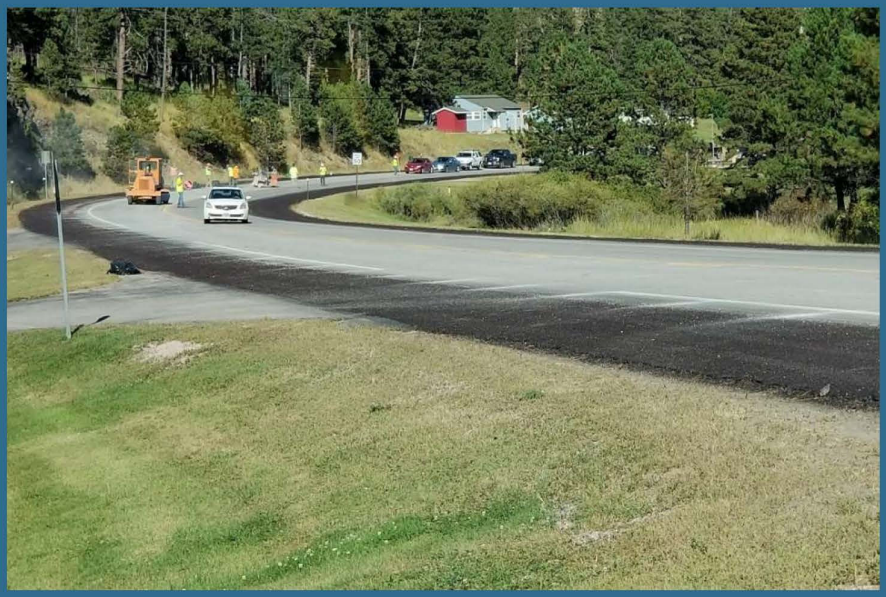
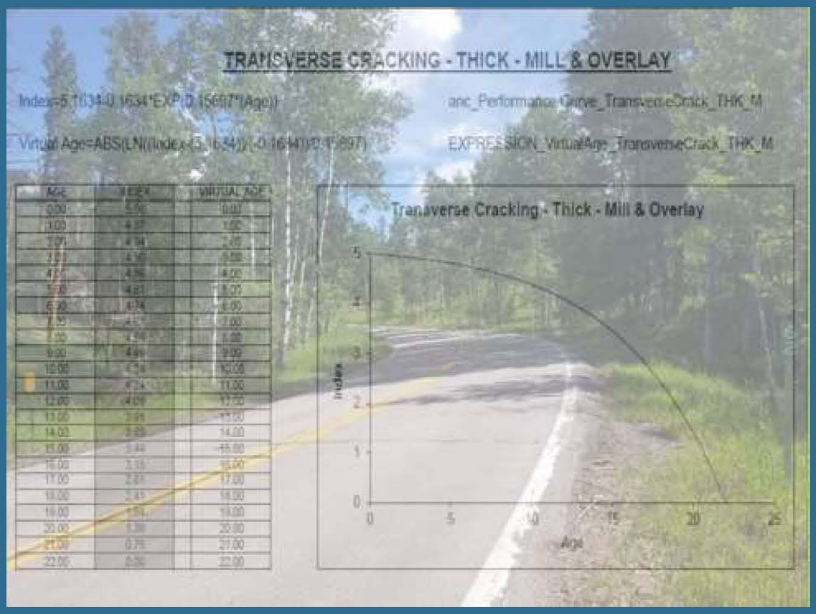


2023 SYNOPSIS

SD DOT

ENHANCED PAVEMENT MANAGEMENT SYSTEM



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PAVEMENT MANAGEMENT MISSION

TO DEVELOP OBJECTIVE AND COST-EFFECTIVE PAVEMENT TREATMENT RECOMMENDATIONS TO MAINTAIN AND IMPROVE THE CONDITION OF THE SOUTH DAKOTA STATE HIGHWAY SYSTEM

The Pavement Management Unit accomplishes this mission by:

- Recommending improvements to the state highway system.
- Recommending improvements to surfacing designs.
- Aiding in the assessment of future financial needs of the state highway system.
- Aiding management in future highway improvement strategies.

PAVEMENT MANAGEMENT ROLE

The South Dakota Department of Transportation (SDDOT)'s Pavement Management Unit is located in the Office of Project Development. The Unit's primary function is to provide objective data and recommend treatment candidates for use in preparing the Strategic Transportation Improvement Program (STIP). Secondary functions of the Unit include maintaining and providing historical pavement information, analyzing the long-term performance of pavement designs, providing economic analysis for high priority highway corridors and to provide technical assistance to pavement related research projects.

The Pavement Management Unit formerly worked under the guidance of the Pavement Management Task Force. The Pavement Management Task Force consisted of SDDOT personnel from Research and Transportation Inventory Management, Bureau of Information and Telecommunications (BIT), Materials and Surfacing, Operations Support, Project Development, the four Regions and one representative from the Federal Highway Administration (FHWA). As time passed, this evolved into a list of Stakeholders. The Pavement Management Stakeholders have input in Pavement Management affairs through the Pavement Management Engineers. ***Table 1*** is a general list showing all the Pavement Management Stakeholders that have potential input into the Pavement Management System (PMS). Final decisions on major changes or enhancements are made by the Pavement Management Engineer, Project Development Program Manager, and the Division Director of Planning and Engineering.

PAVEMENT MANAGEMENT STAKEHOLDERS	
Position	**Representing**
Pavement Management Engineer and Assistant	Project Development
Region and Area Engineers	Region and Area Operations personnel
Concrete Engineer	Materials and Surfacing
Bituminous Engineer	Materials and Surfacing
Pavement Design Engineer	Materials and Surfacing
Surfacing Plans Engineer Manager	Materials and Surfacing
Material and Surfacing Program Manager	Materials and Surfacing
Traffic Monitoring and Pavement Condition Engineer Manager	Research & Transportation Inventory Management
Computer Application Developer	Bureau of Information and Telecommunications
Research & Transportation Inventory Management Program Manager	Research & Transportation Inventory Management
FHWA Representative	Federal Highway Administration
Project Development Program Manager	Project Development
Planning and Engineering Division Director	Planning and Engineering Division

Table 1: Pavement Management Stakeholders

THE PAVEMENT MANAGEMENT CYCLE

The Pavement Management Unit works on an annual cycle as shown in ***Figure 1***. The exact timing of the tasks varies from year to year, but generally occurs near the time indicated. A more detailed description of the highway project selection process can be found in Appendix A.

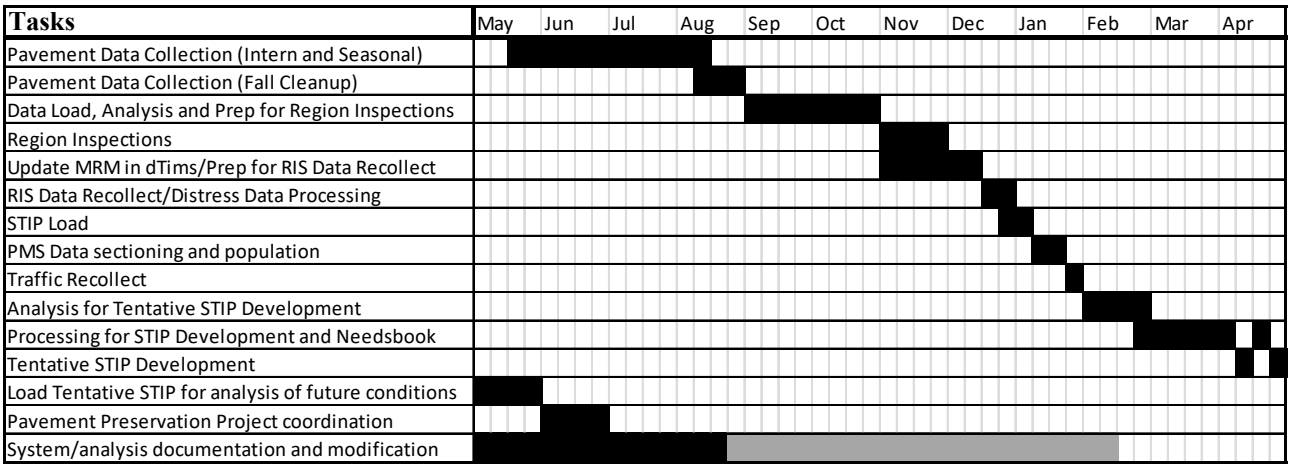


Figure 1: Pavement Management Cycle

THE PLANNING FILE

Developed in 1977 as the Rural Planning Inventory System, the South Dakota Department of Transportation's initial pavement management system was developed as a system to provide information for perpetual needs analysis relative to alternative levels of improvement. This system evolved into what became known as the Planning File. The Planning File was a mainframe based, single-year prioritization system used by the SDDOT from 1978 to 1996.

