APPENDIX X
SUMMARY OF EXPERTS' RESPONSES AND DATA ANALYSIS FOR CRCP UTILITY CURVES

Table X1.Expert Opinions about PMIS High/Low Limits.

FC			ADT/L	Abbas	Darlene	David	Elizabeth	Mike	Ron	Stacey	Tomas
Rural	1	Rural Interstate	7,500	ok	Ok	ok	ok	ok	ok	ok	10,000
	2	Rural Principal Arterial (Other)	7,500	ok	Ok	ok	ok	ok	ok	ok	ok
	6	Rural Minor Arterial	3,000	ok	Ok	ok	ok	ok	ok	ok	ok
	7	Rural Major Collector	2,000	ok	Ok	ok	ok	ok	ok	ok	ok
	8	Rural Minor Collector	2,000	ok	Ok	ok	ok	ok	ok	ok	ok
	9	Rural Local	2,000	ok	ok	ok	ok	ok	ok	ok	1,000
Urban	11	Urban Principal Arterial (Interstate)	7,500	ok	ok	ok	8,250	15,000*	ok	ok	10,000
	12	Urban Principal Arterial (Other Freeway)	7,500	ok	ok	ok	ok	15,000*	ok	ok	ok
	14	Urban Principal Arterial (Other)	7,500	ok	ok	ok	ok	10,000*	ok	ok	ok
	16	Urban Minor Arterial	3,000	ok	ok	ok	ok	4,000*	ok	ok	ok
	17	Urban Collector	2,000	ok	ok	ok	ok	3,000*	ok	ok	ok
	19	Urban Local	2,000	ok	ok	ok	ok	3,000*	ok	ok	1,000

*These numbers are in respect to a metropolitan area

Table X2. Treatments by PMIS Treatment Level according to CRCP Experts.

	Abbas Mehdibeigi	Darlene Goehl	David Wagner	Elizabeth Lukefahr	Mike Alford	Ron Baker	Stacey Young	Tomas Saenz
PM	Seal coats; thin overlay (<2"); micro surfacing	Spot Repair	NA	Joint Sealing	Sealing joints; minimal full depth; minimal spall repair	Joint Repair	Joint Repair	NA
LRhb	Overlay (between 2" and 3"); base repair and seal coat; mill, seal and thin overlay; widening and seal coat	Thin Overlay (2")	Partial Depth Repair	Diamond grinding; surface restoration	Extensive full depth, extensive spall repair	Milling for Ride	Milling for Ride	Micro mill; asphalt patch/partial
MRhb	Overlay (between 3" and 5"); mill and inlay; mill, slab, base and seal; level up and overlay; base repair and overlay	Spot Repair, Thick Overlay (3")	Full Depth Repair, Diamond Grind for texture only, Shot Blast	Diamond grinding and surface restoration depending on percentage of roadway affected; full depth repair; patching	Thin bonded concrete overlay, (3-4")	Bonded Overlay (PFC), Patching	Bonded Overlay (PFC), Patching	Asphalt patch, full depth; concrete partial
HRhb	Reconstruction; rework (bomag) base and overlay	Thick Overlay (4" or more), Hot mix overlays	Overlay (either asphalt or concrete), Repave over existing concrete (9" or more)	Extensive full depth repair or overlay	Unbounded overlay over existing pavement (10")	Reconstruction	Reconstruction	Full depth patch-concrete; fix faulting

Table X3. Rank and Average Trigger Values of Input Factor Compiled Data for High ADT/L Sections.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Ride Score	1	> 3.4	1	< 3.4	1	< 2.8	1	< 2.3
Distress Score	2	> 83	2	< 83	2	< 72	2	< 63
Condition Score	3	> 80	3	< 80	3	< 71	3	< 63
Punchouts per mile	4	≤ 2	4	> 2	4	> 4	5	> 7
PUNPAT/M	5	≤ 9	5	≤ 12	5	≤ 15	4	> 15
Spalled Cracks per mile	6	≤ 44	6	≤ 55	6	> 55	6	> 60
Other (deterioration model for Darlene and Failed Patch for Lisa)	7	-	7	-	7	-	7	-
Average Crack Spacing Rating	8	7	8	6	8	5	8	4
Average County Rainfall	9	25	9	26	9	30	9	39

