to the 5-level response (Pavement Ratings 1-5) using all relevant distresses (all non-significant distresses whose coefficients had the wrong sign were taken out). The analysis was then continued (ignoring the logit transformation and the different intercepts) by just performing a location and scale change on the linear part (sum of products of coefficients and distresses) of the formula obtained by the model to obtain the final pavement condition rating. The location and scale change (i.e., multiplying all coefficients with the same constant and then adding an overall intercept constant to the formula) was done such that the final pavement condition rating ranged between 0 and 100.

Table 17. Results of Expert Survey Data Analysis, Rigid Pavements Constants A0 and Coefficients A1, A2, ...

Regression Coefficients	CRCP			JRCP/JCP		
	Method #1	Method #2	Recomm.	Method #1	Method #2	Recomm.
A0	90.53	105.5	100	90.62	106.0	100
A1		-0.4	-15	-7.27		-10
A2		-14.1			-6.0	
A3	-44.67	-24.0	-25	-14.36	-13.9	-15
A4		-6.2	-10			
A5	-14.88			-14.09	-18.8	-20
A6	-23.26	-35.0	-30	-17.07	-16.2	-15
A7		-17.0	-20	-4.22	-19.4	-20
A8	-8.00	-5.8	-10	-12.61	-19.1	-20
A9	-5.54	-8.8	-10			
A10				-13.02	-26.4	-25
A11					-2.9	-10
A12					-4.9	-10
A13						
A14						
R^2	0.827			0.586		

Table 18. Results of Expert Survey Data Analysis, Flexible and Composite Pavements Constants A0 and Coefficients A1, A2, ...

Regression Coefficients	Flexible			Composite		
	Method #1	Method #2	Recomm.	Method #1	Method #2	Recomm.
A0	89.17	104.5	100	100.93	106.0	100
A1		-3.5	-10	-19.99	-13.3	-15
A2	-12.34	-21.9	-15			
A3		-4.3	-10	-18.07	-3.9	-15
A4	-17.56	-33.6	-20		-14.4	-10
A5	-9.98	-7.3	-10	-9.29	-27.9	-25
A6	-21.82	-22.4	-25		-11.4	-10
A7					-3.0	
A8					-8.0	
A9	-14.36	-32.9	-30			-30
A10	-8.79	-9.4	-10	-30.97	-16.2	-15
A11		-2.0		-8.83	-12.3	-15
A12						-10
A13	-14.44	-15.8	-15		-4.1	
A14				-14.10	-25.9	-20
R^2	0.742			0.872		

Statistical Note: We tried individual logistic regression for different cut-off points on the ordinal scale, but for most the maximum likelihood estimators did not exist (data separation from large number of covariates). Combining the results from 4 different logistic regressions into one formula would also have been problematic. We also looked at retransforming to the probability scale by applying an inverse logit function in the true sense of the model. However, about half the scores ended up either close to zero or close to one which is not desirable. A description of the Proportional Odds Model is as follows:

Proportional Odds Model: The Proportional Odds Model is a logistic regression type model for ordinal response with multiple categories. In our case there are 5 categories (Pavement Condition Ratings 1-5). This gives 4 different ways to split them into just 2 categories (say "good" roads and "bad" road). We can split between level 1 and 2, 2 and 3, ... The Proportional Odds Model assumes that the coefficients for the distresses are the same for the 4 different logistic regression models corresponding to the 4 splits, just the intercept term may be different. The fitting was done by maximum likelihood in SAS proc LOGISTIC.

The logistic regression model is a generalized linear model with a logit link. Basically, it performs a logit transformation (logit (p) = log [p/(1-p)] on the probability of success ("good" road) and expresses it as a linear function of the distresses (like ordinary regression).

For more information on both the basic logistic regression model and the proportional odds model, see, for example, Agresti's Analysis of Categorical Data and References [28,29].

4.7.3 Results of Analysis

Using the technique described above we obtained the formulas for the Pavement Condition Rating (PCR) of the 4 types of pavements. The general form of the formula is same as Equation (3). The results of this analysis (New Weights) are listed in Table 17 for Rigid Pavements and Table 18 for Flexible and Composite Pavements.

It is important to note that the intercepts are greater than 100 and the sum of the coefficients greater than the intercepts. Therefore, theoretically the PCR could be slightly above 100 for very good roads and slightly below zero for very bad roads, although this does not happen with the road segments in the data. Given the restriction of linearity and the goal of using the entire range from 0 to 100, this is unavoidable. However, it happens so rarely that it should not pose a problem.

4.8 DISCUSSIONS OF THE RESULTS AND RECOMMENDATIONS

The results of analysis listed in Tables 17 and 18 indicate that new distress weights estimated from the survey data depended upon the method of analysis chosen for this purpose. Also, the intercepts of the equations were not 100, as was originally assumed for this data. Thus, to make these results more practical and consistent with the assumptions of PCR being 100 for a pavement with no distress, it was necessary to adjust the results slightly. Another consideration in this adjustment

was the results of data analysis listed in Tables 7 to 10 of Chapter 3. Various experts from ODOT as well as Industry indicated the importance of certain distresses in rating the pavements for maintenance purposes which were summarized in these tables. Combining all these considerations and our own opinion, we prepared a list of **New Weights** for each distress. These weights are listed under column "Recomm." in Tables 17 and 18. The weights of each distress correspond to the positive (+) values of Regression Coefficients, A1, A2, ...etc..

When the Expert Opinion survey data was collected, the experts were given only one scale to Rate the pavements of different types. Therefore, it is expected that the results based on this data should Rate all types of pavements on the same scale without any consideration for its type. The effect of New distress Weights on the individual pavement's PCR and the network condition, however, will be evaluated in the next section of this chapter.

It should be noted here that some of the pavement distresses were not assigned weights in the list of new weights. The reason for this is that these distresses did not show any significance either in the analysis of data or the opinions of the experts or both. Therefore, no weights were recommended at this time for these distresses.

It is anticipated that the new distress weights will affect the PCR values more towards the lower end of the scale than at the higher end when compared with the old PCR values. The reason for this is that the upper end of the PCR scale involves very few distresses, thus the changes in their weights will not be as noticeable as when there are several distresses, which will involve lower end of the PCR scale. To illustrate this statement, the PCR data for the year 1996 was used to compare the PCR values obtained from the old and new weights. For this purpose, a Regression analysis of the data was performed to obtain an equation of the following form:

$$PCRnew = B0 + B1 * PCRold \quad (4)$$

where,

B0 = a constant obtained from the Regression analysis of data, and
B1 = Regression Coefficient obtained from the analysis of the data.

The equations obtained from this analysis were as follows:

PCRnew	=	-105 + 2.04 * PCRold,	Composite Pavements	(5)
PCRnew	=	-60 + 1.62 * PCRold,	Flexible Pavements	(6)
PCRnew	=	-82 + 1.86 * PCRold,	Jointed Conc. (JRCP/JCP)	(7)
PCRnew	=	-53 + 1.44 * PCRold,	CRCP	(8)

Using the above Equations (5-8), the values of PCRnew and PCRold were calculated. These values are listed in Table 19. This table clearly shows that the difference between the old and new PCR increases towards the lower end of the Scale.

Table 19. An Example of New and Old PCR Comparison using the Data From 1996 PCR Database

NEW PCR	OLD PCR			
	CRCP	JRCP/JCP	Flexible	Composite
100	100*	100*	100*	100*
90	99	92	93	96
80	92	87	86	91
70	85	82	80	86
60	78	76	74	81
50	72	71	68	76
40	65	66	62	71
30	58	60	56	66
20	51	55	49	61
10	44	49	43	56
0	37	44	37	52

*Assumed, not calculated from the equation.

4.9 EFFECT OF NEW WEIGHTS ON THE RATINGS OF INDIVIDUAL PAVEMENT SEGMENTS AND THE NETWORK CONDITION

The new distress weights estimated from the expert survey data were used to assess their impact on the PCR values of individual pavement sections and the Rating of entire roadway network. The data from PCR surveys conducted in the year 1996 was used for this purpose.

4.9.1 PCR of Selected Pavements

Pavements of all four (4) types were randomly selected from the PCR database file for the year 1996. The data for this study included ten (10) randomly selected pavements of each type.

The new PCR as well as Old PCR (ODOT's PCR) values were calculated for each pavement section selected for this analysis and the results of the calculations are listed in Table 20 - 23. The Pavement Condition Ratings (descriptive, such as Poor, Good, etc.) listed in these tables were obtained from the PCR Scales shown in Figure 10 for the new PCR and Figure 11 for the old PCR. The results of the analysis indicated that the numerical Old and New PCR values for any given pavement were generally different, as expected. However, the descriptive ratings produced by new distress weights divided the old Poor ratings into the new Failed and/or Poor Ratings, whereas, the old Good and Very Good Rating generally remained same in the new Rating system.

Since, the new PCR values were derived from one common scale (descriptive) of PCR for all types of pavements, therefore, the New PCR values reflect the condition of the pavement which is **not dependent** upon the type of pavement.

4.9.2 Weighted Average PCR of the Divided Highway Network from 1996 PCR Survey Data

The average PCR of the network was estimated from the old and new distress weights for each pavement type and all pavements. The results of these estimates are summarized in Table 24. The averages of PCR were estimated by weighting them with the length of the individual roadway sections. This table indicates that the overall descriptive Ratings (Good, Fair, etc.) of Jointed Concrete (JRCP/JCP) and Flexible Pavements are same when using old and new weights, but, these ratings are different for CRCP and Composite Pavements. Also, the Rating of the entire network according to the new weights is one level below (Fair) than the Rating obtained from the old weights (Good). **Normalized Ratings** obtained from the new distress weights may be the reasons for the differences in the ratings of different pavement types as well as overall rating of the network.

4.9.3 Percent Lengths below a Given PCR using PCR Rating from Old and New Distress Weights

The PCR data for the year 1996 was used to estimate the percentages of pavement lengths of each type which were estimated to have PCR values below the ranges indicated. The results of these estimates are listed in Table 25. Using these results, the percentages of pavements of each type

Table 20. Examples of CRCP sections from 1996 PCR data

Pavement No.	Old Weights		New Weights	
	PCR	Rating	PCR	Rating
1	32	Very Poor	0	Failed
2	41	Poor	2	
3	44		11	
4	48		17	
5	54		33	Poor
6	60		38	
7	61	Fair	43	Fair
8	77	Good	61	Good
9	81		66	
10	87		74	

Table 21. Examples of Jointed Concrete Pavement sections from 1996 PCR data

Pavement No.	Old Weights		New Weights	
	PCR	Rating	PCR	Rating
1	44	Poor	4	Failed
2	55		14	
3	66	Fair	46	Fair
4	73		56	
5	76	Good	68	Good
6	82		75	
7	89		85	Very Good
8	91	Very Good	88	
9	95		100	
10	100		100	

Table 22. Examples of Flexible Pavement sections from 1996 PCR data

Pavement No.	Old Weights		New Weights	
	PCR	Rating	PCR	Rating
1	36	Very Poor	2	Failed
2	52	Poor	28	Poor
3	67	Fair	56	Fair
4	72		59	
5	74		62	Good
6	78	Good	69	
7	85		77	
8	91	Very Good	90	Very Good
9	95		95	
10	100		100	

Table 23. Examples of Composite Pavement sections from 1996 PCR data

Pavement No.	Old Weights		New Weights	
	PCR	Rating	PCR	Rating
1	46	Poor	5	Failed
2	55		8	
3	62	Fair	24	Poor
4	68		39	
5	73		45	Fair
6	78	Good	52	
7	84		65	Good
8	89		75	
9	94	Very Good	88	Very Good
10	100		100	

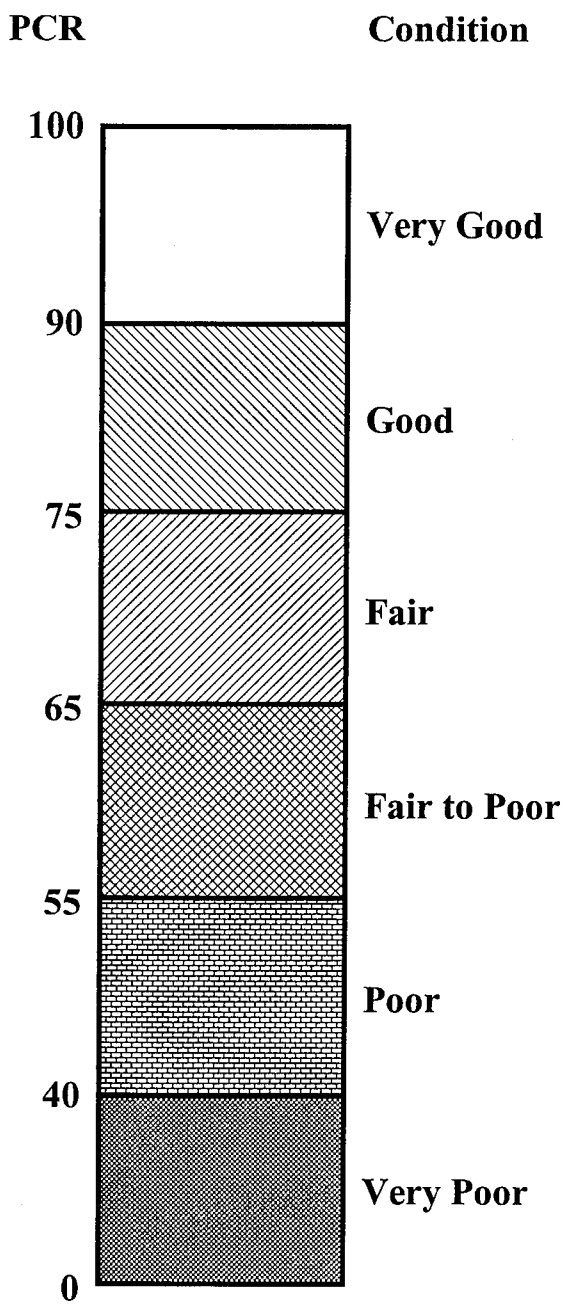

Figure 11. Pavement Condition Rating Scale (old)
From ODOT's Manual [Ref. 1].

Table 24. Average PCR of Roadway Network from 1996 PCR data for all Divided Highways

Pavement Type	Total of Up and Down Length, miles	Old PCR		New PCR	
		Average	Rating	Average	Rating
CRCP	37	61	Fair	37	Poor
JRCP/JCP	554	72	Fair	53	Fair
Flexible	1,080	79	Good	69	Good
Composite	4,456	76	Good	49	Fair
All	**6,127**	**76**	**Good**	**53**	**Fair**

Table 25. Cumulative Percentages of Pavement Lengths which have different PCR ranges
1996 PCR Data

PCR Range	CRCP		JRCP/JCP		Flexible		Composite		RATING	
	Old PCR	New PCR	Old PCR	New PCR	Old PCR	New PCR	Old PCR	New PCR	Old PCR	New PCR
≤10	0	9.6	0	8.1	0	0.1	0	4.0	Failed	Failed
11 - 20	0	35.1	0	22.2	0	0.4	0	12.1		
21 - 30	0	40.9	0.8	28.7	0.1	2.0	0	24.9	Very Poor	Poor
31 - 40	5.8	62.6	1.6	36.2	0.1	7.3	0.1	39.7		
41 - 50	32.2	65.6	8.0	48.7	0.5	13.3	0.5	55.7	Poor	Fair
51 - 60	54.0	65.6	29.4	58.0	4.5	27.0	10.8	72.7		
61 - 70	65.6	98.2	47.4	65.8	16.9	51.5	36.2	79.0	Fair	Good
71 - 75	65.6	98.2	57.1	69.1	37.4	67.3	52.9	80.9		
76 - 80	85.2	100	64.4	71.9	57.0	73.9	68.5	82.2	Good	
81 - 90	100	100	84.4	82.4	86.0	92.3	82.4	90.3		V. Good
91 -100	100	100	100	100	100	100	100	100	V. Good	

which are below the indicated Rating (Good, Fair, etc.) were determined and the results of these calculations are listed in Table 26. It is evident from this table that the new PCR Rating Scale is capable of distinguishing the pavements which may be Rated as "Failed", whereas, the old PCR Rating Scale did not recognize the "Failed" conditions of the pavements and were lumped with "Poor". Also, the percentages of pavements in "Very Good" Rating are either equal to or greater than the percentages estimated from old scale for all pavement types. Again, the effect of normalized rating under new system is apparent in the percentages of pavement lengths of Jointed Concrete and Flexible pavements in Good to Very Good condition.

4.9.4 Comparison of Average PCR of the Ohio NHS Network for the Years 1985-96

The entire NHS network was included in the analysis to obtain and compare the average PCR values using the new and old distress weights. The results of this analysis are graphically plotted in Figure 12. It is apparent from this figure that the yearly changes in the new PCR values of the network are more noticeable than is the case with old PCR numbers. A gradual decrease in the overall condition of the network is also more noticeable when using the new PCR values, because the condition of the network changed from a PCR of 66 in 1985 to a PCR of 58 in the year 1996. No significant change was observed from the old PCR values, because the numbers changed from 79 to 76 during this period of 11 years, as shown in Figure 12. It, therefore, appears that the new PCR weights may be more sensitive to the changes in the PCR values (which are the results of budget inputs) than the current PCR weights, if the network level analysis is performed with new weights.

4.9.5 Comparison of Average PCR of I-71 for the Years 1985-96

Interstate Route I-71 was selected to calculate the average PCR of the entire Ohio route using the Old PCR and New PCR weights. The results of these calculations are shown in Figure 13. It is apparent from this analysis that the yearly changes in the average PCR values are more noticeable with new weights than with old weights. Also, the average new PCR plot crosses the 60 PCR line quite often, indicating the average condition of this route changes from "Fair" to "Good". The plot of old PCR, on the other hand mostly stays above 75 PCR, except in the year 1995 when it dropped to a PCR of 74, indicating that the descriptive condition of route did not change from year to year, i.e. it is always "Good" according to the old PCR scale.

4.9.6 An example of individual pavement section showing year to year changes in PCR values from 1985 to 1996

A composite pavement section (type 4) was selected to illustrate year-to-year changes in the PCR values. The graphical plot of the pavement's PCR values is shown in Figures 14. This figure shows that the PCR values based on new weights provide more noticeable changes from year-to-year than the PCR values based on old weights.

Table 26. Cumulative Percentages of Pavement Lengths which have Condition Ratings below than indicated. 1996 PCR Data

PCR Rating	CRCP		JRCP/JCP		Flexible		Composite	
	Old PCR	New PCR	Old PCR	New PCR	Old PCR	New PCR	Old PCR	New PCR
Failed	0	35	0	22	0	0	0	12
Poor	54	63	29	36	5	7	11	40
Fair	66	66	57	58	37	27	53	73
Good	100	100	84	72	86	74	82	82
V. Good	100	100	100	100	100	100	100	100

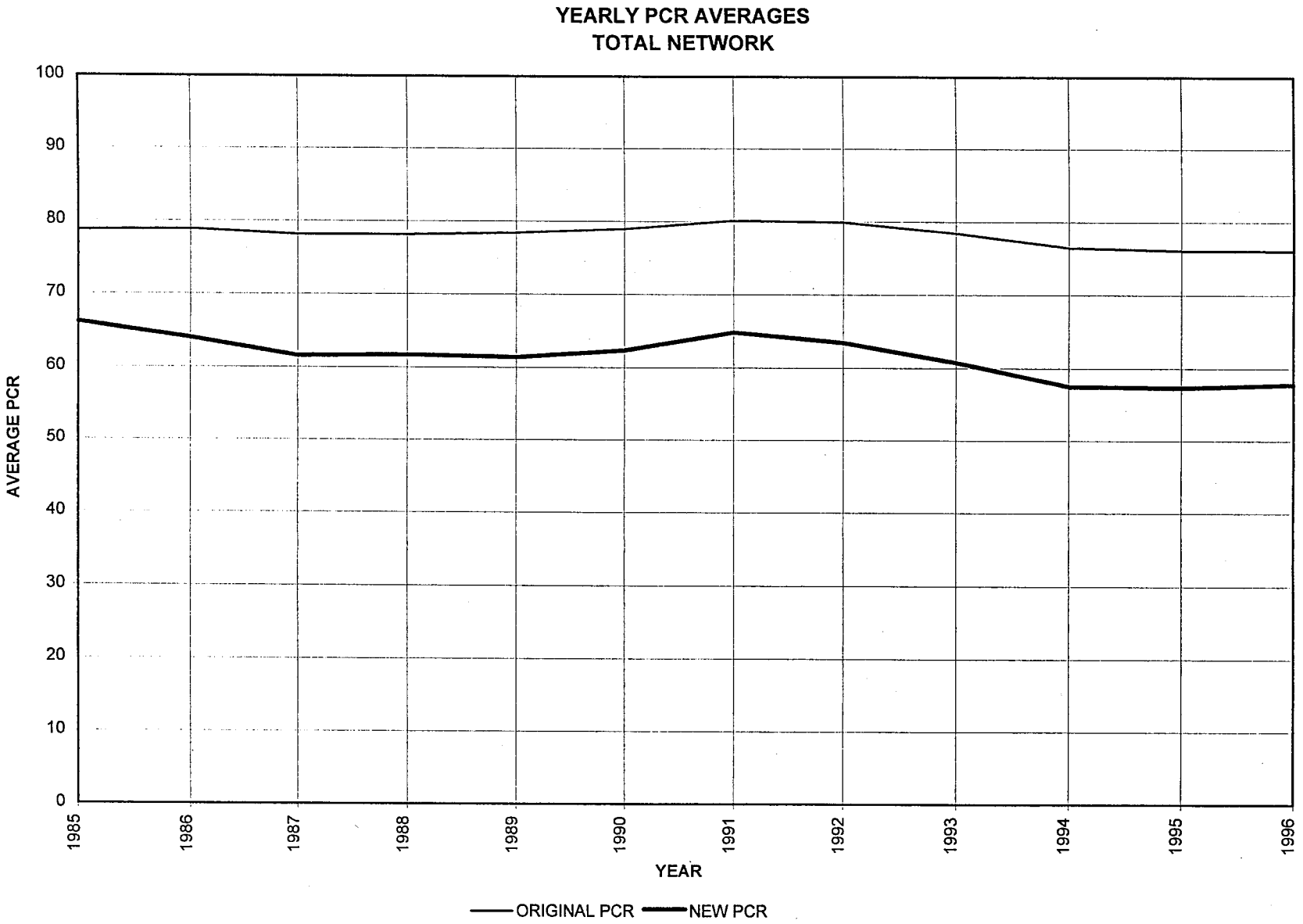

Figure 12. Plot of Average PCR of the NHS Network based on original and new Weights

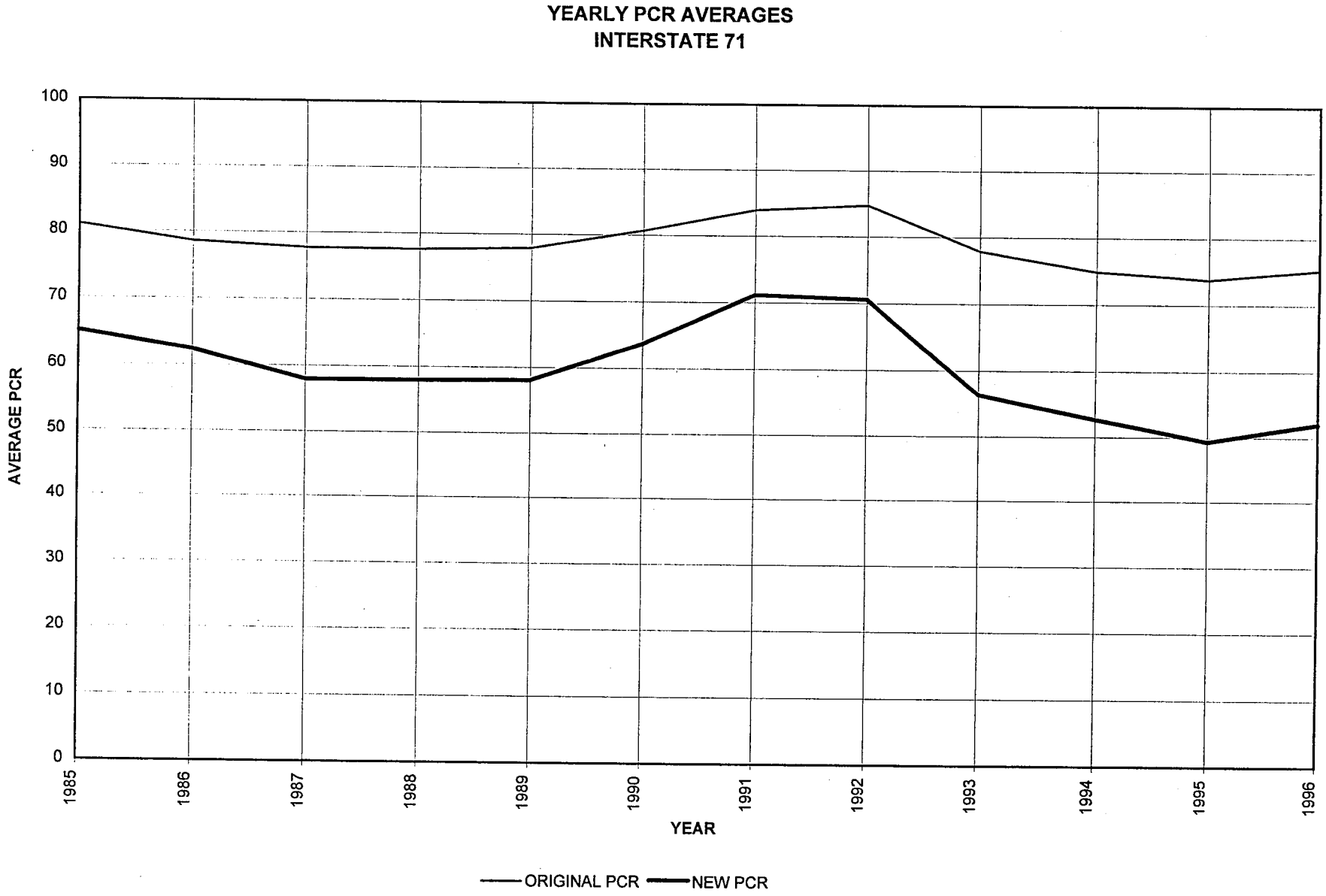

Figure 13. Plot of Average PCR of roure I-71 based on original and new Weights

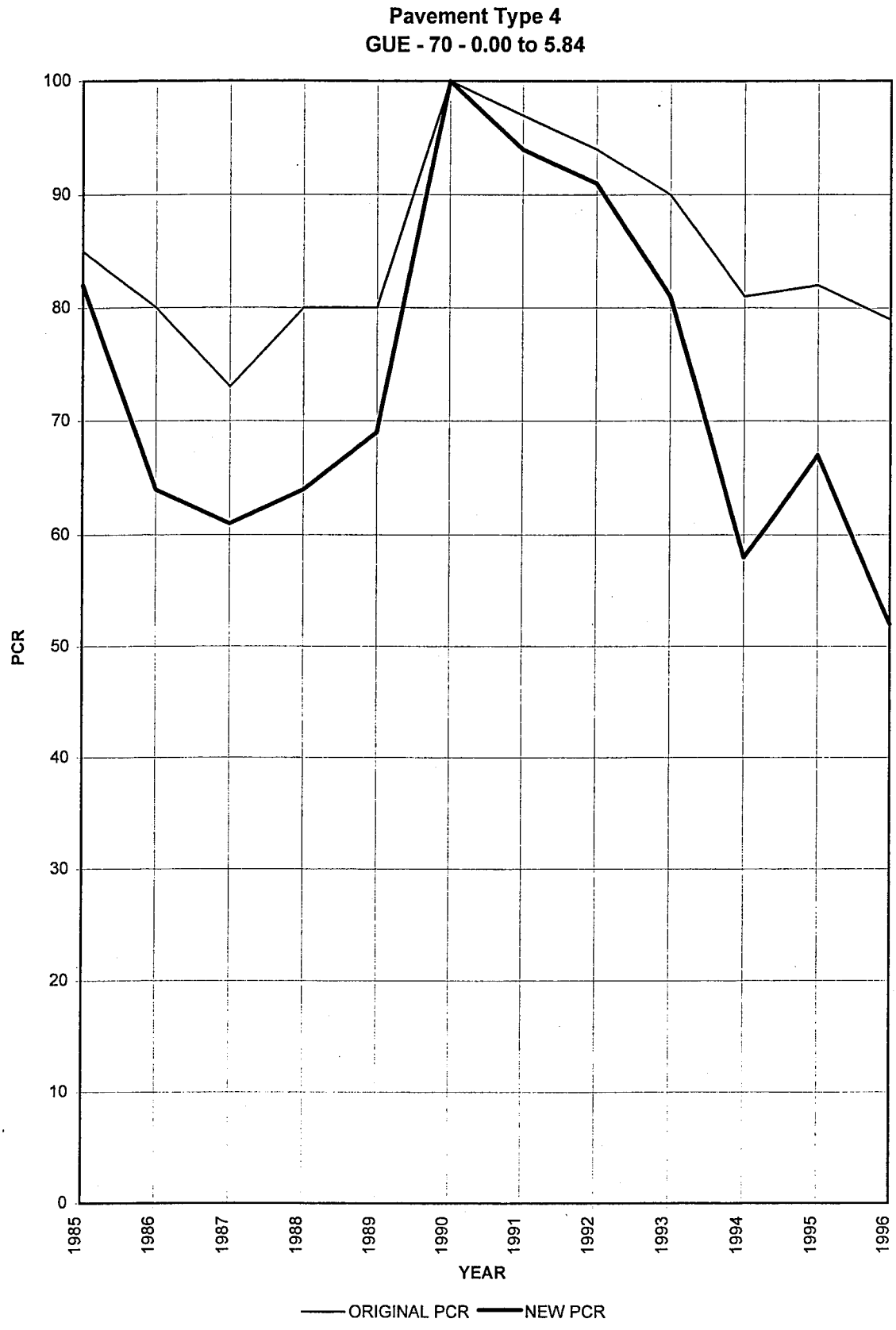

Figure 14. Average PCR of a composite pavement section located on GUE I-70 based on original and new Weights

CHAPTER 5
SAMPLING FOR PCR SURVEYS

5.1 INTRODUCTION

Currently the PCR data is collected annually for the Divided (4-Lane) and Undivided (2-Lane) Highways which requires a large amount of resources (man power, vehicles, etc.) . Therefore, it was proposed to investigate the feasibility of surveying only a sample from each District to estimate the conditions of roadway Network of each District as well as the entire Network of the State of Ohio.

The PCR data has also been used in the past as an INPUT to the computer program PMS-II, which generates the annual Maintenance and Rehabilitation Program for the State of Ohio by developing a priority list of pavement sections of the network. Since this software requires the PCR of individual Pavement Sections, the sampling in the usual sense may not be the appropriate method for this purpose. A different kind of sampling is, therefore, required to collect the data for this program.

The sampling methods suitable for each one of the above two cases are discussed in the following sections of this chapter.