The Planning File used a Pavement Serviceability Rating (PSR) to reflect current pavement condition of the highway section. The PSR was based on a 0 to 5 scale, with 5 being a perfect surface. The PSR was derived using data from the profilometer in conjunction with the condition elements from the sufficiency rating. The PSR values were adjusted for the age of the grade, age of the surface over its normal life curve, traffic volume in excess of state averages and truck volume in excess of state averages. The adjusted PSR was plotted along the life curve belonging to the pavement surface type.

By 1985, the system had three life curves to help predict future condition. The three curves were:

- Asphalt Concrete (staged) 8 years
- Asphalt Concrete (full design) 18 years
- Portland Cement Concrete 33 years

As the system evolved between 1985 and 1996, the Asphalt Concrete (staged) curve was eliminated, leaving the system with two curves: Asphalt Concrete (full design) and Portland Cement Concrete (PCC). From these curves, a remaining service life (RSL) could be determined by following the plot from the current PSR to the threshold PSR. The distance along the x-axis (years) from the current PSR to the threshold PSR was the remaining service life of the pavement segment. The threshold PSR was dependent upon the functional class and width of the pavement segment as compared to the minimum width for that class of highway. If the pavement segment had the minimum acceptable width, a resurfacing treatment would be applied, if it did not exceed minimum width, a reconstruction treatment would be applied. The PSR threshold criteria used in 1985 can be seen in ***Table 2***.

Functional Class	Minimum Width	Treatment	PSR Threshold
Principal Arterial	Yes	Resurfacing	3.0
Principal Arterial	No	Reconstruction	2.6
Other Functional Class	Yes	Resurfacing	2.6
Other Functional Class	No	Reconstruction	2.6

Table 2. The 1985 Planning File PSR Thresholds

Per mile costs were applied to each pavement segment dependent upon the existing pavement type and the determined treatment. The year of need was determined to be the year the pavement segment would fall below the PSR threshold on the life curve for the segment's pavement type.

Each pavement segment was given a priority ranking dependent upon ten factors. The ten factors contributed to a percentage to the priority ranking number as follows:

- Surface Condition (25%)
- Rideability (23%)
- Remaining Surface Life (22%)
- Drainage Adequacy (7%)
- Surface Thickness (5%)
- Surface Maintenance (5%)
- Roadway Strength (4%)
- Current Traffic (3%)
- Current Truck Traffic (3%)
- Friction (3%)

The pavement segments were then prioritized within each funding category in worst-first order. When ranks were equal, highways with higher functional classifications and higher traffic volumes would prioritize ahead of those with lower classification and/or volumes.

The lists created by the system were then used by upper management for use in preparing the annual five-year construction program. The system gained a reputation of being credible both within SDDOT and by outside agencies, including the state legislature.

The system had some limitations, especially regarding some Federal regulations within the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). SDDOT responded to the Federal regulations with the development of the Pavement Management Task Force and eventually with the development of a new enhanced pavement management system.

THE ENHANCED PAVEMENT MANAGEMENT SYSTEM

The enhanced pavement management system was developed through Research Project SD93-14, Enhancement of South Dakota's Pavement Management System. The enhanced system was developed under the guidance of the Pavement Management Task Force after evaluation of the former system. The evaluation of the former system, known as the Planning File, showed its strengths and weaknesses. Some of the strengths of the system included:

- Good external communications outside of the Department.
- Usage of the output within the agency.

Some of the weaknesses of the system included:

- The inability to evaluate consequences of varying budgets and scenarios.
- Answering "what-if" situations.
- Could not consider user benefits.
- Rigid mainframe-based system.
- Only two performance curves.

As a result of the evaluation, it was decided that a new system had to be developed in order to do what was desired. At the same time, Congress enacted ISTEA, which placed additional requirements that could not be addressed by the existing system. The research project had four tasks:

1. Determine how the content and organization of the Department's database can support a historically based, multi-year optimizing Pavement Management System and identify needed improvements.
- Develop fundamental pavement management components.
2. Provide operational software.
3. Recommend policies and procedures and provide training.

The research project was awarded to Deighton Associates, LTD. of Whitby, Ontario, Canada. Deighton Associates had previously developed a set of software packages, dROAD, dTIMS, and dMAP, which were designed for a Pavement Management System. dROAD was an inventory software package, dTIMS was an analysis software package, and dMAP was a mapping software package. As part of the research project, Deighton Associates evaluated SDDOT's current system, supplied SDDOT with eight licenses to use their software, set up the system, and provided training to run the system. SDDOT currently uses a modular, SQL/Web based combination of the old dROAD and dTIMS software packages known as dTIMS BA.

Deighton Associates followed a seven-step approach to fulfilling the requirements of the research project:

1. Review recent applicable literature and studies performed by the Department.
2. Review the existing Pavement Management System.
3. Develop indexes and curves.
4. Define reasonable Maintenance, Rehabilitation and Reconstruction strategies.
5. Provide and install software.
6. Provide training.
7. Prepare a final report and present to the Pavement Management Task Force and SDDOT Executive Team.

After performing steps one and two, the following steps were recommended:

- Determine elements that effect pavement performance.
- Develop and perform a formal distress survey with quality control.
- Create and use individual, specific condition indexes.
- Create and use pavement performance curves based on expert opinion*, then history as data becomes available.
- Establish a historical pavement management database.
- Perform network analysis and optimization.

** Because of the lack of historical pavement condition data, an expert opinion survey was conducted by Deighton Associates. The expert panel consisted of SDDOT personnel from Materials and Surfacing, Operations Support, Planning and Programming (now Project Development), Research (now Research and Transportation Inventory Management), and Field Offices.*

DETERMINE ELEMENTS THAT EFFECT PAVEMENT PERFORMANCE

The Research Technical Panel concluded that the prime influence on pavement performance was pavement type. This conclusion seems reasonable because of the very narrow distribution of traffic loadings in South Dakota, the relatively constant soil support, and Deighton Associates experiences with other state departments of transportation. The Research Technical Panel decided on five types each of flexible and rigid pavements. Beginning in 1996, the Pavement Management Unit also started evaluating gravel surfaced highways. In 2000, it was decided to break out blotter surfaced highways from the thin flexible pavement types. The current surface types used by the system are shown in ***Table 3***.

	Type	Description
FLEXIBLE	**AC on PCC**	Asphalt overlay on top of PCCP
	Blotter	Blotter treatment without any AC mat
	Full Depth	≥ 10 in. Asphalt Concrete
	Thick	≥ 5 < 10 in. Asphalt Concrete
	Thin on Strong	< 5 in. Asphalt Concrete and ≥ 8 in. granular base
	Thin on Weak	< 5 in. Asphalt Concrete and < 8 in. granular base
RIGID	**Continuous Reinforced**	Continuous reinforced PCCP
	Mesh Reinforced	Mesh reinforced PCCP
	Thick Short Jointed	PCCP with ≥ 8 in and ≤ 20 ft joint spacing without dowels
	Thick Short Jointed w/dowels	Doweled PCCP ≥ 8 in.and ≤ 20 ft. joint spacing
	Thin Short Jointed	< 8 in and ≤ 20 ft.joint spacing without dowels
GRAVEL	**Gravel**	Gravel Surfacing
OTHER	**Other Surfacing**	Other (Bridges, etc.)

Table 3: Surface Types in the Enhanced Pavement Management System.

The Research Technical Panel was then asked to determine the primary failure mechanisms for flexible and rigid pavements in South Dakota. A list of these distresses can be found in ***Table 4***. The failure mechanisms form the foundation of most of the modeling in the enhanced pavement management system.

PERFORM A FORMAL DISTRESS SURVEY WITH QUALITY CONTROL

A new, more detailed distress survey needed to be developed to replace the former PSR condition survey. The Research Technical Panel identified the failure mechanisms for pavements that were prevalent and would trigger a rehabilitation or reconstruction project in South Dakota. The pavement distresses collected in this survey are listed below in ***Table 4*** and defined in ***Appendix B***.

Flexible Pavement Failure Mechanisms	Rigid Pavement Failure Mechanisms
Transverse Cracking	D-Cracking and ASR
Fatigue Cracking	Joint Spalling
Patching/Patch deterioration	Corner Cracking
Block Cracking	Faulting
Rutting	Joint Seal Damage
Roughness	Roughness
	Punchouts

Table 4: Original failure mechanisms for pavements in South Dakota. (For current failure mechanism listing see Table 5 or 6)

The Research Technical Panel and Deighton Associates staff then decided on categories of severity and extent for each distress. The extents and severity levels were based upon those given in the Strategic Highway Research Program's (SHRP) *Distress Identification Manual for the Long-Term Pavement Performance Project* 1993 Edition. A few modifications were made to better reflect conditions seen in South Dakota.