Table X4. Rank and Average Trigger Values of Input Factor Compiled Data for Low ADT/L Sections.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Ride Score	1	> 3.2	1	< 3.2	1	< 2.6	1	< 2.1
Distress Score	2	> 79	2	< 79	2	< 71	2	< 63
Condition Score	3	> 78	3	< 78	3	< 70	3	< 63
Punchouts per mile	4	≤ 3	4	> 3	5	> 4	4	> 7
PUNPAT/M	5	≤ 12	5	≤ 14	4	≤ 17	5	> 17
Spalled Cracks per mile	6	≤ 50	6	≤ 57	6	> 57	6	> 63
Other (deterioration model for Darlene and Failed Patch for Lisa)	7	-	7	-	7	-	7	-
Average Crack Spacing Rating	8	7	8	5	8	20	8	3
Average County Rainfall	9	26	9	29	9	32	9	38

Abbas Mehdibeigi- Transportation Engineer

CRCP Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	1	Rural Interstate	7,500	ok
	2	Rural Principal Arterial (Other)	7,500	ok
	6	Rural Minor Arterial	3,000	ok
	7	Rural Major Collector	2,000	ok
	8	Rural Minor Collector	2,000	ok
	9	Rural Local	2,000	ok
Urban	11	Urban Principal Arterial (Interstate)	7,500	ok
	12	Urban Principal Arterial (Other Freeway)	7,500	ok
	14	Urban Principal Arterial (Other)	7,500	ok
	16	Urban Minor Arterial	3,000	ok
	17	Urban Collector	2,000	ok
	19	Urban Local	2,000	ok

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

We gear the treatment toward the specific problem and causes of that problem rather than the classification. Furthermore, this holds true unless it is a routine maintenance treatment.

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments for CRCP under each treatment type category.

Treatment Type Category	Treatments
PM	Seal coats; thin overlay (<2"); micro surfacing
LR	Overlay (between 2" and 3"); base repair and seal coat; mill, seal and thin overlay; widening and seal coat
MR	Overlay (between 3" and 5"); mill and inlay; mill, slab, base and seal; level up and overlay; base repair and overlay
HR	Reconstruction; rework (bomag) base and overlay

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating	6	6	4	5	4	4	4	4
Condition Score	1	95	1	90	1	85	1	80
Distress Score	3	90	3	85	3	80	3	75
Ride Score	2	4	2	3.5	2	3.0	2	2.5
Spalled Cracks per mile	8	150	7	180	6	190	7	200
Punchouts per mile	4	8	5	9	5	10	6	12
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	5	40	6	50	7	55	5	65
Average County Rainfall	7	40	8	40	8	40	8	40
Other (Failed Patch)								
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating	4	5	4	4	4	35	6	3
Condition Score	1	90	1	85	1	80	1	75
Distress Score	3	85	3	80	3	75	3	70
Ride Score	2	3.5	2	3.0	2	2.5	2	2.0
Spalled Cracks per mile	7	180	6	190	7	200	7	210
Punchouts per mile	5	9	5	10	6	12	4	14
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	6	50	7	55	5	60	5	65
Average County Rainfall	8	40	8	40	8	40	8	40
Other (Failed Patch)								
Other								

***Lower trigger values are expected for sections with a low ADT/L.**

Darlene Goehl- Pavement Engineer

CRCP Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	**1**	Rural Interstate	7,500	ok
	2	Rural Principal Arterial (Other)	7,500	ok
	6	Rural Minor Arterial	3,000	ok
	7	Rural Major Collector	2,000	ok
	8	Rural Minor Collector	2,000	ok
	9	Rural Local	2,000	ok
Urban	**11**	Urban Principal Arterial (Interstate)	7,500	ok
	12	Urban Principal Arterial (Other Freeway)	7,500	ok
	14	Urban Principal Arterial (Other)	7,500	ok
	16	Urban Minor Arterial	3,000	ok
	17	Urban Collector	2,000	ok
	19	Urban Local	2,000	ok

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

All the sections are looked at the same regardless of the functional class.

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments for CRCP under each treatment type category.

Treatment Type Category	Treatments
PM	Spot Repair
LR	Thin Overlay (2")
MR	Spot Repair, Thick Overlay (3")
HR	Thick Overlay (4" or more), Hot mix overlays

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Comment: I think we need to review the definition of punchout and break that into 2 categories: one for failure and one for connected cracking that has not "faulted."

