APPENDIX Q
CRCP IMPACT ANALYSIS

Introduction

This appendix provides statistics of the 2011 PMIS pavement distress and condition scores using the recalibrated distress utility curves for CRCP pavements. The impact analysis shows the effects of the recalibrated distress utility curves on the total lane miles for each of the five pavement condition categories: very good, good, fair, poor, and very poor.

Methodology

Distress scores were recalculated using the coefficients of the recalibrated distress utility curves for CRCP. The total number of miles in each pavement condition category were calculated for each pavement type and shown in summary tables and graphs.

The statistical analysis reflects the changes in the distress and condition scores produced by the recalibrated distress utility coefficients. The current ride utility coefficients were used to calculate the condition scores. The recalibrated utility coefficients are used in the following formula to calculate the distress utility value:

$$U_i = 1 - \alpha * e^{-\left[\left(\frac{\rho}{L_i}\right)^{\beta}\right]}, \quad \text{when } L_I > 0$$

$$\text{And } U_i = 1, \qquad \text{when } L_I = 0.$$

Where:

Ui = Utility value for distress type.

e = base of the natural logarithms.

α = Alpha coefficient for utility equation.

ρ = Rho coefficient for utility equation.

Li = Level of distress for a distress type.

β = Beta coefficient for utility equation.

Table Q1 shows the coefficients for the current and recalibrated utility coefficients for CRCP.

Table Q1. Distress Utility Coefficients for CRCP.

Distress Type	Alpha (α)		Beta (β)		Rho (ρ)	
	Current	Recalibrated	Current	Recalibrated	Current	Recalibrated
Spalled Cracks	1.0000	0.9899	0.6900	0.5102	106.0000	62.7000
Punchouts	0.9849	0.7682	1.0000	0.9482	5.1400	2.9121
ACP Patches	0.9849	1.5974	1.0000	0.2452	5.1400	50.0000
PCC Patches	0.8649	0.8991	1.0000	0.6581	8.2000	13.6109

Tables Q2 and Q3 show a description of each distress and condition score class. For the impact analysis, the total number of miles that fall in the category of "Good" or better condition were calculated with the current and recalibrated distress utility curve using 2011 PMIS data after calculating distress and condition score with the proposed and actual coefficients.

Table Q2. PMIS Distress Score Classes.

Distress Score	Class	Description
90-100	"A"	Very Good
80-89	"B"	Good
70-79	"C"	Fair
60-69	"D"	Poor
1-59	"F"	Very Poor

Table Q3. PMIS Condition Score Classes.

Distress Score	Class	Description
90-100	"A"	Very Good
70-89	"B"	Good
50-69	"C"	Fair
35-49	"D"	Poor
1-34	"F"	Very Poor

Summary of Statistical Findings

A summary of the statistical findings for the statewide overall network condition is presented below. Tables Q4 and Q5 show the percent difference of lane miles by using the proposed coefficients.

Table Q4. Comparison of CRCP Lane Miles with Distress Score ≥ 80.

	Current Distress Utility Curves	Recalibrated Distress Utility Curves
Lane Miles with Distress Score ≥ 80	12159.6	11990.9
Total Statewide CRCP Lane Miles	13447.1	13447.1
% Lane Miles in "Good" or Better Condition	90.43%	89.17%
% Difference	**-1.25%**	
No. of Sections with Distress Score ≥ 80	10184	10059
Total Statewide CRCP Sections	11328	11328
% of Sections in "Good" or better Condition	89.90%	88.80%
% Difference	**-1.10%**	

*2011 PMIS Data – Roadbed ID K, L, R, A, and X.

*2011 PMIS Data – Roadbed ID K, L, R, A, and X.

Table Q5. Comparison of CRCP Lane Miles with Condition Score ≥ 70.

	Current Distress UtilityCurves	Recalibrated Distress UtilityCurves
Lane Miles with Condition Score ≥ 70	12471.9	12440.9
Total Statewide CRCP Lane Miles	13447.1	13447.1
% Lane Miles in "Good" or Better Condition	90.43%	89.17%

% Difference	**-1.25%**	
No. of Sections with Condition Score ≥ 70	10445	10422
Total Statewide CRCP Sections	11328	11328
% of Sections in "Good" or better Condition	92.21%	92.00%
% Difference	**-0.20%**	

*2011 PMIS Data – Roadbed ID K, L, R, A, and X.