Responsibility for the data collected are separated between two offices. Faulting, Roughness and Rutting are the current types of distresses from Table 4 that are collected by the Office of Research and Transportation Inventory Management staff with a pavement condition monitoring vehicle from Pathway Services. All other distresses in Table 4 plus CRC Block Cracking, are being collected manually by a visual distress survey conducted by Pavement Management in the Project Development Office using interns and seasonal employees. All distresses are collected by sections with an average section length of 0.250 mile. Visual distress data was first collected on a statewide basis in 1995.

Gravel rating is done using the guidelines stated in the *Rural Road Condition Survey Guide* published by the SDDOT Office of Research in 1995. The segments length for gravel highways are of average length of 1.000 miles

The distress for Longitudinal Cracking in PCC pavement was added in 2008. Longitudinal Cracking was part of a requirement for the Highway Performance Monitoring System (HPMS) data submittal. The Longitudinal Cracking distress was later removed in 2018 as it was no longer needed.

A new distress, Continuously Reinforced Concrete Pavement (CRCP) Block Cracking, was defined and added as a new failure mechanism on South Dakota highways in 2015 and first collected in 2016. The Block Cracking distress, like Punchouts, only affects CRCP pavements. CRCP pavements that were built after 1995 are impacted.

Table 5 shows the Severity Levels and ***Table 6*** shows the extent categories as used by SDDOT's Enhanced Pavement Management System for each visual distress. **Table 5 and 6** include the new distress defined in 2015 (CRCP Block Cracking) for CRC pavements.

A research project, SD2022-04 *Automated Distress Measurement for Pavement Management*, has been initiated that will hopefully lead to collecting pavement images with a specialized van travelling at highway speed. The visual pavement distress rating would then be performed in the office using the collected pavement images and automated collection methods. Some changes in the rating procedure may result by the change in data collection methods.

DEFICIENCY		MEDIUM	HIGH
Transverse Cracking	Unsealed crack width < ¼ inch wide or sealed crack width is less than ¾ inch and no crack depression	Unsealed crack width is > ¼ inch and ¾ inch and < 1 inch and/or crack depression < ¼ inch	Any crack, unsealed or sealed, with width > 1 inch or crack depression > ¼ inch
Fatigue Cracking	Fine parallel cracks in the wheel path(s)	Alligator pattern clearly developed	Alligator pattern clearly developed with spalling and distortion
Patching and Patch Deterioration	Patch shows no visual distress of any type and with a smooth ride	Patch shows low or medium severity distress of any type and/ or notable roughness	Patch shows a high severity distress of any type and/ or distinct roughness
Block Cracking	Random longitudinal cracks between the wheel paths, **or** interconnected transverse and longitudinal cracks that form blocks greater than 6 ft per side	Interconnected transverse and longitudinal cracks that form blocks 3 feet to 6 feet per side	Interconnected transverse and longitudinal cracks that form blocks less than 3 feet per side
Durability Cracking (D-Cracking) and Alkali-Silicia Reactivity (ASR)	Cracks are light, with no loose or missing pieces	Cracks are well defined and some small pieces are loose or missing	Cracks are well developed pattern with a significant amount of loose or missing material
Joint Spalling	Spalls < 3 inches wide with no significant loss of material or Joint & Spall repair patch with cracking	Spalls 3 to 6 inches with loss of material	Spalls > 6 inches with significant loss of material
Corner Cracking	Crack not spalled with no faulting & piece not broken	Crack spalled slightly, or faulting < 1/2 inch, or piece broken	Crack spalled, or faulting > 1/2 inch, or piece broken
Punchout/ Longitudinal Crack	NO SEVERITY LEVEL	NO SEVERITY LEVEL	NO SEVERITY LEVEL
CRCP Block Cracking	Closely spaced transverse shrikage cracks with occasional interconnected longitudinal cracks occuring perpendicular to the parent transverse cracks	The pattern between the longitudinal and transverse cracks create a “block” or rectangular pattern	The pattern between the longitudinal and transverse cracks create a “block” or rectangular pattern. The cracking pattern is distorted and spalls are present in cracks
Joint Seal Damage	Damage to < 10% of joint	Damage to 10% - 50% of joint	Damage to > 50% of joint

Table 5: Severity levels used to describe the cracking failure mechanisms.

DEFICIENCY	LOW	MODERATE	HIGH	EXTREME
Transverse Cracking	> 50 ft. spacing.	>25 ft. & < 50 ft. spacing	>12 ft. & <25 ft. spacing	< 12 ft. spacing.
Fatigue Cracking	1% to 9% of wheel path	10% to 24% of wheel path	25% to 49% of wheel path	> 49 % of wheel path
Patching and Patch Deterioration	1% to 9% of section	10% to 24% of section	25% to 49% of section	> 49 % of section
Block Cracking	1% to 9% of section	10% to 49% of section	>49% of section	N/A
D-Cracking and ASR	1% to 9% of slabs	10% to 24% of slabs	25% to 49% of slabs	> 49 % of slabs
Joint Spalling	1% to 9% of joints	10% to 24% of joints	25% to 49% of joints	> 49 % of joints
Corner Cracking	1% to 9% of slabs	10% to 24% of slabs	25% to 49% of slabs	> 49 % of slabs
Punchout	1 to 2 per section	3 to 6 per section	7 or greater per section	N/A
CRCP Block Cracking	1% to 9% of section	10% to 24% of section	25% to 49% of section	> 49 % of section
Joint Seal Damage	1% to 9% of joints	10% to 24% of joints	25% to 49% of joints	> 49 % of joints

Table 6: Extent levels used to describe the cracking failure mechanisms.

NHPP and SDDOT Pavement Management

Beginning in the summer of 2018, the Office of Research and Transportation Inventory Management and The Pavement Management Unit partnered to provide pavement data for the National Highway Performance Program (NHPP). NHPP is a set of Federally mandated performance measures. All state DOTs are required to collect the performance metrics and report in 0.1-mile segments or less for the National Highway System (NHS)-Interstate and the NHS-Non Interstate. The performance metrics are reported through the HPMS system and are outlined in ***Table 7***.

The Enhanced Pavement Management System has used the distresses International Roughness Index (IRI), Rutting and Faulting since inception. For Pavement Management purposes, these distresses are converted to a 0 to 5 scale (0 for poor and 5 for excellent) and brought into the system as 0.25-mile segments.

The NHPP cracking percent for all three pavement types, Asphalt Concrete (AC), Portland cement concrete (PCC) and Continuously Reinforced Concrete Pavement (CRCP), are not used within the Pavement Management System. The cracking defined in Tables 5 and 6 are more suitable for detailed analysis than the NHPP cracking standards.

The AC cracking percent is the only cracking metric for NHPP that is collected using Automated methods. This represents a significant advancement in the ability to collect distresses from pavement images using the profile van. Advancement in technology continues to improve the Automated methods collected by the profile van.

The PCC jointed and CRC pavement cracking percent is collected by semi-automated methods using the pavement images and a distress collection application.

Federal Metric	How reported	Remarks
IRI	Average IRI per 0.1-mile segment	Already collected, all pavement types
Rutting	Average Rut on outside wheel path per 0.1-mile segment	Already collected, AC pavement types
Faulting	Average fault per 0.1-mile segment	Already collected, PCC pavement types except CRC
Cracking Percent (AC)	Percent of wheel path cracking per 0.1-mile segment	Began using automated method for collection
Cracking Percent (Jointed PCC)	Percent of slabs cracked per 0.1-mile segment	Began using semi-automated method
Cracking Percent (CRCP)	Percent of longitudinal and punchouts per 0.1-mile segment	Began using semi-automated method
PSR	SDDOT SCI = PSR and is reported per 0.1-mile segment	Straight conversion of SCI to PSR approved by FHWA Division

Table 7: NHPP performance measure metrics.

CREATE AND USE INDIVIDUAL, SPECIFIC CONDITION INDICES

Deighton Associates staff then developed pavement condition indices for each deficiency using input from the Research Technical Panel and staff experience.

The three main functions of Pavement condition indices in a pavement management system:

1. Determine when to apply a treatment.
2. Calculate the cost of a treatment.
3. Monitor the overall health of the network.

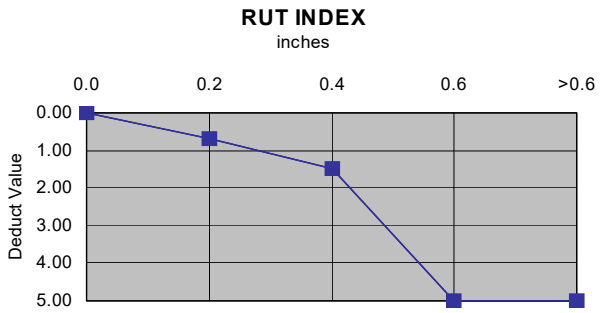
SDDOT's pavement management system uses a 0.00 to 5.00 scale (0.00 for poor and 5.00 for excellent) for the pavement condition indices. Deduct values were developed for severity and extent for each distress. Deduct values for each distress is shown in ***Tables 8 and 9***.