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Condition Score								
Distress Score	1	80	1	70	1	60	1	50
Ride Score	3	100	3	125	3	150	3	170
Spalled Cracks per mile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Punchouts per mile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average County Rainfall								
Other - add deterioration model	2		2		2		2	
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Condition Score								
Distress Score	1	80	1	70	1	60	1	50
Ride Score	3	125	3	150	3	170	3	200
Spalled Cracks per mile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Punchouts per mile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average County Rainfall								
Other - add deterioration model	2		2		2		2	
Other								

David Wagner- District Pavement Management Engineer

CRCP Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	1	Rural Interstate	7,500	ok
	2	Rural Principal Arterial (Other)	7,500	ok
	6	Rural Minor Arterial	3,000	ok
	7	Rural Major Collector	2,000	ok
	8	Rural Minor Collector	2,000	ok
	9	Rural Local	2,000	ok
Urban	11	Urban Principal Arterial (Interstate)	7,500	ok
	12	Urban Principal Arterial (Other Freeway)	7,500	ok
	14	Urban Principal Arterial (Other)	7,500	ok
	16	Urban Minor Arterial	3,000	ok
	17	Urban Collector	2,000	ok
	19	Urban Local	2,000	ok

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

Sections are looked at differently in the treatment selection process according to the different functional classes. Nevertheless, ADT and functional class are not the major factors looked at during the treatment selection process. If the level of distress is the same for two CRCP sections candidate for treatment, then ADT is used as the final deciding factor to determine which section will receive treatment. If ADT is also similar, then the functional class will be used to make the final decision.

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments for CRCP under each treatment type category.

Treatment Type Category	Treatments
PM	NA
LR	Partial Depth Repair
MR	Full Depth Repair, Diamond Grind for texture only, Shot Blast
HR	Overlay (either asphalt or concrete), Repave over existing concrete (9" or more)

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating*								
Condition Score	4	>70	4	<70	4	<70	4	<70
Distress Score	3	-	3	-	3	-	3	-
Ride Score**								
Spalled Cracks per mile	5	≤40	5	≤50	5	>50	5	>50
Punchouts per mile	2	=0	2	>0	2	>0	2	>0
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	1	≤6	1	≤6	1	≤6	1	≤6
Average County Rainfall*								
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating*								
Condition Score	4	>70	4	<70	4	<70	4	<70
Distress Score	3	-	3	-	3	-	3	-
Ride Score**								
Spalled Cracks per mile	5	≤40	5	≤50	5	>50	5	>50
Punchouts per mile	2	=0	2	>0	2	>0	2	>0
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	1	≤8	1	≤8	1	≤8	1	≤8
Average County Rainfall*								
Other								

*ACS and the Average County rainfall are not used as factors in the treatment selection process.

**Ride Score is not a factor in the treatment selection process. The reason for this is that treating for Ride Score is not effective given that Ride Score is hard to improve in CRCP.

Elizabeth Lukefahr- Rigid Pavements Branch Manager

CRCP Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	1	Rural Interstate	7,500	ok
	2	Rural Principal Arterial (Other)	7,500	ok
	6	Rural Minor Arterial	3,000	ok
	7	Rural Major Collector	2,000	ok
	8	Rural Minor Collector	2,000	ok
	9	Rural Local	2,000	ok
Urban	11	Urban Principal Arterial (Interstate)	7,500	8,250
	12	Urban Principal Arterial (Other Freeway)	7,500	ok
	14	Urban Principal Arterial (Other)	7,500	ok
	16	Urban Minor Arterial	3,000	ok
	17	Urban Collector	2,000	ok
	19	Urban Local	2,000	ok

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

There is a difference in treatment selection between a section with a rural interstate functional class and a rural principal arterial. Rural functional classes 6 through 9 do not have a significant number of CRC pavement sections, so judgment in the difference in treatment selection cannot be made. A difference in treatment selection also exists between the different urban functional classes. The guidelines applied to sections located in urban areas are stricter; therefore they are given more priority.

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments for CRCP under each treatment type category.