*2011 PMIS Data – Roadbed ID K, L, and R.

Figure Q1 shows the total statewide lane miles under each distress score category for CRCP.

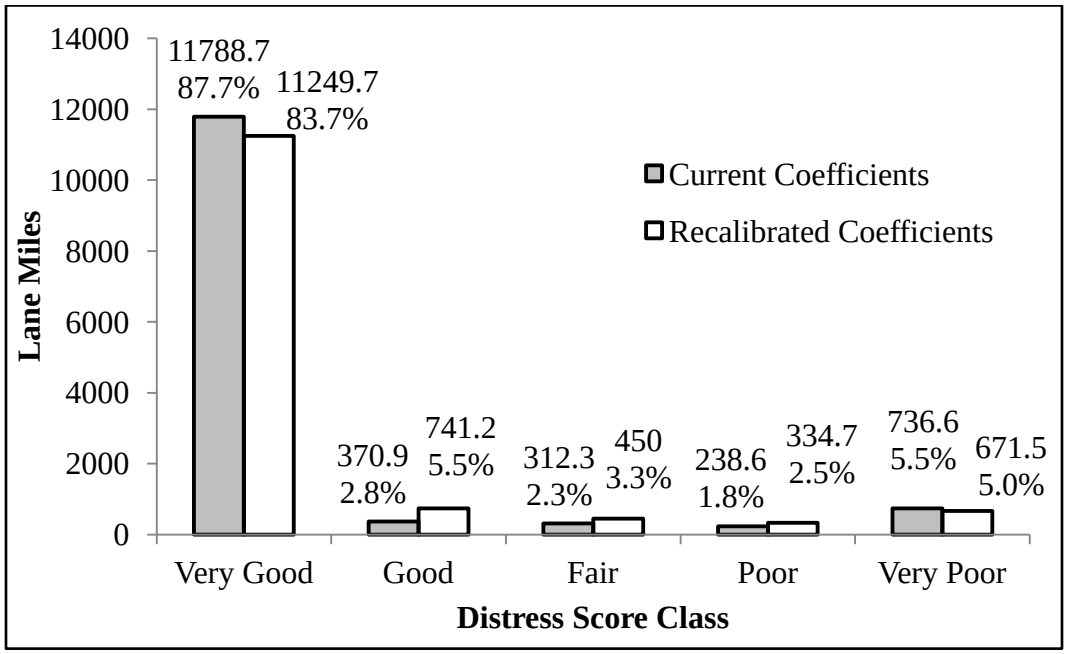

Figure Q1. 2011 Lane Miles per Distress Score Category for CRCP.

Figure Q2 shows the total statewide lane miles under each condition score category for CRCP.