FATIGUE CRACKING AND PATCHING				
	EXTENT			
SEVERITY	Low	Moderate	High	Extreme
Low	0.4	0.8	1.4	2.0
Medium	0.8	1.7	3.1	5.0
High	1.1	2.7	5.0	5.0

TRANSVERSE CRACKING				
	EXTENT			
SEVERITY	Low	Moderate	High	
Low	0.1	0.2	0.5	
Medium	0.2	0.6	1.5	
High	1.0	2.2	5.0	

BLOCK CRACKING				
	EXTENT			
SEVERITY	Low	Moderate	High	
Low	0.7	1.2	2.0	
Medium	0.8	1.6	3.0	
High	0.9	2.2	5.0	

RUT DEPTH



ROUGHNESS

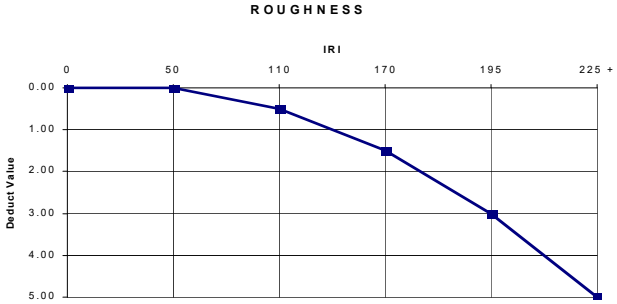


Table 8: Deduct values for the failure mechanism conditions on flexible pavements using an index scale from 0.00 (poor) to 5.00 (excellent).

CORNER CRACKING				
	EXTENT			
SEVERITY	Low	Moderate	High	Extreme
Low	0.4	0.8	1.4	2.0
Medium	0.8	1.7	3.1	5.0
High	1.1	2.7	5.0	5.0

D-CRACKING/ASR & CRCP BLOCK CRACKING				
	EXTENT			
SEVERITY	Low	Moderate	High	Extreme
Low	0.4	0.6	0.8	1.0
Medium	1.0	1.7	3.1	5.0
High	1.1	2.7	5.0	5.0

JOINT SPALLING & JOINT SEAL DAMAGE				
	EXTENT			
SEVERITY	Low	Moderate	High	Extreme
Low	0.4	0.7	1.0	1.5
Medium	0.6	1.2	2.0	3.0
High	0.8	1.7	3.2	5.0

FAULTING INDEX ALGORITHM

A continuous analog of the discrete (binned) equation is:

$$D = min\left[5, \frac{1}{N}\sum_{f=1}^{F} d_f\right]$$

where

h_f = the (average) height of fault f, in inches
N = the total number of joints
d_f is the deduct value for an individual fault f:

$d_f = 24\ (|h_f| - 0.05) \qquad (|h_f| \geq 0.05)$

$= 0 \qquad (|h_f| < 0.05)$

The total deduct value D cannot exceed 5
The Faulting Index for the Pavement Management System remains:

$$F = 5 - D$$

PUNCHOUTS				
	EXTENT			
SEVERITY	Low	Moderate	High	
All	0.8	1.7	3.2	

Table 9: Deduct values for the failure mechanism conditions on rigid pavements using an index scale from 0.00 (poor) to 5.00 (excellent). (Continued on next page)

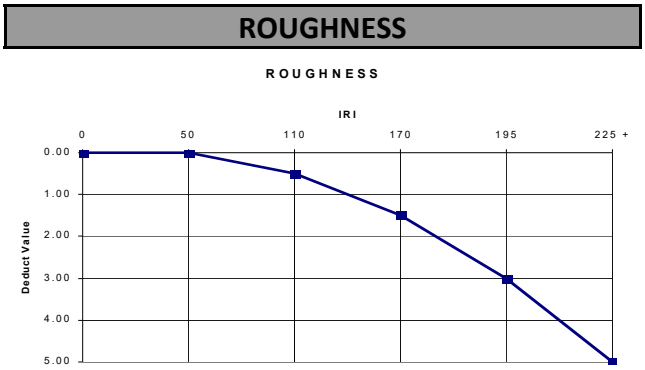


Table 9: Deduct values for the failure mechanism conditions on rigid pavements using an index scale from 0.00 (poor) to 5.00 (excellent).
(Continued from previous page)

The individual index for each distress triggers the treatments chosen by the enhanced system. To calculate the benefits of a strategy and to monitor the overall health of the network, a composite condition index is computed. Deighton Associates staff did research on methods to calculate a composite condition index. Most traditional methods to calculate a composite condition index involve averaging the individual indices. The problem with traditional methods is that if a pavement has only one bad deficiency, the impact on the composite condition index would be washed out by the good values of all the other indices. As a result of Deighton Associate's work, the following composite condition index equation was developed:

$$CMP = mean - 1.25 \times sd$$

Where:

CMP = the composite condition index ($\geq$ lowest individual index and ≥ 0.00)
mean = the mean of all contributing individual condition indices
sd = the standard deviation of all contributing individual condition indices.

The Pavement Management Task Force later decided to name the calculated composite condition index the **Surface Condition Index (SCI).**

The distress indices used to calculate the mean value and standard deviation varies depending upon the pavement type and whether Durability Cracking (D-Cracking)/ Alkali-Silica Reactivity (ASR) exists. The indices used for each pavement type are shown in ***Tables 10, 11, 12 and 13***. The differences are because many of the distress types will only occur on certain pavement types, and different tolerances between rural and urban pavements. To use these distresses on other pavement types would skew the composite index.

Pavement Type	Transverse Cracking	Fatigue Cracking	Patching / Patch Deterioration	Block Cracking	Rut Depth	Roughness
AC on PCC	yes	yes	yes	yes	yes	yes
BLOTTER	yes	yes	yes	yes	yes	yes
FULL DEPTH	yes	yes	yes	yes	yes	yes
THICK	yes	yes	yes	yes	yes	yes
THIN ON STRONG	yes	yes	yes	yes	yes	yes
THIN ON WEAK	yes	yes	yes	yes	yes	yes

Table 10: ***Individual condition indexes involved in the calculation of the surface condition index for rural, flexible pavements.***

Pavement Type	Transverse Cracking	Fatigue Cracking	Patching / Patch Deterioration	Block Cracking	Rut Depth	Roughness
AC on PCC	yes	yes	yes	yes	yes	no
BLOTTER	yes	yes	yes	yes	yes	no
FULL DEPTH	yes	yes	yes	yes	yes	no
THICK	yes	yes	yes	yes	yes	no
THIN ON STRONG	yes	yes	yes	yes	yes	no
THIN ON WEAK	yes	yes	yes	yes	yes	no

Table 11: ***Individual condition indexes involved in the calculation of the surface condition index for urban, flexible pavements.***

Pavement Type	D & ASR Cracking	Punchouts	CRCP Block Cracking	Corner Cracking	Faulting	Joint Seal	Joint Spallng	Roughness
CONTINUOUS REINFORCED	no if = 5.00	yes	yes	no	no	no	no	yes
MESH REINFORCED	no if = 5.00	no	no	yes	yes	no	yes	yes
THICK SHORT JOINTED	no if = 5.00	no	no	yes	yes	no	yes	yes
THICK SHORT JOINTED WITH DOWELS	no if = 5.00	no	no	yes	yes	no	yes	yes
THIN SHORT JOINTED	no if = 5.00	no	no	yes	yes	no	yes	yes

Table 12: Individual condition indexes involved in the calculation of the surface condition index for rural, rigid pavements.

Pavement Type	D & ASR Cracking	Punchouts	CRCP Block Cracking	Corner Cracking	Faulting	Joint Seal	Joint Spallng	Roughness
CONTINUOUS REINFORCED	no if = 5.00	yes	yes	no	no	no	no	yes
MESH REINFORCED	no if = 5.00	no	no	yes	no	no	yes	no
THICK SHORT JOINTED	no if = 5.00	no	no	yes	no	no	yes	no
THICK SHORT JOINTED WITH DOWELS	no if = 5.00	no	no	yes	no	no	yes	no
THIN SHORT JOINTED	no if = 5.00	no	no	yes	no	no	yes	no

Table 13: Individual condition indexes involved in the calculation of the surface condition index for urban, rigid pavements.

For gravel surfaces, the composite index is determined by converting the 0 to 100 gravel rating determined by the distress survey crew to a 0.00 to 5.00 scale.

CREATE AND USE PAVEMENT PERFORMANCE CURVES

Performance curves give the Pavement Management System the ability to project future conditions for the pavements across the state. ***Figure 2*** is a sample performance curve that shows a representative deterioration of condition over time. Each pavement type, treatment type and condition index has its own performance curve. The curves were initially developed using data from the Expert Panel of the expert opinion survey. The Expert Panel members had a table for each pavement distress and each pavement type, which totaled 65 tables. In each table, the experts gave the estimated number of years it would take each distress to reach each level of severity and extent on that pavement type. By combining the data from the experts, the distress deduct values, and performing a regression analysis, Deighton Associates developed the initial performance curves.

