APPENDIX S
JCP IMPACT ANALYSIS

Introduction

This appendix provides statistics of the 2011 PMIS pavement distress and condition scores using the recalibrated distress utility curves for JCP 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 JCP. 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:

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

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

Where:

U_i = Utility value for distress type.
e = base of the natural logarithms.
α = Alpha coefficient for utility equation.
ρ = Rho coefficient for utility equation.
L_i = Level of distress for a distress type.
β = Beta coefficient for utility equation.

Table S1 shows the coefficients for the current and recalibrated utility coefficients for CRCP.

Table S1. Distress Utility Coefficients for JCP.

Category	Traffic Category	Original α	Original β	Original ρ	Updated α	Updated β	Updated ρ
Condition Score	Low	1.818	1	58.5	1.37	0.75	89
	Medium	1.76	1	48.1	1.37	0.75	89
	High	1.73	1	41	1.67	0.74	76
Failed Joints and Cracks	Low	0.53	1	21.4	0.56	0.98	33.38
	Medium	0.53	1	21.4	0.78	0.82	33.56
	High	0.53	1	21.4	0.91	0.67	31.05
Failures	Low	1.46	1	22.15	1.1	0.98	33.38
	Medium	1.46	1	22.15	1.1	0.97	29.87
	High	1.46	1	22.15	1.1	0.89	24.12
PCC Patches	Low	1.07	1	24.24	0.9	1.3	65
	Medium	1.07	1	24.24	1.1	0.99	64
	High	1.07	1	24.24	1.32	0.89	56
Slabs with Longitudinal Cracks	Low	1.0058	1	47.8	1.03	0.65	57.21
	Medium	1.0058	1	47.8	0.97	0.71	37.98
	High	1.0058	1	47.8	1.01	0.71	31.12
Shattered Slabs	Low	1.2	1.0	16.3	1.1	0.4	23.0
	Medium	1.2	1.0	16.3	1.1	0.5	18.2
	High	1.2	1.0	16.3	1.1	0.5	12.2

Tables S2 and S3 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 S2. 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 S3. PMIS Condition Score Classes.

Condition 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 S4 and S5 show the percent difference of lane miles by using the proposed coefficients.

Table S4. Comparison of JCP Lane Miles with Distress Score ≥ 80.

	Current Distress Utility Curves	Recalibrated Distress Utility Curves
Lane Miles with Distress Score ≥ 80	2924.9	3125.7
Total Statewide JCP Lane Miles	3829.4	3829.4
% Lane Miles in "Good" or Better Condition	76.38%	81.62%
% Difference	**5.24%**	
No. of Sections with Distress Score ≥ 80	2628	2809
Total Statewide JCP Sections	3485	3485
% of Sections in "Good" or better Condition	75.41%	80.60%
% Difference	**5.19%**	

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

Table S5. Comparison of JCP Lane Miles with Condition Score ≥ 70.

	Current Distress Utility Curves	Recalibrated Distress Utility Curves
Lane Miles with Condition Score ≥ 70	2103.5	2303.4
Total Statewide JCP Lane Miles	3695.4	3695.4
% Lane Miles in "Good" or Better Condition	56.92%	62.33%
% Difference	**5.41%**	
No. of Sections with Condition Score ≥ 70	1847	2035
Total Statewide JCP Sections	3287	3287
% of Sections in "Good" or better Condition	56.19%	61.91%
% Difference	**5.72%**	

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

Figure S1 shows the total statewide lane miles under each distress score category for JCP.