Treatment Type Category	Treatments
PM	Joint Sealing
LR	Diamond grinding; surface restoration
MR	Diamond grinding and surface restoration depending on percentage of roadway affected; full depth repair; patching
HR	Extensive full depth repair or overlay

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating								
Condition Score	4		4		4		4	
Distress Score	5		5		5		5	
Ride Score	2		2		2		2	
Spalled Cracks per mile	3		3		3		3	
Punchouts per mile								
Punchouts per mile+ACP Patches per mile+PCC Patches per mile								
Average County Rainfall								
Other (Failed Patch)	1		1		1		1	
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating								
Condition Score	4		4		4		4	
Distress Score	5		5		5		5	
Ride Score	2		2		2		2	
Spalled Cracks per mile	3		3		3		3	
Punchouts per mile								
Punchouts per mile+ACP Patches per mile+PCC Patches per mile								
Average County Rainfall								
Other (Failed Patch)	1		1		1		1	
Other								

***Lower trigger values are expected for sections with a low ADT/L.**

Mike Alford- TxDOT Director of Maintenance

CRCP Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	1	Rural Interstate	7,500	ok
	2	Rural Principal Arterial (Other)	7,500	ok
	6	Rural Minor Arterial	3,000	ok
	7	Rural Major Collector	2,000	ok
	8	Rural Minor Collector	2,000	ok
	9	Rural Local	2,000	ok
Urban	11	Urban Principal Arterial (Interstate)	7,500	15,000*
	12	Urban Principal Arterial (Other Freeway)	7,500	15,000*
	14	Urban Principal Arterial (Other)	7,500	10,000*
	16	Urban Minor Arterial	3,000	4,000*
	17	Urban Collector	2,000	3,000*
	19	Urban Local	2,000	3,000*

*These numbers are in respect to a metropolitan area.

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

Treatment selection is based on what needs to be done rather than ADT or functional class. If there is a budget constrain, then you consider treating sections with more important functional class first.

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments for CRCP under each treatment type category.

Treatment Type Category	Treatments
PM	Sealing joints; minimal full depth; minimal spall repair
LR	Extensive full depth, extensive spall repair
MR	Thin bonded concrete overlay, (3-4")
HR	Unbounded overlay over existing pavement (10")

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating								
Condition Score	6	≥70	6	≥50	6	≥35	6	≤35
Distress Score	4	≥80	4	≥70	4	≥60	4	≤60
Ride Score	5	≥3.0	5	≥2	5	≥1	5	≤1
Spalled Cracks per mile	3	≤50	3	≤50	3	>50	3	>50
Punchouts per mile	1	0	1	≥0	1	≥5	1	≥10
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	2	6	2	≤6	2	≤6	2	>10
Average County Rainfall								
Other (Failed Patch)								
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating								
Condition Score	6	≥70	6	≥50	6	≥35	6	≤35
Distress Score	4	≥80	4	≥70	4	≥60	4	≤60
Ride Score	5	≥3.0	5	≥2	5	≥1	5	≤1
Spalled Cracks per mile	3	≤50	3	≤50	3	>50	3	>50
Punchouts per mile	1	0	1	≥0	1	≥5	1	≥10
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	2	6	2	≤6	2	≤6	2	>10
Average County Rainfall								
Other (Failed Patch)								
Other								

Stacey Young- Transportation Engineer

Ron Baker- Director of Construction

CRCP Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	1	Rural Interstate	7,500	ok
	2	Rural Principal Arterial (Other)	7,500	ok
	6	Rural Minor Arterial	3,000	ok
	7	Rural Major Collector	2,000	ok
	8	Rural Minor Collector	2,000	ok
	9	Rural Local	2,000	ok
Urban	11	Urban Principal Arterial (Interstate)	7,500	ok
	12	Urban Principal Arterial (Other Freeway)	7,500	ok
	14	Urban Principal Arterial (Other)	7,500	ok
	16	Urban Minor Arterial	3,000	ok
	17	Urban Collector	2,000	ok
	19	Urban Local	2,000	ok

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

Pavement sections are repaired the same within the different rural functional classes. The same applies within sections in urban areas. A difference in treatment selection does exist between sections of urban and rural functional class. The degree (amount) of treatment applied does change between sections located in urban and rural areas.

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments for CRCP under each treatment type category.