Currently five mathematically types of curves are used by SDDOT for pavement performance curves: Linear, Quadratic, Cubic, Power and Exponential. The equations are as follows:

- Linear: $Index = C0 + (C1 \times age)$
- Quadratic: $Index = C0 + (C1 \times age) + (C2 \times age^2)$
- Cubic: $Index = C0 + (C1 \times age) + (C2 \times age^2) + (C3 \times age^3)$
- Power: $Index = C0 + (CP \times age \text{ ^ } B)$
- Exponential: $Index = C0 + (CP \times e \text{ ^ } (Ce \times age))$

Where:

Index	= the individual condition index or the composite index
age	= pavement age
C0	= Term 0 coefficient (Constant)
C1	= Term 1 coefficient (Linear)
C2	= Term 2 coefficient (Quadradic)
C3	= Term 3 coefficient (Cubic)
CP	= coefficient for Power or Exponential Equation
B	= the exponent for the Power curve
e	= natural log base constant
Ce	= coefficient for e expression

Each pavement type had one curve developed for each of the individual condition indexes and one for the composite condition index. This led to 35 curves being developed for flexible pavements and 33 curves being developed for rigid pavements. Additional curves have since been developed for the individual condition indexes after the application of certain roadway treatments. Today there are 183 base performance curves in use.

Since the initial performance curves were based on expert opinion, Deighton Associates recommended that the curves be based on actual historical data. To develop a method and obtain tools to do this, SDDOT decided to initiate research project SD97-05, *Statistical Methods for Pavement Performance Curve Building, Historical Analysis, Data Sampling and Storage*. The research project was awarded to Applied Pavement Technology, Inc. (APTECH) of Urbana, Illinois. As a result of the research, SDDOT has developed over 100 historically based pavement performance curves.

In 2011, it was recognized that the software that came out of research project SD97-05 was unable to analyze the volumes of data that the Pavement Management System had collected since 1994. A new research project, SD2011-04, *Update Performance Curves for South Dakota DOT's Pavement Management System,* was initiated. As part of this project, the Pavement Performance Modeling (PPM) tool was developed for creating, updating, and assessing pavement performance models. The PPM tool utilizes historical pavement condition data exported from the SDDOT dTIMS pavement management

software to analyze and develop performance prediction models. The PPM tool performs regression analysis for the four types of curves listed above plus one additional type of curve, the Exponential curve:

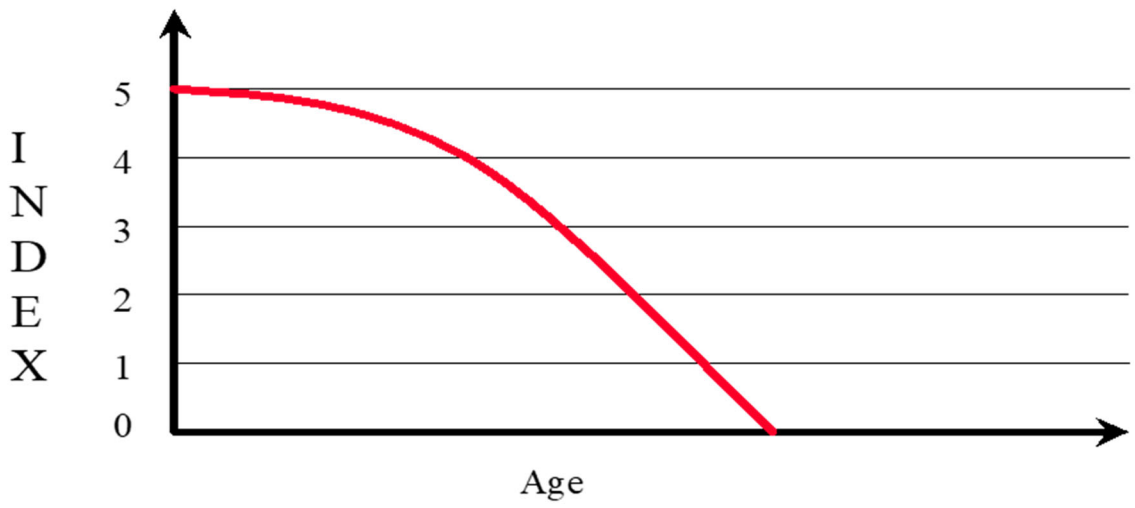


Figure 2: Sample Performance Curve

In 2017 and 2020, a full-scale analysis of the performance curves was performed to update the curves. In 2017, the Thick Short-Jointed PCC with Dowels (TKSJD) and the Thick Asphalt (THK) families were analyzed and updated. The TKSJD and THK families represents 51% of the total system miles. In 2020, a study was performed on all the remaining pertinent pavement families to complete the update. The only pavement family that was not updated was Mesh. Mesh will be eliminated as a pavement family in the 2025 construction year.

It is recommended that the pavement families be updated every 3 to 5 years if there are no major changes in construction material performance or data collection methods. If there is a major change in performance or data collection, it is recommended that 1 to 2 years of data be accumulated before analyzing the data to determine if an equation requires a change.

The contract for maintenance and upkeep of the PPM tool is a renewable contract. It currently has been renewed to the end of state fiscal year 2024. If any changes or maintenance are needed for the PPM tool, it may be done through this contract. Contact the Office of Research and Transportation Inventory Management for details.

ESTABLISH A HISTORICAL PAVEMENT MANAGEMENT DATABASE

Initially, SDDOT did not have what would be considered in the industry a historical pavement management database. The software of the enhanced system can store all data necessary to maintain a pavement management historical database. To utilize this capacity, the Pavement Management Unit created tables within the database to exploit this capability by tracking and storing construction history and pavement condition data.

Three sets of tables in the pavement management database are used to track historical data. The Pavement Management Unit has kept the raw data from the pavement distress surveys since 1995 in the first set of tables. The second table was created to track pavement performance measures on an annual basis. This was later replaced by exporting data to Excel spreadsheets. These spreadsheets are updated annually and track many of the performance measures the Department looks at for historical performance. The third table tracks construction project history. The SDDOT C2C (Concept to Contract) system, an application to add and track projects from inception to bid letting, was introduced in the early 2000's. As a result, the third perspective became obsolete and has since been eliminated. Currently SDDOT can analyze the cost effectiveness of pavement treatments from data that spans for over 25 years.

ESTABLISH HOMOGENEOUS ANALYSIS SEGMENTS

To perform a proper analysis of the data, the pavement network needs to be divided into homogeneous segments. These segments are checked and updated annually. Changes in segment breaks correspond to the changes in the highway system from one year to the next.

The segment breaks are determined using the following list of criteria:

- Highway terminal breaks.
- Changes in pavement type.
- STIP project limits.
- Changes in Improvement Types.
- Changes in Funding Category.
- Changes in SDDOT Region designation.
- Changes in State Significance designation.
- Changes in Roadway Width* greater than 10 feet.
- Changes in Year Graded.
- Changes in Year Resurfaced.

* *Roadway width is the combination of the surfacing width and shoulder width.*

PERFORM NETWORK ANALYSIS AND OPTIMIZATION

The enhanced pavement management system evaluates pavement treatment strategies. A treatment is any action taken on a road section at a specific point in time. A pavement strategy is a series of one or more treatments performed over a set period. This period is known as a treatment application period. The treatment application period is the window of time where a treatment can be triggered for an asset in the Pavement Management models. Currently, the treatment application period for SDDOT is set for twenty years. The period where the benefits of strategies are calculated is called the analysis period. This is generally set 30 to 40 years beyond the treatment period so that the benefit of a treatment made late in the treatment application period can be captured. The analysis period currently used by SDDOT is fifty years.

To develop the models needed for analysis, Deighton Associates set up four tasks:

1. Identify typical treatment alternatives.
2. Develop a treatment cost matrix.
3. Develop a set of treatment triggers.
4. Develop a set of treatment impacts or resets.

The Pavement Management Task Force identified a list of typical treatment alternatives used to repair pavements in South Dakota. The treatment alternatives have been refined by the Pavement Management Unit as the needs and desires of the Department changes. ***Tables 14 through 17*** show the new list of treatment alternatives. ***Table 18*** is a list of treatment alternatives that are currently not triggered as treatment alternatives in the analysis but are used to denote projects within the STIP commitments that may or may not affect the pavement life cycle. Base designs for each treatment on the different pavement types are shown in ***Appendix C***.