5.2 SAMPLING FOR MONITORING THE CONDITIONS OF ROADWAY NETWORK OF THE DISTRICTS AND THE STATE

There are two conditions which should be satisfied by the sampling method for this purpose. First, the sampling should provide an estimate of the Pavement Condition of each District, and second, the sampling should provide an estimate of the Pavement Condition of the State's network. Due to the type of sampling needed for this purpose, it is termed as **Stratified** sampling. Since the pavement sections of the network consist of various lengths, the average PCR of the network (or each district) is calculated as a weighted mean, using the length of each section as a weighting factor. The following formula can be used for this purpose to estimate the PCR for the State of Ohio:

$$PCR = \sum Wj * Yj \qquad (9)$$

where,

PCR = Estimate of weighted mean of PCR for the State,
Wj = Weighting factor for District "j", calculated by: $Wj = Lj / L$,
Lj = Total length of roadway sections sampled from District "j",
L = Total length of roadway sections sampled from all 12 districts, and
Yj = Average PCR estimated from the sample collected for District "j".

The same Equation (9) can be used to estimate the PCR of each District, where the variables of the equation will be defined as follows:

PCR = Estimate of weighted mean of PCR for the District,
Wj = Weighting factor for roadway section "j", calculated by: Wj = Lj/ L,
Lj = Length of the roadway section "j",
L = Total lengths of roadway sections included in the sample from the district, and
Yj = PCR of the roadway section "j".

5.3 SIMULATION STUDY FOR SAMPLING FROM THE NETWORK

A simulation study was conducted to estimate the standard errors for the weighted Mean of the Network PCR. The PCR data for the year 1996 was used in this simulation.

Stratified random sampling with proportional allocation was used in a procedure to estimate the average PCR of the Ohio Highway Network. A description of this procedure is as follows:

1. The 12 districts served as the 12 strata for this simulation.
2. A sample was taken from each district that was proportional to the total length of pavements that exist in the district. If District 8 had roughly twice the length of pavements that District 2 had, we would sample twice as much length of the pavements in District 8 that we would sample in District 2.
3. The estimate for the State-wide average PCR would be a weighted average with weights proportional to the amount of pavements sampled, as explained above in Equation (9).

The goal is to determine - how much variability exists in samples of different sizes, for the estimates of the average PCR of each district and the estimate of the average PCR of the entire State of Ohio.

A Monte Carlo Simulation was performed to estimate the precision associated with the current estimate of PCR, the weighted mean with weights proportional to the length of the pavement. In this simulation, random samples of pavement were sampled from the 1996 PCR data, assuming that the probability that a pavement length was selected was proportional to the length of the pavement. There were 2,875 sections of pavement in Ohio's network with a total length of 6,127.02 miles (counting both, UP and DOWN sections). If pavement section "j" had length Lj, then the probability that pavement "j" was selected in a simulated sample was Lj/6,127.02. One thousand samples were simulated and the standard error of the weighted mean was calculated to estimate the standard error associated with the weighted mean. Table 27 shows the estimated precision for various sample sizes.

A 95% confidence interval for the mean PCR for the State of Ohio network could be formed by adding and subtracting 1.96 standard errors from the weighted average of a sample. This will mean we would be 95% confident that the resulting random interval would contain the true average PCR for the State of Ohio, since 95% of all confidence intervals calculated in this manner would contain the true average PCR. Figure 15 is a graphical plot that illustrates the size of the confidence

Table 27. Estimated Standard Errors for the weighted Mean of each District and the State

District	Total Length, miles	No. Of Pav. Sections	10% Sample	20% Sample	30% Sample	40%Sample	50% Sample
1	285.14	86	5.162	3.837	3.014	2.546	2.187
2	360.89	242	3,253	2.050	1.647	1.461	1.350
3	592.72	237	3.928	2.770	2.178	1.859	1.658
4	829.07	365	3.354	2.321	1.735	1.469	1.346
5	392.13	147	5.228	3.451	2.748	2.299	2.001
6	762.85	354	3.382	2.128	1.630	1.402	1.233
7	510.84	246	2.826	1.804	1.417	1.267	1.106
8	707.20	352	2.736	1.793	1.483	1.293	1.107
9	481.06	187	2.667	1.756	1.394	1.143	0.985
10	305.78	129	3.025	2.388	2.462	2.110	1.787
11	401.10	180	2.997	2.516	2.099	1.943	1.661
12	498.24	350	2.227	1.645	1.359	1.136	1.027
Population (State) Mean			**76.00**	**76.01**	**76.03**	**76.03**	**76.03**
Standard Error of Pop. Mean			**1.039**	**0.678**	**0.536**	**0.466**	**0.414**

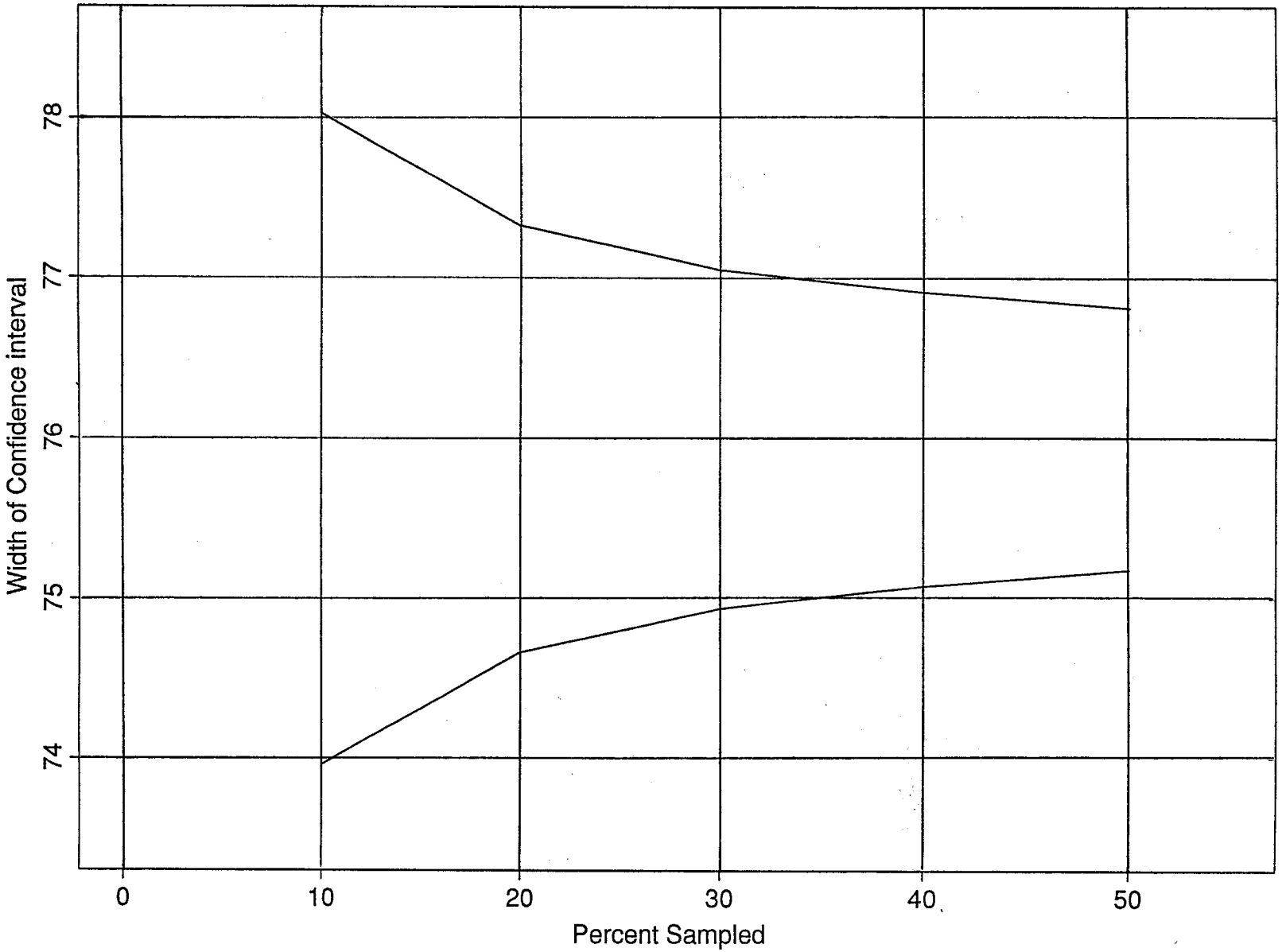

Figure 15. Graphical Plot showing the effect of Sample Size on the width of Confidence Interval of Mean PCR

intervals for the various percentages of roadway segments sampled.

Based on the results of this study (as summarized in Table 27 and Figure 15), a sample size of 30%, for example, will yield a weighted average PCR for the State of Ohio within (±1) PCR (1.96 x 0.536 ≈ 1). A lower precision equal to (±2) PCR will require only a 10% sample.

5.4 SAMPLING OF PAVEMENT SECTIONS FOR INCLUSION IN THE YEARLY MAINTENANCE PROGRAM

The sampling described above will not provide information suitable for the selection of the pavement sections which should be included in the yearly maintenance and rehabilitation program of ODOT. A different kind of sampling is, therefore, proposed for this purpose.

Starting with the year in which all pavement sections (100% sample) are surveyed (let us call this year #1), a priority list of all pavements will be prepared by PMS-II from the analysis of this data. Based on the previous trends, it can be assumed that only some of the High Priority Pavement Sections (totaling to about 200 center line miles) will be funded in the year #1. The pavement sections which will not be funded in this year will be the candidates for funding in the subsequent years.

Assuming that the relative changes in the conditions of the pavements are same in subsequent year #2 and #3, the relative priorities of the pavements will not change drastically in the next 2 years. Therefore, it will not be necessary to survey the entire network in the years 2 and 3 to find the pavement sections of relatively high priority. As an alternative to the 100% sample survey, therefore, only about 200 to 300 miles of the pavements can be surveyed in the year #2 and another 200 to 300 miles in the year #3 out of the total 3,000 miles of the network. This will be roughly a 10% (maximum) of the total miles. The procedure to select roadway sections for survey in the year #2 is as follows:

Delete all those pavement sections from the priority list prepared in year #1 which have already been recommended for funding in year #1 and prior to this year. Select from the remaining list those pavement sections which have relatively high priority and could be the possible candidates for funding in year #2. The criteria to select these pavements will be:

1. The section should have relatively high priority, and
2. The section should have PCR low enough so that at least minor rehabilitation can be recommended.

It will be desirable to select these pavements from all 12 Districts. Roughly 20 to 25 mile of total length can be selected from each district for this purpose, some districts may require more miles and some may require less miles, depending upon the PCR of pavement sections in any given District. Thus, a total of 200 to 300 miles of sections can be selected in this manner for surveying in the year #2. A similar procedure can be used to select pavements for surveying in the year #3. It

is proposed to conduct 100% survey again in year #4.

As indicated above, the proposed sampling will require approximately 10% of the total network survey in the years 2 and 3. When added to the 30% of the sample proposed above for network condition monitoring, a maximum of 40% of the network survey will be needed to obtain enough information for satisfying the current needs of the ODOT. Thus, in a period of three years, a minimum saving of 120% can be expected, as explained below:

1. Survey in year #1	-	100%
2. Survey in year #2	-	40% (max)
3. Survey in year #3	-	40% (max)
4. Survey in year #4	-	100%, and so on.
Total Saving in the 3- year period	=	300% - (100 + 40 + 40)%
	=	120%.

It is anticipated that 30% sample collected for network monitoring may include some of those sections which are the candidates for sampling in the Rehabilitation Program. Therefore, less than 40% samples will be required to satisfy both of the requirements stated earlier in this chapter.

5.5 SUMMARY

The PCR surveys conducted annually by ODOT provide information for estimating the average condition of the roadway network and prepare a list of pavements for inclusion in the Rehabilitation Program. It is proposed to collect a 30% sample (procedure to collect this sample is outlined in Section 5.3) for 2 years between two consecutive 100% surveys. This sample will provide reasonable estimate of the Pavement Conditions of each District and the State of Ohio. A procedure to collect a 10% sample for selecting the pavements for Rehabilitation Program is also described in this chapter, Section 5.4. A substantial saving of the resources can be achieved by this sampling scheme during a 3-year cycle. Further saving can be expected, if the proposed sampling is implemented and the experience from the first 3-year cycle indicates that the length of this cycle can be increased to 4 years without affecting the reliability of the information obtained from the sampling.

CHAPTER 6
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY AND CONCLUSIONS

The objective of this study was to review the PCR methodology currently used by ODOT. For this purpose, a literature search was conducted to familiarize with the Pavement Condition Rating systems used by other Highway and Transportation agencies in the United States. A review of literature related to this topic indicated that most of the agencies have developed pavement condition rating systems which are unique to each agency. The distresses recorded for each pavement type are however, similar. The methods of combining the distresses to obtain a combined pavement index or rating vary among the agencies. The linear combination of pavement distresses, as currently used by ODOT, to assess the combined index, PCR, is one of the most common type of method used by many agencies. Some other non-linear combinations of complex types are also used by some agencies.

An attempt is being made by many Researchers and Entrepreneurs to develop automated data collection equipments for pavement condition rating. These equipments are designed to collect data on cracking, raveling, roughness and rutting. Therefore, in future the pavement condition rating of the roadway network will be estimated from these distresses.

The ODOT's database currently contains the PCR data for the Divided Highway System, which has been collected annually since 1985. This data was analyzed to determine several trends. The results of this analysis indicated that the current network of Divided Highways consists of approximately 3,000 center line miles of pavements. Roughly 73% of this mileage has composite pavements, 18% has flexible pavements, 9% has jointed concrete pavements and less than 1% has CRC pavements.

There are some distresses which were rarely recorded during the past 11 years of data collection. These distresses for various pavement types are:

1. CRCP
   - Settlement and waves, and
   - Pressure damage.

2. Jointed Concrete
   - Pumping,
   - Settlements,
   - Pressure damage,
   - Longitudinal cracking, and
   - Corner breaks.

3. Flexible
- Bleeding,
- Potholes,
- Settlements,
- Corrugations,
- Wheel track cracking, and
- Edge cracking.

4. Composite
- Bleeding,
- Surface disintegration, debonding,
- Pumping,
- Shattered slab, and
- Transverse cracks (CRCP Base).

A review of the data and discussions with ODOT Engineers indicated that some of the above distresses may not have been recorded because of the way they are defined in the current PCR Manual. For example: Pot Holes are recorded only if they are deteriorated. Some other distresses may not develop because of the design of pavements for this type of the roadways. For example: Edge Cracking in Divided Highways does not develop due to the presence of wide and paved Shoulders. Wheel track cracks also are not commonly observed because of the designs used for these pavements and subsequent maintenance performed.

Further analysis of this data was performed to determine the importance of various pavement distresses from maintenance point of view. The results of all these analyses were finally summarized in Tables 7-10, chapter 3.

An Expert Opinion Survey was conducted to collect data regarding the Pavement Condition Ratings of all types of pavements. Approximately 96 pavements of each type in various surface conditions were included in the surveys. Engineers from ODOT central office and District 6 participated in this survey. The data collected from these surveys was analyzed using different statistical methods. Finally, the results of analysis obtained from two different statistical methods were combined to arrive at the recommended "New Distress Weights" for all four types of pavements. The old and new distress weights for all four types of pavements are shown in Tables 28 to 31. It should be noted here that the new weights were derived from the data available for this study. Data obtained from more experts (District engineers, Industry, etc.) will be helpful in improving the applicability of the distress weights if derived from a wider range of experts.

The results of Expert Opinion Survey data analysis were used to assess the effect of new distress weights on the Pavement Condition Rating (PCR). A comparison of new PCR and new condition rating (Good, Fair, Poor, etc.) with the corresponding old values indicated that the new distress weights can distinguish the Failed, Poor and part of Fair ratings more clearly than the old weights. Also, the effect of new weights is more visible on pavements in Very Good condition (See Tables 20-26). Further, the new weights assigned to the distresses will yield the Ratings which are **independent** of the pavement type.

TABLE 28. List of Old and New Distress Weights of CRC Pavements

Distress No.	Description of Distress	Old Weights	New Weights	Not Important
1	Surface Deterioration	10	15	
2	Popouts	5		✓
3	Patching	5	25	
4	Pumping	15	10	
5	Settlements & Waves	10		✓
6	Transverse Crack Spacing	10	30	
7	Longitudinal Cracking	10	20	
8	Punchouts or Edge Breaks	15	10	
9	Spalling	15	10	
10	Pressure Damage	5		✓

✓ = Not Important

TABLE 29. List of Old and New Distress Weights of Jointed Concrete Pavements

Distress No.	Description of Distress	Old Weights	New Weights	Not Important
1	Surface Deterioration	10	10	
2	Popouts	5		✓
3	Patching	5	15	
4	Pumping	15		✓
5	Faulting (joints & cracks)	10	20	
6	Settlements	5	15	
7	Transverse Joint Spalling	15	20	
8	Joint Sealant Damage	5	20	
9	Pressure Damage	5		✓
10	Transverse Cracking	10	25	
11	Longitudinal Cracking	5	10	
12	Corner Breaks	10	10	

✓ = Not Important

TABLE 30. List of Old and New Distress Weights of Flexible Pavements

Distress No.	Description of Distress	Old Weights	New Weights	Not Important
1	Raveling	10	10	
2	Bleeding	5	15	
3	Patching	5	10	
4	Potholes/Debonding	10	20	
5	Crack Sealing Deficiency	5	10	
6	Rutting	10	25	
7	Settlements	10		✓
8	Corrugations	5		✓
9	Wheel Track Cracking	15	30	
10	Block & Transverse Cracking	10	10	
11	Longitudinal Joint Cracking	5		✓
12	Edge Cracking	5		✓
13	Random Cracking	5	15	

✓ = Not Important

TABLE 31. List of Old and New Distress Weights of Composite Pavements

Distress No.	Description of Distress		Old Weights	New Weights	Not Important
1	Raveling		10	15	
2	Bleeding		5		✓
3	Patching		5	15	
4	Surface Disintegration or Debonding		5	10	
5	Rutting		10	25	
6	Pumping		15	10	
7	Shattered Slab		10		✓
8	Settlements		5		✓
9	CRCP Base	Transverse Cracks	20	30	
10	Jointed Base Cracks	Joint Reflection	12	15	
11		Others	8	15	
12	Longitudinal Cracking		5	10	
13	Pressure Damage/ Upheaval		5		✓
14	Crack Sealing deficiency		5	20	

✓ = Not Important

The issue related to the feasibility of using a sample for network analysis was also investigated. The results of this investigation are summarized in chapter 5. The effect of sample size on the standard error of weighted mean of PCR is listed in Table 27. From this analysis it was observed that a 30% sample will yield an average PCR which will be within (±1) PCR of the True Mean with a confidence level of 95%. A smaller size sample will increase the width of confidence interval as illustrated in Figure 15.

A sampling procedure to survey the pavements, which are in "Critical" condition from Maintenance Program point of view, is also described in chapter 5.

6.2 RECOMMENDATIONS

Based on the results of this study, the following recommendations are presented for possible implementations:

1. There are some distresses of each pavement type, which do not affect either the overall condition of the pavement or the decision to perform Maintenance on it. These distresses, therefore, should **not** be included in the calculations of PCR. Tables 28 to 31 list these distresses with no weight assigned to them.

2. Based on the analysis of the data obtained from the Expert Opinion Surveys for this study, it was observed that the Ratings of Pavements are not a linear function of various distresses, as currently assumed. In order to obtain a Pavement Rating consistent with the opinions of experts, a non-linear model, as developed from "Classification Tree" analysis may be better than the linear model currently used. The current computer technology will be helpful in the implementation of such models.

3. The statistical methods used for the analysis of data in this study are suitable for the category type of data which is currently collected for pavement distresses. For example, the data collected in terms of L, M and H levels of distress Severity and O, F and E levels of Extent can be directly used by these models. There is no need to convert these levels into the numerical values for L, M and H for the analysis of data. This analysis, therefore, allows to assess the Pavement Condition Rating in the same manner as an expert will assess from the observations of the pavement without translating the levels of severity and extent into their assigned numbers.

4. The analysis of expert opinion survey data indicated that it is **feasible** to develop a PCR Scale which is **independent** of Pavement Types. More data from District Engineers with field experience will be helpful in developing such scale.

5. It is recommended that the definitions of some pavement distresses, as indicated in the report, should be revised so as to make them more effective in the assessment of

pavement condition.

6. Sampling scheme as outlined in the report should be considered for implementation in future surveys.

7. The results obtained from the PMS at network as well as project level will improve greatly if a study to develop suitable pavement performance prediction models is initiated soon. During the discussions with the consultant for this study, it was learnt that there are analytical tools (based on statistical methods) which can be effectively used to develop pavement condition prediction models. The availability of these models will reduce the efforts to collect the extensive field data and make the pavement condition predictions more reliable. The improvements in PMS process due to the availability of these models will be significant and beneficial to the ODOT.

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APPENDIX A

LISTING OF THE PAVEMENTS USED IN THE EXPERT OPINION SURVEYS and their RATINGS

This Appendix contains the listing of the Pavements which were used in the Expert Opinion Surveys for this Project. The severity of each distress is indicated with the letter S and a number which represents the distress number. The extent of each distress is indicated with the letter E and a number corresponding to the distress number. A table in the next page (Table A) contains a description of the distresses of all four (4) types of ODOT pavements and their corresponding numbers. The following tables are included in this appendix:

1. Table A-1 Survey data of CRC Pavements (Pavement type 1)
2. Table A-2 Survey data of JRC/JC Pavements (Pavement type 2)
3. Table A-3 Survey data of Flexible Pavements (Pavement type 3)
4. Table A-4 Survey data of Composite Pavements (Pavement type 4).

Tables A-1 to A-4 also contain the following information under the column headings:

FORM - This column indicates the Pavement Type:
- 1 = CRCP,
- 2 = JRCP/JCP,
- 3 = Flexible, and
- 4 = Composite.

KRIN - A number which was assigned to each pavement to identify them for analysis purposes.

BOOK - Identification assigned to each expert.

PCR - The PCR calculated by ODOT formula for PCR.

RAT4LINT - The expert rating of the pavement on a scale of 1-5 for 4-lane system.

ACT4LINT - The assignment of M&R Action by expert (1-5).

TABLE A. Distresses of Various Types of Pavements

Distress	CRC (1)	JCP (2)	Flexible (3)	Composite (4)
D1	Surface Deterioration	Surface Deterioration	Raveling	Raveling
D2	Popouts	Popouts	Bleeding	Bleeding
D3	Patching	Patching	Patching	Patching
D4	Pumping	Pumping	Potholes	Surface Disintegration, Debonding
D5	Settlements & Waves	Faulting	Crack Sealing Deficiency	Rutting
D6	Transverse Crack Spacing	Settlements	Rutting	Pumping
D7	Longitudinal Cracking	Joint Spalling	Settlements	Shattered Slab
D8	Punchouts	Joint Sealant Damage	Corrugations	Settlements
D9	Spalling	Pressure Damage	Wheel Track Cracking	Transverse Cracking, Unjointed Base
D10	Pressure Damage	Transverse Cracking	Block and Transverse Cracking	Joint Reflection Cracking, Jointed Base
D11	-	Longitudinal Cracking	Longitudinal Joint Cracking	Other Cracking, Jointed base
D12	-	Corner Breaks	Edge Cracking	Longitudinal Cracking
D13	-	-	Random Cracking	Pressure Damage Upheaval
D14	-	-	-	Crack Sealing deficiency

Table A-1. Listing of the Pavements used in the Expert Opinion Surveys and their Ratings
Pavement Type 1 (CRCP)