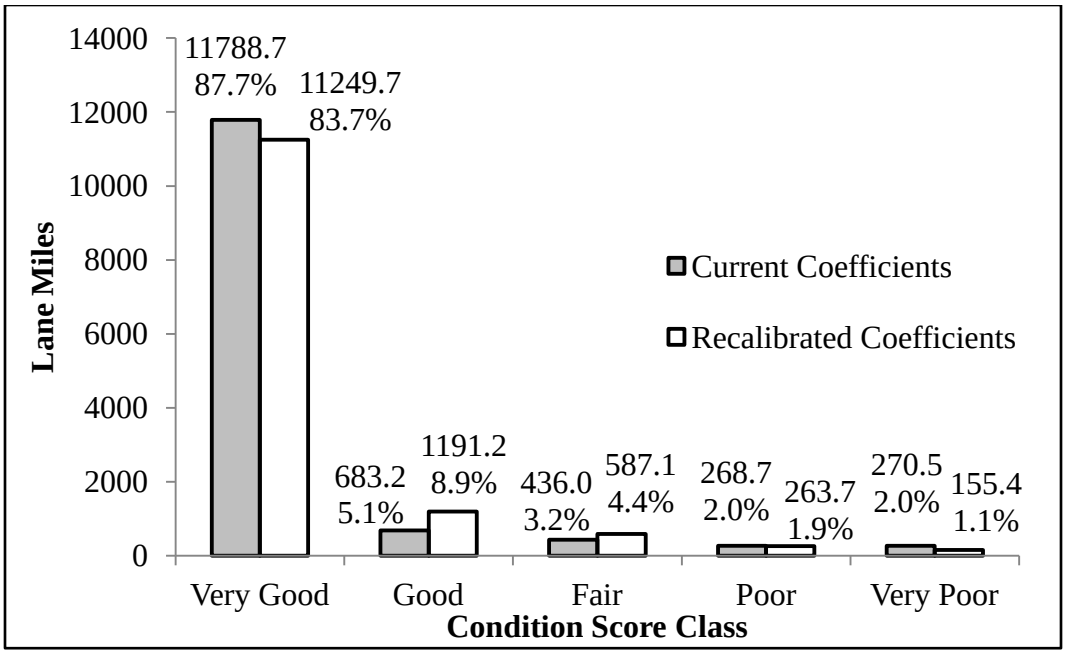

Figure Q2. 2011 Lane Miles per Condition Score Category for CRCP.

The influence of each recalibrated distress utility curve has on the overall condition is presented in Table Q6, showing the total lane miles with distress score of 80 or above, when we use the recalibrated coefficients for one distress and keep other distresses with current coefficients. For CRCP the total number of miles with the current coefficient and distress score of 80 or above is 12,159.6.

Table Q6. 2011 CRCP Lane Miles with Distress Score ≥ 80.

Distress Type	Recalibrated Coefficients	% Difference
Spalled Cracks	**12046.8**	**-0.93%**
Punchouts	**12077.1**	**-0.68%**
ACP Patches	**12150.1**	**-0.08%**
PCC Patches	**12294.1**	**1.11%**

Figures Q3 shows a comparison of lane miles with the influence that each individual distress for CRCP present with the recalibrated utility coefficients.

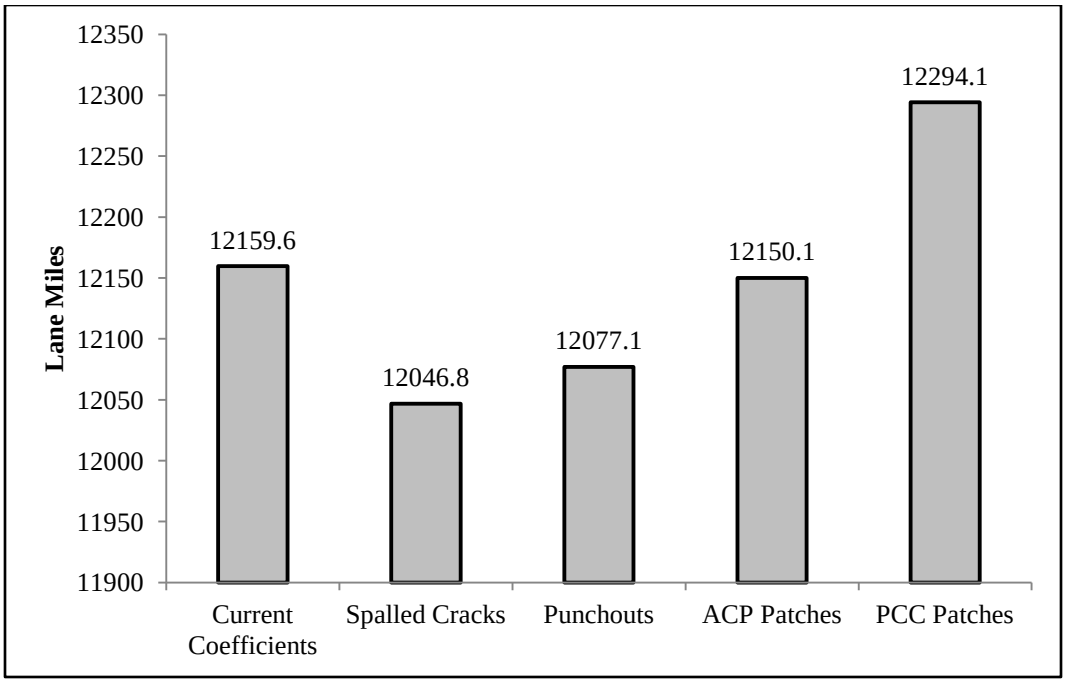

Figure Q3. 2011 CRCP Lane Miles with Distress Score ≥ 80.