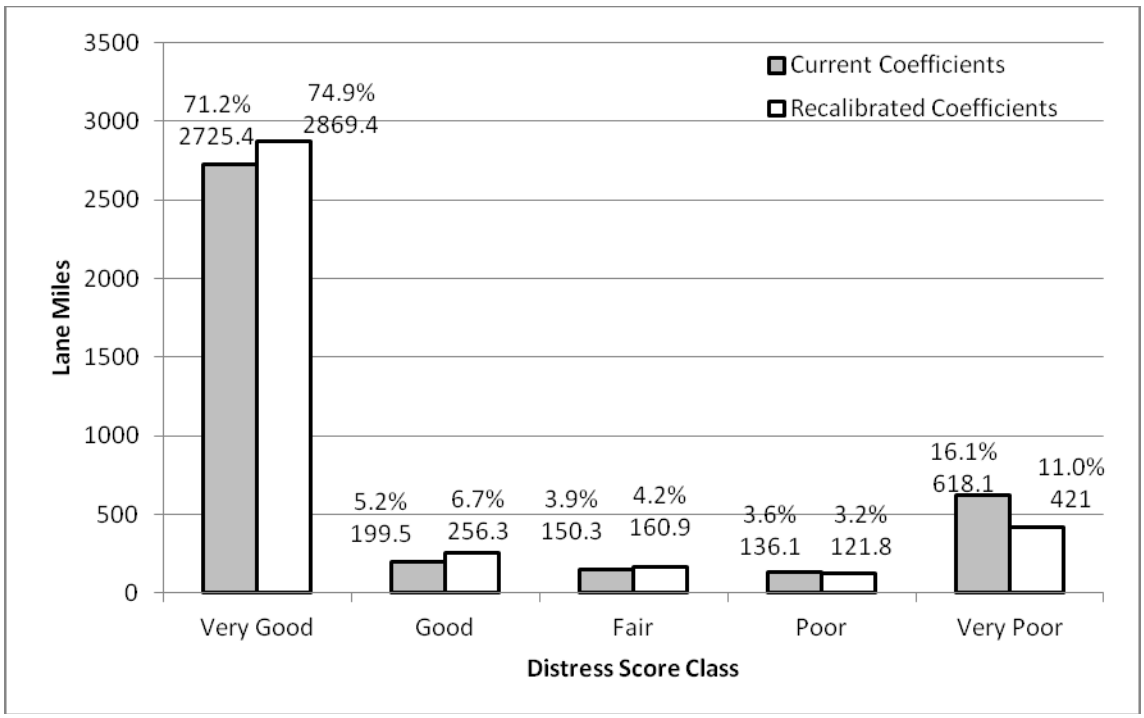

Figure S1. 2011 Lane Miles per Distress Score Category for JCP.

Figure S2 shows the total statewide lane miles under each condition score category for JCP.

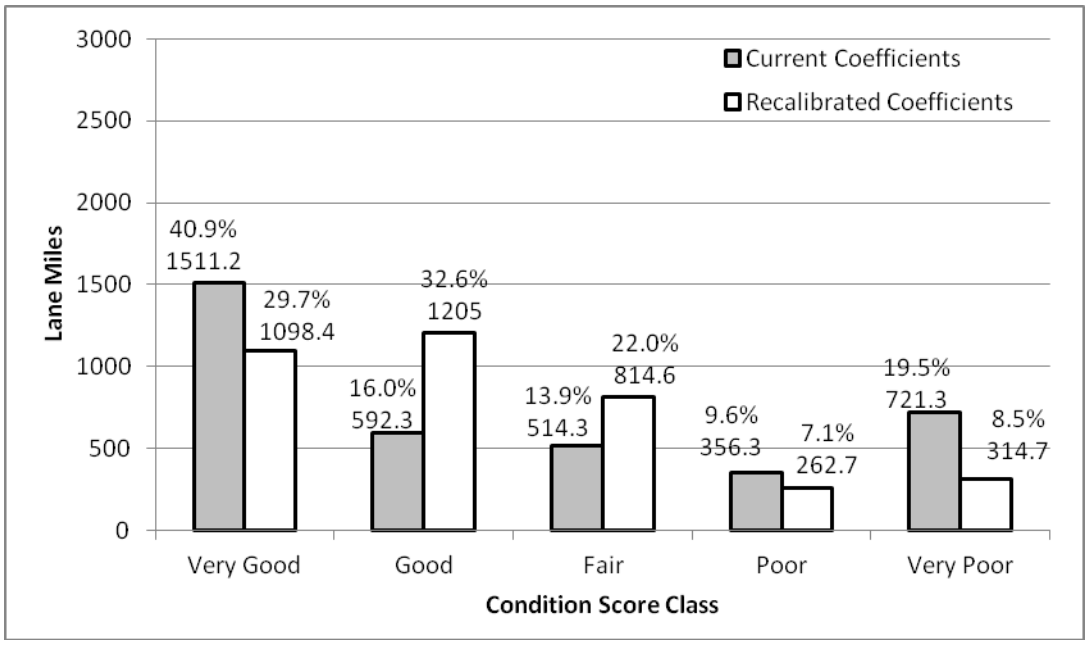

Figure S2. 2011 Lane Miles per Condition Score Category for JCP.