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	PCR	RAT4LINT	ACT4LINT
1	1	4		0	H	3	H	1	M	3		0	L	3	H	1	H	1		0		0	65	4	3
1	1	5		0	H	3	H	1	M	3		0	L	3	H	1	H	1		0		0	65	2	3
1	2	4	L	3	H	3	M	2	M	3	L	1	M	3	M	1		0	H	2		0	50	4	3
1	2	5	L	3	H	3	M	2	M	3	L	1	M	3	M	1		0	H	2		0	50	3	3
1	3	4		0	H	3		0		0		0	L	2	L	2	M	2	H	2		0	69	4	3
1	3	5		0	H	3		0		0		0	L	2	L	2	M	2	H	2		0	69	4	5
1	4	4		0	H	3	H	2	H	3		0	L	3	M	3		0	M	2		0	49	3	3
1	4	5		0	H	3	H	2	H	3		0	L	3	M	3		0	M	2		0	49	2	2
1	5	4	L	2	H	3		0		0		0	H	3		0		0		0		0	82	4	3
1	5	5	L	2	H	3		0		0		0	H	3		0		0		0		0	82	4	4
1	6	4		0	H	3	H	1	L	3		0	H	3	M	1	M	1		0		0	61	4	3
1	6	5		0	H	3	H	1	L	3		0	H	3	M	1	M	1		0		0	61	3	3
1	7	2	L	3	H	3	M	2	M	3	L	1	M	3	H	2		0	M	2		0	46	2	3
1	7	4	L	3	H	3	M	2	M	3	L	1	M	3	H	2		0	M	2		0	46	3	2
1	7	5	L	3	H	3	M	2	M	3	L	1	M	3	H	2		0	M	2		0	46	3	3
1	8	2		0	H	3	M	2	M	3		0	M	3	H	2		0	L	1	H	1	54	3	3
1	8	4		0	H	3	M	2	M	3		0	M	3	H	2		0	L	1	H	1	54	3	3
1	8	5		0	H	3	M	2	M	3		0	M	3	H	2		0	L	1	H	1	54	3	3
1	9	2		0	H	3	M	2	M	3		0	M	3	M	3	H	2		0		0	57	3	3
1	9	4		0	H	3	M	2	M	3		0	M	3	M	3	H	2		0		0	57	3	2
1	9	5		0	H	3	M	2	M	3		0	M	3	M	3	H	2		0		0	57	3	3
1	10	2		0	H	3		0	M	2		0	M	3		0		0		0		0	81	4	4
1	10	4		0	H	3		0	M	2		0	M	3		0		0		0		0	81	4	3
1	10	5		0	H	3		0	M	2		0	M	3		0		0		0		0	81	4	4
1	11	2		0	H	3	H	1	L	2		0	H	3	H	2		0	M	1		0	57	3	3
1	11	4		0	H	3	H	1	L	2		0	H	3	H	2		0	M	1		0	57	4	3
1	11	5		0	H	3	H	1	L	2		0	H	3	H	2		0	M	1		0	57	3	3
1	12	2	L	3	H	3		0		0		0	H	3	H	3	L	1		0	H	1	64	3	3
1	12	4	L	3	H	3		0		0		0	H	3	H	3	L	1		0	H	1	64	3	3
1	12	5	L	3	H	3		0		0		0	H	3	H	3	L	1		0	H	1	64	3	3
1	13	4	L	3	H	3		0		0		0	H	3		0		0		0		0	81	4	3
1	13	5	L	3	H	3		0		0		0	H	3		0		0		0		0	81	3	5
1	14	4		0	H	1		0		0	M	2	L	3	M	3		0		0		0	81	4	3
1	14	5		0	H	1		0		0	M	2	L	3	M	3		0		0		0	81	4	5
1	15	4		0	H	1		0		0		0	M	3		0		0		0		0	91	4	3
1	15	5		0	H	1		0		0		0	M	3		0		0		0		0	91	5	5
1	16	4		0	H	3	H	3	M	3		0	M	3	H	3	H	1	M	3		0	37	3	2
1	16	5		0	H	3	H	3	M	3		0	M	3	H	3	H	1	M	3		0	37	2	2
1	17	4		0	H	3	H	3	M	3		0	M	3	M	3	M	3	H	3	H	1	33	3	2
1	17	5		0	H	3	H	3	M	3		0	M	3	M	3	M	3	H	3	H	1	33	1	2
1	18	4		0	H	3		0	M	3		0	M	3	M	3	H	1		0		0	65	3	2
1	18	5		0	H	3		0	M	3		0	M	3	M	3	H	1		0		0	65	3	3
1	19	4		0	H	3	L	1	L	1		0	L	3	M	1	H	1		0		0	77	4	3
1	19	5		0	H	3	L	1	L	1		0	L	3	M	1	H	1		0		0	77	3	2
1	20	4		0	H	3	M	2	M	3		0	H	3	H	3	H	2	H	3		0	36	3	2
1	20	5		0	H	3	M	2	M	3		0	H	3	H	3	H	2	H	3		0	36	2	2
1	21	4		0	H	3	H	2	M	3	M	2	H	3		0	M	2	M	2		0	41	4	3
1	21	5		0	H	3	H	2	M	3	M	2	H	3		0	M	2	M	2		0	41	2	2
1	22	4		0	H	3	H	1	M	3	L	1	H	3	M	3	H	1	H	2		0	43	3	3
1	22	5		0	H	3	H	1	M	3	L	1	H	3	M	3	H	1	H	2		0	43	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	PCR	RAT4LINT	ACT4LINT
1	23	4		0	H	3		0	M	3	L	1	L	3	M	1		0		0		0	75	4	4
1	23	5		0	H	3		0	M	3	L	1	L	3	M	1		0		0		0	75	4	5
1	24	4		0		0		0		0		0	M	3		0		0		0		0	93	4	3
1	24	5		0		0		0		0		0	M	3		0		0		0		0	93	5	5
1	25	4		0	H	3	M	1	M	3		0	L	3	H	1		0		0		0	72	5	5
1	25	5		0	H	3	M	1	M	3		0	L	3	H	1		0		0		0	72	3	3
1	26	4		0	H	3	H	3		0		0	M	3	H	3	H	1	M	3		0	48	3	2
1	26	5		0	H	3	H	3		0		0	M	3	H	3	H	1	M	3		0	48	2	2
1	27	4		0	H	3	H	3	M	3		0	M	3	H	3		0	M	3		0	42	3	2
1	27	5		0	H	3	H	3	M	3		0	M	3	H	3		0	M	3		0	42	2	3
1	28	4		0		0		0		0		0	H	2		0		0		0		0	92	4	3
1	28	5		0		0		0		0		0	H	2		0		0		0		0	92	3	3
1	29	4	L	3	H	3		0		0		0	M	3		0		0		0		0	84	4	3
1	29	5	L	3	H	3		0		0		0	M	3		0		0		0		0	84	4	3
1	30	4		0	H	3	M	2	H	3	M	1	L	3	M	1	M	2		0	H	1	53	4	3
1	30	5		0	H	3	M	2	H	3	M	1	L	3	M	1	M	2		0	H	1	53	3	3
1	31	4	L	3		0		0		0		0	M	3		0		0		0		0	89	4	3
1	31	5	L	3		0		0		0		0	M	3		0		0		0		0	89	5	5
1	31	21	L	3		0		0		0		0	M	3		0		0		0		0	89	5	5
1	32	4		0	H	3	H	3	M	3		0	L	3	M	3	H	3	H	2		0	41	4	3
1	32	5		0	H	3	H	3	M	3		0	L	3	M	3	H	3	H	2		0	41	1	1
1	32	21		0	H	3	H	3	M	3		0	L	3	M	3	H	3	H	2		0	41	1	1
1	33	4		0	H	3	H	2	M	3	M	1	H	3	M	2	M	1	H	2		0	40	3	3
1	33	5		0	H	3	H	2	M	3	M	1	H	3	M	2	M	1	H	2		0	40	1	2
1	33	21		0	H	3	H	2	M	3	M	1	H	3	M	2	M	1	H	2		0	40	1	1
1	34	4	L	3	H	2	H	2		0		0	M	3	H	2		0	M	3		0	55	4	3
1	34	5	L	3	H	2	H	2		0		0	M	3	H	2		0	M	3		0	55	3	3
1	34	21	L	3	H	2	H	2		0		0	M	3	H	2		0	M	3		0	55	2	2
1	35	4		0	H	3	H	2	M	3		0	M	3	M	3	H	1		0		0	57	3	2
1	35	5		0	H	3	H	2	M	3		0	M	3	M	3	H	1		0		0	57	2	3
1	35	21		0	H	3	H	2	M	3		0	M	3	M	3	H	1		0		0	57	2	3
1	36	4		0	H	3		0	M	2		0	M	3	M	2		0	L	1		0	68	4	3
1	36	5		0	H	3		0	M	2		0	M	3	M	2		0	L	1		0	68	3	3
1	36	21		0	H	3		0	M	2		0	M	3	M	2		0	L	1		0	68	3	3
1	37	4		0	H	3		0	L	3		0	H	3	M	1		0		0		0	71	4	3
1	37	5		0	H	3		0	L	3		0	H	3	M	1		0		0		0	71	4	5
1	37	21		0	H	3		0	L	3		0	H	3	M	1		0		0		0	71	3	1
1	38	4		0	H	2	H	3	M	3		0	M	3	M	3	H	2	H	3		0	39	3	3
1	38	5		0	H	2	H	3	M	3		0	M	3	M	3	H	2	H	3		0	39	2	2
1	38	21		0	H	2	H	3	M	3		0	M	3	M	3	H	2	H	3		0	39	2	2
1	39	4		0	H	3		0	L	3		0	M	3	H	1	M	1	M	1		0	60	4	3
1	39	5		0	H	3		0	L	3		0	M	3	H	1	M	1	M	1		0	60	3	3
1	39	21		0	H	3		0	L	3		0	M	3	H	1	M	1	M	1		0	60	3	3
1	40	4		0	H	2	H	3	M	3		0	H	3	M	3	H	2	H	2		0	39	3	2
1	40	5		0	H	2	H	3	M	3		0	H	3	M	3	H	2	H	2		0	39	1	1
1	40	21		0	H	2	H	3	M	3		0	H	3	M	3	H	2	H	2		0	39	1	1
1	41	4	L	3	H	3	H	3		0		0	M	3	M	2		0	M	3		0	53	3	3
1	41	5	L	3	H	3	H	3		0		0	M	3	M	2		0	M	3		0	53	2	2
1	41	21	L	3	H	3	H	3		0		0	M	3	M	2		0	M	3		0	53	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	PCR	RAT4LINT	ACT4LINT
1	42	4	L	3	H	3	M	2	M	3	L	2	H	3	H	2		0	M	2		0	42	4	3
1	42	5	L	3	H	3	M	2	M	3	L	2	H	3	H	2		0	M	2		0	42	2	3
1	42	21	L	3	H	3	M	2	M	3	L	2	H	3	H	2		0	M	2		0	42	2	1
1	43	4		0	H	3		0	M	2		0	M	3	M	2		0		0		0	75	4	3
1	43	5		0	H	3		0	M	2		0	M	3	M	2		0		0		0	75	4	3
1	43	21		0	H	3		0	M	2		0	M	3	M	2		0		0		0	75	3	3
1	44	4		0	H	3		0	L	1		0	M	3	M	3	M	2		0		0	70	4	3
1	44	5		0	H	3		0	L	1		0	M	3	M	3	M	2		0		0	70	3	3
1	44	21		0	H	3		0	L	1		0	M	3	M	3	M	2		0		0	70	3	3
1	45	4		0	H	3		0	L	1		0	H	3	H	2		0	H	1		0	66	3	3
1	45	5		0	H	3		0	L	1		0	H	3	H	2		0	H	1		0	66	2	3
1	45	21		0	H	3		0	L	1		0	H	3	H	2		0	H	1		0	66	1	1
1	46	2	L	3	H	3	H	1		0		0	M	3		0		0		0		0	79	3	3
1	46	4	L	3	H	3	H	1		0		0	M	3		0		0		0		0	79	4	4
1	46	5	L	3	H	3	H	1		0		0	M	3		0		0		0		0	79	3	3
1	46	21	L	3	H	3	H	1		0		0	M	3		0		0		0		0	79	3	4
1	47	2		0		0		0		0		0	L	3		0		0		0		0	96	5	5
1	47	4		0		0		0		0		0	L	3		0		0		0		0	96	5	5
1	47	5		0		0		0		0		0	L	3		0		0		0		0	96	5	5
1	47	21		0		0		0		0		0	L	3		0		0		0		0	96	5	5
1	48	2	L	3		0		0		0		0	L	1		0		0		0		0	94	5	5
1	48	4	L	3		0		0		0		0	L	1		0		0		0		0	94	5	5
1	48	5	L	3		0		0		0		0	L	1		0		0		0		0	94	5	5
1	48	21	L	3		0		0		0		0	L	1		0		0		0		0	94	5	5
1	49	2		0	H	3	H	2	M	3	M	1	H	3	M	3		0	H	1		0	48	1	1
1	49	4		0	H	3	H	2	M	3	M	1	H	3	M	3		0	H	1		0	48	4	3
1	49	5		0	H	3	H	2	M	3	M	1	H	3	M	3		0	H	1		0	48	2	2
1	49	21		0	H	3	H	2	M	3	M	1	H	3	M	3		0	H	1		0	48	1	1
1	50	2		0	H	2	L	2		0		0	M	3		0		0	L	1		0	79	3	3
1	50	4		0	H	3	L	2		0		0	M	3		0		0	L	1		0	77	4	3
1	50	5		0	H	3	L	2		0		0	M	3		0		0	L	1		0	77	4	3
1	50	21		0	H	3	L	2		0		0	M	3		0		0	L	1		0	77	3	3
1	51	2	L	3	H	3	M	2	M	3	L	1	M	3	H	1		0	H	2		0	49	3	3
1	51	4	L	3	H	3	M	2	M	3	L	1	M	3	H	1		0	H	2		0	49	4	3
1	51	5	L	3	H	3	M	2	M	3	L	1	M	3	H	1		0	H	2		0	49	3	3
1	51	21	L	3	H	3	M	2	M	3	L	1	M	3	H	1		0	H	2		0	49	3	3
1	52	4		0	H	3		0	L	2		0	M	3	M	2	H	1		0		0	70	4	3
1	52	5		0	H	3		0	L	2		0	M	3	M	2	H	1		0		0	70	4	5
1	52	21		0	H	3		0	L	2		0	M	3	M	2	H	1		0		0	70	2	2
1	53	4		0	H	3		0	M	2		0	H	3	H	1		0		0		0	73	4	3
1	53	5		0	H	3		0	M	2		0	H	3	H	1		0		0		0	73	3	3
1	53	21		0	H	3		0	M	2		0	H	3	H	1		0		0		0	73	2	1
1	54	4		0	H	3		0	L	2		0	M	3		0	M	1		0		0	76	4	3
1	54	5		0	H	3		0	L	2		0	M	3		0	M	1		0		0	76	3	3
1	54	21		0	H	3		0	L	2		0	M	3		0	M	1		0		0	76	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	PCR	RAT4LINT	ACT4LINT
1	55	2		0	H	1	L	2	M	3		0	L	3		0		0		0		0	80	3	3
1	55	4		0	H	1	L	2	M	3		0	L	3		0		0		0		0	80	4	4
1	55	5		0	H	1	L	2	M	3		0	L	3		0		0		0		0	80	2	3
1	55	21		0	H	1	L	2	M	3		0	L	3		0		0		0		0	80	3	3
1	56	2		0	H	3	H	3	M	1		0	L	3	M	2		0	H	3		0	57	2	2
1	56	4		0	H	3	H	3	M	1		0	L	3	M	2		0	H	3		0	57	4	3
1	56	5		0	H	3	H	3	M	1		0	L	3	M	2		0	H	3		0	57	1	1
1	56	21		0	H	3	H	3	M	1		0	L	3	M	2		0	H	3		0	57	2	3
1	57	2		0	H	3		0	L	1	M	1	M	3	H	2		0		0		0	73	3	3
1	57	4		0	H	3		0	L	1	M	1	M	3	H	2		0		0		0	73	4	3
1	57	5		0	H	3		0	L	1	M	1	M	3	H	2		0		0		0	73	4	3
1	57	21		0	H	3		0	L	1	M	1	M	3	H	2		0		0		0	73	2	1
1	58	2		0	H	3		0		0	L	1	M	3	M	1		0		0		0	82	5	5
1	58	4		0	H	3		0		0	L	1	M	3	M	1		0		0		0	82	4	3
1	58	5		0	H	3		0		0	L	1	M	3	M	1		0		0		0	82	4	5
1	58	21		0	H	3		0		0	L	1	M	3	M	1		0		0		0	82	3	3
1	59	2		0	H	2	H	3	M	2		0	M	3	H	3		0	H	3		0	48	2	2
1	59	4		0	H	2	H	3	M	2		0	M	3	H	3		0	H	3		0	48	4	3
1	59	5		0	H	2	H	3	M	2		0	M	3	H	3		0	H	3		0	48	2	2
1	59	21		0	H	2	H	3	M	2		0	M	3	H	3		0	H	3		0	48	1	1
1	60	2		0	H	3	M	2		0		0	H	3	M	3	H	2		0		0	64	3	3
1	60	4		0	H	3	M	2		0		0	H	3	M	3	H	2		0		0	64	3	3
1	60	5		0	H	3	M	2		0		0	H	3	M	3	H	2		0		0	64	3	3
1	60	21		0	H	3	M	2		0		0	H	3	M	3	H	2		0		0	64	2	1
1	61	4		0	H	3		0	M	2		0	M	3	M	3		0		0		0	74	4	3
1	61	5		0	H	3		0	M	2		0	M	3	M	3		0		0		0	74	4	4
1	61	21		0	H	3		0	M	2		0	M	3	M	3		0		0		0	74	3	3
1	62	4		0	H	3	M	2	L	1	L	2	M	3	M	2		0		0		0	70	4	3
1	62	5		0	H	3	M	2	L	1	L	2	M	3	M	2		0		0		0	70	4	4
1	62	21		0	H	3	M	2	L	1	L	2	M	3	M	2		0		0		0	70	3	3
1	63	4		0	H	3		0	L	2		0	M	3	H	2	M	1		0		0	68	4	3
1	63	5		0	H	3		0	L	2		0	M	3	H	2	M	1		0		0	68	4	3
1	63	21		0	H	3		0	L	2		0	M	3	H	2	M	1		0		0	68	2	2
1	64	4		0		0	H	3	M	1		0	H	3	H	3		0	H	3		0	52	3	3
1	64	5		0		0	H	3	M	1		0	H	3	H	3		0	H	3		0	52	2	2
1	64	21		0		0	H	3	M	1		0	H	3	H	3		0	H	3		0	52	1	1
1	65	4		0	H	3	M	2	H	2		0	M	3	M	1		0		0		0	68	4	3
1	65	5		0	H	3	M	2	H	2		0	M	3	M	1		0		0		0	68	3	3
1	65	21		0	H	3	M	2	H	2		0	M	3	M	1		0		0		0	68	2	3
1	66	4		0	H	3	H	3	H	3	M	1	H	3	H	3		0	H	3	H	1	29	3	2
1	66	5		0	H	3	H	3	H	3	M	1	H	3	H	3		0	H	3	H	1	29	1	2
1	66	21		0	H	3	H	3	H	3	M	1	H	3	H	3		0	H	3	H	1	29	1	1
1	67	4	L	3		0	H	1	L	2		0	L	3	M	1	H	3	H	2	H	1	52	4	3
1	67	5	L	3		0	H	1	L	2		0	L	3	M	1	H	3	H	2	H	1	52	3	3
1	67	21	L	3		0	H	1	L	2		0	L	3	M	1	H	3	H	2	H	1	52	4	4

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	PCR	RAT4LINT	ACT4LINT
1	68	4		0	H	3	H	3	M	1		0	H	3	H	2		0	H	2		0	52	4	3
1	68	5		0	H	3	H	3	M	1		0	H	3	H	2		0	H	2		0	52	2	2
1	68	21		0	H	3	H	3	M	1		0	H	3	H	2		0	H	2		0	52	1	1
1	69	4		0	H	3	L	1		0		0	L	3		0		0		0		0	89	5	4
1	69	5		0	H	3	L	1		0		0	L	3		0		0		0		0	89	4	5
1	69	21		0	H	3	L	1		0		0	L	3		0		0		0		0	89	4	4
1	70	4		0	H	3	H	3	M	3		0	H	3	H	3		0	H	3		0	39	3	3
1	70	5		0	H	3	H	3	M	3		0	H	3	H	3		0	H	3		0	39	1	2
1	70	21		0	H	3	H	3	M	3		0	H	3	H	3		0	H	3		0	39	1	1
1	71	4	L	3		0	L	1		0		0	H	3	H	3		0	L	1		0	66	3	3
1	71	5	L	3		0	L	1		0		0	H	3	H	3		0	L	1		0	66	3	3
1	71	21	L	3		0	L	1		0		0	H	3	H	3		0	L	1		0	66	2	1
1	72	4		0	H	3		0	L	1		0	M	3	M	1		0		0		0	81	4	3
1	72	5		0	H	3		0	L	1		0	M	3	M	1		0		0		0	81	4	3
1	72	21		0	H	3		0	L	1		0	M	3	M	1		0		0		0	81	3	3
1	73	4		0	H	2	H	3	M	1		0	H	3	M	3	H	2	H	2		0	47	3	2
1	73	5		0	H	2	H	3	M	1		0	H	3	M	3	H	2	H	2		0	47	1	1
1	73	21		0	H	2	H	3	M	1		0	H	3	M	3	H	2	H	2		0	47	1	1
1	74	4		0	H	3	H	2	M	3		0	L	3	M	2	M	2	L	1		0	51	4	3
1	74	5		0	H	3	H	2	M	3		0	L	3	M	2	M	2	L	1		0	51	2	3
1	74	21		0	H	3	H	2	M	3		0	L	3	M	2	M	2	L	1		0	51	3	3
1	75	4		0	H	3	M	2	H	3	M	1	H	3	M	3		0	H	2		0	42	4	3
1	75	5		0	H	3	M	2	H	3	M	1	H	3	M	3		0	H	2		0	42	2	3
1	75	21		0	H	3	M	2	H	3	M	1	H	3	M	3		0	H	2		0	42	1	1
1	76	4		0	H	3		0	L	1		0	L	3	M	1		0		0		0	84	4	4
1	76	5		0	H	3		0	L	1		0	L	3	M	1		0		0		0	84	4	3
1	76	21		0	H	3		0	L	1		0	L	3	M	1		0		0		0	84	4	5
1	77	4		0	H	2	H	3	M	2		0	M	3	M	3	H	1	H	1		0	53	4	3
1	77	5		0	H	2	H	3	M	2		0	M	3	M	3	H	1	H	1		0	53	2	2
1	77	21		0	H	2	H	3	M	2		0	M	3	M	3	H	1	H	1		0	53	3	3
1	78	4		0	H	3		0		0		0	M	3		0		0		0		0	88	4	4
1	78	5		0	H	3		0		0		0	M	3		0		0		0		0	88	5	5
1	78	21		0	H	3		0		0		0	M	3		0		0		0		0	88	5	5
1	79	4	L	3		0		0		0		0	L	2		0		0		0		0	93	5	5
1	79	5	L	3		0		0		0		0	L	2		0		0		0		0	93	5	5
1	79	21	L	3		0		0		0		0	L	2		0		0		0		0	93	5	5
1	80	4		0	H	1		0		0		0		0		0		0		0		0	98	5	5
1	80	5		0	H	1		0		0		0		0		0		0		0		0	98	5	5
1	80	21		0	H	1		0		0		0		0		0		0		0		0	98	5	5
1	81	4		0	H	3		0		0		0	L	3	M	3		0		0		0	84	5	5
1	81	5		0	H	3		0		0		0	L	3	M	3		0		0		0	84	4	3
1	81	21		0	H	3		0		0		0	L	3	M	3		0		0		0	84	4	4
1	82	4		0	H	2	L	3		0		0	L	3	M	3		0		0		0	82	4	3
1	82	5		0	H	2	L	3		0		0	L	3	M	3		0		0		0	82	3	3
1	82	21		0	H	2	L	3		0		0	L	3	M	3		0		0		0	82	4	4
1	83	4		0	H	3	H	2	M	3		0	H	3	H	3	H	1	M	3		0	36	3	3
1	83	5		0	H	3	H	2	M	3		0	H	3	H	3	H	1	M	3		0	36	2	2
1	83	21		0	H	3	H	2	M	3		0	H	3	H	3	H	1	M	3		0	36	1	1

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	PCR	RAT4LINT	ACT4LINT
1	84	4		0	H	3		0		0		0	M	3		0		0	L	1		0	80	4	3
1	84	5		0	H	3		0		0		0	M	3		0		0	L	1		0	80	5	5
1	84	21		0	H	3		0		0		0	M	3		0		0	L	1		0	80	4	4
1	85	4		0	H	3	H	2	M	3		0	M	3	H	3	H	3	H	3		0	34	3	2
1	85	5		0	H	3	H	2	M	3		0	M	3	H	3	H	3	H	3		0	34	2	3
1	85	21		0	H	3	H	2	M	3		0	M	3	H	3	H	3	H	3		0	34	1	1
1	86	4	L	3	H	3		0		0		0	M	3	M	2	M	2	H	2		0	58	3	2
1	86	5	L	3	H	3		0		0		0	M	3	M	2	M	2	H	2		0	58	3	3
1	86	21	L	3	H	3		0		0		0	M	3	M	2	M	2	H	2		0	58	3	3
1	87	4		0	H	3		0	L	1		0	H	3	M	3		0		0		0	75	3	2
1	87	5		0	H	3		0	L	1		0	H	3	M	3		0		0		0	75	4	3
1	87	21		0	H	3		0	L	1		0	H	3	M	3		0		0		0	75	2	2
1	88	4	L	3	H	3		0		0		0	H	3		0		0	M	3		0	66	4	3
1	88	5	L	3	H	3		0		0		0	H	3		0		0	M	3		0	66	3	3
1	88	21	L	3	H	3		0		0		0	H	3		0		0	M	3		0	66	3	2
1	89	4		0	H	3	H	1	L	2		0	H	3	H	2	M	1	M	2		0	48	4	3
1	89	5		0	H	3	H	1	L	2		0	H	3	H	2	M	1	M	2		0	48	2	3
1	89	21		0	H	3	H	1	L	2		0	H	3	H	2	M	1	M	2		0	48	1	1
1	90	4		0	H	3		0	L	1		0	M	3	H	3		0		0		0	75	4	3
1	90	5		0	H	3		0	L	1		0	M	3	H	3		0		0		0	75	4	5
1	90	21		0	H	3		0	L	1		0	M	3	H	3		0		0		0	75	2	2
1	91	4	L	3	H	3	H	2	L	2		0	M	3		0	H	3	M	2		0	47	4	3
1	91	5	L	3	H	3	H	2	L	2		0	M	3		0	H	3	M	2		0	47	2	2
1	91	21	L	3	H	3	H	2	L	2		0	M	3		0	H	3	M	2		0	47	1	1
1	92	4		0	H	3		0	M	3		0	M	3	H	1		0		0		0	72	4	3
1	92	5		0	H	3		0	M	3		0	M	3	H	1		0		0		0	72	3	3
1	92	21		0	H	3		0	M	3		0	M	3	H	1		0		0		0	72	3	3
1	93	4		0	H	3		0		0		0	M	3	M	2	M	1		0		0	77	4	3
1	93	5		0	H	3		0		0		0	M	3	M	2	M	1		0		0	77	3	3
1	93	21		0	H	3		0		0		0	M	3	M	2	M	1		0		0	77	3	3
1	94	2		0	H	3	H	2		0		0	H	3	M	2	H	1		0		0	66	1	1
1	94	4		0	H	3	H	2		0		0	H	3	M	2	H	1		0		0	66	4	3
1	94	5		0	H	3	H	2		0		0	H	3	M	2	H	1		0		0	66	1	2
1	94	21		0	H	3	H	2		0		0	H	3	M	2	H	1		0		0	66	2	1
1	95	2		0	H	3	H	3	M	2		0	H	3	H	1		0	H	2		0	51	1	1
1	95	4		0	H	3	H	3	M	2		0	H	3	H	1		0	H	2		0	51	4	3
1	95	5		0	H	3	H	3	M	2		0	H	3	H	1		0	H	2		0	51	1	1
1	95	21		0	H	3	H	3	M	2		0	H	3	H	1		0	H	2		0	51	1	1
1	96	2		0	H	3	M	2	M	2		0	L	3	M	3		0	H	1		0	64	3	2
1	96	4		0	H	3	M	2	M	2		0	L	3	M	3		0	H	1		0	64	4	3
1	96	5		0	H	3	M	2	M	2		0	L	3	M	3		0	H	1		0	64	3	3
1	96	21		0	H	3	M	2	M	2		0	L	3	M	3		0	H	1		0	64	2	3
1	97	2	L	3	H	1		0		0	M	1		0		0		0		0	H	1	88	5	4
1	98	2		0	H	3	H	3	H	1		0	H	3	M	3	H	3	H	3		0	38	2	2
1	99	2		0	H	3	M	1	M	3	L	1	H	3	M	3		0		0		0	62	4	4

Table A-2. Listing of the Pavements used in the Expert Opinion Surveys and their Ratings
Pavement Type 2 (JRCP/JCP)