Treatment Type Category	Treatments
PM	Joint Repair
LR	Milling for Ride
MR	Bonded Overlay (PFC), Patching
HR	Reconstruction

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating								
Condition Score								
Distress Score								
Ride Score								
Spalled Cracks per mile								
Punchouts per mile								
Punchouts per mile+ACP Patches per mile+PCC Patches per mile								
Average County Rainfall								
Other								
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating								
Condition Score								
Distress Score								
Ride Score								
Spalled Cracks per mile								
Punchouts per mile								
Punchouts per mile+ACP Patches per mile+PCC Patches per mile								
Average County Rainfall								
Other								
Other								

Tomas Saenz- Transportation Engineering Supervisor

Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	1	Rural Interstate	7,500	10,000
	2	Rural Principal Arterial (Other)	7,500	Ok
	6	Rural Minor Arterial	3,000	Ok
	7	Rural Major Collector	2,000	Ok
	8	Rural Minor Collector	2,000	Ok
	9	Rural Local	2,000	1,000
Urban	11	Urban Principal Arterial (Interstate)	7,500	10,000
	12	Urban Principal Arterial (Other Freeway)	7,500	Ok
	14	Urban Principal Arterial (Other)	7,500	Ok
	16	Urban Minor Arterial	3,000	Ok
	17	Urban Collector	2,000	Ok
	19	Urban Local	2,000	1,000

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

A difference does exist between rural functional classes during treatment selection. A difference is also made in urban functional classes during this process. When selecting a treatment, the parameters used to select a treatment in their order of importance are the following: distresses, traffic (e.g., type of traffic, percentage of trucks), and budget.

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments under each treatment type category.

Treatment Type Category	Treatments
NN	NA
PM	Micro mill; asphalt patch/partial
LR	Asphalt patch, full depth; concrete partial
MR	Full depth patch-concrete; fix faulting
HR	Long Joint Repair (Stitching/Stapling) Slab replacements

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating	7	8	7	6	7	5	7	4
Condition Score	1	85	1	75	1	65	1	55
Distress Score	2	90	2	70	2	60	2	50
Ride Score	3	3.8	3	3.5	3	3.2	3	28
Spalled Cracks per mile	6	5	6	8	6	12	6	18
Punchouts per mile	5	2	5	4	5	8	5	10
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	4	0	4	2	4	4	4	8
Average County Rainfall	8	9	8	12	8	20	8	38
Other								
Other								

*Tomas considered this table for “High Speed” traffic (60-80 mph).

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating	7	8	7	6	7	5	7	3
Condition Score	1	80	1	75	1	70	1	55
Distress Score	2	70	2	65	2	60	2	50
Ride Score	3	34	3	3	3	2.8	3	2.5
Spalled Cracks per mile	6	8	6	12	6	20	6	30
Punchouts per mile	5	4	5	6	5	8	5	10
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	4	4	4	6	4	8	4	10
Average County Rainfall	8	12	8	18	8	24	8	36
Other								
Other								

*Tomas considered this table for “Low Speed” traffic (< 60 mph).

Andrew Wimsatt- TTI Division Head Materials and Pavements

CRCP Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	1	Rural Interstate	7,500	ok
	2	Rural Principal Arterial (Other)	7,500	ok
	6	Rural Minor Arterial	3,000	ok
	7	Rural Major Collector	2,000	ok
	8	Rural Minor Collector	2,000	ok
	9	Rural Local	2,000	ok
Urban	11	Urban Principal Arterial (Interstate)	7,500	ok
	12	Urban Principal Arterial (Other Freeway)	7,500	ok
	14	Urban Principal Arterial (Other)	7,500	ok
	16	Urban Minor Arterial	3,000	ok
	17	Urban Collector	2,000	ok
	19	Urban Local	2,000	ok

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

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2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments for CRCP under each treatment type category.

Treatment Type Category	Treatments
PM	Partial Depth Repairs, Isolated Full Depth Repairs (2 per mile or less), Grooving and Grinding
LR	ACP overlays up to 2", Full Depth Repairs (2 to 5 per mile)
MR	ACP overlays greater than 2", Full Depth Repairs (more than 5 per mile), Bonded Concrete Overlays
HR	Unbonded Concrete Overlays, Reconstruction