The influence of each recalibrated distress utility curve has on the overall condition is presented in Table S6, 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

JCP the total number of lane miles with the current coefficient and distress score of 80 or above is 2,949.2.

Table S6. 2011 JCP Lane Miles with Distress Score ≥ 80.

Distress Type	Total Number of Distresses	Recalibrated Coefficients	% Difference
Failed Joints and Cracks	7772	2913.5	−0.39%
Failures	6192	2971.1	1.58%
PCC Patches	15360	3114.2	6.47%
Longitudinal Cracks	6059	2897.4	−0.94%
Shattered Slabs	95	2924.9	0.00%

Figure S3 shows a comparison of lane miles with the influence that each individual distress for JCP presents with the recalibrated utility coefficients.

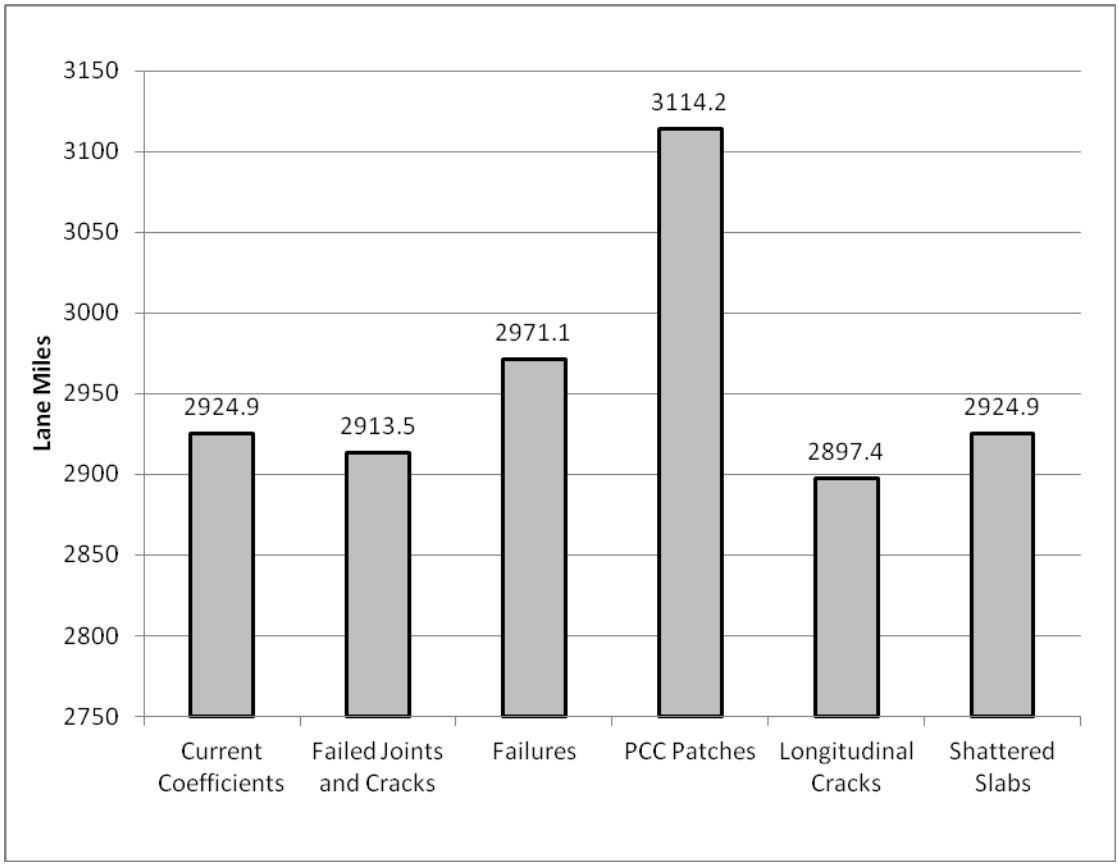

Figure S3. 2011 JCP Lane Miles with Distress Score ≥ 80.