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	103	4		0	H	3		0		0		0		0	M	1	H	3		0	M	1		0		0	77	4	4
2	103	5		0	H	3		0		0		0		0	M	1	H	3		0	M	1		0		0	77	4	4
2	103	21		0	H	3		0		0		0		0	M	1	H	3		0	M	1		0		0	77	4	4
2	104	4		0	H	3		0	L	1		0		0		0		0		0		0		0		0	92	5	4
2	104	5		0	H	3		0	L	1		0		0		0		0		0		0		0		0	92	5	4
2	104	21		0	H	3		0	L	1		0		0		0		0		0		0		0		0	92	5	5
2	105	4		0	H	3	H	3		0	M	2		0	H	3	H	3		0	M	2		0	M	2	56	4	3
2	105	5		0	H	3	H	3		0	M	2		0	H	3	H	3		0	M	2		0	M	2	56	1	2
2	105	21		0	H	3	H	3		0	M	2		0	H	3	H	3		0	M	2		0	M	2	56	3	3
2	106	4	L	1	H	3		0		0		0		0		0		0		0	L	1		0		0	86	5	5
2	106	5	L	1	H	3		0		0		0		0		0		0		0	L	1		0		0	86	5	5
2	106	21	L	1	H	3		0		0		0		0		0		0		0	L	1		0		0	86	5	5
2	107	4	L	2	H	3		0		0		0		0		0		0		0	L	1		0		0	85	5	5
2	107	5	L	2	H	3		0		0		0		0		0		0		0	L	1		0		0	85	5	5
2	107	21	L	2	H	3		0		0		0		0		0		0		0	L	1		0		0	85	5	5
2	108	4		0	H	2		0	L	1	L	2		0		0	H	3		0	M	2		0	M	3	78	3	3
2	108	5		0	H	2		0	L	1	L	2		0		0	H	3		0	M	2		0	M	3	78	4	4
2	108	21		0	H	2		0	L	1	L	2		0		0	H	3		0	M	2		0	M	3	78	3	3
2	109	4		0	H	2		0		0	L	3	L	1	L	2	H	3		0	L	1		0		0	76	4	3
2	109	5		0	H	2		0		0	L	3	L	1	L	2	H	3		0	L	1		0		0	76	4	4
2	109	21		0	H	2		0		0	L	3	L	1	L	2	H	3		0	L	1		0		0	76	4	4
2	110	4		0	H	3	M	2	L	1	M	3		0	M	3	H	3		0	M	1		0	H	3	58	3	2
2	110	5		0	H	3	M	2	L	1	M	3		0	M	3	H	3		0	M	1		0	H	3	58	3	4
2	110	21		0	H	3	M	2	L	1	M	3		0	M	3	H	3		0	M	1		0	H	3	58	2	3
2	111	4	L	2	H	3	H	3	M	2	L	2	M	2	M	3	H	2		0	M	2	H	3	H	3	49	3	2
2	111	5	L	2	H	3	H	3	M	2	L	2	M	2	M	3	H	2		0	M	2	H	3	H	3	49	2	2
2	111	21	L	2	H	3	H	3	M	2	L	2	M	2	M	3	H	2		0	M	2	H	3	H	3	49	2	2
2	112	4	L	1	H	3	L	1	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	64	4	3
2	112	5	L	1	H	3	L	1	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	64	3	4
2	112	21	L	1	H	3	L	1	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	64	2	3
2	113	4	M	3	H	3	M	3		0	M	2		0	H	3	H	3		0	H	2		0	H	2	51	3	2
2	113	5	M	3	H	3	M	3		0	M	2		0	H	3	H	3		0	H	2		0	H	2	51	2	2
2	113	21	M	3	H	3	M	3		0	M	2		0	H	3	H	3		0	H	2		0	H	2	51	2	3
2	114	4		0	H	3	H	3		0		0		0		0	H	3		0	M	2	M	1	M	1	76	4	3
2	114	5		0	H	3	H	3		0		0		0		0	H	3		0	M	2	M	1	M	1	76	2	2
2	114	21		0	H	3	H	3		0		0		0		0	H	3		0	M	2	M	1	M	1	76	3	4
2	115	2	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	H	3	46	2	1
2	115	4	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	H	3	46	3	2
2	115	5	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	H	3	46	1	2
2	115	21	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	H	3	46	1	1
2	116	2		0	H	3	H	3	M	2	M	2	M	3	H	2	H	2	H	1	M	2	M	3	H	2	46	1	1
2	116	4		0	H	3	H	3	M	2	M	2	M	3	H	2	H	2	H	1	M	2	M	3	H	2	46	3	2
2	116	5		0	H	3	H	3	M	2	M	2	M	3	H	2	H	2	H	1	M	2	M	3	H	2	46	1	2
2	116	21		0	H	3	H	3	M	2	M	2	M	3	H	2	H	2	H	1	M	2	M	3	H	2	46	2	3
2	117	2		0	H	3	H	3		0	M	3		0	L	1	H	3		0	M	1		0	M	3	68	2	2
2	117	4		0	H	3	H	3		0	M	3		0	L	1	H	3		0	M	1		0	M	3	68	4	3
2	117	5		0	H	3	H	3		0	M	3		0	L	1	H	3		0	M	1		0	M	3	68	2	2
2	117	21		0	H	3	H	3		0	M	3		0	L	1	H	3		0	M	1		0	M	3	68	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	118	2		0	H	3	M	2		0	M	2		0	H	2	H	3		0	M	1	L	2	L	1	63	2	2
2	118	4		0	H	3	M	2		0	M	2		0	H	2	H	3		0	M	1	L	2	L	1	63	4	3
2	118	5		0	H	3	M	2		0	M	2		0	H	2	H	3		0	M	1	L	2	L	1	63	3	3
2	118	21		0	H	3	M	2		0	M	2		0	H	2	H	3		0	M	1	L	2	L	1	63	3	3
2	119	2		0	H	3	H	3		0		0		0	H	2	H	3		0	H	3		0		0	63	2	1
2	119	4		0	H	3	H	3		0		0		0	H	2	H	3		0	H	3		0		0	63	4	3
2	119	5		0	H	3	H	3		0		0		0	H	2	H	3		0	H	3		0		0	63	1	2
2	119	21		0	H	3	H	3		0		0		0	H	2	H	3		0	H	3		0		0	63	3	3
2	120	2	L	3	H	3		0		0		0		0	L	2	H	1		0	M	1		0		0	76	4	3
2	120	4	L	3	H	3		0		0		0		0	L	2	H	1		0	M	1		0		0	76	4	3
2	120	5	L	3	H	3		0		0		0		0	L	2	H	1		0	M	1		0		0	76	3	3
2	120	21	L	3	H	3		0		0		0		0	L	2	H	1		0	M	1		0		0	76	3	4
2	121	2	L	3	H	3	M	1		0		0		0	L	1	H	1		0	M	1		0		0	76	4	3
2	121	4	L	3	H	3	M	1		0		0		0	L	1	H	1		0	M	1		0		0	76	4	4
2	121	5	L	3	H	3	M	1		0		0		0	L	1	H	1		0	M	1		0		0	76	4	4
2	121	21	L	3	H	3	M	1		0		0		0	L	1	H	1		0	M	1		0		0	76	4	3
2	122	2	L	3	H	3	H	3		0	H	2		0	H	3		0		0	H	3	H	2	H	1	54	2	2
2	122	4	L	3	H	3	H	3		0	H	2		0	H	3		0		0	H	3	H	2	H	1	54	3	2
2	122	5	L	3	H	3	H	3		0	H	2		0	H	3		0		0	H	3	H	2	H	1	54	1	2
2	122	21	L	3	H	3	H	3		0	H	2		0	H	3		0		0	H	3	H	2	H	1	54	1	1
2	123	2		0	H	3		0		0		0		0		0		0		0	M	1		0		0	88	4	4
2	123	4		0	H	3		0		0		0		0		0		0		0	M	1		0		0	88	5	4
2	123	5		0	H	3		0		0		0		0		0		0		0	M	1		0		0	88	4	4
2	123	21		0	H	3		0		0		0		0		0		0		0	M	1		0		0	88	4	4
2	124	1		0	H	3		0		0		0		0		0	H	2		0		0		0		0	90	2	2
2	124	2		0	H	3		0		0		0		0		0	H	2		0		0		0		0	90	5	5
2	124	4		0	H	3		0		0		0		0		0	H	2		0		0		0		0	90	5	5
2	124	5		0	H	3		0		0		0		0		0	H	2		0		0		0		0	90	5	5
2	124	21		0	H	3		0		0		0		0		0	H	2		0		0		0		0	90	5	5
2	125	1		0	H	3		0	L	1	M	3		0	M	2	H	3		0	L	1		0	M	3	63	2	2
2	125	2		0	H	3		0	L	1	M	3		0	M	2	H	3		0	L	1		0	M	3	63	4	3
2	125	4		0	H	3		0	L	1	M	3		0	M	2	H	3		0	L	1		0	M	3	63	4	3
2	125	5		0	H	3		0	L	1	M	3		0	M	2	H	3		0	L	1		0	M	3	63	2	3
2	125	21		0	H	3		0	L	1	M	3		0	M	2	H	3		0	L	1		0	M	3	63	3	3
2	126	1	L	1	H	3		0	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	65	2	2
2	126	2	L	1	H	3		0	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	65	4	3
2	126	4	L	1	H	3		0	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	65	4	3
2	126	5	L	1	H	3		0	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	65	3	3
2	126	21	L	1	H	3		0	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	65	3	3
2	127	1		0	H	3	H	3		0	M	3		0		0	H	3		0	M	2		0		0	69	2	2
2	127	4		0	H	3	H	3		0	M	3		0		0	H	3		0	M	2		0		0	69	4	3
2	127	5		0	H	3	H	3		0	M	3		0		0	H	3		0	M	2		0		0	69	2	3
2	127	21		0	H	3	H	3		0	M	3		0		0	H	3		0	M	2		0		0	69	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	128	1	L	3	H	3	H	3	L	1		0		0	M	3	H	3		0	M	2		0	H	3	57	2	2
2	128	4	L	3	H	3	H	3	L	1		0		0	M	3	H	3		0	M	2		0	H	3	57	4	3
2	128	5	L	3	H	3	H	3	L	1		0		0	M	3	H	3		0	M	2		0	H	3	57	1	2
2	128	21	L	3	H	3	H	3	L	1		0		0	M	3	H	3		0	M	2		0	H	3	57	3	3
2	129	1	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	H	2		0	56	2	2
2	129	4	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	H	2		0	56	3	3
2	129	5	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	H	2		0	56	1	2
2	129	21	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	H	2		0	56	2	2
2	130	1		0	H	3	M	3	M	2	M	3		0	M	3	H	3		0	M	3		0		0	50	3	3
2	130	4		0	H	3	M	3	M	2	M	3		0	M	3	H	3		0	M	3		0		0	50	3	2
2	130	5		0	H	3	M	3	M	2	M	3		0	M	3	H	3		0	M	3		0		0	50	2	3
2	130	21		0	H	3	M	3	M	2	M	3		0	M	3	H	3		0	M	3		0		0	50	2	2
2	131	1	L	3	H	1		0		0		0		0		0		0		0	M	1		0		0	87	4	4
2	131	4	L	3	H	1		0		0		0		0		0		0		0	M	1		0		0	87	5	5
2	131	5	L	3	H	1		0		0		0		0		0		0		0	M	1		0		0	87	4	4
2	131	21	L	3	H	1		0		0		0		0		0		0		0	M	1		0		0	87	4	5
2	132	1		0	H	3		0		0	L	3		0		0	H	3		0	M	1		0	L	1	80	3	3
2	132	4		0	H	3		0		0	L	3		0		0	H	3		0	M	1		0	L	1	80	4	3
2	132	5		0	H	3		0		0	L	3		0		0	H	3		0	M	1		0	L	1	80	4	4
2	132	21		0	H	3		0		0	L	3		0		0	H	3		0	M	1		0	L	1	80	3	3
2	133	1		0		0	M	3		0	M	3		0		0	H	3		0	L	2		0		0	75	3	3
2	133	4		0		0	M	3		0	M	3		0		0	H	3		0	L	2		0		0	75	4	4
2	133	5		0		0	M	3		0	M	3		0		0	H	3		0	L	2		0		0	75	4	4
2	133	21		0		0	M	3		0	M	3		0		0	H	3		0	L	2		0		0	75	4	4
2	134	1		0	H	3	L	2		0	M	3		0	M	1	H	2		0	L	2		0	L	2	67	3	3
2	134	4		0	H	3	L	2		0	M	3		0	M	1	H	2		0	L	2		0	L	2	67	4	3
2	134	5		0	H	3	L	2		0	M	3		0	M	1	H	2		0	L	2		0	L	2	67	3	3
2	134	21		0	H	3	L	2		0	M	3		0	M	1	H	2		0	L	2		0	L	2	67	3	3
2	135	1	L	3	H	3	H	3	L	2	M	3		0	H	3	H	3	H	2	H	3	H	2	H	2	38	3	2
2	135	4	L	3	H	3	H	3	L	2	M	3		0	H	3	H	3	H	2	H	3	H	2	H	2	38	3	2
2	135	5	L	3	H	3	H	3	L	2	M	3		0	H	3	H	3	H	2	H	3	H	2	H	2	38	1	2
2	135	21	L	3	H	3	H	3	L	2	M	3		0	H	3	H	3	H	2	H	3	H	2	H	2	38	2	1
2	136	4		0	H	2		0		0		0		0		0		0		0	M	2		0		0	88	4	5
2	136	5		0	H	2		0		0		0		0		0		0		0	M	2		0		0	88	5	5
2	136	21		0	H	2		0		0		0		0		0		0		0	M	2		0		0	88	4	5
2	137	4	L	3		0	H	3		0		0		0	M	3	H	3		0	H	1		0		0	67	4	3
2	137	5	L	3		0	H	3		0		0		0	M	3	H	3		0	H	1		0		0	67	2	2
2	137	21	L	3		0	H	3		0		0		0	M	3	H	3		0	H	1		0		0	67	3	3
2	138	4	L	3	H	3	H	3		0	M	3		0	H	3	H	3		0	H	3		0	H	3	49	2	2
2	138	5	L	3	H	3	H	3		0	M	3		0	H	3	H	3		0	H	3		0	H	3	49	1	2
2	138	21	L	3	H	3	H	3		0	M	3		0	H	3	H	3		0	H	3		0	H	3	49	2	2
2	139	4	L	3	H	3	M	3		0	M	3		0	L	3	H	3		0		0	L	1	M	3	69	4	3
2	139	5	L	3	H	3	M	3		0	M	3		0	L	3	H	3		0		0	L	1	M	3	69	3	3
2	139	21	L	3	H	3	M	3		0	M	3		0	L	3	H	3		0		0	L	1	M	3	69	2	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	140	4	L	3	H	3	H	3	L	1	M	2		0	M	3	H	3	H	2	M	1		0		0	50	4	3
2	140	5	L	3	H	3	H	3	L	1	M	2		0	M	3	H	3	H	2	M	1		0		0	50	2	3
2	140	21	L	3	H	3	H	3	L	1	M	2		0	M	3	H	3	H	2	M	1		0		0	50	2	3
2	141	4		0	H	3	M	2		0	L	3		0	M	3	H	3		0	L	1		0		0	65	4	3
2	141	5		0	H	3	M	2		0	L	3		0	M	3	H	3		0	L	1		0		0	65	2	3
2	141	21		0	H	3	M	2		0	L	3		0	M	3	H	3		0	L	1		0		0	65	4	4
2	142	4	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	H	3	H	3	56	3	2
2	142	5	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	H	3	H	3	56	1	2
2	142	21	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	H	3	H	3	56	2	1
2	143	4		0	H	3	L	1		0	M	3		0	M	2	H	3		0	M	1		0	M	2	65	4	3
2	143	5		0	H	3	L	1		0	M	3		0	M	2	H	3		0	M	1		0	M	2	65	2	2
2	143	21		0	H	3	L	1		0	M	3		0	M	2	H	3		0	M	1		0	M	2	65	3	3
2	144	4		0	H	3		0		0	M	3		0		0	H	3		0	L	2		0		0	74	4	3
2	144	5		0	H	3		0		0	M	3		0		0	H	3		0	L	2		0		0	74	3	3
2	144	21		0	H	3		0		0	M	3		0		0	H	3		0	L	2		0		0	74	4	4
2	145	4		0	H	3		0		0	M	3		0	M	1	H	2		0	M	1		0	M	1	70	4	3
2	145	5		0	H	3		0		0	M	3		0	M	1	H	2		0	M	1		0	M	1	70	3	3
2	145	21		0	H	3		0		0	M	3		0	M	1	H	2		0	M	1		0	M	1	70	3	3
2	146	4	L	3	H	3	H	3		0	M	3		0	M	3	H	3		0	M	2	H	3	M	3	53	3	2
2	146	5	L	3	H	3	H	3		0	M	3		0	M	3	H	3		0	M	2	H	3	M	3	53	2	2
2	146	21	L	3	H	3	H	3		0	M	3		0	M	3	H	3		0	M	2	H	3	M	3	53	3	3
2	147	4	M	3	H	3	H	3		0	M	3		0	H	3	H	3		0	M	1		0		0	49	3	2
2	147	5	M	3	H	3	H	3		0	M	3		0	H	3	H	3		0	M	1		0		0	49	1	2
2	147	21	M	3	H	3	H	3		0	M	3		0	H	3	H	3		0	M	1		0		0	49	3	3
2	148	4		0	H	3		0		0		0		0	L	1		0		0	L	1		0		0	85	5	4
2	148	5		0	H	3		0		0		0		0	L	1		0		0	L	1		0		0	85	4	5
2	148	21		0	H	3		0		0		0		0	L	1		0		0	L	1		0		0	85	4	4
2	149	4	L	3	H	3	L	1		0	M	3		0		0	H	3		0	M	2		0		0	69	4	3
2	149	5	L	3	H	3	L	1		0	M	3		0		0	H	3		0	M	2		0		0	69	4	5
2	149	21	L	3	H	3	L	1		0	M	3		0		0	H	3		0	M	2		0		0	69	3	3
2	150	4		0	H	3	H	2	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	63	4	3
2	150	5		0	H	3	H	2	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	63	2	3
2	150	21		0	H	3	H	2	M	1	M	3		0	M	1	H	3		0	M	1		0	M	2	63	3	3
2	151	4	L	3	H	3	H	3		0	M	3		0	L	3	H	3		0	M	2		0	M	3	59	4	3
2	151	5	L	3	H	3	H	3		0	M	3		0	L	3	H	3		0	M	2		0	M	3	59	2	2
2	151	21	L	3	H	3	H	3		0	M	3		0	L	3	H	3		0	M	2		0	M	3	59	2	3
2	152	4		0	H	3	H	2		0		0		0		0	H	2		0	L	2	M	2		0	77	4	4
2	152	5		0	H	3	H	2		0		0		0		0	H	2		0	L	2	M	2		0	77	3	3
2	152	21		0	H	3	H	2		0		0		0		0	H	2		0	L	2	M	2		0	77	4	4
2	153	4	L	3	H	3	M	3		0		0		0	H	3	H	3		0	H	2		0	M	3	58	3	2
2	153	5	L	3	H	3	M	3		0		0		0	H	3	H	3		0	H	2		0	M	3	58	2	2
2	153	21	L	3	H	3	M	3		0		0		0	H	3	H	3		0	H	2		0	M	3	58	3	3
2	154	4		0	H	3	M	2	L	2	M	3		0	M	3	H	3		0	M	2	M	3	M	3	52	3	2
2	154	5		0	H	3	M	2	L	2	M	3		0	M	3	H	3		0	M	2	M	3	M	3	52	2	3
2	154	21		0	H	3	M	2	L	2	M	3		0	M	3	H	3		0	M	2	M	3	M	3	52	2	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	155	4		0	H	1		0		0	L	2	M	2		0		0		0	L	1		0		0	86	4	4
2	155	5		0	H	1		0		0	L	2	M	2		0		0		0	L	1		0		0	86	3	3
2	155	21		0	H	1		0		0	L	2	M	2		0		0		0	L	1		0		0	86	4	4
2	156	4	L	3	H	3	H	3		0	M	3		0	M	2	H	2	H	2	H	3	M	3	M	2	51	3	2
2	156	5	L	3	H	3	H	3		0	M	3		0	M	2	H	2	H	2	H	3	M	3	M	2	51	2	3
2	156	21	L	3	H	3	H	3		0	M	3		0	M	2	H	2	H	2	H	3	M	3	M	2	51	1	2
2	157	4		0	H	3		0	M	1	M	3		0	L	3	H	3		0	M	1		0		0	67	4	3
2	157	5		0	H	3		0	M	1	M	3		0	L	3	H	3		0	M	1		0		0	67	4	3
2	157	21		0	H	3		0	M	1	M	3		0	L	3	H	3		0	M	1		0		0	67	3	3
2	158	4		0	H	3		0	M	2	H	3		0	H	3	H	3	H	2	H	2	H	3	M	1	45	3	2
2	158	5		0	H	3		0	M	2	H	3		0	H	3	H	3	H	2	H	2	H	3	M	1	45	2	2
2	158	21		0	H	3		0	M	2	H	3		0	H	3	H	3	H	2	H	2	H	3	M	1	45	1	1
2	159	4	L	1	H	3		0		0	M	2		0		0	H	2		0	M	1		0	M	3	77	4	3
2	159	5	L	1	H	3		0		0	M	2		0		0	H	2		0	M	1		0	M	3	77	4	4
2	159	21	L	1	H	3		0		0	M	2		0		0	H	2		0	M	1		0	M	3	77	3	4
2	160	4		0	H	3		0		0		0		0		0		0		0	L	1		0	L	1	88	5	5
2	160	5		0	H	3		0		0		0		0		0		0		0	L	1		0	L	1	88	4	4
2	160	21		0	H	3		0		0		0		0		0		0		0	L	1		0	L	1	88	5	5
2	161	4		0	H	3		0		0		0		0		0	H	3		0	M	2	M	3	M	3	81	4	3
2	161	5		0	H	3		0		0		0		0		0	H	3		0	M	2	M	3	M	3	81	3	3
2	161	21		0	H	3		0		0		0		0		0	H	3		0	M	2	M	3	M	3	81	4	4
2	162	4		0	H	3	L	1	L	1	M	3	M	1	M	2	H	3		0	M	1	H	3	H	1	61	4	3
2	162	5		0	H	3	L	1	L	1	M	3	M	1	M	2	H	3		0	M	1	H	3	H	1	61	3	3
2	162	21		0	H	3	L	1	L	1	M	3	M	1	M	2	H	3		0	M	1	H	3	H	1	61	2	3
2	163	2		0	H	3		0		0	M	3		0	M	2	H	3		0	L	1		0		0	66	3	3
2	163	4		0	H	3		0		0	M	3		0	M	2	H	3		0	L	1		0		0	66	4	3
2	163	5		0	H	3		0		0	M	3		0	M	2	H	3		0	L	1		0		0	66	2	3
2	163	21		0	H	3		0		0	M	3		0	M	2	H	3		0	L	1		0		0	66	3	4
2	164	2	L	3	H	3	M	1		0		0		0	L	2	H	2		0	M	2		0	L	2	71	3	3
2	164	4	L	3	H	3	M	1		0		0		0	L	2	H	2		0	M	2		0	L	2	71	4	3
2	164	5	L	3	H	3	M	1		0		0		0	L	2	H	2		0	M	2		0	L	2	71	3	3
2	164	21	L	3	H	3	M	1		0		0		0	L	2	H	2		0	M	2		0	L	2	71	4	4
2	165	2		0	H	3		0		0	M	3		0	L	1		0		0	M	1		0		0	78	4	3
2	165	4		0	H	3		0		0	M	3		0	L	1		0		0	M	1		0		0	78	4	3
2	165	5		0	H	3		0		0	M	3		0	L	1		0		0	M	1		0		0	78	3	4
2	165	21		0	H	3		0		0	M	3		0	L	1		0		0	M	1		0		0	78	3	3
2	166	2		0	H	3	H	3		0	M	3		0	H	3	H	3		0	H	2		0		0	54	2	1
2	166	4		0	H	3	H	3		0	M	3		0	H	3	H	3		0	H	2		0		0	54	3	2
2	166	5		0	H	3	H	3		0	M	3		0	H	3	H	3		0	H	2		0		0	54	1	2
2	166	21		0	H	3	H	3		0	M	3		0	H	3	H	3		0	H	2		0		0	54	3	3
2	167	2	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3	M	3	72	2	1
2	167	4	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3	M	3	72	4	3
2	167	5	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3	M	3	72	2	3
2	167	21	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3	M	3	72	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	168	2		0	H	1		0		0		0		0		0	H	2		0	M	1		0		0	86	4	4
2	168	4		0	H	1		0		0		0		0		0	H	2		0	M	1		0		0	86	4	5
2	168	5		0	H	1		0		0		0		0		0	H	2		0	M	1		0		0	86	4	4
2	168	21		0	H	1		0		0		0		0		0	H	2		0	M	1		0		0	86	4	5
2	169	2		0	H	3	H	1		0		0		0	L	1	H	1		0	M	1		0	L	1	79	4	4
2	169	4		0	H	3	H	1		0		0		0	L	1	H	1		0	M	1		0	L	1	79	4	3
2	169	5		0	H	3	H	1		0		0		0	L	1	H	1		0	M	1		0	L	1	79	3	3
2	169	21		0	H	3	H	1		0		0		0	L	1	H	1		0	M	1		0	L	1	79	3	3
2	170	2	L	3	H	3	L	2	H	1		0	L	2	M	3	H	2	H	1	M	2	M	2	M	1	55	3	2
2	170	4	L	3	H	3	L	2	H	1		0	L	2	M	3	H	2	H	1	M	2	M	2	M	1	55	4	3
2	170	5	L	3	H	3	L	2	H	1		0	L	2	M	3	H	2	H	1	M	2	M	2	M	1	55	2	3
2	170	21	L	3	H	3	L	2	H	1		0	L	2	M	3	H	2	H	1	M	2	M	2	M	1	55	3	3
2	171	2	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3		0	72	3	3
2	171	4	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3		0	72	4	4
2	171	5	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3		0	72	2	2
2	171	21	L	3	H	3	H	3		0		0		0		0	H	3		0	M	2	M	3		0	72	3	3
2	172	1		0	H	2	L	1		0	M	3		0	L	1	H	3		0		0		0		0	81	3	3
2	172	2		0	H	2	L	1		0	M	3		0	L	1	H	3		0		0		0		0	81	4	3
2	172	4		0	H	2	L	1		0	M	3		0	L	1	H	3		0		0		0		0	81	4	3
2	172	5		0	H	2	L	1		0	M	3		0	L	1	H	3		0		0		0		0	81	4	4
2	172	21		0	H	2	L	1		0	M	3		0	L	1	H	3		0		0		0		0	81	4	4
2	173	1	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	2	H	3		0	57	1	1
2	173	2	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	2	H	3		0	57	1	1
2	173	4	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	2	H	3		0	57	4	3
2	173	5	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	2	H	3		0	57	1	2
2	173	21	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	2	H	3		0	57	3	3
2	174	1		0	H	3		0		0		0		0	H	1	H	3		0		0		0		0	82	2	2
2	174	2		0	H	3		0		0		0		0	H	1	H	3		0		0		0		0	82	4	4
2	174	4		0	H	3		0		0		0		0	H	1	H	3		0		0		0		0	82	4	4
2	174	5		0	H	3		0		0		0		0	H	1	H	3		0		0		0		0	82	2	3
2	174	21		0	H	3		0		0		0		0	H	1	H	3		0		0		0		0	82	4	4
2	175	1	L	3	H	3	H	3		0	M	3		0	M	3	H	3	H	3	H	3	H	3	M	2	47	3	3
2	175	4	L	3	H	3	H	3		0	M	3		0	M	3	H	3	H	3	H	3	H	3	M	2	47	3	2
2	175	5	L	3	H	3	H	3		0	M	3		0	M	3	H	3	H	3	H	3	H	3	M	2	47	1	2
2	175	21	L	3	H	3	H	3		0	M	3		0	M	3	H	3	H	3	H	3	H	3	M	2	47	1	1
2	176	1		0	H	3	H	3		0	M	3		0	H	3	H	3		0	M	2	M	2	H	3	54	2	2
2	176	4		0	H	3	H	3		0	M	3		0	H	3	H	3		0	M	2	M	2	H	3	54	3	2
2	176	5		0	H	3	H	3		0	M	3		0	H	3	H	3		0	M	2	M	2	H	3	54	1	2
2	176	21		0	H	3	H	3		0	M	3		0	H	3	H	3		0	M	2	M	2	H	3	54	2	3
2	177	1		0	H	1	L	1		0		0		0		0	H	1		0	M	1		0		0	87	4	4
2	177	4		0	H	1	L	1		0		0		0		0	H	1		0	M	1		0		0	87	4	4
2	177	5		0	H	1	L	1		0		0		0		0	H	1		0	M	1		0		0	87	4	5
2	177	21		0	H	1	L	1		0		0		0		0	H	1		0	M	1		0		0	87	4	4
2	178	1	L	3	H	3	H	2		0	M	3		0	H	3	H	3		0	H	3	H	2	H	3	50	2	2
2	178	4	L	3	H	3	H	2		0	M	3		0	H	3	H	3		0	H	3	H	2	H	3	50	3	2
2	178	5	L	3	H	3	H	2		0	M	3		0	H	3	H	3		0	H	3	H	2	H	3	50	2	2
2	178	21	L	3	H	3	H	2		0	M	3		0	H	3	H	3		0	H	3	H	2	H	3	50	1	2

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	179	1		0	H	3		0		0		0		0		0	H	1		0	L	1		0		0	85	3	3
2	179	4		0	H	3		0		0		0		0		0	H	1		0	L	1		0		0	85	5	5
2	179	5		0	H	3		0		0		0		0		0	H	1		0	L	1		0		0	85	5	5
2	179	21		0	H	3		0		0		0		0		0	H	1		0	L	1		0		0	85	5	5
2	180	1	L	3	H	3	H	3		0		0		0	M	2	H	3	H	2	M	2		0		0	58	2	2
2	180	4	L	3	H	3	H	3		0		0		0	M	2	H	3	H	2	M	2		0		0	58	4	3
2	180	5	L	3	H	3	H	3		0		0		0	M	2	H	3	H	2	M	2		0		0	58	3	3
2	180	21	L	3	H	3	H	3		0		0		0	M	2	H	3	H	2	M	2		0		0	58	3	3
2	181	1	L	3		0	M	3		0	L	3		0	M	2	H	3		0	M	2	H	3		0	66	3	3
2	181	4	L	3		0	M	3		0	L	3		0	M	2	H	3		0	M	2	H	3		0	66	4	3
2	181	5	L	3		0	M	3		0	L	3		0	M	2	H	3		0	M	2	H	3		0	66	3	3
2	181	21	L	3		0	M	3		0	L	3		0	M	2	H	3		0	M	2	H	3		0	66	3	3
2	182	1	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	M	3	46	2	2
2	182	4	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	M	3	46	3	2
2	182	5	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	M	3	46	1	2
2	182	21	L	3	H	3	H	3	M	1	H	3		0	M	3	H	3		0	H	3	H	3	M	3	46	1	1
2	183	1		0	H	3		0	M	2	M	3		0	H	3	H	3	H	3	M	1		0	H	3	49	2	2
2	183	4		0	H	3		0	M	2	M	3		0	H	3	H	3	H	3	M	1		0	H	3	49	4	3
2	183	5		0	H	3		0	M	2	M	3		0	H	3	H	3	H	3	M	1		0	H	3	49	2	2
2	183	21		0	H	3		0	M	2	M	3		0	H	3	H	3	H	3	M	1		0	H	3	49	3	3
2	184	4		0	H	3	L	1		0	M	2		0		0	H	2		0	L	2		0		0	76	4	3
2	184	5		0	H	3	L	1		0	M	2		0		0	H	2		0	L	2		0		0	76	4	5
2	184	21		0	H	3	L	1		0	M	2		0		0	H	2		0	L	2		0		0	76	3	3
2	185	4		0	H	3	M	3	M	2	M	3	M	2	H	3	H	3		0	M	1		0	H	3	47	4	3
2	185	5		0	H	3	M	3	M	2	M	3	M	2	H	3	H	3		0	M	1		0	H	3	47	2	3
2	185	21		0	H	3	M	3	M	2	M	3	M	2	H	3	H	3		0	M	1		0	H	3	47	3	3
2	186	4		0	H	3	M	2	L	2	M	3	M	1	H	3	H	3		0	M	1		0	H	3	49	3	2
2	186	5		0	H	3	M	2	L	2	M	3	M	1	H	3	H	3		0	M	1		0	H	3	49	1	2
2	186	21		0	H	3	M	2	L	2	M	3	M	1	H	3	H	3		0	M	1		0	H	3	49	3	3
2	187	4	L	3	H	3	M	1	H	2	M	3	L	3	M	2	H	3	H	2	M	2	M	1	L	1	42	3	3
2	187	5	L	3	H	3	M	1	H	2	M	3	L	3	M	2	H	3	H	2	M	2	M	1	L	1	42	3	3
2	187	21	L	3	H	3	M	1	H	2	M	3	L	3	M	2	H	3	H	2	M	2	M	1	L	1	42	1	2
2	188	4	L	3		0		0		0	L	1		0	L	2	H	1		0	M	1		0	L	1	80	4	3
2	188	5	L	3		0		0		0	L	1		0	L	2	H	1		0	M	1		0	L	1	80	4	4
2	188	21	L	3		0		0		0	L	1		0	L	2	H	1		0	M	1		0	L	1	80	4	5
2	189	4	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	M	1		0	56	3	2
2	189	5	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	M	1		0	56	1	2
2	189	21	L	3	H	3	H	3		0		0		0	H	3	H	3		0	H	3	M	1		0	56	3	3
2	190	4		0	H	3	M	2	L	1	M	3		0	M	2	H	3		0	M	1		0	M	1	60	3	3
2	190	5		0	H	3	M	2	L	1	M	3		0	M	2	H	3		0	M	1		0	M	1	60	2	3
2	190	21		0	H	3	M	2	L	1	M	3		0	M	2	H	3		0	M	1		0	M	1	60	3	3
2	191	4		0	H	3	L	1	H	2	M	3	L	1	H	2	H	3		0	M	1	M	3	H	3	52	3	2
2	191	5		0	H	3	L	1	H	2	M	3	L	1	H	2	H	3		0	M	1	M	3	H	3	52	2	3
2	191	21		0	H	3	L	1	H	2	M	3	L	1	H	2	H	3		0	M	1	M	3	H	3	52	2	3
2	192	4	L	3	H	3	H	3	L	1	H	2		0	H	2	H	3	H	2	H	3	H	1	H	1	45	3	2
2	192	5	L	3	H	3	H	3	L	1	H	2		0	H	2	H	3	H	2	H	3	H	1	H	1	45	1	2
2	192	21	L	3	H	3	H	3	L	1	H	2		0	H	2	H	3	H	2	H	3	H	1	H	1	45	2	1
2	193	4		0	H	3	H	3		0	M	3		0	H	3	H	3		0	M	1		0	M	2	56	3	2
2	193	5		0	H	3	H	3		0	M	3		0	H	3	H	3		0	M	1		0	M	2	56	1	2
2	193	21		0	H	3	H	3		0	M	3		0	H	3	H	3		0	M	1		0	M	2	56	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	PCR	RAT4LINT	ACT4LINT
2	194	4	L	3	H	3	M	2		0		0		0	H	2	H	2		0	H	2		0		0	63	4	3
2	194	5	L	3	H	3	M	2		0		0		0	H	2	H	2		0	H	2		0		0	63	2	2
2	194	21	L	3	H	3	M	2		0		0		0	H	2	H	2		0	H	2		0		0	63	3	3
2	195	4		0	H	3	H	1		0		0		0	M	3	H	3		0	M	2		0		0	66	4	3
2	195	5		0	H	3	H	1		0		0		0	M	3	H	3		0	M	2		0		0	66	2	2
2	195	21		0	H	3	H	1		0		0		0	M	3	H	3		0	M	2		0		0	66	3	3
2	196	4	L	3	H	3	M	2		0		0		0	L	1	H	1		0	L	1		0		0	75	5	4
2	196	5	L	3	H	3	M	2		0		0		0	L	1	H	1		0	L	1		0		0	75	3	3
2	196	21	L	3	H	3	M	2		0		0		0	L	1	H	1		0	L	1		0		0	75	4	4
2	197	4		0	H	3	H	2	M	3	M	3	M	1	H	2	H	3		0	M	1		0	H	3	48	3	3
2	197	5		0	H	3	H	2	M	3	M	3	M	1	H	2	H	3		0	M	1		0	H	3	48	2	2
2	197	21		0	H	3	H	2	M	3	M	3	M	1	H	2	H	3		0	M	1		0	H	3	48	2	3
2	198	4		0	H	3	L	2		0	M	3		0	M	2	H	3		0	M	1		0	M	2	65	3	3
2	198	5		0	H	3	L	2		0	M	3		0	M	2	H	3		0	M	1		0	M	2	65	2	3
2	198	21		0	H	3	L	2		0	M	3		0	M	2	H	3		0	M	1		0	M	2	65	3	3

Table A-3. Listing of the Pavements used in the Expert Opinion Surveys and their Ratings
Pavement Type 3 (Flexible)