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
ADT/L/FC	ADT per lane per Functional Class (separate decision tree)
CRF	Average County Rainfall (inches)
PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating								
Condition Score	5	80	5	70	5	60	5	50
Distress Score	6	80	6	70	6	60	6	50
Ride Score	1	3	1	2.7	1	2.5	1	2
Spalled Cracks per mile	4	10	4	20	4	20	4	20
Punchouts per mile	2	1	2	3	2	10	2	15
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	3	1	3	3	3	10	3	15
Average County Rainfall								
Other (Failed Patch)								
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	PMIS Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value	Rank	PMIS Trigger Value
Average Crack Spacing Rating								
Condition Score	5	80	5	70	5	60	5	50
Distress Score	6	80	6	70	6	60	6	50
Ride Score	1	3	1	2.5	1	2	1	1.5
Spalled Cracks per mile	4	10	4	20	4	20	4	20
Punchouts per mile	2	1	2	3	2	10	2	15
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	3	1	3	3	3	10	3	15
Average County Rainfall								
Other (Failed Patch)								
Other								

Won Moon- Texas Tech University Professor

Treatment Selection Questionnaire

1. PMIS currently categorizes roads as having a High or Low ADT per lane per functional class. It uses this classification as an input in the decision tree when determining treatment needs. The following table displays the functional class categories and the trigger value used to differentiate between High and Low ADT per lane (ADT/L). Please verify that these ADT/L values are correct according to your district practices. If they do not agree with your definition, please provide the value.

FC			ADT/L	OK?
Rural	**1**	Rural Interstate	7,500	
	2	Rural Principal Arterial (Other)	7,500	
	6	Rural Minor Arterial	3,000	
	7	Rural Major Collector	2,000	
	8	Rural Minor Collector	2,000	
	9	Rural Local	2,000	
Urban	**11**	Urban Principal Arterial (Interstate)	7,500	
	12	Urban Principal Arterial (Other Freeway)	7,500	
	14	Urban Principal Arterial (Other)	7,500	
	16	Urban Minor Arterial	3,000	
	17	Urban Collector	2,000	
	19	Urban Local	2,000	

For treatment selection, is there a difference when considering a rural functional class compared to another rural functional class? For example, is there a difference in treatment selection between rural interstate and rural principal arterial or rural interstate and rural local. Is there a difference in treatment selection between urban functional classes?

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_____
_____
_____
_____
_____

2. PMIS classifies treatment needs into five treatment type categories: Need Nothing (NN), Preventive Maintenance (PM), Light Rehabilitation (LR), Medium Rehabilitation (MR), and Heavy Rehabilitation (HR). Please provide the treatments under each treatment type category.

Treatment Type Category	Treatments
PM	Tie bar retrofit (stapling), Retrofit Tied Concrete Shoulder, Joint Sealing, Underselling
LR	Full Depth Repair
MR	Higher Number of Full Depth Repairs
HR	Bonded Overlays, Thicker ACP overlays, Unbonded Overlays

3. Treatment needs for CRC pavement are determined by PMIS decision trees. The input factors used are displayed in the following table.

Input Factor	Description
ACS	Average Crack Spacing Rating (ft)
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PUN/M	Number of Punchouts per mile
PUNPAT/M	Number of Punchouts per mile+ Number of ACP Patches per mile +Number of PCC Patches/mile
RS	Ride Score
SPC/M	Number of Spalled Cracks per mile

Please enter the order of importance of each factor as well as the value that would trigger the given treatment for the High and Low ADT/L tables.

Input Factors for Sections with High ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating	100		100		100		100	
Condition Score	3	80	3	70	3	60	3	50
Distress Score	4	80	4	70	4	60	4	
Ride Score	1	3	1	2.5	1	2	1	1.5
Spalled Cracks per mile	5	10	5	20	5	40	5	50
Punchouts per mile	3	1	3	2	3	3	3	5
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	2	3	2	5	2	10	2	25
Average County Rainfall	100		100		100		100	
Other - add deterioration model								
Other								

Input Factors for Sections with Low ADT/L.

Input Factor for Decision Tree	Need Nothing		Light Rehabilitation		Medium Rehabilitation		Heavy Rehabilitation	
	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value	Rank	Trigger Value
Average Crack Spacing Rating	100		100		100		100	
Condition Score	3	80	3	70	3	60	3	50
Distress Score	4	80	4	70	4	60	4	
Ride Score	1	3	1	2.5	1	2	1	1.5
Spalled Cracks per mile	5	10	5	20	5	40	5	50
Punchouts per mile	3	1	3	2	3	3	3	5
Punchouts per mile+ACP Patches per mile+PCC Patches per mile	2	3	2	5	2	10	2	25
Average County Rainfall	100		100		100		100	
Other - add deterioration model								
Other								