The cost matrices were developed by SDDOT's Pavement Management Task Force with the help of SDDOT's Planning/Engineering Division's Cost Estimators. The costs are updated annually using average costs that are supplied by Bid Letting and the Transportation Planning Engineers (TPE). A summary of the costs is shown in ***Tables 19 through 25***. ***Tables 19, 20, 21, 22 and 23*** show the cost for each treatment as a function of the following items:

- Surfacing Cost
- Mobilization Cost
- Traffic Control Cost
- Slope Flattening (Rural)/ Sidewalk (Urban) Cost
- Bridge Replacement/Guard Rail Cost
- Box Culvert Cost
- Lighting Cost
- Preliminary Engineering Cost
- Construction Engineering Cost
- Right of Way Cost
- Utility Cost

Tables 24 and 25 show a summary of the reconstruction surfacing costs based on the following items:

- Highway Classification
- Average Daily Traffic (ADT)
- Truck volumes

ASPHALT TREATMENTS	
IMPROVEMENT TYPE	**BUDGET CATEGORY**
Reconstruct to Flexible (Thick Interstate, Thin On Strong Other)	Non-Maintenance
Reconstruct to Rigid (Thick Short Jointed with Dowels)	Non-Maintenance
Reconstruct to Flexible - Urban Sections	Non-Maintenance
Reconstruct to Rigid - Urban Sections	Non-Maintenance
Reconstruct to CRCP (Interstate Only)*	Non-Maintenance
Asphalt Concrete Overlay	Non-Maintenance
Asphalt Concrete Overlay - Urban Sections	Non-Maintenance
Mill and Asphalt Concrete Overlay	Non-Maintenance
Mill and Asphalt Concrete Overlay - Urban Sections	Non-Maintenance
Mill and Class S Asphalt Concrete Overlay	Non-Maintenance
Mill and Replace AC – 4" *	Non-Maintenance
Mill and Portland Cement Concrete Overlay	Non-Maintenance
Mill and Portland Cement Concrete Overlay - Urban Sections	Non-Maintenance
Full depth reclamation	Non-Maintenance
Cold in Place Recycle	Non-Maintenance
Rout and Seal Cracks	Preventive Maintenance
Chip Seal	Preventive Maintenance
Micro-surfacing	Preventive Maintenance

Table 14: Treatments for use on existing flexible pavements

****This treatment is currently inactive.***

BLOTTER TREATMENTS	
IMPROVEMENT TYPE	**BUDGET CATEGORY**
Reconstruct to Blotter	Non-Maintenance
Reconstruct to Flexible	Non-Maintenance
Asphalt Concrete Overlay on Blotter	Non-Maintenance
Blotter Reapplication	Preventive Maintenance
Full depth reclamation and New Blotter Surfacing	Non-Maintenance

Table 15: Treatments for use on existing blotter surfaced roads.

GRAVEL TREATMENTS	
IMPROVEMENT TYPE	**BUDGET CATEGORY**
Reconstruct to Gravel	Non-Maintenance
Reconstruct to Blotter	Non-Maintenance
Reconstruct to Flexible	Non-Maintenance
Gravel Resurfacing	Non-Maintenance

Table 16: Treatments for use on existing gravel surfaced roads.

CONCRETE TREATMENTS	
IMPROVEMENT TYPE	**BUDGET CATEGORY**
Reconstruct to Rigid (Thick Short Jointed with Dowels)	Non-Maintenance
Reconstruct to Rigid - Urban Sections (Thick Short Jointed with Dowels)	Non-Maintenance
Reconstruct to CRCP (Interstate only) *	Non-Maintenance
Remove and Replace Portland Cement Concrete (Thick Short Jointed with Dowels)	Non-Maintenance
Remove and Replace Portland Cement Concrete - Urban Sections (Thick Short Jointed with Dowels)	Non-Maintenance
Remove and Replace Portland Cement Concrete (Continuous Reinforced)*	Non-Maintenance
Rubblize and Asphalt Overlay	Non-Maintenance
Crack & Seat and Asphalt Overlay	Non-Maintenance
Asphalt Overlay (No Crack & Seat)	Non-Maintenance
Pavement Restoration 1	Preventive Maintenance
Pavement Restoration 2	Preventive Maintenance
Pavement Restoration - Urban Sections	Preventive Maintenance
Grinding Only	Preventive Maintenance
Unbonded Concrete Overlay	Non-Maintenance
Bonded Overlay*	Non-Maintenance
Saw and Seal Joints*	Preventive Maintenance
Saw and Seal Joints - Urban Sections*	Preventive Maintenance
Rout and Seal of AC Shoulders	Preventive Maintenance
Chip Seal of AC Shoulders	Preventive Maintenance
Mill and Replace AC Shoulders	Preventive Maintenance

Table 17: Treatments for use on existing rigid pavements

****This treatment is currently inactive.***

OTHER TREATMENTS *(For use in STIP perspective only, not available for strategy selection)*	
IMPROVEMENT TYPE	**BUDGET CATEGORY**
DO NOTHING (Used for bridges, Nat'l Park roads, and other highways as designated by SDDOT)	Non-Maintenance
Crack-leveling	Preventive Maintenance
Miscellaneous Major Improvement	Non-Maintenance
Shoulder Widening	Non-Maintenance

Table 18: Treatments provided from the STIP.

Trigger values were initially developed from the data of the Expert Opinion Survey. The triggers have been periodically revised by the Pavement Management Unit. The treatments are triggered by various distress index values, roadway width, and designation, depending upon pavement type. The roadway width levels are shown in ***Appendix D***. The methodology for determining if a state highway is eligible for Reconstruction treatments is in ***Appendix E***. The triggers for the various pavement types are shown in ***Appendix F, G and H***. The analysis software of the enhanced system checks the distress index values, roadway width, and designation flags to select all strategies that fit within the trigger limit window.

The analysis software then evaluates the impacts of each eligible treatment on the section of roadway. These impacts are called resets. A reset is a value that represents what happens to specified analysis variables when a treatment is applied. These values may include the distress indices, roadway widths, pavement types, etc. The analysis software then relates the reset values to a new benefit value for that specific strategy. The benefits and costs for a specific treatment strategy are now calculated. The benefits and cost are combined to create Benefit/Cost ratio and Incremental Benefit/Cost ratio for each of the strategies.

The system will optimize the generated treatment strategies. The analysis software then selects the best strategy for each section in such a way as to not exceed the budget levels supplied by the user. To select the best strategy for each road section, the analysis software uses “heuristic optimization” based upon the incremental benefit-cost technique described in Pavement Budget Optimization Using the Incremental Benefit-Cost Technique; Volume 3, Proceedings; North American Pavement Management Conference, 1985.

Summary of Rural Treatment Costs for dTIMS BA Estimates

Asphalt	Surface Cost *per 2-lane mile*	Traffic Control *per 2-lane mile*	Slope Flattening *per 2-lane mile*	Bridge *per structure*	Box Culvert *per Box*	Mobilization *per project*	P.E. *per project*	C.E. *per project*	ROW *per 2-lane mile*	Utilities *per 2-lane mile*
Reconstruction	See Reconst. Cost Matrix Table 24	$10,000	NA	$125,000+ $260*Area (new)+$25 * Area (old)	$320,000	10.00%	5.5% (2.5% for Interst.)	8.00%	$16,000**	$33,900**
Asphalt Overlay	$241,119	$4,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Mill and AC overlay on FD, THK, or AONC	$326,590	$5,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Mill and AC Overlay on TONS or TONW	$298,637	$5,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Mill and Class 'S' Overlay	$267,790	$5,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Mill and Replace AC – 4" ***	$703,062	$5,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Mill and PCCP Overlay (AONC)	$1,069,539	$12,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Mill and PCCP Overlay (FD, THK or TONS)	$1,050,175	$12,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Full Depth Reclamation on FD	$732,612	$6,250	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Full Depth Reclamation on THK	$629,309	$6,250	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Full Depth Reclamation on TONS	$567,375	$6,250	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Full Depth Reclamation on TONW	$567,375	$6,250	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Cold in Place Recycle on THK	$455,936	$5,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Cold in Place Recycle on TONS	$455,936	$5,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Rout and Seal	$7,138	$250	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Chip Seal	$38,421	$450	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Microsurfacing	$54,135	$1,500	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA

Cost Estimates from Transportation Planning Engineer, February 6th, 2023

** Treatment may have additional Ancillary Treatments, see **Table 23**: Ancillary Treatment Cost Matrix* *** Not included with Interstate reconstruction.* **** Treatment not currently active*

Table 19: Rural Asphalt Treatment Cost Matrix

Summary of Rural Treatment Costs for dTIMS BA Estimates(cont.)

Blotter	Surface Cost *per 2-lane mile*	Traffic Control *per 2-lane mile*	Slope Flattening *per 2-lane mile*	Bridge *per structure*	Box Culvert *per Box*	Mobilization *per project*	P.E. *per project*	C.E. *per project*	ROW *per 2-lane mile*	Utilities *per 2-lane mile*
Reconstruction	See Reconst. Cost Matrix Table 24	$10,000	NA	$125,000+ $260*Area (new)+$25 * Area (old)	$320,000	7.00%	5.50%	8.00%	$16,000**	$33,900**
Asphalt Overlay	$327,695	$4,750	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Blotter Reapplication	$69,188	$1,250	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Full Depth Reclamation & New Blotter Surface	$134,629	$1,750	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Gravel										
Reconstruction	$1,256,637	$10,000	NA	$125,000+ $260*Area (new)+$25 * Area (old)	$209,100	7.00%	5.50%	8.00%	$16,000**	$33,900**
Gravel Resurfacing	$156,438	$1,275	$16,083	NA	NA	7.00%	2.5%	8.00%	NA	NA

Cost Estimates from Transportation Planning Engineer, February 6th, 2023

** Treatment may have additional Ancillary Treatments, see Table 23: Ancillary Treatment Cost Matrix* *** Not included with Interstate reconstruction.*

Table 20: Rural Blotter and Gravel Treatment Cost Matrix

Summary of Rural Treatment Costs for dTIMS CT Estimates (cont.)