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	PCR	RAT4LINT	ACT4LINT
3	202	4		0		0		0		0		0	M	2		0		0		0		0		0	L	3		0	92	4	4
3	202	5		0		0		0		0		0	M	2		0		0		0		0		0	L	3		0	92	4	3
3	203	4	M	3		0		0		0	H	3	M	3		0		0	M	2	M	2	H	2		0	M	3	63	4	3
3	203	5	M	3		0		0		0	H	3	M	3		0		0	M	2	M	2	H	2		0	M	3	63	4	3
3	204	4	M	3		0	H	1	H	1	H	3	M	3		0		0	M	1	H	3	H	3	M	3	M	3	47	4	3
3	204	5	M	3		0	H	1	H	1	H	3	M	3		0		0	M	1	H	3	H	3	M	3	M	3	47	3	3
3	205	2	L	3		0		0		0		0		0		0		0		0	L	3		0	L	1		0	92	4	5
3	205	4	L	3		0		0		0		0		0		0		0		0	L	3		0	L	1		0	92	5	5
3	205	5	L	3		0		0		0		0		0		0		0		0	L	3		0	L	1		0	92	5	5
3	205	21	L	3		0		0		0		0		0		0		0		0	L	3		0	L	1		0	92	5	5
3	206	2	H	3		0	H	1		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	48	3	3
3	206	4	H	3		0	H	1		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	48	3	2
3	206	5	H	3		0	H	1		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	48	2	3
3	206	21	H	3		0	H	1		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	48	1	2
3	207	2	L	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	H	3	H	3	52	3	3
3	207	4	L	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	H	3	H	3	52	4	3
3	207	5	L	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	H	3	H	3	52	3	3
3	207	21	L	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	H	3	H	3	52	3	3
3	208	2	L	3		0		0		0		0	L	1		0		0		0	L	2	L	2		0		0	91	4	5
3	208	4	L	3		0		0		0		0	L	1		0		0		0	L	2	L	2		0		0	91	5	5
3	208	5	L	3		0		0		0		0	L	1		0		0		0	L	2	L	2		0		0	91	5	5
3	208	21	L	3		0		0		0		0	L	1		0		0		0	L	2	L	2		0		0	91	5	5
3	209	2	L	3		0		0		0		0	L	3		0		0		0	M	1		0		0		0	90	5	5
3	209	4	L	3		0		0		0		0	L	3		0		0		0	M	1		0		0		0	90	5	5
3	209	5	L	3		0		0		0		0	L	3		0		0		0	M	1		0		0		0	90	4	5
3	209	21	L	3		0		0		0		0	L	3		0		0		0	M	1		0		0		0	90	5	5
3	210	2	H	2	H	3	L	1		0	H	3	M	3		0		0	M	3	M	2	H	2		0	M	1	53	4	4
3	210	4	H	2	H	3	L	1		0	H	3	M	3		0		0	M	3	M	2	H	2		0	M	1	53	3	2
3	210	5	H	2	H	3	L	1		0	H	3	M	3		0		0	M	3	M	2	H	2		0	M	1	53	2	3
3	210	21	H	2	H	3	L	1		0	H	3	M	3		0		0	M	3	M	2	H	2		0	M	1	53	2	3
3	211	2	M	3		0	H	2	L	1	H	3	M	3		0		0	L	2	H	3	H	2	M	2	H	3	51	2	2
3	211	4	M	3		0	H	2	L	1	H	3	M	3		0		0	L	2	H	3	H	2	M	2	H	3	51	4	3
3	211	5	M	3		0	H	2	L	1	H	3	M	3		0		0	L	2	H	3	H	2	M	2	H	3	51	2	3
3	211	21	M	3		0	H	2	L	1	H	3	M	3		0		0	L	2	H	3	H	2	M	2	H	3	51	3	3
3	212	2	H	3		0		0		0	H	3	M	3		0		0	M	3	M	3	M	3		0	M	3	53	2	3
3	212	4	H	3		0		0		0	H	3	M	3		0		0	M	3	M	3	M	3		0	M	3	53	3	3
3	212	5	H	3		0		0		0	H	3	M	3		0		0	M	3	M	3	M	3		0	M	3	53	2	3
3	212	21	H	3		0		0		0	H	3	M	3		0		0	M	3	M	3	M	3		0	M	3	53	2	3
3	213	2	M	3		0	H	3	M	2	H	3		0	L	1		0	H	3	M	3	H	2	H	3	M	3	42	1	2
3	213	4	M	3		0	H	3	M	2	H	3		0	L	1		0	H	3	M	3	H	2	H	3	M	3	42	3	2
3	213	5	M	3		0	H	3	M	2	H	3		0	L	1		0	H	3	M	3	H	2	H	3	M	3	42	1	2
3	213	21	M	3		0	H	3	M	2	H	3		0	L	1		0	H	3	M	3	H	2	H	3	M	3	42	1	2
3	214	4	L	3		0	H	1		0	H	3	M	3		0		0		0	H	3	H	3		0	M	2	65	4	3
3	214	5	L	3		0	H	1		0	H	3	M	3		0		0		0	H	3	H	3		0	M	2	65	3	3
3	214	21	L	3		0	H	1		0	H	3	M	3		0		0		0	H	3	H	3		0	M	2	65	3	4
3	215	4	L	3		0		0		0	H	1	M	3		0		0	M	3	H	2	M	3	M	2	M	3	61	3	3
3	215	5	L	3		0		0		0	H	1	M	3		0		0	M	3	H	2	M	3	M	2	M	3	61	2	3
3	215	21	L	3		0		0		0	H	1	M	3		0		0	M	3	H	2	M	3	M	2	M	3	61	3	3
3	216	4	M	3	L	3	H	3		0	H	3	L	3		0		0	H	2	M	3	H	2	H	3	M	3	47	3	2
3	216	5	M	3	L	3	H	3		0	H	3	L	3		0		0	H	2	M	3	H	2	H	3	M	3	47	2	3
3	216	21	M	3	L	3	H	3		0	H	3	L	3		0		0	H	2	M	3	H	2	H	3	M	3	47	2	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	PCR	RAT4LINT	ACT4LINT
3	217	4	L	3		0	M	2		0	H	3	L	3		0		0	H	3	H	3	H	3	M	2	M	3	51	3	2
3	217	5	L	3		0	M	2		0	H	3	L	3		0		0	H	3	H	3	H	3	M	2	M	3	51	2	3
3	217	21	L	3		0	M	2		0	H	3	L	3		0		0	H	3	H	3	H	3	M	2	M	3	51	2	2
3	218	4	L	3		0		0		0	H	3	H	3		0		0	M	3	M	3		0		0		0	64	3	2
3	218	5	L	3		0		0		0	H	3	H	3		0		0	M	3	M	3		0		0		0	64	2	3
3	218	21	L	3		0		0		0	H	3	H	3		0		0	M	3	M	3		0		0		0	64	1	2
3	219	4	M	3		0	H	3	M	1	H	3	M	3		0		0	H	3	H	3	M	2	M	2	M	3	40	2	2
3	219	5	M	3		0	H	3	M	1	H	3	M	3		0		0	H	3	H	3	M	2	M	2	M	3	40	1	2
3	219	21	M	3		0	H	3	M	1	H	3	M	3		0		0	H	3	H	3	M	2	M	2	M	3	40	1	1
3	220	4	L	3		0	M	1		0	H	1	L	3	L	1		0		0	L	2		0		0	L	2	83	5	4
3	220	5	L	3		0	M	1		0	H	1	L	3	L	1		0		0	L	2		0		0	L	2	83	4	4
3	220	21	L	3		0	M	1		0	H	1	L	3	L	1		0		0	L	2		0		0	L	2	83	4	5
3	221	4	L	3		0		0		0		0		0		0		0		0	L	3	L	3		0		0	91	5	5
3	221	5	L	3		0		0		0		0		0		0		0		0	L	3	L	3		0		0	91	5	5
3	221	21	L	3		0		0		0		0		0		0		0		0	L	3	L	3		0		0	91	5	5
3	222	4	L	3		0		0		0		0	M	3		0		0		0		0	M	3		0	M	3	83	4	3
3	222	5	L	3		0		0		0		0	M	3		0		0		0		0	M	3		0	M	3	83	3	3
3	222	21	L	3		0		0		0		0	M	3		0		0		0		0	M	3		0	M	3	83	3	4
3	223	1	L	3	M	3		0		0	H	3	M	2		0		0		0	M	3	M	3		0		0	72	3	4
3	223	4	L	3	M	3		0		0	H	3	M	2		0		0		0	M	3	M	3		0		0	72	4	3
3	223	5	L	3	M	3		0		0	H	3	M	2		0		0		0	M	3	M	3		0		0	72	3	3
3	223	21	L	3	M	3		0		0	H	3	M	2		0		0		0	M	3	M	3		0		0	72	3	4
3	224	1	H	3	L	3	H	3		0	H	3	M	3		0		0	H	2	M	2	H	2	H	3	M	3	42	2	3
3	224	4	H	3	L	3	H	3		0	H	3	M	3		0		0	H	2	M	2	H	2	H	3	M	3	42	3	2
3	224	5	H	3	L	3	H	3		0	H	3	M	3		0		0	H	2	M	2	H	2	H	3	M	3	42	3	3
3	224	21	H	3	L	3	H	3		0	H	3	M	3		0		0	H	2	M	2	H	2	H	3	M	3	42	1	2
3	225	1	L	3		0	H	2		0	H	3	M	3		0		0	H	2	M	3	H	3	H	2	M	3	51	3	3
3	225	4	L	3		0	H	2		0	H	3	M	3		0		0	H	2	M	3	H	3	H	2	M	3	51	3	2
3	225	5	L	3		0	H	2		0	H	3	M	3		0		0	H	2	M	3	H	3	H	2	M	3	51	3	3
3	225	21	L	3		0	H	2		0	H	3	M	3		0		0	H	2	M	3	H	3	H	2	M	3	51	2	3
3	226	1	M	3		0	M	1	L	1	H	3	M	3		0		0	H	2	M	3	M	3	M	2	M	3	51	3	3
3	226	4	M	3		0	M	1	L	1	H	3	M	3		0		0	H	2	M	3	M	3	M	2	M	3	51	3	2
3	226	5	M	3		0	M	1	L	1	H	3	M	3		0		0	H	2	M	3	M	3	M	2	M	3	51	2	3
3	226	21	M	3		0	M	1	L	1	H	3	M	3		0		0	H	2	M	3	M	3	M	2	M	3	51	2	2
3	227	1	L	3		0		0		0	H	1		0		0		0		0	M	3	M	2		0	M	1	83	3	3
3	227	4	L	3		0		0		0	H	1		0		0		0		0	M	3	M	2		0	M	1	83	4	4
3	227	5	L	3		0		0		0	H	1		0		0		0		0	M	3	M	2		0	M	1	83	3	4
3	227	21	L	3		0		0		0	H	1		0		0		0		0	M	3	M	2		0	M	1	83	4	4
3	228	1	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	2		0		0	82	3	4
3	228	4	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	2		0		0	82	4	4
3	228	5	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	2		0		0	82	2	3
3	228	21	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	2		0		0	82	4	4
3	229	1	L	3		0		0		0	H	3	L	3		0		0		0	H	3	M	3		0	M	3	72	3	3
3	229	4	L	3		0		0		0	H	3	L	3		0		0		0	H	3	M	3		0	M	3	72	4	3
3	229	5	L	3		0		0		0	H	3	L	3		0		0		0	H	3	M	3		0	M	3	72	3	4
3	229	21	L	3		0		0		0	H	3	L	3		0		0		0	H	3	M	3		0	M	3	72	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	PCR	RAT4LINT	ACT4LINT
3	230	1	L	3		0	L	1		0	H	3	M	3		0		0	L	1	M	3	M	1		0	L	1	71	3	3
3	230	4	L	3		0	L	1		0	H	3	M	3		0		0	L	1	M	3	M	1		0	L	1	71	4	3
3	230	5	L	3		0	L	1		0	H	3	M	3		0		0	L	1	M	3	M	1		0	L	1	71	4	3
3	230	21	L	3		0	L	1		0	H	3	M	3		0		0	L	1	M	3	M	1		0	L	1	71	4	4
3	231	1	L	3		0		0		0		0		0		0		0		0	M	2		0		0		0	92	4	4
3	231	4	L	3		0		0		0		0		0		0		0		0	M	2		0		0		0	92	5	5
3	231	5	L	3		0		0		0		0		0		0		0		0	M	2		0		0		0	92	5	4
3	231	21	L	3		0		0		0		0		0		0		0		0	M	2		0		0		0	92	5	5
3	232	1	L	3	H	1		0		0		0	L	3		0		0		0		0		0		0		0	91	4	5
3	232	4	L	3	H	1		0		0		0	L	3		0		0		0		0		0		0		0	91	5	5
3	232	5	L	3	H	1		0		0		0	L	3		0		0		0		0		0		0		0	91	4	4
3	232	21	L	3	H	1		0		0		0	L	3		0		0		0		0		0		0		0	91	4	4
3	233	1	L	3		0		0		0	H	3	M	3	H	1		0	H	2	H	3	M	1		0	M	3	54	3	3
3	233	4	L	3		0		0		0	H	3	M	3	H	1		0	H	2	H	3	M	1		0	M	3	54	3	3
3	233	5	L	3		0		0		0	H	3	M	3	H	1		0	H	2	H	3	M	1		0	M	3	54	3	3
3	233	21	L	3		0		0		0	H	3	M	3	H	1		0	H	2	H	3	M	1		0	M	3	54	2	3
3	234	1	L	3		0		0		0	H	3		0		0		0		0	M	3	L	1		0	M	1	82	4	4
3	234	4	L	3		0		0		0	H	3		0		0		0		0	M	3	L	1		0	M	1	82	4	4
3	234	5	L	3		0		0		0	H	3		0		0		0		0	M	3	L	1		0	M	1	82	4	4
3	234	21	L	3		0		0		0	H	3		0		0		0		0	M	3	L	1		0	M	1	82	4	4
3	235	4	L	3		0	H	3	L	2	H	3	M	3		0		0	M	3	H	3	H	3		0	M	3	48	3	3
3	235	5	L	3		0	H	3	L	2	H	3	M	3		0		0	M	3	H	3	H	3		0	M	3	48	2	3
3	235	21	L	3		0	H	3	L	2	H	3	M	3		0		0	M	3	H	3	H	3		0	M	3	48	2	3
3	236	4	L	3		0		0		0		0	L	3		0		0		0		0		0		0	M	3	90	5	5
3	236	5	L	3		0		0		0		0	L	3		0		0		0		0		0		0	M	3	90	5	5
3	236	21	L	3		0		0		0		0	L	3		0		0		0		0		0		0	M	3	90	4	5
3	237	4	L	3		0		0		0	H	3	M	3	L	1		0	M	3	M	2		0		0	M	3	64	4	3
3	237	5	L	3		0		0		0	H	3	M	3	L	1		0	M	3	M	2		0		0	M	3	64	3	3
3	237	21	L	3		0		0		0	H	3	M	3	L	1		0	M	3	M	2		0		0	M	3	64	3	3
3	238	2	H	3		0	H	3		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	46	2	2
3	238	4	H	3		0	H	3		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	46	3	2
3	238	5	H	3		0	H	3		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	46	2	2
3	238	21	H	3		0	H	3		0	H	3	M	3		0		0	H	3	M	3		0	H	2	M	1	46	1	1
3	239	2	L	3		0	M	2		0	H	3	L	3		0		0	L	3	H	3	H	3		0	H	3	61	3	3
3	239	4	L	3		0	M	2		0	H	3	L	3		0		0	L	3	H	3	H	3		0	H	3	61	4	3
3	239	5	L	3		0	M	2		0	H	3	L	3		0		0	L	3	H	3	H	3		0	H	3	61	3	3
3	239	21	L	3		0	M	2		0	H	3	L	3		0		0	L	3	H	3	H	3		0	H	3	61	3	3
3	240	2	L	3		0		0		0	H	3		0		0		0		0	M	2	M	2		0	M	3	81	4	4
3	240	4	L	3		0		0		0	H	3		0		0		0		0	M	2	M	2		0	M	3	81	4	4
3	240	5	L	3		0		0		0	H	3		0		0		0		0	M	2	M	2		0	M	3	81	4	4
3	240	21	L	3		0		0		0	H	3		0		0		0		0	M	2	M	2		0	M	3	81	4	4
3	241	4	M	3		0		0		0	H	3	L	3		0		0		0	M	3	M	2	M	1	M	3	71	4	3
3	241	5	M	3		0		0		0	H	3	L	3		0		0		0	M	3	M	2	M	1	M	3	71	3	3
3	241	21	M	3		0		0		0	H	3	L	3		0		0		0	M	3	M	2	M	1	M	3	71	2	3
3	242	4	L	3		0		0		0	H	1	L	3		0		0		0	M	3		0		0	M	3	81	4	4
3	242	5	L	3		0		0		0	H	1	L	3		0		0		0	M	3		0		0	M	3	81	4	4
3	242	21	L	3		0		0		0	H	1	L	3		0		0		0	M	3		0		0	M	3	81	4	4
3	243	4	H	3		0	H	3		0	H	3	M	3		0		0	H	2	H	3		0		0	M	2	50	3	3
3	243	5	H	3		0	H	3		0	H	3	M	3		0		0	H	2	H	3		0		0	M	2	50	2	3
3	243	21	H	3		0	H	3		0	H	3	M	3		0		0	H	2	H	3		0		0	M	2	50	1	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	PCR	RAT4LINT	ACT4LINT
3	244	4	M	3		0	M	3		0	H	3	M	3		0		0		0	H	3	H	3		0	H	2	60	4	3
3	244	5	M	3		0	M	3		0	H	3	M	3		0		0		0	H	3	H	3		0	H	2	60	3	4
3	244	21	M	3		0	M	3		0	H	3	M	3		0		0		0	H	3	H	3		0	H	2	60	2	3
3	245	4	M	2		0	M	3	L	1	H	3	M	3		0		0	M	3	M	3	M	2	M	3	M	2	52	3	2
3	245	5	M	2		0	M	3	L	1	H	3	M	3		0		0	M	3	M	3	M	2	M	3	M	2	52	2	3
3	245	21	M	2		0	M	3	L	1	H	3	M	3		0		0	M	3	M	3	M	2	M	3	M	2	52	2	3
3	246	4	L	3		0		0		0	H	3	L	3		0		0		0	M	1	M	2		0	M	1	81	4	4
3	246	5	L	3		0		0		0	H	3	L	3		0		0		0	M	1	M	2		0	M	1	81	4	4
3	246	21	L	3		0		0		0	H	3	L	3		0		0		0	M	1	M	2		0	M	1	81	5	5
3	247	4	L	3	H	2		0		0	H	3	M	3		0		0		0	L	3	M	3		0		0	73	4	3
3	247	5	L	3	H	2		0		0	H	3	M	3		0		0		0	L	3	M	3		0		0	73	4	3
3	247	21	L	3	H	2		0		0	H	3	M	3		0		0		0	L	3	M	3		0		0	73	3	4
3	248	4	H	2		0	H	3	L	1	H	3	M	3	M	2		0	M	2	M	2	M	3	H	2	M	2	46	4	3
3	248	5	H	2		0	H	3	L	1	H	3	M	3	M	2		0	M	2	M	2	M	3	H	2	M	2	46	2	2
3	248	21	H	2		0	H	3	L	1	H	3	M	3	M	2		0	M	2	M	2	M	3	H	2	M	2	46	2	3
3	249	4	L	3		0		0		0	H	3	M	3		0		0		0	H	3	H	3	H	2	M	3	63	3	3
3	249	5	L	3		0		0		0	H	3	M	3		0		0		0	H	3	H	3	H	2	M	3	63	3	3
3	249	21	L	3		0		0		0	H	3	M	3		0		0		0	H	3	H	3	H	2	M	3	63	3	3
3	250	4	M	3		0	H	1	L	1	H	3	M	3	M	1		0	M	1	M	3	M	3	M	2	M	3	52	4	3
3	250	5	M	3		0	H	1	L	1	H	3	M	3	M	1		0	M	1	M	3	M	3	M	2	M	3	52	3	3
3	250	21	M	3		0	H	1	L	1	H	3	M	3	M	1		0	M	1	M	3	M	3	M	2	M	3	52	2	3
3	251	4		0	L	3		0	L	3		0	H	3		0		0		0		0		0		0	H	2	78	4	3
3	251	5		0	L	3		0	L	3		0	H	3		0		0		0		0		0		0	H	2	78	2	3
3	251	21		0	L	3		0	L	3		0	H	3		0		0		0		0		0		0	H	2	78	2	3
3	252	4	H	3		0	H	3	L	1	H	3	M	3	M	1		0	H	2	M	2	M	3	H	3	M	2	41	3	3
3	252	5	H	3		0	H	3	L	1	H	3	M	3	M	1		0	H	2	M	2	M	3	H	3	M	2	41	2	3
3	252	21	H	3		0	H	3	L	1	H	3	M	3	M	1		0	H	2	M	2	M	3	H	3	M	2	41	2	2
3	253	2	L	3		0	M	2	L	1	H	3	L	3	H	1		0	M	2	M	2		0	H	1	M	2	62	3	3
3	253	4	L	3		0	M	2	L	1	H	3	L	3	H	1		0	M	2	M	2		0	H	1	M	2	62	4	3
3	253	5	L	3		0	M	2	L	1	H	3	L	3	H	1		0	M	2	M	2		0	H	1	M	2	62	3	3
3	253	21	L	3		0	M	2	L	1	H	3	L	3	H	1		0	M	2	M	2		0	H	1	M	2	62	2	3
3	254	2	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	L	1	82	4	5
3	254	4	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	L	1	82	5	4
3	254	5	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	L	1	82	4	4
3	254	21	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	L	1	82	4	5
3	255	2	L	3		0	H	3		0	H	3	M	3		0		0	H	3	H	3	H	3		0	H	3	45	2	2
3	255	4	L	3		0	H	3		0	H	3	M	3		0		0	H	3	H	3	H	3		0	H	3	45	3	2
3	255	5	L	3		0	H	3		0	H	3	M	3		0		0	H	3	H	3	H	3		0	H	3	45	2	3
3	255	21	L	3		0	H	3		0	H	3	M	3		0		0	H	3	H	3	H	3		0	H	3	45	1	2
3	256	2	H	3		0	M	2	M	2	H	3	M	3		0		0	M	3	M	2	H	3	H	3	M	3	41	2	3
3	256	4	H	3		0	M	2	M	2	H	3	M	3		0		0	M	3	M	2	H	3	H	3	M	3	41	3	2
3	256	5	H	3		0	M	2	M	2	H	3	M	3		0		0	M	3	M	2	H	3	H	3	M	3	41	2	3
3	256	21	H	3		0	M	2	M	2	H	3	M	3		0		0	M	3	M	2	H	3	H	3	M	3	41	2	3
3	257	2	M	3		0	H	3	M	2	H	3	M	3		0		0	H	3	M	3	H	3	H	3	M	3	36	1	2
3	257	4	M	3		0	H	3	M	2	H	3	M	3		0		0	H	3	M	3	H	3	H	3	M	3	36	3	2
3	257	5	M	3		0	H	3	M	2	H	3	M	3		0		0	H	3	M	3	H	3	H	3	M	3	36	1	2
3	257	21	M	3		0	H	3	M	2	H	3	M	3		0		0	H	3	M	3	H	3	H	3	M	3	36	1	2
3	258	2	L	3		0		0		0	H	3	M	3		0		0	H	1	M	3	M	3		0	M	1	65	3	3
3	258	4	L	3		0		0		0	H	3	M	3		0		0	H	1	M	3	M	3		0	M	1	65	4	3
3	258	5	L	3		0		0		0	H	3	M	3		0		0	H	1	M	3	M	3		0	M	1	65	3	3
3	258	21	L	3		0		0		0	H	3	M	3		0		0	H	1	M	3	M	3		0	M	1	65	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	PCR	RAT4LINT	ACT4LINT
3	259	2	H	3		0	H	3	L	1	H	3	M	3		0		0	H	3	H	3	H	3	M	1	H	3	34	2	2
3	259	4	H	3		0	H	3	L	1	H	3	M	3		0		0	H	3	H	3	H	3	M	1	H	3	34	3	2
3	259	5	H	3		0	H	3	L	1	H	3	M	3		0		0	H	3	H	3	H	3	M	1	H	3	34	1	2
3	259	21	H	3		0	H	3	L	1	H	3	M	3		0		0	H	3	H	3	H	3	M	1	H	3	34	1	1
3	260	2	L	3		0		0		0	H	1		0		0		0		0	L	2	L	1		0		0	91	4	5
3	260	4	L	3		0		0		0	H	1		0		0		0		0	L	2	L	1		0		0	91	5	5
3	260	5	L	3		0		0		0	H	1		0		0		0		0	L	2	L	1		0		0	91	5	5
3	260	21	L	3		0		0		0	H	1		0		0		0		0	L	2	L	1		0		0	91	5	5
3	261	2	L	3		0		0		0	H	3	L	3		0		0	M	1	M	3	M	2		0	M	3	71	3	3
3	261	4	L	3		0		0		0	H	3	L	3		0		0	M	1	M	3	M	2		0	M	3	71	5	4
3	261	5	L	3		0		0		0	H	3	L	3		0		0	M	1	M	3	M	2		0	M	3	71	3	3
3	261	21	L	3		0		0		0	H	3	L	3		0		0	M	1	M	3	M	2		0	M	3	71	3	4
3	262	4	H	3		0	H	3	L	1	H	3	M	3		0		0	H	2	H	3	H	3	M	2	M	3	40	3	2
3	262	5	H	3		0	H	3	L	1	H	3	M	3		0		0	H	2	H	3	H	3	M	2	M	3	40	2	3
3	262	21	H	3		0	H	3	L	1	H	3	M	3		0		0	H	2	H	3	H	3	M	2	M	3	40	1	2
3	263	4	L	3		0	H	3		0	H	3	L	3		0		0	H	2	H	3	H	3		0	H	3	53	3	3
3	263	5	L	3		0	H	3		0	H	3	L	3		0		0	H	2	H	3	H	3		0	H	3	53	2	3
3	263	21	L	3		0	H	3		0	H	3	L	3		0		0	H	2	H	3	H	3		0	H	3	53	3	3
3	264	4	M	3		0	H	3	L	2	H	3	M	3		0		0		0	H	3	H	3	H	3	H	3	49	3	3
3	264	5	M	3		0	H	3	L	2	H	3	M	3		0		0		0	H	3	H	3	H	3	H	3	49	2	3
3	264	21	M	3		0	H	3	L	2	H	3	M	3		0		0		0	H	3	H	3	H	3	H	3	49	3	3
3	265	4	L	3		0		0		0	H	3	M	3		0		0		0	M	3	M	2		0	M	2	73	4	3
3	265	5	L	3		0		0		0	H	3	M	3		0		0		0	M	3	M	2		0	M	2	73	4	4
3	265	21	L	3		0		0		0	H	3	M	3		0		0		0	M	3	M	2		0	M	2	73	4	4
3	266	4	M	3		0	H	1		0	H	3	M	3	M	2		0	M	2	M	3	M	3		0	M	3	52	4	3
3	266	5	M	3		0	H	1		0	H	3	M	3	M	2		0	M	2	M	3	M	3		0	M	3	52	3	3
3	266	21	M	3		0	H	1		0	H	3	M	3	M	2		0	M	2	M	3	M	3		0	M	3	52	2	3
3	267	4	L	3		0	H	3		0	H	3	M	3		0		0		0		0	M	3		0	M	3	73	4	3
3	267	5	L	3		0	H	3		0	H	3	M	3		0		0		0		0	M	3		0	M	3	73	2	3
3	267	21	L	3		0	H	3		0	H	3	M	3		0		0		0		0	M	3		0	M	3	73	4	4
3	268	4	L	3		0		0		0	H	1	L	3		0		0		0		0	L	1		0		0	90	5	5
3	268	5	L	3		0		0		0	H	1	L	3		0		0		0		0	L	1		0		0	90	5	5
3	268	21	L	3		0		0		0	H	1	L	3		0		0		0		0	L	1		0		0	90	5	5
3	269	4	L	3		0		0		0		0		0		0		0		0	M	2	L	1		0		0	91	5	4
3	269	5	L	3		0		0		0		0		0		0		0		0	M	2	L	1		0		0	91	4	5
3	269	21	L	3		0		0		0		0		0		0		0		0	M	2	L	1		0		0	91	4	5
3	270	4	M	3		0	L	1	M	1	H	3	M	3	L	1		0	M	3	M	3	H	3	H	3	M	3	44	3	2
3	270	5	M	3		0	L	1	M	1	H	3	M	3	L	1		0	M	3	M	3	H	3	H	3	M	3	44	3	3
3	270	21	M	3		0	L	1	M	1	H	3	M	3	L	1		0	M	3	M	3	H	3	H	3	M	3	44	2	3
3	271	1	L	3		0		0		0	H	3	M	3		0		0	L	2	M	1		0	H	2	M	2	71	3	4
3	271	4	L	3		0		0		0	H	3	M	3		0		0	L	2	M	1		0	H	2	M	2	71	4	3
3	271	5	L	3		0		0		0	H	3	M	3		0		0	L	2	M	1		0	H	2	M	2	71	3	3
3	271	21	L	3		0		0		0	H	3	M	3		0		0	L	2	M	1		0	H	2	M	2	71	3	3
3	272	1	L	3		0		0		0	H	2	L	3		0		0		0	L	3	L	3	L	1		0	83	3	4
3	272	4	L	3		0		0		0	H	2	L	3		0		0		0	L	3	L	3	L	1		0	83	5	4
3	272	5	L	3		0		0		0	H	2	L	3		0		0		0	L	3	L	3	L	1		0	83	4	5
3	272	21	L	3		0		0		0	H	2	L	3		0		0		0	L	3	L	3	L	1		0	83	5	5

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	PCR	RAT4LINT	ACT4LINT
3	273	1	L	3		0		0		0	H	3	H	3		0		0		0	H	3	H	3		0	M	3	63	3	3
3	273	4	L	3		0		0		0	H	3	H	3		0		0		0	H	3	H	3		0	M	3	63	4	3
3	273	5	L	3		0		0		0	H	3	H	3		0		0		0	H	3	H	3		0	M	3	63	2	3
3	273	21	L	3		0		0		0	H	3	H	3		0		0		0	H	3	H	3		0	M	3	63	1	3
3	274	1	L	3		0		0		0	H	1	M	3		0		0		0		0	M	2		0	M	3	82	3	3
3	274	4	L	3		0		0		0	H	1	M	3		0		0		0		0	M	2		0	M	3	82	4	3
3	274	5	L	3		0		0		0	H	1	M	3		0		0		0		0	M	2		0	M	3	82	3	3
3	274	21	L	3		0		0		0	H	1	M	3		0		0		0		0	M	2		0	M	3	82	3	3
3	275	1	L	3		0		0		0		0	L	3		0		0		0		0	M	3		0		0	90	4	4
3	275	4	L	3		0		0		0		0	L	3		0		0		0		0	M	3		0		0	90	4	4
3	275	5	L	3		0		0		0		0	L	3		0		0		0		0	M	3		0		0	90	4	4
3	275	21	L	3		0		0		0		0	L	3		0		0		0		0	M	3		0		0	90	5	5
3	276	1	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	3		0		0	81	3	3
3	276	4	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	3		0		0	81	4	4
3	276	5	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	3		0		0	81	2	3
3	276	21	L	3	H	2		0		0	H	3	L	3		0		0		0		0	M	3		0		0	81	4	4
3	277	1	M	3		0	H	2	L	3	H	3	M	3		0		0	M	2	M	2	M	3	M	1	M	2	54	2	3
3	277	4	M	3		0	H	2	L	3	H	3	M	3		0		0	M	2	M	2	M	3	M	1	M	2	54	3	2
3	277	5	M	3		0	H	2	L	3	H	3	M	3		0		0	M	2	M	2	M	3	M	1	M	2	54	2	3
3	277	21	M	3		0	H	2	L	3	H	3	M	3		0		0	M	2	M	2	M	3	M	1	M	2	54	2	3
3	278	1	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	M	1	81	3	3
3	278	4	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	M	1	81	4	4
3	278	5	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	M	1	81	5	5
3	278	21	L	3		0		0		0	H	2	L	3		0		0		0	M	3		0		0	M	1	81	4	4
3	279	1	L	3		0		0		0	H	3	L	3	L	1		0	L	1	M	3	L	1		0	M	2	73	3	3
3	279	4	L	3		0		0		0	H	3	L	3	L	1		0	L	1	M	3	L	1		0	M	2	73	4	3
3	279	5	L	3		0		0		0	H	3	L	3	L	1		0	L	1	M	3	L	1		0	M	2	73	4	4
3	279	21	L	3		0		0		0	H	3	L	3	L	1		0	L	1	M	3	L	1		0	M	2	73	4	4
3	280	1	L	3		0		0		0	H	3	L	3		0		0		0	M	2	M	2		0		0	82	4	4
3	280	4	L	3		0		0		0	H	3	L	3		0		0		0	M	2	M	2		0		0	82	4	4
3	280	5	L	3		0		0		0	H	3	L	3		0		0		0	M	2	M	2		0		0	82	5	4
3	280	21	L	3		0		0		0	H	3	L	3		0		0		0	M	2	M	2		0		0	82	4	4
3	281	1	L	3		0		0		0	H	3	M	2		0		0	M	3	M	2		0		0		0	71	3	3
3	281	4	L	3		0		0		0	H	3	M	2		0		0	M	3	M	2		0		0		0	71	4	3
3	281	5	L	3		0		0		0	H	3	M	2		0		0	M	3	M	2		0		0		0	71	3	3
3	281	21	L	3		0		0		0	H	3	M	2		0		0	M	3	M	2		0		0		0	71	3	3
3	282	1	M	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	M	2	M	2	54	3	3
3	282	4	M	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	M	2	M	2	54	3	3
3	282	5	M	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	M	2	M	2	54	3	3
3	282	21	M	3		0	M	1		0	H	3	M	3		0		0	M	2	H	3	M	3	M	2	M	2	54	2	3
3	283	4	H	3		0	H	2	L	1	H	3	M	3		0		0	H	2	H	3	H	3	M	2	M	3	41	3	2
3	283	5	H	3		0	H	2	L	1	H	3	M	3		0		0	H	2	H	3	H	3	M	2	M	3	41	1	2
3	283	21	H	3		0	H	2	L	1	H	3	M	3		0		0	H	2	H	3	H	3	M	2	M	3	41	1	2
3	284	4	L	3		0	L	1		0	H	3	M	3		0		0	M	2	M	3	M	2		0	M	3	64	4	3
3	284	5	L	3		0	L	1		0	H	3	M	3		0		0	M	2	M	3	M	2		0	M	3	64	3	3
3	284	21	L	3		0	L	1		0	H	3	M	3		0		0	M	2	M	3	M	2		0	M	3	64	3	3
3	285	4	L	3		0		0		0	H	3	M	3		0		0	M	1	M	3	M	2	H	1	M	2	65	4	3
3	285	5	L	3		0		0		0	H	3	M	3		0		0	M	1	M	3	M	2	H	1	M	2	65	3	3
3	285	21	L	3		0		0		0	H	3	M	3		0		0	M	1	M	3	M	2	H	1	M	2	65	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	PCR	RAT4LINT	ACT4LINT
3	286	2	L	3		0	L	1		0	H	3		0		0		0	M	3	M	2	L	2		0	L	3	72	3	3
3	286	4	L	3		0	L	1		0	H	3		0		0		0	M	3	M	2	L	2		0	L	3	72	4	3
3	286	5	L	3		0	L	1		0	H	3		0		0		0	M	3	M	2	L	2		0	L	3	72	2	3
3	286	21	L	3		0	L	1		0	H	3		0		0		0	M	3	M	2	L	2		0	L	3	72	3	3
3	287	2	L	3		0		0		0	H	3		0		0		0	M	2	M	2		0	H	2	M	3	73	4	4
3	287	4	L	3		0		0		0	H	3		0		0		0	M	2	M	2		0	H	2	M	3	73	4	3
3	287	5	L	3		0		0		0	H	3		0		0		0	M	2	M	2		0	H	2	M	3	73	3	3
3	287	21	L	3		0		0		0	H	3		0		0		0	M	2	M	2		0	H	2	M	3	73	3	3
3	288	2	L	3		0		0		0		0	L	3		0		0		0	L	1		0	L	1		0	91	4	5
3	288	4	L	3		0		0		0		0	L	3		0		0		0	L	1		0	L	1		0	91	5	4
3	288	5	L	3		0		0		0		0	L	3		0		0		0	L	1		0	L	1		0	91	5	5
3	288	21	L	3		0		0		0		0	L	3		0		0		0	L	1		0	L	1		0	91	5	5
3	289	4		0	L	3		0		0		0	H	3		0		0		0		0		0		0	H	2	82	4	3
3	289	5		0	L	3		0		0		0	H	3		0		0		0		0		0		0	H	2	82	2	3
3	289	21		0	L	3		0		0		0	H	3		0		0		0		0		0		0	H	2	82	2	2
3	290	4	L	3	M	2		0		0		0		0		0		0		0		0	L	2		0	L	2	91	4	4
3	290	5	L	3	M	2		0		0		0		0		0		0		0		0	L	2		0	L	2	91	4	3
3	290	21	L	3	M	2		0		0		0		0		0		0		0		0	L	2		0	L	2	91	4	4
3	291	4	L	3		0		0		0		0	L	3		0		0	L	1	M	2	H	3	H	3	M	2	74	4	3
3	291	5	L	3		0		0		0		0	L	3		0		0	L	1	M	2	H	3	H	3	M	2	74	4	4
3	291	21	L	3		0		0		0		0	L	3		0		0	L	1	M	2	H	3	H	3	M	2	74	3	4
3	292	4	H	3		0	H	3	L	3	H	3	M	3		0		0	H	3	H	3	H	3	H	3	H	3	29	2	2
3	292	5	H	3		0	H	3	L	3	H	3	M	3		0		0	H	3	H	3	H	3	H	3	H	3	29	1	2
3	292	21	H	3		0	H	3	L	3	H	3	M	3		0		0	H	3	H	3	H	3	H	3	H	3	29	1	1
3	293	4	L	3		0		0		0	H	3	L	3		0		0		0	L	3	L	1		0	L	2	83	5	5
3	293	5	L	3		0		0		0	H	3	L	3		0		0		0	L	3	L	1		0	L	2	83	4	4
3	293	21	L	3		0		0		0	H	3	L	3		0		0		0	L	3	L	1		0	L	2	83	5	5
3	294	4	L	3		0	H	2	L	1	H	3	H	3		0		0	M	1	H	3	H	2		0	M	3	54	4	3
3	294	5	L	3		0	H	2	L	1	H	3	H	3		0		0	M	1	H	3	H	2		0	M	3	54	2	3
3	294	21	L	3		0	H	2	L	1	H	3	H	3		0		0	M	1	H	3	H	2		0	M	3	54	1	2
3	295	4	L	3		0		0		0	H	3	M	3		0		0		0	M	2	H	3		0	M	3	72	4	3
3	295	5	L	3		0		0		0	H	3	M	3		0		0		0	M	2	H	3		0	M	3	72	4	3
3	295	21	L	3		0		0		0	H	3	M	3		0		0		0	M	2	H	3		0	M	3	72	4	4
3	296	4	M	3		0	M	1		0	H	3	M	3	M	1		0	M	2	H	3	M	3	H	3	M	3	47	4	3
3	296	5	M	3		0	M	1		0	H	3	M	3	M	1		0	M	2	H	3	M	3	H	3	M	3	47	3	3
3	296	21	M	3		0	M	1		0	H	3	M	3	M	1		0	M	2	H	3	M	3	H	3	M	3	47	2	3
3	297	4	M	3		0	H	2	M	1	H	3	M	3		0		0	H	3	H	3	M	2	M	2	M	3	41	3	2
3	297	5	M	3		0	H	2	M	1	H	3	M	3		0		0	H	3	H	3	M	2	M	2	M	3	41	2	3
3	297	21	M	3		0	H	2	M	1	H	3	M	3		0		0	H	3	H	3	M	2	M	2	M	3	41	1	2
3	298	21	L	3		0		0		0	H	1		0		0		0		0		0		0		0	M	3	91	5	5
3	299	21	L	3		0	H	1	M	1	H	3		0		0		0	M	2	M	3	H	2	H	1	M	2	63	3	3
3	300	21	L	3		0		0		0	H	3	M	3		0		0		0	H	3	H	3	M	3	H	3	61	3	3

Table A-4. Listing of the Pavements used in the Expert Opinion Surveys and their Ratings
Pavement Type 4 (Composite)

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	S14	E14	PCR	RAT4LINT	ACT4LINT
4	301	2	L	E							M	E									M	E			M	F	M	F	H	E	73	3	4
4	301	4	L	E							M	E									M	E			M	F	M	F	H	E	73	4	3
4	301	5	L	E							M	E									M	E			M	F	M	F	H	E	73	3	3
4	302	2	L	E							M	E													H	F			H	E	81	4	5
4	302	4	L	E							M	E													H	F			H	E	81	4	3
4	302	5	L	E							M	E													H	F			H	E	81	4	4
4	303	2	L	E					M	O	M	E			M	O					H	E	M	F	H	F	H	F	H	E	54	3	3
4	303	4	L	E					M	O	M	E			M	O					H	E	M	F	H	F	H	F	H	E	54	3	2
4	303	5	L	E					M	O	M	E			M	O					H	E	M	F	H	F	H	F	H	E	54	3	3
4	304	4	L	E			H	E	M	O	M	E			M	O	M	O			H	E	M	F	H	F	H	F	H	E	47	3	2
4	304	5	L	E			H	E	M	O	M	E			M	O	M	O			H	E	M	F	H	F	H	F	H	E	47	2	2
4	304	21	L	E			H	E	M	O	M	E			M	O	M	O			H	E	M	F	H	F	H	F	H	E	47	2	3
4	305	4	L	E							M	E									M	E	H	O			M	F	H	E	72	3	2
4	305	5	L	E							M	E									M	E	H	O			M	F	H	E	72	3	4
4	305	21	L	E							M	E									M	E	H	O			M	F	H	E	72	3	3
4	306	4	M	E			M	F			M	E									H	E	M	O	M	F	M	F	H	E	61	3	2
4	306	5	M	E			M	F			M	E									H	E	M	O	M	F	M	F	H	E	61	3	4
4	306	21	M	E			M	F			M	E									H	E	M	O	M	F	M	F	H	E	61	3	3
4	307	4	L	E			H	E			M	E									H	E	H	F	H	E	M	F	H	E	54	3	2
4	307	5	L	E			H	E			M	E									H	E	H	F	H	E	M	F	H	E	54	2	2
4	307	21	L	E			H	E			M	E									H	E	H	F	H	E	M	F	H	E	54	3	3
4	308	4	L	E			H	E			H	E	M	O							H	E	H	F	H	E	M	E	H	E	48	3	2
4	308	5	L	E			H	E			H	E	M	O							H	E	H	F	H	E	M	E	H	E	48	1	2
4	308	21	L	E			H	E			H	E	M	O							H	E	H	F	H	E	M	E	H	E	48	1	3
4	309	4	L	E							H	E	H	E			H	E			M	E	M	E	M	F			H	E	53	3	2
4	309	5	L	E							H	E	H	E			H	E			M	E	M	E	M	F			H	E	53	2	3
4	309	21	L	E							H	E	H	E			H	E			M	E	M	E	M	F			H	E	53	1	1
4	310	4	L	E																			M	O					H	F	91	5	4
4	310	5	L	E																			M	O					H	F	91	4	4
4	310	21	L	E																			M	O					H	F	91	4	4
4	311	4	L	E							L	E									M	F	M	O					H	E	81	4	4
4	311	5	L	E							L	E									M	F	M	O					H	E	81	4	4
4	311	21	L	E							L	E									M	F	M	O					H	E	81	4	4
4	312	4	L	E			H	E			M	E	M	O							H	E	H	F	M	E			H	E	56	4	2
4	312	5	L	E			H	E			M	E	M	O							H	E	H	F	M	E			H	E	56	2	2
4	312	21	L	E			H	E			M	E	M	O							H	E	H	F	M	E			H	E	56	2	3
4	313	21	L	E																	M	O			L	O			H	O	91	4	5
4	314	21	L	E			H	E					H	E			H	E			H	E	H	E	M	F	H	E	H	E	45	1	1
4	315	21	L	E																	L	O	M	O	L	O			H	O	91	3	3
4	316	4	L	E			L	O													M	E	M	O					H	E	82	4	3
4	316	5	L	E			L	O													M	E	M	O					H	E	82	4	4
4	316	21	L	E			L	O													M	E	M	O					H	E	82	3	3
4	317	4	L	E			H	F			M	E									M	E	M	O					H	E	72	4	3
4	317	5	L	E			H	F			M	E									M	E	M	O					H	E	72	3	3
4	317	21	L	E			H	F			M	E									M	E	M	O					H	E	72	2	3
4	318	4	M	E			M	O	L	O	M	E									H	E	M	O	M	E			H	E	62	3	3
4	318	5	M	E			M	O	L	O	M	E									H	E	M	O	M	E			H	E	62	3	3
4	318	21	M	E			M	O	L	O	M	E									H	E	M	O	M	E			H	E	62	2	3
4	319	2	H	E			H	E	L	F	M	E									H	E	M	F	H	F	H	F	H	E	48	1	1
4	319	4	H	E			H	E	L	F	M	E									H	E	M	F	H	F	H	F	H	E	48	2	2
4	319	5	H	E			H	E	L	F	M	E									H	E	M	F	H	F	H	F	H	E	48	2	2
4	319	21	H	E			H	E	L	F	M	E									H	E	M	F	H	F	H	F	H	E	48	1	3
4	320	2	L	E							L	E									M	E			M	F	M	O			83	4	4
4	320	4	L	E							L	E									M	E			M	F	M	O			83	4	3
4	320	5	L	E							L	E									M	E			M	F	M	O			83	4	3
4	320	21	L	E							L	E									M	E			M	F	M	O			83	3	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	S14	E14	PCR	RAT4LINT	ACT4LINT
4	321	2	L	E							L	E									H	E	H	O	L	O	M	O	H	E	72	3	4
4	321	4	L	E							L	E									H	E	H	O	L	O	M	O	H	E	72	4	2
4	321	5	L	E							L	E									H	E	H	O	L	O	M	O	H	E	72	3	3
4	321	21	L	E							L	E									H	E	H	O	L	O	M	O	H	E	72	3	3
4	322	4	M	E			M	F	L	O	M	E									H	E	H	E	M	E	H	F	H	E	52	3	2
4	322	5	M	E			M	F	L	O	M	E									H	E	H	E	M	E	H	F	H	E	52	2	3
4	322	21	M	E			M	F	L	O	M	E									H	E	H	E	M	E	H	F	H	E	52	1	2
4	323	4	H	E			M	E	L	F	M	E									H	E	H	F	H	F	H	F	H	E	47	3	2
4	323	5	H	E			M	E	L	F	M	E									H	E	H	F	H	F	H	F	H	E	47	2	3
4	323	21	H	E			M	E	L	F	M	E									H	E	H	F	H	F	H	F	H	E	47	1	3
4	324	4	L	E							L	E	M	O							M	E	M	F	M	F	M	O	H	E	72	3	3
4	324	5	L	E							L	E	M	O							M	E	M	F	M	F	M	O	H	E	72	3	3
4	324	21	L	E							L	E	M	O							M	E	M	F	M	F	M	O	H	E	72	3	3
4	325	1	L	E							M	E	L	F							M	E	M	O	M	F	M	F	H	E	66	3	3
4	325	4	L	E							M	E	L	F							M	E	M	O	M	F	M	F	H	E	66	3	3
4	325	5	L	E							M	E	L	F							M	E	M	O	M	F	M	F	H	E	66	2	3
4	325	21	L	E							M	E	L	F							M	E	M	O	M	F	M	F	H	E	66	3	3
4	326	1	L	E							M	E	H	F							M	E	M	O	M	F			H	E	66	2	3
4	326	4	L	E							M	E	H	F							M	E	M	O	M	F			H	E	66	3	3
4	326	5	L	E							M	E	H	F							M	E	M	O	M	F			H	E	66	2	3
4	326	21	L	E							M	E	H	F							M	E	M	O	M	F			H	E	66	2	3
4	327	1	H	E			H	E	L	F	M	E									H	E	M	F	M	E	H	E	H	E	48	2	2
4	327	4	H	E			H	E	L	F	M	E									H	E	M	F	M	E	H	E	H	E	48	3	3
4	327	5	H	E			H	E	L	F	M	E									H	E	M	F	M	E	H	E	H	E	48	1	2
4	327	21	H	E			H	E	L	F	M	E									H	E	M	F	M	E	H	E	H	E	48	1	3
4	328	1	H	E			H	E	M	O	M	E			M	O					H	E	M	O	H	F			H	E	48	2	2
4	328	4	H	E			H	E	M	O	M	E			M	O					H	E	M	O	H	F			H	E	48	3	2
4	328	5	H	E			H	E	M	O	M	E			M	O					H	E	M	O	H	F			H	E	48	2	2
4	328	21	H	E			H	E	M	O	M	E			M	O					H	E	M	O	H	F			H	E	48	1	3
4	329	1	L	E			M	F			M	E	H	E	M	O					H	E	M	O	M	F	H	O	H	E	48	3	2
4	329	4	L	E			M	F			M	E	H	E	M	O					H	E	M	O	M	F	H	O	H	E	48	3	2
4	329	5	L	E			M	F			M	E	H	E	M	O					H	E	M	O	M	F	H	O	H	E	48	1	2
4	329	21	L	E			M	F			M	E	H	E	M	O					H	E	M	O	M	F	H	O	H	E	48	1	3
4	330	1	M	E			M	F	L	O	M	E					M	O			H	E	M	E	M	E	M	F	H	E	54	3	3
4	330	4	M	E			M	F	L	O	M	E					M	O			H	E	M	E	M	E	M	F	H	E	54	3	2
4	330	5	M	E			M	F	L	O	M	E					M	O			H	E	M	E	M	E	M	F	H	E	54	2	3
4	330	21	M	E			M	F	L	O	M	E					M	O			H	E	M	E	M	E	M	F	H	E	54	1	4
4	331	1	L	E			L	E			M	E									L	E	L	E	L	E	M	E			80	4	4
4	331	4	L	E			L	E			M	E									L	E	L	E	L	E	M	E			80	4	3
4	331	5	L	E			L	E			M	E									L	E	L	E	L	E	M	E			80	4	4
4	331	21	L	E			L	E			M	E									L	E	L	E	L	E	M	E			80	4	4
4	332	1	L	E							L	F											H	O	H	F			H	E	82	4	3
4	332	4	L	E							L	F											H	O	H	F			H	E	82	4	3
4	332	5	L	E							L	F											H	O	H	F			H	E	82	4	4
4	332	21	L	E							L	F											H	O	H	F			H	E	82	3	3
4	333	1	M	E			H	F	L	O	M	E							H	E					M	F			H	E	55	3	3
4	333	4	M	E			H	F	L	O	M	E							H	E					M	F			H	E	55	4	3
4	333	5	M	E			H	F	L	O	M	E							H	E					M	F			H	E	55	3	3
4	333	21	M	E			H	F	L	O	M	E							H	E					M	F			H	E	55	1	2
4	334	1	M	E							L	E									H	E	M	O	M	O			H	E	71	3	3
4	334	4	M	E							L	E									H	E	M	O	M	O			H	E	71	4	3
4	334	5	M	E							L	E									H	E	M	O	M	O			H	E	71	4	4
4	334	21	M	E							L	E									H	E	M	O	M	O			H	E	71	2	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	S14	E14	PCR	RAT4LINT	ACT4LINT
4	335	1	L	E							L	E									M	O	L	O							90	3	3
4	335	4	L	E							L	E									M	O	L	O							90	5	4
4	335	5	L	E							L	E									M	O	L	O							90	4	5
4	335	21	L	E							L	E									M	O	L	O							90	4	5
4	336	1	L	E							L	E									L	E			L	F					91	4	4
4	336	4	L	E							L	E									L	E			L	F					91	5	5
4	336	5	L	E							L	E									L	E			L	F					91	5	5
4	336	21	L	E							L	E									L	E			L	F					91	5	5
4	337	4	L	E							L	E									H	E	M	O	L	O	M	O	H	E	73	3	3
4	337	5	L	E							L	E									H	E	M	O	L	O	M	O	H	E	73	4	4
4	337	21	L	E							L	E									H	E	M	O	L	O	M	O	H	E	73	3	3
4	338	4	H	E			H	E	L	F	M	E									H	E	M	F	H	E	H	F	H	E	47	3	2
4	338	5	H	E			H	E	L	F	M	E									H	E	M	F	H	E	H	F	H	E	47	1	2
4	338	21	H	E			H	E	L	F	M	E									H	E	M	F	H	E	H	F	H	E	47	2	3
4	339	4	L	E			H	O			M	E									M	E			H	O			H	E	73	4	3
4	339	5	L	E			H	O			M	E									M	E			H	O			H	E	73	3	3
4	339	21	L	E			H	O			M	E									M	E			H	O			H	E	73	3	3
4	340	4	L	E			H	E			H	E									H	E	M	F	M	E	M	E	H	E	55	3	2
4	340	5	L	E			H	E			H	E									H	E	M	F	M	E	M	E	H	E	55	2	2
4	340	21	L	E			H	E			H	E									H	E	M	F	M	E	M	E	H	E	55	1	3
4	341	4	L	E			H	E			L	E									H	E	H	F	H	F			H	E	62	4	2
4	341	5	L	E			H	E			L	E									H	E	H	F	H	F			H	E	62	3	2
4	341	21	L	E			H	E			L	E									H	E	H	F	H	F			H	E	62	3	3
4	342	4	L	E			H	E			M	E									H	E	H	O	H	F	H	E	H	E	56	4	3
4	342	5	L	E			H	E			M	E									H	E	H	O	H	F	H	E	H	E	56	2	1
4	342	21	L	E			H	E			M	E									H	E	H	O	H	F	H	E	H	E	56	2	3
4	343	2	L	E							L	F									L	E	L	F	L	O					91	4	5
4	343	4	L	E							L	F									L	E	L	F	L	O					91	5	4
4	343	5	L	E							L	F									L	E	L	F	L	O					91	5	5
4	343	21	L	E							L	F									L	E	L	F	L	O					91	5	5
4	344	2	L	E					L	O	M	E									M	E	M	F	L	O			H	E	73	3	4
4	344	4	L	E					L	O	M	E									M	E	M	F	L	O			H	E	73	3	2
4	344	5	L	E					L	O	M	E									M	E	M	F	L	O			H	E	73	3	3
4	344	21	L	E					L	O	M	E									M	E	M	F	L	O			H	E	73	3	3
4	345	2	L	E			M	E			M	E			M	O									H	F	M	F	H	E	70	3	3
4	345	4	L	E			M	E			M	E			M	O									H	F	M	F	H	E	70	4	3
4	345	5	L	E			M	E			M	E			M	O									H	F	M	F	H	E	70	3	4
4	345	21	L	E			M	E			M	E			M	O									H	F	M	F	H	E	70	4	4
4	346	2	L	E			H	E			M	E	H	F							H	E	M	O	H	F			H	E	55	2	1
4	346	4	L	E			H	E			M	E	H	F							H	E	M	O	H	F			H	E	55	4	2
4	346	5	L	E			H	E			M	E	H	F							H	E	M	O	H	F			H	E	55	2	2
4	346	21	L	E			H	E			M	E	H	F							H	E	M	O	H	F			H	E	55	2	3
4	347	2	L	E			H	E			H	E													H	E	M	F	H	E	70	2	1
4	347	4	L	E			H	E			H	E													H	E	M	F	H	E	70	4	3
4	347	5	L	E			H	E			H	E													H	E	M	F	H	E	70	2	2
4	347	21	L	E			H	E			H	E													H	E	M	F	H	E	70	2	4
4	348	2	M	E							M	E	M	F							M	E	M	O	M	F			H	E	66	3	3
4	348	4	M	E							M	E	M	F							M	E	M	O	M	F			H	E	66	3	2
4	348	5	M	E							M	E	M	F							M	E	M	O	M	F			H	E	66	3	3
4	348	21	M	E							M	E	M	F							M	E	M	O	M	F			H	E	66	2	3
4	349	2	M	E			H	E	M	F	L	E			H	F	M	F			H	E	H	F	H	F	M	O	H	E	43	2	1
4	349	4	M	E			H	E	M	F	L	E			H	F	M	F			H	E	H	F	H	F	M	O	H	E	43	2	2
4	349	5	M	E			H	E	M	F	L	E			H	F	M	F			H	E	H	F	H	F	M	O	H	E	43	2	2
4	349	21	M	E			H	E	M	F	L	E			H	F	M	F			H	E	H	F	H	F	M	O	H	E	43	1	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	S14	E14	PCR	RAT4LINT	ACT4LINT
4	350	2	M	E			H	E	L	O	M	E									H	E	M	E	H	F	M	O	H	E	54	2	1
4	350	4	M	E			H	E	L	O	M	E									H	E	M	E	H	F	M	O	H	E	54	3	2
4	350	5	M	E			H	E	L	O	M	E									H	E	M	E	H	F	M	O	H	E	54	1	2
4	350	21	M	E			H	E	L	O	M	E									H	E	M	E	H	F	M	O	H	E	54	1	1
4	351	2	H	E							M	E	H	E							M	E	M	E	H	E	M	E	H	E	48	3	2
4	351	4	H	E							M	E	H	E							M	E	M	E	H	E	M	E	H	E	48	3	2
4	351	5	H	E							M	E	H	E							M	E	M	E	H	E	M	E	H	E	48	2	3
4	351	21	H	E							M	E	H	E							M	E	M	E	H	E	M	E	H	E	48	1	1
4	352	4	M	E							L	E																			91	5	5
4	352	5	M	E							L	E																			91	4	5
4	352	21	M	E							L	E																			91	3	4
4	353	4	M	E			H	E			H	E									H	E			H	E	M	E	H	E	54	4	3
4	353	5	M	E			H	E			H	E									H	E			H	E	M	E	H	E	54	1	2
4	353	21	M	E			H	E			H	E									H	E			H	E	M	E	H	E	54	1	3
4	354	4	L	E							L	E							M	O					M	O			H	E	83	4	4
4	354	5	L	E							L	E							M	O					M	O			H	E	83	4	4
4	354	21	L	E							L	E							M	O					M	O			H	E	83	4	4
4	355	4	L	E			L	O													L	O	L	O	L	F			H	O	91	4	4
4	355	5	L	E			L	O													L	O	L	O	L	F			H	O	91	4	5
4	355	21	L	E			L	O													L	O	L	O	L	F			H	O	91	5	5
4	356	4	L	E							M	F									M	E	M	F	M	F	M	F	H	F	72	3	2
4	356	5	L	E							M	F									M	E	M	F	M	F	M	F	H	F	72	3	3
4	356	21	L	E							M	F									M	E	M	F	M	F	M	F	H	F	72	3	3
4	357	4	L	E							L	E									L	E	M	O	M	E			H	E	82	4	3
4	357	5	L	E							L	E									L	E	M	O	M	E			H	E	82	4	4
4	357	21	L	E							L	E									L	E	M	O	M	E			H	E	82	4	4
4	358	4	L	E			H	F	M	O	M	E	M	F	M	O									H	F			H	E	65	4	3
4	358	5	L	E			H	F	M	O	M	E	M	F	M	O									H	F			H	E	65	2	3
4	358	21	L	E			H	F	M	O	M	E	M	F	M	O									H	F			H	E	65	3	3
4	359	4	L	E							M	E									M	E	M	O	M	F	M	E	H	E	70	4	3
4	359	5	L	E							M	E									M	E	M	O	M	F	M	E	H	E	70	2	3
4	359	21	L	E							M	E									M	E	M	O	M	F	M	E	H	E	70	3	3
4	360	4	L	E			H	E	M	O	M	E									H	E			M	E	M	O	H	E	62	4	3
4	360	5	L	E			H	E	M	O	M	E									H	E			M	E	M	O	H	E	62	2	3
4	360	21	L	E			H	E	M	O	M	E									H	E			M	E	M	O	H	E	62	3	3
4	361	4	L	E			M	E			H	E									H	E	M	O	H	F			H	E	61	3	2
4	361	5	L	E			M	E			H	E									H	E	M	O	H	F			H	E	61	2	3
4	361	21	L	E			M	E			H	E									H	E	M	O	H	F			H	E	61	1	2
4	362	4	M	F			H	E			M	E	H	F			H	F			H	E	H	E	M	F	H	E	H	E	40	3	2
4	362	5	M	F			H	E			M	E	H	F			H	F			H	E	H	E	M	F	H	E	H	E	40	1	2
4	362	21	M	F			H	E			M	E	H	F			H	F			H	E	H	E	M	F	H	E	H	E	40	1	1
4	363	4	L	E							M	F									L	E	L	F	L	E			H	E	82	4	3
4	363	5	L	E							M	F									L	E	L	F	L	E			H	E	82	4	3
4	363	21	L	E							M	F									L	E	L	F	L	E			H	E	82	3	3
4	364	4	M	E							M	E									H	E	M	O	H	F	M	F	H	E	62	3	3
4	364	5	M	E							M	E									H	E	M	O	H	F	M	F	H	E	62	2	3
4	364	21	M	E							M	E									H	E	M	O	H	F	M	F	H	E	62	1	3
4	365	4	L	E							L	F									L	E					L	O			91	4	4
4	365	5	L	E							L	F									L	E					L	O			91	3	3
4	365	21	L	E							L	F									L	E					L	O			91	4	5
4	366	4	L	E							H	E													H	E			H	E	77	4	3
4	366	5	L	E							H	E													H	E			H	E	77	3	3
4	366	21	L	E							H	E													H	E			H	E	77	2	3