PCCP	Surface Cost *per 2-lane mile*	Traffic Control *per 2-lane mile*	Slope Flattening *per 2-lane mile*	Bridge *per structure*	Box Culvert *per Box*	Mobilization *per project*	P.E. *per project*	C.E. *per project*	ROW *per 2-lane mile*	Utilities *per 2-lane mile*
Reconstruction	See Reconst. Cost Matrix Table 25	$16,000	NA	$125,000+ $260*Area (new)+$25 * Area (old)	$320,000	10.00 %	5.50% (2.5% for Interstate)	8.00%	$16,000**	$33,900**
Remove and Replace PCCP (CRCP)* **	$1,938,705	$16,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Remove and Replace PCCP (Jointed)	$2,129,133	$16,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Rubblize with AC Overlay (Non-Interstate)	$966,433	$16,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Rubblize with AC Overlay (Interstate)	$1,590,100	$16,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Crack and Seat with AC Overlay	$878,588	$7,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
AC Overlay (no crack & seat)	$589,018	$5,750	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Pavement Restoration 1* < 40% Full Depth Repair	$151,782	$3,750	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Pavement Restoration 2* > 40% Full Depth Repair	$988,730	$3,750	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Grinding Only* (Quartzite)	$144,333	$4,250	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Grinding Only* (Granite/Limestone)	$144,333	$4,250	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Unbonded CRC Overlay (CRCP)* **	$1,304,911	$16,500	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Unbonded PCC Overlay (Jointed)	$1,390,701	$15,250	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Bonded Overlay* **	$762,754	$13,000	$25,150	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA
Saw and Seal Joints* **	$30,297	$900	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Rout and Seal of AC Shoulders	$4,777	$250	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Chip Seal of AC Shoulders	$23,335	$450	NA	NA	NA	7.00%	2.5%	8.00%	NA	NA
Mill and Replace AC Shoulders	$153,049	$1,500	NA	$53,437 (replace guardrail)	NA	7.00%	2.5%	8.00%	NA	NA

Cost Estimates from Transportation Planning Engineer, February 6th, 2023

** Treatment may have additional Ancillary Treatments, see Table 23: Ancillary Treatment Cost Matrix* *** Not included with Interstate reconstruction.* **** Treatment not currently active*

Table 21: Rural PCC Treatment Cost Matrix

Summary of Urban Treatment costs for dTIMS CT Estimates

Reconstruction includes Surface Removal, Grading, Drainage, and New Surfacing.

ASPHALT	Surface Cost *per sq. ft.*	Sidewalk *per mile*	Traffic Control *per mile*	Bridge *per structure*	Box Culvert *per Box*	Lighting *per mile*	ADA Curb Ramps *Per mile*	Mobilization *Per project*	P.E. *per project*	C.E. *per project*	ROW *per mile*	Utilities *per mile*
Reconstruction to Asphalt	$18.10	$341,801	$100,000	$125,000+ $260*Area (new)+$25 * Area (old)	$320,000	$407,059	$248,454	7.0%	9.5%	8.0%	$70,000	$100,000
Asphalt Overlay	$2.05	N/A	$21,500	$53,437 (replace guardrail)	N/A	N/A	$248,454	7.0%	2.5%	8.0%	N/A	N/A
Mill & AC Overlay	$2.62	N/A	$21,500	$53,437 (replace guardrail)	N/A	N/A	$248,454	7.0%	2.5%	8.0%	N/A	N/A
Mill & PCC Overlay	$5.47	N/A	$36,500	$53,437 (replace guardrail)	N/A	N/A	$248,454	7.0%	5.5%	8.0%	N/A	N/A
Rout & Seal	$0.12	N/A	$1,500	N/A	N/A	N/A	N/A	7.0%	2.5%	8.0%	N/A	N/A
Chip Seal	$0.34	N/A	$1,250	N/A	N/A	N/A	N/A	7.0%	2.5%	8.0%	N/A	N/A
PCCP												
Reconstruction to PCCP	$19.55	$341,801	$150,000	$125,000+ $260*Area (new)+$25 * Area (old)	$320,000	$407,059	$248,454	7.0%	9.5%	8.0%	$70,000	$100,000
Remove & Replace PCCP	$12.46	N/A	$32,500	$53,437 (replace guardrail)	N/A	N/A	$248,454	7.0%	5.5%	8.0%	N/A	N/A
AC Overlay (No Crack & Seat)	$5.31	N/A	$21,500	$53,437 (replace guardrail)	N/A	N/A	$248,454	7.0%	2.5%	8.0%	N/A	N/A
Pavement Restoration Urban	$6.73	N/A	$16,500	N/A	N/A	N/A	N/A	7.0%	2.5%	8.0%	N/A	N/A
Grinding Only (Quartzite)	1.73	N/A	$11,500	N/A	N/A	N/A	N/A	7.0%	2.5%	8.0%	N/A	N/A
Grinding Only (Granite/Limestone)	1.73	N/A	$11,500	N/A	N/A	N/A	N/A	7.0%	2.5%	8.0%	N/A	N/A
Saw & Seal Joints* **	$0.10	N/A	$9,500	N/A	N/A	N/A	N/A	7.0%	2.5%	8.0%	N/A	N/A

Cost Estimates from Transportation Planning Engineer, February 6th, 2023

**** Treatment not currently active*

Table 22: Urban Treatment Cost Matrix

Summary of Ancillary Costs for dTIMS CT Estimates

PCCP	Surface Cost *per 2-lane mile*	Traffic Control *per 2-lane mile*	Slope Flattening *per 2-lane mile*	Guard Rail *per structure*	Lighting *per 2-lane mile*	Mobilization *per project*	P.E. *per project*	C.E. *per project*	ROW *per 2-lane mile*	Utilities *per 2-lane mile*
Grinding Quartzite	$144,333	$1,500	NA	NA	NA	7.00%	2.50%	8.00%	NA	NA
Grinding Granite or Limestone	$144,333	$1,500	NA	NA	NA	7.00%	2.50%	8.00%	NA	NA
Dowel Bar Retrofit	$93,995	$2,500	NA	NA	NA	7.00%	2.50%	8.00%	NA	NA

Cost Estimates from Transportation Planning Engineer, February 6th, 2023

Table 23: Ancillary Treatment Cost Matrix

Summary of Reconstruction Surfacing Costs for dTIMS CT Estimates

Interstate costs are based on old PCCP removal and new surfacing. Divided Highway (non-Interstate) costs are based on old PCCP removal, grading and new surfacing. NHS and STP (non-divided) costs are based on salvage old AC surfacing, grading, and new surfacing. All costs are per 2 lane mile.

	INTERSTATE	NON-INTERSTATE DIVIDED		NHS & STP							
Surface Width (feet)	40	38		36				40			
ADT				≤249	250-549	550-1499		1500 - 2499		≥2500	
Trucks		≤199	≥200			≤199	≥200	≤199	≥200	≤199	≥200
ASPHALT											
Blotter Surfacing, 12" Base Course, Gravel Shoulders				$1,269,758							
4" AC Surfacing, 12" Base Course & Gravel Shoulders				$ 1,693,228							
4.5" AC Surfacing, 12" Base Course & 4.5" AC Shoulders						$1,738,785		$ 1,872,403			
5" AC Surfacing, 12" Base Course & 5" AC Shoulders		$1,860,713					$1,803,879		$1,938,918	$1,938,918	
6" AC Surfacing, 12" Base Course & 6" AC Shoulders			$ 1,988,169								$2,079,408
8" AC Surfacing, 12" Base Course & 4" AC Shoulders	$2,341,199										

Cost Estimates from Transportation Planning Engineer, February 6th, 2023

Table 24: Reconstruction Asphalt Surfacing Cost Matrix

Summary of Reconstruction Surfacing Costs for dTIMS CT Estimates (cont.)

Interstate costs are based on old PCCP removal and new surfacing. Divided Highway (non-Interstate) costs are based on old PCCP removal, grading and new surfacing. NHS and STP (non-divided) costs are based on salvage old AC surfacing, grading, and new surfacing. All costs are per 2 lane mile.