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	S14	E14	PCR	RAT4LINT	ACT4LINT
4	367	4	L	E																	L	F	M	F							91	4	3
4	367	5	L	E																	L	F	M	F							91	4	4
4	367	21	L	E																	L	F	M	F							91	3	3
4	368	4	L	E																	M	E	M	O	L	O			H	E	82	4	3
4	368	5	L	E																	M	E	M	O	L	O			H	E	82	3	4
4	368	21	L	E																	M	E	M	O	L	O			H	E	82	3	3
4	369	4	L	E							M	E									L	E	L	F	L	F	M	F			83	4	3
4	369	5	L	E							M	E									L	E	L	F	L	F	M	F			83	3	3
4	369	21	L	E							M	E									L	E	L	F	L	F	M	F			83	4	4
4	370	4	L	E					L	O											M	O							H	O	91	5	4
4	370	5	L	E					L	O											M	O							H	O	91	3	4
4	370	21	L	E					L	O											M	O							H	O	91	4	5
4	371	4	L	E							L	E									L	E	L	O	M	F	M	F	H	E	81	5	4
4	371	5	L	E							L	E									L	E	L	O	M	F	M	F	H	E	81	4	4
4	371	21	L	E							L	E									L	E	L	O	M	F	M	F	H	E	81	4	4
4	372	4	L	E																			M	O	L	F			H	O	92	4	3
4	372	5	L	E																			M	O	L	F			H	O	92	4	4
4	372	21	L	E																			M	O	L	F			H	O	92	4	4
4	373	1	L	E							L	E									M	E	L	O	L	E			H	F	81	4	4
4	373	4	L	E							L	E									M	E	L	O	L	E			H	F	81	4	3
4	373	5	L	E							L	E									M	E	L	O	L	E			H	F	81	3	4
4	373	21	L	E							L	E									M	E	L	O	L	E			H	F	81	3	3
4	374	1	H	E			M	E	L	F	M	E									H	E	M	E	H	F	H	F	H	E	49	3	3
4	374	4	H	E			M	E	L	F	M	E									H	E	M	E	H	F	H	F	H	E	49	3	2
4	374	5	H	E			M	E	L	F	M	E									H	E	M	E	H	F	H	F	H	E	49	2	3
4	374	21	H	E			M	E	L	F	M	E									H	E	M	E	H	F	H	F	H	E	49	1	2
4	375	1	L	E							L	E									L	F	L	O	L	O					91	5	5
4	375	4	L	E							L	E									L	F	L	O	L	O					91	4	4
4	375	5	L	E							L	E									L	F	L	O	L	O					91	5	4
4	375	21	L	E							L	E									L	F	L	O	L	O					91	5	5
4	376	1	H	E			H	F			M	E			M	O					H	E	M	O	H	F	M	O	H	E	49	3	3
4	376	4	H	E			H	F			M	E			M	O					H	E	M	O	H	F	M	O	H	E	49	3	2
4	376	5	H	E			H	F			M	E			M	O					H	E	M	O	H	F	M	O	H	E	49	2	3
4	376	21	H	E			H	F			M	E			M	O					H	E	M	O	H	F	M	O	H	E	49	1	3
4	377	1	L	E							L	E									M	E	M	O	M	O	M	O			82	3	3
4	377	4	L	E							L	E									M	E	M	O	M	O	M	O			82	3	2
4	377	5	L	E							L	E									M	E	M	O	M	O	M	O			82	3	3
4	377	21	L	E							L	E									M	E	M	O	M	O	M	O			82	3	3
4	378	1	L	E			M	E			M	E									H	E	M	F	H	F			H	E	62	3	3
4	378	4	L	E			M	E			M	E									H	E	M	F	H	F			H	E	62	3	2
4	378	5	L	E			M	E			M	E									H	E	M	F	H	F			H	E	62	3	3
4	378	21	L	E			M	E			M	E									H	E	M	F	H	F			H	E	62	3	3
4	379	1	H	E			H	E			M	E									H	E	M	E	H	F			H	E	52	3	2
4	379	4	H	E			H	E			M	E									H	E	M	E	H	F			H	E	52	3	2
4	379	5	H	E			H	E			M	E									H	E	M	E	H	F			H	E	52	1	2
4	379	21	H	E			H	E			M	E									H	E	M	E	H	F			H	E	52	1	4
4	380	1	L	E			M	E			M	E									H	E	M	E	M	F			H	E	63	3	3
4	380	4	L	E			M	E			M	E									H	E	M	E	M	F			H	E	63	3	2
4	380	5	L	E			M	E			M	E									H	E	M	E	M	F			H	E	63	2	3
4	380	21	L	E			M	E			M	E									H	E	M	E	M	F			H	E	63	2	4
4	381	1	H	E			H	F	H	F	L	E			H	F	L	O			H	F	H	F	H	F	M	F	H	E	41	1	2
4	381	4	H	E			H	F	H	F	L	E			H	F	L	O			H	F	H	F	H	F	M	F	H	E	41	4	2
4	381	5	H	E			H	F	H	F	L	E			H	F	L	O			H	F	H	F	H	F	M	F	H	E	41	1	1
4	381	21	H	E			H	F	H	F	L	E			H	F	L	O			H	F	H	F	H	F	M	F	H	E	41	1	4

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	S14	E14	PCR	RAT4LINT	ACT4LINT
4	382	1	M	E							M	E									M	E	M	O	M	F			H	F	71	3	3
4	382	4	M	E							M	E									M	E	M	O	M	F			H	F	71	4	3
4	382	5	M	E							M	E									M	E	M	O	M	F			H	F	71	3	4
4	382	21	M	E							M	E									M	E	M	O	M	F			H	F	71	2	3
4	383	1	L	E			H	E			M	E									H	E	H	F	M	O			H	F	61	3	3
4	383	4	L	E			H	E			M	E									H	E	H	F	M	O			H	F	61	3	3
4	383	5	L	E			H	E			M	E									H	E	H	F	M	O			H	F	61	3	3
4	383	21	L	E			H	E			M	E									H	E	H	F	M	O			H	F	61	2	3
4	384	1	L	E			M	O			L	E									H	E			H	F			H	E	71	3	3
4	384	4	L	E			M	O			L	E									H	E			H	F			H	E	71	4	4
4	384	5	L	E			M	O			L	E									H	E			H	F			H	E	71	4	4
4	384	21	L	E			M	O			L	E									H	E			H	F			H	E	71	3	3
4	385	4	L	E							H	E									H	E	M	O	M	F	M	O	H	E	64	3	3
4	385	5	L	E							H	E									H	E	M	O	M	F	M	O	H	E	64	2	3
4	385	21	L	E							H	E									H	E	M	O	M	F	M	O	H	E	64	1	3
4	386	4	L	E			M	E			M	E									M	E			M	F			H	E	72	4	3
4	386	5	L	E			M	E			M	E									M	E			M	F			H	E	72	3	4
4	386	21	L	E			M	E			M	E									M	E			M	F			H	E	72	3	3
4	387	4	L	E							L	E											L	O					H	O	91	5	5
4	387	5	L	E							L	E											L	O					H	O	91	5	5
4	387	21	L	E							L	E											L	O					H	O	91	5	5
4	388	4	L	E			H	F			M	E	H	F	H	O	M	O			M	E	M	O	M	F	H	O	H	E	51	3	2
4	388	5	L	E			H	F			M	E	H	F	H	O	M	O			M	E	M	O	M	F	H	O	H	E	51	2	2
4	388	21	L	E			H	F			M	E	H	F	H	O	M	O			M	E	M	O	M	F	H	O	H	E	51	2	3
4	389	4	L	E																	H	F			M	O			H	F	82	4	4
4	389	5	L	E																	H	F			M	O			H	F	82	4	4
4	389	21	L	E																	H	F			M	O			H	F	82	4	4
4	390	4	M	E			H	F	L	O	M	E									H	E	M	E	H	E	M	F	H	E	53	3	2
4	390	5	M	E			H	F	L	O	M	E									H	E	M	E	H	E	M	F	H	E	53	2	2
4	390	21	M	E			H	F	L	O	M	E									H	E	M	E	H	E	M	F	H	E	53	1	1
4	391	2	L	E	M	E	H	E			M	E	M	F							H	E	M	F	H	F	M	E	H	E	48	2	2
4	391	4	L	E	M	E	H	E			M	E	M	F							H	E	M	F	H	F	M	E	H	E	48	3	2
4	391	5	L	E	M	E	H	E			M	E	M	F							H	E	M	F	H	F	M	E	H	E	48	2	2
4	391	21	L	E	M	E	H	E			M	E	M	F							H	E	M	F	H	F	M	E	H	E	48	3	3
4	392	2	L	E			H	E			H	E									H	E	H	F	M	E			H	E	56	1	1
4	392	4	L	E			H	E			H	E									H	E	H	F	M	E			H	E	56	3	2
4	392	5	L	E			H	E			H	E									H	E	H	F	M	E			H	E	56	1	2
4	392	21	L	E			H	E			H	E									H	E	H	F	M	E			H	E	56	1	3
4	393	2	M	F			H	E			M	E			M	O	M	O			H	E	H	F	H	F	M	F	H	E	46	2	2
4	393	4	M	F			H	E			M	E			M	O	M	O			H	E	H	F	H	F	M	F	H	E	46	3	2
4	393	5	M	F			H	E			M	E			M	O	M	O			H	E	H	F	H	F	M	F	H	E	46	2	2
4	393	21	M	F			H	E			M	E			M	O	M	O			H	E	H	F	H	F	M	F	H	E	46	2	3
4	394	2	L	E							H	E									H	E	M	F	M	O	M	E	H	E	62	3	4
4	394	4	L	E							H	E									H	E	M	F	M	O	M	E	H	E	62	3	2
4	394	5	L	E							H	E									H	E	M	F	M	O	M	E	H	E	62	2	3
4	394	21	L	E							H	E									H	E	M	F	M	O	M	E	H	E	62	1	3
4	395	2	L	E			H	E			M	E									M	E	M	F	M	E	M	E	H	E	63	2	2
4	395	4	L	E			H	E			M	E									M	E	M	F	M	E	M	E	H	E	63	3	2
4	395	5	L	E			H	E			M	E									M	E	M	F	M	E	M	E	H	E	63	1	2
4	395	21	L	E			H	E			M	E									M	E	M	F	M	E	M	E	H	E	63	3	3
4	396	2	L	E			H	F			M	E									M	E			M	F			H	E	71	3	4
4	396	4	L	E			H	F			M	E									M	E			M	F			H	E	71	3	2
4	396	5	L	E			H	F			M	E									M	E			M	F			H	E	71	2	3
4	396	21	L	E			H	F			M	E									M	E			M	F			H	E	71	3	3
4	397	2	L	E			H	E			H	E									H	E	H	E	H	E	H	E	H	E	47	2	2
4	397	4	L	E			H	E			H	E									H	E	H	E	H	E	H	E	H	E	47	3	2
4	397	5	L	E			H	E			H	E									H	E	H	E	H	E	H	E	H	E	47	1	2
4	397	21	L	E			H	E			H	E									H	E	H	E	H	E	H	E	H	E	47	1	1

FORM	KRIN	BOOK	S1	E1	S2	E2	S3	E3	S4	E4	S5	E5	S6	E6	S7	E7	S8	E8	S9	E9	S10	E10	S11	E11	S12	E12	S13	E13	S14	E14	PCR	RAT4LINT	ACT4LINT
4	398	2	L	E			H	E			M	E									H	E	H	E	H	E	M	F	H	E	53	2	2
4	398	4	L	E			H	E			M	E									H	E	H	E	H	E	M	F	H	E	53	3	2
4	398	5	L	E			H	E			M	E									H	E	H	E	H	E	M	F	H	E	53	2	2
4	398	21	L	E			H	E			M	E									H	E	H	E	H	E	M	F	H	E	53	2	1
4	399	2	L	E							L	E									L	F					L	F			90	4	5
4	399	4	L	E							L	E									L	F					L	F			90	5	5
4	399	5	L	E							L	E									L	F					L	F			90	5	4
4	399	21	L	E							L	E									L	F					L	F			90	5	5
4	400	2	M	E			H	E			M	E									H	E	H	F	H	F			H	E	55	2	2

APPENDIX B

LISTING OF THE EXPERT OPINION SURVEY RATINGS AND THE RATINGS OBTAINED FROM SUBSEQUENT ANALYSIS

This Appendix contains the listing of the Pavement Ratings which were assigned by the Expert to the Pavements included in the Surveys. There are four (4) tables in this appendix, each one of which contains data related to one type of pavement as follows:

1. Table B-1 Survey data of CRC Pavements (Pavement type 1)
2. Table B-2 Survey data of JRC/JC Pavements (Pavement type 2)
3. Table B-3 Survey data of Flexible Pavements (Pavement type 3)
4. Table B-4 Survey data of Composite Pavements (Pavement type 4).

These tables contain the ratings obtained from subsequent analysis of data also. The information included in each column of these tables is as follows:

1.	Pavement Type	1 = CRC; 2 = Jointed Concrete (JRCP/JCP); 3 = Flexible; 4 = Composite.
1.	Pavement Number	A number assigned to each pavement in the survey data, Used for identification of the pavement.
3.	ODOT PCR	The PCR of the pavement calculated from old distress weights.
4.	4-Lane Rating	The Condition Ratings assigned by the experts, when the pavement was a part of the 4-Lane system.
5.	Classification Tree Rating	The condition Ratings obtained from the Classification Tree Analysis of the data.
6.	Classification Tree Probability	The probability of condition Ratings obtained from the Classification Tree Analysis of the data.
7.	Representative PCR	The PCR value assigned to the pavement based on the Classification Tree Rating and the New PCR Scale.

Table B-1 Listing of Expert Opinion Rating and Classification Tree Rating Along with the ODOT PCR and PCR Assigned to Represent the Ratings for CRC Pavement

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
1	1	66	4	4	0.375	73
1	1	66	2	4	0.375	73
1	2	50	4	3	0.579	48
1	2	50	3	3	0.579	48
1	3	69	4	4	0.824	63
1	3	69	4	4	0.824	63
1	4	49	3	2	0.450	31
1	4	49	2	2	0.450	31
1	5	82	4	4	0.529	69
1	5	82	4	4	0.529	69
1	6	61	4	4	0.500	70
1	6	61	3	4	0.500	70
1	7	46	2	3	0.579	48
1	7	46	3	3	0.579	48
1	7	46	3	3	0.579	48
1	8	54	3	3	0.579	48
1	8	54	3	3	0.579	48
1	8	54	3	3	0.579	48
1	9	57	3	3	0.579	48
1	9	57	3	3	0.579	48
1	9	57	3	3	0.579	48
1	10	81	4	4	0.529	69
1	10	81	4	4	0.529	69
1	10	81	4	4	0.529	69
1	11	57	3	4	0.375	73
1	11	57	4	4	0.375	73
1	11	57	3	4	0.375	73
1	12	64	3	3	0.833	43
1	12	64	3	3	0.833	43
1	12	64	3	3	0.833	43
1	13	81	4	4	0.529	69
1	13	81	3	4	0.529	69
1	14	81	4	4	0.824	63
1	14	81	4	4	0.824	63
1	15	91	4	4	0.529	69
1	15	91	5	4	0.529	69
1	16	38	3	2	0.450	31
1	16	38	2	2	0.450	31
1	17	34	3	1	0.455	11
1	17	34	1	1	0.455	11
1	18	66	3	4	0.500	70
1	18	66	3	4	0.500	70
1	19	77	4	4	0.824	63
1	19	77	3	4	0.824	63
1	20	36	3	3	0.667	47
1	20	36	2	3	0.667	47

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
1	21	41	4	1	0.513	10
1	21	41	2	1	0.513	10
1	22	44	3	3	1.000	40
1	22	44	3	3	1.000	40
1	23	75	4	4	0.824	63
1	23	75	4	4	0.824	63
1	24	93	4	4	0.529	69
1	24	93	5	4	0.529	69
1	25	72	5	4	0.375	73
1	25	72	3	4	0.375	73
1	26	48	3	2	0.450	31
1	26	48	2	2	0.450	31
1	27	43	3	2	0.450	31
1	27	43	2	2	0.450	31
1	28	92	4	4	0.529	69
1	28	92	3	4	0.529	69
1	29	84	4	4	0.529	69
1	29	84	4	4	0.529	69
1	30	53	4	3	0.579	48
1	30	53	3	3	0.579	48
1	31	89	5	4	0.529	69
1	31	89	4	4	0.529	69
1	31	89	5	4	0.529	69
1	32	42	1	1	0.455	11
1	32	42	4	1	0.455	11
1	32	42	1	1	0.455	11
1	33	40	1	1	0.513	10
1	33	40	3	1	0.513	10
1	33	40	1	1	0.513	10
1	34	55	2	2	0.450	31
1	34	55	4	2	0.450	31
1	34	55	3	2	0.450	31
1	35	58	2	2	0.450	31
1	35	58	3	2	0.450	31
1	35	58	2	2	0.450	31
1	36	68	3	4	0.500	70
1	36	68	4	4	0.500	70
1	36	68	3	4	0.500	70
1	37	71	3	4	0.500	70
1	37	71	4	4	0.500	70
1	37	71	4	4	0.500	70
1	38	40	2	2	0.500	30
1	38	40	3	2	0.500	30
1	38	40	2	2	0.500	30
1	39	60	3	4	0.375	73
1	39	60	4	4	0.375	73
1	39	60	3	4	0.375	73
1	40	40	1	1	0.513	10
1	40	40	3	1	0.513	10

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
1	40	40	1	1	0.513	10
1	41	53	3	2	0.450	31
1	41	53	3	2	0.450	31
1	41	53	2	2	0.450	31
1	42	42	2	2	0.500	30
1	42	42	4	2	0.500	30
1	42	42	2	2	0.500	30
1	43	75	3	4	0.500	70
1	43	75	4	4	0.500	70
1	43	75	4	4	0.500	70
1	44	70	3	4	0.500	70
1	44	70	4	4	0.500	70
1	44	70	3	4	0.500	70
1	45	66	1	4	0.375	73
1	45	66	3	4	0.375	73
1	45	66	2	4	0.375	73
1	46	79	3	4	0.529	69
1	46	79	3	4	0.529	69
1	46	79	4	4	0.529	69
1	46	79	3	4	0.529	69
1	47	96	5	5	0.889	82
1	47	96	5	5	0.889	82
1	47	96	5	5	0.889	82
1	47	96	5	5	0.889	82
1	48	94	5	5	0.889	82
1	48	94	5	5	0.889	82
1	48	94	5	5	0.889	82
1	48	94	5	5	0.889	82
1	49	49	1	1	0.513	10
1	49	49	1	1	0.513	10
1	49	49	4	1	0.513	10
1	49	49	2	1	0.513	10
1	50	77	3	3	0.579	48
1	50	77	3	3	0.579	48
1	50	77	4	3	0.579	48
1	50	77	4	3	0.579	48
1	51	49	3	3	0.579	48
1	51	49	3	3	0.579	48
1	51	49	4	3	0.579	48
1	51	49	3	3	0.579	48
1	52	70	2	4	0.500	70
1	52	70	4	4	0.500	70
1	52	70	4	4	0.500	70
1	53	73	2	4	0.375	73
1	53	73	4	4	0.375	73
1	53	73	3	4	0.375	73
1	54	76	3	4	0.529	69
1	54	76	4	4	0.529	69
1	54	76	3	4	0.529	69

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
1	55	80	3	3	0.579	48
1	55	80	3	3	0.579	48
1	55	80	4	3	0.579	48
1	55	80	2	3	0.579	48
1	56	57	2	2	0.500	30
1	56	57	2	2	0.500	30
1	56	57	4	2	0.500	30
1	56	57	1	2	0.500	30
1	57	73	3	4	0.375	73
1	57	73	2	4	0.375	73
1	57	73	4	4	0.375	73
1	57	73	4	4	0.375	73
1	58	83	5	4	0.500	70
1	58	83	3	4	0.500	70
1	58	83	4	4	0.500	70
1	58	83	4	4	0.500	70
1	59	48	2	2	0.500	30
1	59	48	1	2	0.500	30
1	59	48	4	2	0.500	30
1	59	48	2	2	0.500	30
1	60	64	3	3	0.667	47
1	60	64	2	3	0.667	47
1	60	64	3	3	0.667	47
1	60	64	3	3	0.667	47
1	61	74	3	4	0.500	70
1	61	74	4	4	0.500	70
1	61	74	4	4	0.500	70
1	62	70	3	3	0.579	48
1	62	70	4	3	0.579	48
1	62	70	4	3	0.579	48
1	63	68	2	4	0.375	73
1	63	68	4	4	0.375	73
1	63	68	4	4	0.375	73
1	64	52	1	1	0.513	10
1	64	52	3	1	0.513	10
1	64	52	2	1	0.513	10
1	65	68	2	3	0.579	48
1	65	68	4	3	0.579	48
1	65	68	3	3	0.579	48
1	66	30	1	1	0.513	10
1	66	30	3	1	0.513	10
1	66	30	1	1	0.513	10
1	67	52	4	4	0.824	63
1	67	52	4	4	0.824	63
1	67	52	3	4	0.824	63
1	68	52	1	1	0.513	10
1	68	52	4	1	0.513	10
1	68	52	2	1	0.513	10
1	69	89	4	5	0.889	82

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
1	69	89	5	5	0.889	82
1	69	89	4	5	0.889	82
1	70	40	1	1	0.513	10
1	70	40	3	1	0.513	10
1	70	40	1	1	0.513	10
1	71	67	2	3	0.833	43
1	71	67	3	3	0.833	43
1	71	67	3	3	0.833	43
1	72	81	3	4	0.500	70
1	72	81	4	4	0.500	70
1	72	81	4	4	0.500	70
1	73	47	1	1	0.513	10
1	73	47	3	1	0.513	10
1	73	47	1	1	0.513	10
1	74	51	3	2	0.450	31
1	74	51	4	2	0.450	31
1	74	51	2	2	0.450	31
1	75	42	1	2	0.500	30
1	75	42	4	2	0.500	30
1	75	42	2	2	0.500	30
1	76	84	4	4	0.824	63
1	76	84	4	4	0.824	63
1	76	84	4	4	0.824	63
1	77	53	3	2	0.500	30
1	77	53	4	2	0.500	30
1	77	53	2	2	0.500	30
1	78	88	5	4	0.529	69
1	78	88	4	4	0.529	69
1	78	88	5	4	0.529	69
1	79	93	5	5	0.889	82
1	79	93	5	5	0.889	82
1	79	93	5	5	0.889	82
1	80	98	5	5	0.889	82
1	80	98	5	5	0.889	82
1	80	98	5	5	0.889	82
1	81	84	4	4	0.824	63
1	81	84	5	4	0.824	63
1	81	84	4	4	0.824	63
1	82	82	4	3	0.579	48
1	82	82	4	3	0.579	48
1	82	82	3	3	0.579	48
1	83	37	1	1	0.513	10
1	83	37	3	1	0.513	10
1	83	37	2	1	0.513	10
1	84	81	4	4	0.529	69
1	84	81	4	4	0.529	69
1	84	81	5	4	0.529	69
1	85	35	1	1	0.455	11
1	85	35	3	1	0.455	11

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
1	85	35	2	1	0.455	11
1	86	58	3	3	1.000	40
1	86	58	3	3	1.000	40
1	86	58	3	3	1.000	40
1	87	75	2	4	0.500	70
1	87	75	3	4	0.500	70
1	87	75	4	4	0.500	70
1	88	66	3	4	0.529	69
1	88	66	4	4	0.529	69
1	88	66	3	4	0.529	69
1	89	48	1	4	0.375	73
1	89	48	4	4	0.375	73
1	89	48	2	4	0.375	73
1	90	75	2	4	0.375	73
1	90	75	4	4	0.375	73
1	90	75	4	4	0.375	73
1	91	47	1	1	0.455	11
1	91	47	4	1	0.455	11
1	91	47	2	1	0.455	11
1	92	73	3	4	0.375	73
1	92	73	4	4	0.375	73
1	92	73	3	4	0.375	73
1	93	77	3	4	0.500	70
1	93	77	4	4	0.500	70
1	93	77	3	4	0.500	70
1	94	66	1	1	0.513	10
1	94	66	2	1	0.513	10
1	94	66	4	1	0.513	10
1	94	66	1	1	0.513	10
1	95	51	1	1	0.513	10
1	95	51	1	1	0.513	10
1	95	51	4	1	0.513	10
1	95	51	1	1	0.513	10
1	96	64	3	3	0.579	48
1	96	64	2	3	0.579	48
1	96	64	4	3	0.579	48
1	96	64	3	3	0.579	48
1	97	89	5	5	0.889	82
1	98	39	2	1	0.513	10
1	99	62	4	4	0.500	70

Table B-2 Listing of Expert Opinion Rating and Classification Tree Rating Along with the ODOT PCR and PCR Assigned to Represent the Ratings for Jointed Concrete Pavement

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
2	103	77	4	3	0.423	52
2	103	77	4	3	0.423	52
2	103	77	4	3	0.423	52
2	104	92	5	5	0.667	87
2	104	92	5	5	0.667	87
2	104	92	5	5	0.667	87
2	105	56	3	3	0.349	53
2	105	56	4	3	0.349	53
2	105	56	1	3	0.349	53
2	106	86	5	5	0.667	87
2	106	86	5	5	0.667	87
2	106	86	5	5	0.667	87
2	107	85	5	5	0.667	87
2	107	85	5	5	0.667	87
2	107	85	5	5	0.667	87
2	108	78	3	4	0.675	67
2	108	78	3	4	0.675	67
2	108	78	4	4	0.675	67
2	109	76	4	4	0.675	67
2	109	76	4	4	0.675	67
2	109	76	4	4	0.675	67
2	110	58	2	3	0.423	52
2	110	58	3	3	0.423	52
2	110	58	3	3	0.423	52
2	111	49	2	1	0.356	13
2	111	49	3	1	0.356	13
2	111	49	2	1	0.356	13
2	112	64	2	3	0.423	52
2	112	64	4	3	0.423	52
2	112	64	3	3	0.423	52
2	113	51	2	3	0.423	52
2	113	51	3	3	0.423	52
2	113	51	2	3	0.423	52
2	114	76	3	2	0.379	32
2	114	76	4	2	0.379	32
2	114	76	2	2	0.379	32
2	115	46	2	1	0.356	13
2	115	46	1	1	0.356	13
2	115	46	3	1	0.356	13
2	115	46	1	1	0.356	13
2	116	46	1	1	0.356	13
2	116	46	2	1	0.356	13
2	116	46	3	1	0.356	13
2	116	46	1	1	0.356	13
2	117	68	2	2	0.379	32
2	117	68	3	2	0.379	32

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
2	117	68	4	2	0.379	32
2	117	68	2	2	0.379	32
2	118	63	2	3	0.423	52
2	118	63	3	3	0.423	52
2	118	63	4	3	0.423	52
2	118	63	3	3	0.423	52
2	119	63	2	3	0.349	53
2	119	63	3	3	0.349	53
2	119	63	4	3	0.349	53
2	119	63	1	3	0.349	53
2	120	76	4	4	0.737	65
2	120	76	3	4	0.737	65
2	120	76	4	4	0.737	65
2	120	76	3	4	0.737	65
2	121	76	4	4	0.737	65
2	121	76	4	4	0.737	65
2	121	76	4	4	0.737	65
2	121	76	4	4	0.737	65
2	122	54	2	1	0.356	13
2	122	54	1	1	0.356	13
2	122	54	3	1	0.356	13
2	122	54	1	1	0.356	13
2	123	88	4	4	0.737	65
2	123	88	4	4	0.737	65
2	123	88	5	4	0.737	65
2	123	88	4	4	0.737	65
2	124	91	2	5	0.667	87
2	124	91	5	5	0.667	87
2	124	91	5	5	0.667	87
2	124	91	5	5	0.667	87
2	124	91	5	5	0.667	87
2	125	63	2	3	0.423	52
2	125	63	4	3	0.423	52
2	125	63	3	3	0.423	52
2	125	63	4	3	0.423	52
2	125	63	2	3	0.423	52
2	126	65	2	3	0.423	52
2	126	65	4	3	0.423	52
2	126	65	3	3	0.423	52
2	126	65	4	3	0.423	52
2	126	65	3	3	0.423	52
2	127	69	2	2	0.379	32
2	127	69	3	2	0.379	32
2	127	69	4	2	0.379	32
2	127	69	2	2	0.379	32
2	128	57	2	3	0.349	53
2	128	57	3	3	0.349	53
2	128	57	4	3	0.349	53
2	128	57	1	3	0.349	53

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
2	129	56	2	1	0.356	13
2	129	56	2	1	0.356	13
2	129	56	3	1	0.356	13
2	129	56	1	1	0.356	13
2	130	50	3	3	0.423	48
2	130	50	2	3	0.423	48
2	130	50	3	3	0.423	48
2	130	50	2	3	0.423	48
2	131	87	4	4	0.737	65
2	131	87	4	4	0.737	65
2	131	87	5	4	0.737	65
2	131	87	4	4	0.737	65
2	132	80	3	4	0.675	67
2	132	80	3	4	0.675	67
2	132	80	4	4	0.675	67
2	132	80	4	4	0.675	67
2	133	76	3	2	0.379	32
2	133	76	4	2	0.379	32
2	133	76	4	2	0.379	32
2	133	76	4	2	0.379	32
2	134	67	3	3	0.423	52
2	134	67	3	3	0.423	52
2	134	67	4	3	0.423	52
2	134	67	3	3	0.423	52
2	135	38	3	1	0.356	13
2	135	38	2	1	0.356	13
2	135	38	3	1	0.356	13
2	135	38	1	1	0.356	13
2	136	88	4	4	0.737	65
2	136	88	4	4	0.737	65
2	136	88	5	4	0.737	65
2	137	67	3	3	0.349	53
2	137	67	4	3	0.349	53
2	137	67	2	3	0.349	53
2	138	49	2	3	0.349	53
2	138	49	2	3	0.349	53
2	138	49	1	3	0.349	53
2	139	70	2	2	0.379	32
2	139	70	4	2	0.379	32
2	139	70	3	2	0.379	32
2	140	50	2	3	0.349	53
2	140	50	4	3	0.349	53
2	140	50	2	3	0.349	53
2	141	65	4	3	0.423	52
2	141	65	4	3	0.423	52
2	141	65	2	3	0.423	52
2	142	56	2	1	0.356	13
2	142	56	3	1	0.356	13
2	142	56	1	1	0.356	13

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
2	143	65	3	3	0.423	52
2	143	65	4	3	0.423	52
2	143	65	2	3	0.423	52
2	144	74	4	4	0.675	67
2	144	74	4	4	0.675	67
2	144	74	3	4	0.675	67
2	145	71	3	3	0.423	52
2	145	71	4	3	0.423	52
2	145	71	3	3	0.423	52
2	146	53	3	1	0.356	13
2	146	53	3	1	0.356	13
2	146	53	2	1	0.356	13
2	147	49	3	3	0.349	53
2	147	49	3	3	0.349	53
2	147	49	1	3	0.349	53
2	148	85	4	5	0.667	87
2	148	85	5	5	0.667	87
2	148	85	4	5	0.667	87
2	149	69	3	4	0.675	67
2	149	69	4	4	0.675	67
2	149	69	4	4	0.675	67
2	150	63	3	3	0.349	53
2	150	63	4	3	0.349	53
2	150	63	2	3	0.349	53
2	151	59	2	2	0.379	32
2	151	59	4	2	0.379	32
2	151	59	2	2	0.379	32
2	152	78	4	5	0.667	87
2	152	78	4	5	0.667	87
2	152	78	3	5	0.667	87
2	153	59	3	3	0.423	52
2	153	59	3	3	0.423	52
2	153	59	2	3	0.423	52
2	154	52	2	3	0.423	48
2	154	52	3	3	0.423	48
2	154	52	2	3	0.423	48
2	155	86	4	4	0.675	67
2	155	86	4	4	0.675	67
2	155	86	3	4	0.675	67
2	156	51	1	1	0.356	13
2	156	51	3	1	0.356	13
2	156	51	2	1	0.356	13
2	157	67	3	4	0.675	67
2	157	67	4	4	0.675	67
2	157	67	4	4	0.675	67
2	158	45	1	3	0.423	48
2	158	45	3	3	0.423	48
2	158	45	2	3	0.423	48
2	159	77	3	4	0.675	67

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
2	159	77	4	4	0.675	67
2	159	77	4	4	0.675	67
2	160	88	5	5	0.667	87
2	160	88	5	5	0.667	87
2	160	88	4	5	0.667	87
2	161	81	4	4	0.737	65
2	161	81	4	4	0.737	65
2	161	81	3	4	0.737	65
2	162	61	2	3	0.423	52
2	162	61	4	3	0.423	52
2	162	61	3	3	0.423	52
2	163	66	3	3	0.423	52
2	163	66	3	3	0.423	52
2	163	66	4	3	0.423	52
2	163	66	2	3	0.423	52
2	164	71	3	4	0.737	65
2	164	71	4	4	0.737	65
2	164	71	4	4	0.737	65
2	164	71	3	4	0.737	65
2	165	78	4	4	0.675	67
2	165	78	3	4	0.675	67
2	165	78	4	4	0.675	67
2	165	78	3	4	0.675	67
2	166	54	2	3	0.349	53
2	166	54	3	3	0.349	53
2	166	54	3	3	0.349	53
2	166	54	1	3	0.349	53
2	167	72	2	2	0.379	32
2	167	72	3	2	0.379	32
2	167	72	4	2	0.379	32
2	167	72	2	2	0.379	32
2	168	87	4	4	0.737	65
2	168	87	4	4	0.737	65
2	168	87	4	4	0.737	65
2	168	87	4	4	0.737	65
2	169	80	4	4	0.737	65
2	169	80	3	4	0.737	65
2	169	80	4	4	0.737	65
2	169	80	3	4	0.737	65
2	170	55	3	3	0.423	52
2	170	55	3	3	0.423	52
2	170	55	4	3	0.423	52
2	170	55	2	3	0.423	52
2	171	72	3	2	0.379	32
2	171	72	3	2	0.379	32
2	171	72	4	2	0.379	32
2	171	72	2	2	0.379	32
2	172	81	3	4	0.675	67
2	172	81	4	4	0.675	67

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
2	172	81	4	4	0.675	67
2	172	81	4	4	0.675	67
2	172	81	4	4	0.675	67
2	173	57	1	1	0.356	13
2	173	57	1	1	0.356	13
2	173	57	3	1	0.356	13
2	173	57	4	1	0.356	13
2	173	57	1	1	0.356	13
2	174	83	2	3	0.423	52
2	174	83	4	3	0.423	52
2	174	83	4	3	0.423	52
2	174	83	4	3	0.423	52
2	174	83	2	3	0.423	52
2	175	47	3	1	0.356	13
2	175	47	1	1	0.356	13
2	175	47	3	1	0.356	13
2	175	47	1	1	0.356	13
2	176	54	2	1	0.356	13
2	176	54	2	1	0.356	13
2	176	54	3	1	0.356	13
2	176	54	1	1	0.356	13
2	177	87	4	4	0.737	65
2	177	87	4	4	0.737	65
2	177	87	4	4	0.737	65
2	177	87	4	4	0.737	65
2	178	50	2	1	0.356	13
2	178	50	1	1	0.356	13
2	178	50	3	1	0.356	13
2	178	50	2	1	0.356	13
2	179	85	3	5	0.667	87
2	179	85	5	5	0.667	87
2	179	85	5	5	0.667	87
2	179	85	5	5	0.667	87
2	180	58	2	3	0.349	53
2	180	58	3	3	0.349	53
2	180	58	4	3	0.349	53
2	180	58	3	3	0.349	53
2	181	66	3	3	0.423	52
2	181	66	3	3	0.423	52
2	181	66	4	3	0.423	52
2	181	66	3	3	0.423	52
2	182	46	2	1	0.356	13
2	182	46	1	1	0.356	13
2	182	46	3	1	0.356	13
2	182	46	1	1	0.356	13
2	183	49	2	3	0.423	48
2	183	49	3	3	0.423	48
2	183	49	4	3	0.423	48
2	183	49	2	3	0.423	48

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
2	184	76	3	4	0.675	67
2	184	76	4	4	0.675	67
2	184	76	4	4	0.675	67
2	185	47	3	3	0.423	48
2	185	47	4	3	0.423	48
2	185	47	2	3	0.423	48
2	186	49	3	3	0.423	48
2	186	49	3	3	0.423	48
2	186	49	1	3	0.423	48
2	187	42	1	3	0.423	48
2	187	42	3	3	0.423	48
2	187	42	3	3	0.423	48
2	188	80	4	4	0.675	67
2	188	80	4	4	0.675	67
2	188	80	4	4	0.675	67
2	189	56	3	1	0.356	13
2	189	56	3	1	0.356	13
2	189	56	1	1	0.356	13
2	190	60	3	3	0.423	52
2	190	60	3	3	0.423	52
2	190	60	2	3	0.423	52
2	191	52	2	3	0.423	48
2	191	52	3	3	0.423	48
2	191	52	2	3	0.423	48
2	192	45	2	1	0.356	13
2	192	45	3	1	0.356	13
2	192	45	1	1	0.356	13
2	193	56	3	3	0.349	53
2	193	56	3	3	0.349	53
2	193	56	1	3	0.349	53
2	194	63	3	3	0.423	52
2	194	63	4	3	0.423	52
2	194	63	2	3	0.423	52
2	195	67	3	3	0.349	53
2	195	67	4	3	0.349	53
2	195	67	2	3	0.349	53
2	196	75	4	5	0.667	87
2	196	75	5	5	0.667	87
2	196	75	3	5	0.667	87
2	197	48	2	3	0.349	53
2	197	48	3	3	0.349	53
2	197	48	2	3	0.349	53
2	198	65	3	3	0.423	52
2	198	65	3	3	0.423	52
2	198	65	2	3	0.423	52

Table B-3 Listing of Expert Opinion Rating and Classification Tree Rating Along with the ODOT PCR and PCR Assigned to Represent the Ratings for Flexible Pavement

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
3	202	92	4	5	0.651	87
3	202	92	4	5	0.651	87
3	203	63	4	2	0.512	25
3	203	63	4	2	0.512	25
3	204	47	4	3	0.429	51
3	204	47	3	3	0.429	51
3	205	92	4	5	0.651	87
3	205	92	5	5	0.651	87
3	205	92	5	5	0.651	87
3	205	92	5	5	0.651	87
3	206	48	3	3	0.362	53
3	206	48	1	3	0.362	53
3	206	48	3	3	0.362	53
3	206	48	2	3	0.362	53
3	207	52	3	3	0.628	47
3	207	52	3	3	0.628	47
3	207	52	4	3	0.628	47
3	207	52	3	3	0.628	47
3	208	91	4	5	0.651	87
3	208	91	5	5	0.651	87
3	208	91	5	5	0.651	87
3	208	91	5	5	0.651	87
3	209	91	5	5	0.651	87
3	209	91	5	5	0.651	87
3	209	91	5	5	0.651	87
3	209	91	4	5	0.651	87
3	210	53	4	2	0.512	25
3	210	53	2	2	0.512	25
3	210	53	3	2	0.512	25
3	210	53	2	2	0.512	25
3	211	51	2	2	0.512	25
3	211	51	3	2	0.512	25
3	211	51	4	2	0.512	25
3	211	51	2	2	0.512	25
3	212	54	2	2	0.512	25
3	212	54	2	2	0.512	25
3	212	54	3	2	0.512	25
3	212	54	2	2	0.512	25
3	213	42	1	3	0.362	53
3	213	42	1	3	0.362	53
3	213	42	3	3	0.362	53
3	213	42	1	3	0.362	53
3	214	65	3	3	0.615	48
3	214	65	4	3	0.615	48
3	214	65	3	3	0.615	48
3	215	61	3	3	0.628	47

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
3	215	61	3	3	0.628	47
3	215	61	2	3	0.628	47
3	216	48	2	3	0.362	53
3	216	48	3	3	0.362	53
3	216	48	2	3	0.362	53
3	217	51	2	3	0.362	53
3	217	51	3	3	0.362	53
3	217	51	2	3	0.362	53
3	218	65	1	3	0.628	47
3	218	65	3	3	0.628	47
3	218	65	2	3	0.628	47
3	219	40	1	3	0.362	53
3	219	40	2	3	0.362	53
3	219	40	1	3	0.362	53
3	220	83	4	4	0.688	66
3	220	83	5	4	0.688	66
3	220	83	4	4	0.688	66
3	221	91	5	5	0.651	87
3	221	91	5	5	0.651	87
3	221	91	5	5	0.651	87
3	222	83	3	4	0.641	67
3	222	83	4	4	0.641	67
3	222	83	3	4	0.641	67
3	223	72	3	3	0.615	48
3	223	72	3	3	0.615	48
3	223	72	4	3	0.615	48
3	223	72	3	3	0.615	48
3	224	42	2	3	0.362	53
3	224	42	1	3	0.362	53
3	224	42	3	3	0.362	53
3	224	42	3	3	0.362	53
3	225	52	3	3	0.362	53
3	225	52	2	3	0.362	53
3	225	52	3	3	0.362	53
3	225	52	3	3	0.362	53
3	226	51	3	3	0.362	53
3	226	51	2	3	0.362	53
3	226	51	3	3	0.362	53
3	226	51	2	3	0.362	53
3	227	83	3	3	0.615	48
3	227	83	4	3	0.615	48
3	227	83	4	3	0.615	48
3	227	83	3	3	0.615	48
3	228	82	3	4	0.641	67
3	228	82	4	4	0.641	67
3	228	82	4	4	0.641	67
3	228	82	2	4	0.641	67
3	229	72	3	3	0.615	48
3	229	72	3	3	0.615	48

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
3	229	72	4	3	0.615	48
3	229	72	3	3	0.615	48
3	230	71	3	3	0.615	48
3	230	71	4	3	0.615	48
3	230	71	4	3	0.615	48
3	230	71	4	3	0.615	48
3	231	92	4	5	0.651	87
3	231	92	5	5	0.651	87
3	231	92	5	5	0.651	87
3	231	92	5	5	0.651	87
3	232	91	4	5	0.651	87
3	232	91	4	5	0.651	87
3	232	91	5	5	0.651	87
3	232	91	4	5	0.651	87
3	233	54	3	3	0.362	53
3	233	54	2	3	0.362	53
3	233	54	3	3	0.362	53
3	233	54	3	3	0.362	53
3	234	82	4	4	0.688	66
3	234	82	4	4	0.688	66
3	234	82	4	4	0.688	66
3	234	82	4	4	0.688	66
3	235	48	2	3	0.628	47
3	235	48	3	3	0.628	47
3	235	48	2	3	0.628	47
3	236	91	4	4	0.688	66
3	236	91	5	4	0.688	66
3	236	91	5	4	0.688	66
3	237	64	3	3	0.628	47
3	237	64	4	3	0.628	47
3	237	64	3	3	0.628	47
3	238	46	2	3	0.362	53
3	238	46	1	3	0.362	53
3	238	46	3	3	0.362	53
3	238	46	2	3	0.362	53
3	239	61	3	3	0.628	47
3	239	61	3	3	0.628	47
3	239	61	4	3	0.628	47
3	239	61	3	3	0.628	47
3	240	81	4	4	0.641	67
3	240	81	4	4	0.641	67
3	240	81	4	4	0.641	67
3	240	81	4	4	0.641	67
3	241	71	2	3	0.429	51
3	241	71	4	3	0.429	51
3	241	71	3	3	0.429	51
3	242	81	4	4	0.688	66
3	242	81	4	4	0.688	66
3	242	81	4	4	0.688	66

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
3	243	50	1	3	0.362	53
3	243	50	3	3	0.362	53
3	243	50	2	3	0.362	53
3	244	61	2	3	0.429	51
3	244	61	4	3	0.429	51
3	244	61	3	3	0.429	51
3	245	52	2	2	0.512	25
3	245	52	3	2	0.512	25
3	245	52	2	2	0.512	25
3	246	81	5	4	0.641	67
3	246	81	4	4	0.641	67
3	246	81	4	4	0.641	67
3	247	73	3	3	0.615	48
3	247	73	4	3	0.615	48
3	247	73	4	3	0.615	48
3	248	46	2	2	0.512	25
3	248	46	4	2	0.512	25
3	248	46	2	2	0.512	25
3	249	63	3	3	0.615	48
3	249	63	3	3	0.615	48
3	249	63	3	3	0.615	48
3	250	52	2	3	0.429	51
3	250	52	4	3	0.429	51
3	250	52	3	3	0.429	51
3	251	79	2	2	0.667	26
3	251	79	4	2	0.667	26
3	251	79	2	2	0.667	26
3	252	41	2	3	0.362	53
3	252	41	3	3	0.362	53
3	252	41	2	3	0.362	53
3	253	62	3	3	0.628	47
3	253	62	2	3	0.628	47
3	253	62	4	3	0.628	47
3	253	62	3	3	0.628	47
3	254	82	4	4	0.688	66
3	254	82	4	4	0.688	66
3	254	82	5	4	0.688	66
3	254	82	4	4	0.688	66
3	255	45	2	3	0.362	53
3	255	45	1	3	0.362	53
3	255	45	3	3	0.362	53
3	255	45	2	3	0.362	53
3	256	41	2	2	0.512	25
3	256	41	2	2	0.512	25
3	256	41	3	2	0.512	25
3	256	41	2	2	0.512	25
3	257	36	1	3	0.362	53
3	257	36	1	3	0.362	53
3	257	36	3	3	0.362	53

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
3	257	36	1	3	0.362	53
3	258	65	3	3	0.615	48
3	258	65	3	3	0.615	48
3	258	65	4	3	0.615	48
3	258	65	3	3	0.615	48
3	259	34	2	3	0.362	53
3	259	34	1	3	0.362	53
3	259	34	3	3	0.362	53
3	259	34	1	3	0.362	53
3	260	91	4	5	0.651	87
3	260	91	5	5	0.651	87
3	260	91	5	5	0.651	87
3	260	91	5	5	0.651	87
3	261	71	3	3	0.615	48
3	261	71	3	3	0.615	48
3	261	71	5	3	0.615	48
3	261	71	3	3	0.615	48
3	262	40	1	3	0.362	53
3	262	40	3	3	0.362	53
3	262	40	2	3	0.362	53
3	263	54	3	3	0.362	53
3	263	54	3	3	0.362	53
3	263	54	2	3	0.362	53
3	264	49	3	3	0.429	51
3	264	49	3	3	0.429	51
3	264	49	2	3	0.429	51
3	265	73	4	3	0.615	48
3	265	73	4	3	0.615	48
3	265	73	4	3	0.615	48
3	266	52	2	2	0.512	25
3	266	52	4	2	0.512	25
3	266	52	3	2	0.512	25
3	267	73	4	4	0.641	67
3	267	73	4	4	0.641	67
3	267	73	2	4	0.641	67
3	268	91	5	5	0.651	87
3	268	91	5	5	0.651	87
3	268	91	5	5	0.651	87
3	269	91	4	5	0.651	87
3	269	91	5	5	0.651	87
3	269	91	4	5	0.651	87
3	270	44	2	2	0.512	25
3	270	44	3	2	0.512	25
3	270	44	3	2	0.512	25
3	271	71	3	3	0.628	47
3	271	71	3	3	0.628	47
3	271	71	4	3	0.628	47
3	271	71	3	3	0.628	47
3	272	83	3	5	0.651	87

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
3	272	83	5	5	0.651	87
3	272	83	5	5	0.651	87
3	272	83	4	5	0.651	87
3	273	64	3	1	0.286	14
3	273	64	1	1	0.286	14
3	273	64	4	1	0.286	14
3	273	64	2	1	0.286	14
3	274	82	3	4	0.641	67
3	274	82	3	4	0.641	67
3	274	82	4	4	0.641	67
3	274	82	3	4	0.641	67
3	275	91	4	4	0.641	67
3	275	91	5	4	0.641	67
3	275	91	4	4	0.641	67
3	275	91	4	4	0.641	67
3	276	81	3	4	0.641	67
3	276	81	4	4	0.641	67
3	276	81	4	4	0.641	67
3	276	81	2	4	0.641	67
3	277	54	2	2	0.512	25
3	277	54	2	2	0.512	25
3	277	54	3	2	0.512	25
3	277	54	2	2	0.512	25
3	278	81	3	4	0.688	66
3	278	81	4	4	0.688	66
3	278	81	4	4	0.688	66
3	278	81	5	4	0.688	66
3	279	73	3	4	0.688	66
3	279	73	4	4	0.688	66
3	279	73	4	4	0.688	66
3	279	73	4	4	0.688	66
3	280	82	4	4	0.641	67
3	280	82	4	4	0.641	67
3	280	82	4	4	0.641	67
3	280	82	5	4	0.641	67
3	281	71	3	3	0.628	47
3	281	71	3	3	0.628	47
3	281	71	4	3	0.628	47
3	281	71	3	3	0.628	47
3	282	54	3	2	0.512	25
3	282	54	2	2	0.512	25
3	282	54	3	2	0.512	25
3	282	54	3	2	0.512	25
3	283	41	1	3	0.362	53
3	283	41	3	3	0.362	53
3	283	41	1	3	0.362	53
3	284	64	3	3	0.628	47
3	284	64	4	3	0.628	47
3	284	64	3	3	0.628	47

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
3	285	65	3	3	0.615	48
3	285	65	4	3	0.615	48
3	285	65	3	3	0.615	48
3	286	72	3	3	0.628	47
3	286	72	3	3	0.628	47
3	286	72	4	3	0.628	47
3	286	72	2	3	0.628	47
3	287	73	4	3	0.628	47
3	287	73	3	3	0.628	47
3	287	73	4	3	0.628	47
3	287	73	3	3	0.628	47
3	288	91	4	5	0.651	87
3	288	91	5	5	0.651	87
3	288	91	5	5	0.651	87
3	288	91	5	5	0.651	87
3	289	83	2	2	0.667	26
3	289	83	4	2	0.667	26
3	289	83	2	2	0.667	26
3	290	91	4	4	0.688	66
3	290	91	4	4	0.688	66
3	290	91	4	4	0.688	66
3	291	74	3	4	0.641	67
3	291	74	4	4	0.641	67
3	291	74	4	4	0.641	67
3	292	29	1	3	0.362	53
3	292	29	2	3	0.362	53
3	292	29	1	3	0.362	53
3	293	83	5	4	0.688	66
3	293	83	5	4	0.688	66
3	293	83	4	4	0.688	66
3	294	54	1	1	0.286	14
3	294	54	4	1	0.286	14
3	294	54	2	1	0.286	14
3	295	72	4	4	0.641	67
3	295	72	4	4	0.641	67
3	295	72	4	4	0.641	67
3	296	47	2	2	0.512	25
3	296	47	4	2	0.512	25
3	296	47	3	2	0.512	25
3	297	41	1	3	0.362	53
3	297	41	3	3	0.362	53
3	297	41	2	3	0.362	53
3	298	91	5	4	0.688	66
3	299	63	3	3	0.628	47
3	300	62	3	3	0.615	48

Table B-4 Listing of Expert Opinion Rating and Classification Tree Rating Along with the ODOT PCR and PCR Assigned to Represent the Ratings for Composite Pavement

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
4	301	73	3	3	0.537	49
4	301	73	4	3	0.537	49
4	301	73	3	3	0.537	49
4	302	81	4	4	0.500	70
4	302	81	4	4	0.500	70
4	302	81	4	4	0.500	70
4	303	54	3	3	0.537	49
4	303	54	3	3	0.537	49
4	303	54	3	3	0.537	49
4	304	47	2	2	0.588	28
4	304	47	3	2	0.588	28
4	304	47	2	2	0.588	28
4	305	72	3	3	0.537	49
4	305	72	3	3	0.537	49
4	305	72	3	3	0.537	49
4	306	61	3	1	0.478	10
4	306	61	3	1	0.478	10
4	306	61	3	1	0.478	10
4	307	54	3	2	0.588	28
4	307	54	3	2	0.588	28
4	307	54	2	2	0.588	28
4	308	49	1	1	0.786	4
4	308	49	3	1	0.786	4
4	308	49	1	1	0.786	4
4	309	53	1	3	0.537	49
4	309	53	3	3	0.537	49
4	309	53	2	3	0.537	49
4	310	91	4	4	0.722	86
4	310	91	5	4	0.722	86
4	310	91	4	4	0.722	86
4	311	81	4	3	0.556	48
4	311	81	4	3	0.556	48
4	311	81	4	3	0.556	48
4	312	57	2	2	0.588	28
4	312	57	4	2	0.588	28
4	312	57	2	2	0.588	28
4	313	91	4	3	0.556	48
4	314	45	1	2	0.588	28
4	315	91	3	4	0.722	86
4	316	82	3	3	0.556	48
4	316	82	4	3	0.556	48
4	316	82	4	3	0.556	48
4	317	72	2	3	0.478	51
4	317	72	4	3	0.478	51
4	317	72	3	3	0.478	51
4	318	62	2	3	0.537	49

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
4	318	62	3	3	0.537	49
4	318	62	3	3	0.537	49
4	319	48	1	1	0.478	10
4	319	48	1	1	0.478	10
4	319	48	2	1	0.478	10
4	319	48	2	1	0.478	10
4	320	83	4	5	0.447	89
4	320	83	3	5	0.447	89
4	320	83	4	5	0.447	89
4	320	83	4	5	0.447	89
4	321	72	3	3	0.556	48
4	321	72	3	3	0.556	48
4	321	72	4	3	0.556	48
4	321	72	3	3	0.556	48
4	322	52	1	1	0.478	10
4	322	52	3	1	0.478	10
4	322	52	2	1	0.478	10
4	323	47	1	1	0.478	10
4	323	47	3	1	0.478	10
4	323	47	2	1	0.478	10
4	324	72	3	3	0.556	48
4	324	72	3	3	0.556	48
4	324	72	3	3	0.556	48
4	325	66	3	3	0.537	49
4	325	66	3	3	0.537	49
4	325	66	3	3	0.537	49
4	325	66	2	3	0.537	49
4	326	66	2	3	0.537	49
4	326	66	2	3	0.537	49
4	326	66	3	3	0.537	49
4	326	66	2	3	0.537	49
4	327	48	2	1	0.478	10
4	327	48	1	1	0.478	10
4	327	48	3	1	0.478	10
4	327	48	1	1	0.478	10
4	328	48	2	1	0.478	10
4	328	48	1	1	0.478	10
4	328	48	3	1	0.478	10
4	328	48	2	1	0.478	10
4	329	48	3	2	0.588	28
4	329	48	1	2	0.588	28
4	329	48	3	2	0.588	28
4	329	48	1	2	0.588	28
4	330	54	3	1	0.478	10
4	330	54	1	1	0.478	10
4	330	54	3	1	0.478	10
4	330	54	2	1	0.478	10
4	331	81	4	4	0.900	82
4	331	81	4	4	0.900	82

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
4	331	81	4	4	0.900	82
4	331	81	4	4	0.900	82
4	332	82	4	4	0.722	86
4	332	82	3	4	0.722	86
4	332	82	4	4	0.722	86
4	332	82	4	4	0.722	86
4	333	55	3	4	0.722	86
4	333	55	1	4	0.722	86
4	333	55	4	4	0.722	86
4	333	55	3	4	0.722	86
4	334	71	3	3	0.556	48
4	334	71	2	3	0.556	48
4	334	71	4	3	0.556	48
4	334	71	4	3	0.556	48
4	335	90	3	5	0.447	89
4	335	90	4	5	0.447	89
4	335	90	5	5	0.447	89
4	335	90	4	5	0.447	89
4	336	91	4	5	0.447	89
4	336	91	5	5	0.447	89
4	336	91	5	5	0.447	89
4	336	91	5	5	0.447	89
4	337	73	3	3	0.556	48
4	337	73	3	3	0.556	48
4	337	73	4	3	0.556	48
4	338	47	2	1	0.478	10
4	338	47	3	1	0.478	10
4	338	47	1	1	0.478	10
4	339	73	3	3	0.537	49
4	339	73	4	3	0.537	49
4	339	73	3	3	0.537	49
4	340	55	1	1	0.786	4
4	340	55	3	1	0.786	4
4	340	55	2	1	0.786	4
4	341	62	3	2	0.588	28
4	341	62	4	2	0.588	28
4	341	62	3	2	0.588	28
4	342	56	2	2	0.588	28
4	342	56	4	2	0.588	28
4	342	56	2	2	0.588	28
4	343	91	4	5	0.447	89
4	343	91	5	5	0.447	89
4	343	91	5	5	0.447	89
4	343	91	5	5	0.447	89
4	344	73	3	3	0.537	49
4	344	73	3	3	0.537	49
4	344	73	3	3	0.537	49
4	344	73	3	3	0.537	49
4	345	70	3	3	0.537	49

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
4	345	70	4	3	0.537	49
4	345	70	4	3	0.537	49
4	345	70	3	3	0.537	49
4	346	55	2	2	0.588	28
4	346	55	2	2	0.588	28
4	346	55	4	2	0.588	28
4	346	55	2	2	0.588	28
4	347	70	2	2	0.588	28
4	347	70	2	2	0.588	28
4	347	70	4	2	0.588	28
4	347	70	2	2	0.588	28
4	348	66	3	3	0.537	49
4	348	66	2	3	0.537	49
4	348	66	3	3	0.537	49
4	348	66	3	3	0.537	49
4	349	43	2	1	0.478	10
4	349	43	1	1	0.478	10
4	349	43	2	1	0.478	10
4	349	43	2	1	0.478	10
4	350	54	2	1	0.478	10
4	350	54	1	1	0.478	10
4	350	54	3	1	0.478	10
4	350	54	1	1	0.478	10
4	351	48	3	3	0.537	49
4	351	48	1	3	0.537	49
4	351	48	3	3	0.537	49
4	351	48	2	3	0.537	49
4	352	91	3	5	0.447	89
4	352	91	5	5	0.447	89
4	352	91	4	5	0.447	89
4	353	54	1	1	0.786	4
4	353	54	4	1	0.786	4
4	353	54	1	1	0.786	4
4	354	83	4	4	0.722	86
4	354	83	4	4	0.722	86
4	354	83	4	4	0.722	86
4	355	91	5	4	0.722	86
4	355	91	4	4	0.722	86
4	355	91	4	4	0.722	86
4	356	72	3	3	0.537	49
4	356	72	3	3	0.537	49
4	356	72	3	3	0.537	49
4	357	82	4	4	0.722	86
4	357	82	4	4	0.722	86
4	357	82	4	4	0.722	86
4	358	65	3	4	0.722	86
4	358	65	4	4	0.722	86
4	358	65	2	4	0.722	86
4	359	70	3	3	0.537	49

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
4	359	70	4	3	0.537	49
4	359	70	2	3	0.537	49
4	360	62	3	2	0.588	28
4	360	62	4	2	0.588	28
4	360	62	2	2	0.588	28
4	361	61	1	1	0.786	4
4	361	61	3	1	0.786	4
4	361	61	2	1	0.786	4
4	362	40	1	1	0.478	10
4	362	40	3	1	0.478	10
4	362	40	1	1	0.478	10
4	363	82	3	4	0.500	70
4	363	82	4	4	0.500	70
4	363	82	4	4	0.500	70
4	364	62	1	3	0.537	49
4	364	62	3	3	0.537	49
4	364	62	2	3	0.537	49
4	365	91	4	5	0.447	89
4	365	91	4	5	0.447	89
4	365	91	3	5	0.447	89
4	366	77	2	4	0.500	70
4	366	77	4	4	0.500	70
4	366	77	3	4	0.500	70
4	367	91	3	4	0.833	83
4	367	91	4	4	0.833	83
4	367	91	4	4	0.833	83
4	368	82	3	3	0.556	48
4	368	82	4	3	0.556	48
4	368	82	3	3	0.556	48
4	369	83	4	4	0.900	82
4	369	83	4	4	0.900	82
4	369	83	3	4	0.900	82
4	370	91	4	3	0.556	48
4	370	91	5	3	0.556	48
4	370	91	3	3	0.556	48
4	371	81	4	4	0.722	86
4	371	81	5	4	0.722	86
4	371	81	4	4	0.722	86
4	372	92	4	4	0.722	86
4	372	92	4	4	0.722	86
4	372	92	4	4	0.722	86
4	373	81	4	3	0.556	48
4	373	81	3	3	0.556	48
4	373	81	4	3	0.556	48
4	373	81	3	3	0.556	48
4	374	49	3	1	0.478	10
4	374	49	1	1	0.478	10
4	374	49	3	1	0.478	10
4	374	49	2	1	0.478	10

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
4	375	91	5	5	0.447	89
4	375	91	5	5	0.447	89
4	375	91	4	5	0.447	89
4	375	91	5	5	0.447	89
4	376	49	3	1	0.478	10
4	376	49	1	1	0.478	10
4	376	49	3	1	0.478	10
4	376	49	2	1	0.478	10
4	377	82	3	3	0.556	48
4	377	82	3	3	0.556	48
4	377	82	3	3	0.556	48
4	377	82	3	3	0.556	48
4	378	62	3	2	0.588	28
4	378	62	3	2	0.588	28
4	378	62	3	2	0.588	28
4	378	62	3	2	0.588	28
4	379	52	3	1	0.478	10
4	379	52	1	1	0.478	10
4	379	52	3	1	0.478	10
4	379	52	1	1	0.478	10
4	380	63	3	2	0.588	28
4	380	63	2	2	0.588	28
4	380	63	3	2	0.588	28
4	380	63	2	2	0.588	28
4	381	41	1	1	0.478	10
4	381	41	1	1	0.478	10
4	381	41	4	1	0.478	10
4	381	41	1	1	0.478	10
4	382	71	3	3	0.537	49
4	382	71	2	3	0.537	49
4	382	71	4	3	0.537	49
4	382	71	3	3	0.537	49
4	383	61	3	2	0.588	28
4	383	61	2	2	0.588	28
4	383	61	3	2	0.588	28
4	383	61	3	2	0.588	28
4	384	71	3	3	0.556	48
4	384	71	3	3	0.556	48
4	384	71	4	3	0.556	48
4	384	71	4	3	0.556	48
4	385	64	1	3	0.537	49
4	385	64	3	3	0.537	49
4	385	64	2	3	0.537	49
4	386	72	3	3	0.478	51
4	386	72	4	3	0.478	51
4	386	72	3	3	0.478	51
4	387	91	5	4	0.722	86
4	387	91	5	4	0.722	86
4	387	91	5	4	0.722	86

Pavement Type	Pavement Number	ODOT PCR	4-Lane Rating	Classification Tree Rating	Classification Tree Probability	Representative PCR
4	388	51	2	3	0.478	51
4	388	51	3	3	0.478	51
4	388	51	2	3	0.478	51
4	389	82	4	3	0.556	48
4	389	82	4	3	0.556	48
4	389	82	4	3	0.556	48
4	390	53	1	1	0.478	10
4	390	53	3	1	0.478	10
4	390	53	2	1	0.478	10
4	391	48	2	2	0.588	28
4	391	48	3	2	0.588	28
4	391	48	3	2	0.588	28
4	391	48	2	2	0.588	28
4	392	56	1	1	0.786	4
4	392	56	1	1	0.786	4
4	392	56	3	1	0.786	4
4	392	56	1	1	0.786	4
4	393	46	2	1	0.478	10
4	393	46	2	1	0.478	10
4	393	46	3	1	0.478	10
4	393	46	2	1	0.478	10
4	394	62	3	3	0.537	49
4	394	62	1	3	0.537	49
4	394	62	3	3	0.537	49
4	394	62	2	3	0.537	49
4	395	63	2	3	0.478	51
4	395	63	3	3	0.478	51
4	395	63	3	3	0.478	51
4	395	63	1	3	0.478	51
4	396	71	3	3	0.478	51
4	396	71	3	3	0.478	51
4	396	71	3	3	0.478	51
4	396	71	2	3	0.478	51
4	397	47	2	1	0.786	4
4	397	47	1	1	0.786	4
4	397	47	3	1	0.786	4
4	397	47	1	1	0.786	4
4	398	53	2	2	0.588	28
4	398	53	2	2	0.588	28
4	398	53	3	2	0.588	28
4	398	53	2	2	0.588	28
4	399	90	4	5	0.447	89
4	399	90	5	5	0.447	89
4	399	90	5	5	0.447	89
4	399	90	5	5	0.447	89
4	400	55	2	1	0.478	10