	INTERSTATE			DIVIDED (NON-INTERSTATE)	NHS & STP		
Surface Width (feet)	**40**		**56**	**38**	**36**	**40**	
ADT	**≤19,999**	**20,000-29,999**	**≥30,000**	**ALL**	**≤1499**	**1500 - 2499**	**≥2500**
PCCP							
8" Doweled PCCP, 5" Gravel Cushion & Gravel Shoulders					$2,183,779		
8" Doweled PCCP, 5" Gravel Cushion & 3" AC Shoulders						$2,419,167	
9" Doweled PCCP, 5" Gravel Cushion & 3" AC Shoulders				$2,380,389			$2,419,167
11.5" Doweled PCCP, 5" Gravel Cushion & 3" AC Shoulders	$2,483,659						
11.5" Doweled PCCP, 5" Gravel Cushion & PCC Shoulders (6' Inside)		$2,928,661					
11.5" Doweled PCCP, 5" Gravel Cushion & PCC Shoulders (10' Inside)			$3,655,904				

Cost Estimates from Transportation Planning Engineer, February 6th, 2023

Table 25: Reconstruction PCC Surfacing Cost Matrix

APPENDIX A: HIGHWAY PAVEMENT PROJECT SELECTION PROCESS

The process of objectively selecting highway pavement projects is multi-stepped. Below is a summary of the steps involved in the selection process:

1. Research and Transportation Inventory Management updates roadway and collects automated condition data from the State Highway System during the Summer.
2. Project Development (PMS Unit) collects visual pavement distress data from the State Highway System during the Summer.
3. Research and Transportation Inventory Management enters data into the Roadway Inventory System (RIS) file during the Fall.
4. Project Development (PMS Unit) enters new visual pavement distress data into the dTims BA database and system defaults for an analysis of data prior to Fall Inspections.
5. Highway section data tables, maps and the results of the fall analysis are sent to the Pavement Design Engineer, Region and Area Staff and Project Development staff for review prior to fall inspections.
6. A highway inspection team comprised of the Pavement Management Unit, Pavement Design Engineer, Region and Area Engineers and Project Development's Transportation Planning Engineers (TPE) coordinate and conduct onsite reviews and inspections based on Pavement Management optimization results and Region and Area needs.
7. Minor data adjustments identified by the Highway Inspection Teams are made to the dTims BA data to reflect observed conditions.
8. Project Development (PMS Unit) loads\updates RIS data into the dTims BA database during December.
9. Project Development (PMS Unit) checks the segmentation of the State Highway System for homogenous sections. The dTims BA database computes various rating index values and populates inventory data for each of these highway sections during January.
10. The analysis of the dTims BA database is started, by the analysis module, in Project Development (PMS Unit) near the end of January.
11. The dTims BA analysis begins to generate reports optimizing construction and preservation treatments by the end of February.
12. New recommended project candidates are generated based on the updated data analysis and inspection notes and are forwarded to the TPEs in Project Development for entry into C2C in late February to the end of March.
13. Projects are ranked for project prioritization matrix the Pavement Management Engineer and the Bridge Management Engineer in late March to early April.
14. Project Development staff and invitees conduct pre-programming meeting (second week in April) to review needs and currently programmed projects and outline a staff recommended tentative STIP.
15. Program meeting is the last week in April. Region Engineers, Operations Engineers, Area Engineers and Planning and Engineering Administrative and planning staff review needs and currently programmed projects and outline a staff recommended program of highway projects.
16. Tentative STIP is printed and distributed to members of the SDDOT Commission for review and preliminary approval in June.
17. Public meetings to solicit input on the STIP are conducted in July.
18. The SDDOT Commission reviews the input received during the public meetings, considers minor adjustments to the STIP, and authorizes its final approval in late August.
19. The finalized STIP is approved by FHWA/Federal Transit Administration (FTA) in middle September. The STIP is printed and distributed to relevant parties by the end of September.

20. The Division of Planning/Engineering initiates project scoping, life-cycle cost analysis, design, and implementation for the newly programmed pavement projects.
21. Research and Transportation Inventory Management and Project Development (PMS Unit) gathers roadway data to start the process over again.

APPENDIX B: DEFINITIONS OF DISTRESS

FLEXIBLE PAVEMENT DISTRESSES

Transverse Cracking:	Appears as cracks perpendicular to pavement centerline.
Fatigue Cracking:	Appears initially as a single longitudinal crack in the wheel path. Later appears as a series of interconnected cracks resembling alligator skin or chicken wire.
Patching & Patch Deterioration:	Appears as an area where the pavement surface has been removed or replaced or as a localized overlay covering up another distress.
Block Cracking:	Appears as cracks which divide the surface into approximately rectangular pieces. In the low severity level, they may appear as random longitudinal cracks between the wheel paths. This may include cracks in centerline rumble strips/stripes.
Rut Depth:	Appears as a surface depression in the wheel paths.
Roughness:	The rideability of the road section.

RIGID PAVEMENT DISTRESSES

D-Cracking:	Appears as a series of closely spaced crescent-shaped hairline surface cracks. The crack often causes dark coloring of the surface in the surrounding area.
Alkali Silica Reactivity:	Appears as a series of interconnected cracks. Frequently, larger cracks are oriented in the longitudinal direction of the pavement and interconnected by finer transverse or random cracks.
Joint Spalling:	Appears as the cracking, breaking, chipping, or fraying of slab edges within 2 feet (0.6 meters) of a joint or crack.
Corner Cracking:	Appears as a crack extending vertically through the entire slab depth which intersects the joints at a distance less than 6 feet from the corner of the slab.
Faulting:	Appears as the difference in elevation across a joint or crack.
Joint Seal Damage:	Appears as any condition which enables incompressible materials and/or significant amount of water to infiltrate the joint from the surface.
Punchouts:	The area enclosed by two closely spaced (usually less than 2 feet) transverse cracks, a short longitudinal crack, and the edge of the pavement or a longitudinal joint. Occurs on CRCP Only.
CRCP Block Cracking:	**A**ppears as hairline transverse and longitudinal cracks that form a block pattern in CRCP pavement. Occurs on CRCP Only.
Roughness:	The rideability of the road section.

APPENDIX C: TREATMENT BASE DESIGNS

BASE DESIGNS FOR RURAL TREATMENTS USED IN dTims BA

FLEXIBLE PAVEMENT TYPES

TREATMENT	AC on PCC	Blotter	Full Depth	Thick	Thin On Strong	Thin on Weak
AC Overlay	N/A	3" AC Overlay	N/A	2" AC Overlay	2" AC Overlay	2" AC Overlay
AC Overlay (Class 'S')	1.25" Class 'S' AC Overlay*	N/A	1.25" Class 'S' AC Overlay*	1.25" Class 'S' AC Overlay*	1.25" Class 'S' AC Overlay*	1.25" Class 'S' AC Overlay*
Blotter Treatment	N/A	2nd Application Blotter	N/A	N/A	N/A	N/A
Mill and AC Overlay	Mill 2"	N/A	Mill 2"	Mill 2"	Mill 1"	Mill 1"
	2" AC Overlay		2" AC Overlay	2" AC Overlay	2" AC Overlay	2" AC Overlay
Mill and Class 'S' Overlay	Mill 1"	N/A	Mill 1"	Mill 1"	Mill 1"	Mill 1"
	1.25" Class 'S' AC Overlay		1.25" Class 'S' AC Overlay	1.25" Class 'S' AC Overlay	1.25" Class 'S' AC Overlay	1.25" Class 'S' AC Overlay
Mill and PCC Overlay	Mill 1" AC	N/A	Mill 4"	Mill 4"	Mill 4"	N/A
	8"PCC Overlay 4' – AC shoulder		8"PCC Overlay 4' – AC shoulder	8"PCC Overlay 4' – AC shoulder	8"PCC Overlay 4' – AC shoulder	
Full Depth Reclamation	N/A	Process 5"	Add 4" Aggregate Process 7"	Process 8"	Process 8"	Process 7"
		Blotter Surfacing	AC Surfacing 4"	AC Surfacing 4"	AC Surfacing 4"	AC Surfacing 4"
Cold In-Place Recycle	N/A	N/A	N/A	Mill 2"	CIP 4"	N/A
				Cold In Place 4"	3" AC Surfacing	
				3" AC Surfacing		
Reconstruct to AC Surface	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)
Reconstruct to PCC Surface	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (25)

Note: These designs are for cost estimating purposes only. The Pavement Management Unit only recommends treatments, not designs. (updated 4/25/2022)

N/A = Treatment is Not Applicable to Pavement Type *Applicable on Interstate or where Average Daily Truck Traffic >400.

Table C1: Flexible Rural Pavement Designs

RIGID PAVEMENT TYPES

TREATMENT	Continuous Reinforced	Thick Short Jointed	Thick Short Jointed with Dowels	Thin Short Jointed
AC Overlay on PCC (no Crack and Seat)	4" AC Surfacing	4" AC Surfacing	4" AC Surfacing	4" AC Surfacing
	1.25" Class 'S'*	1.25" Class 'S'*	1.25" Class 'S'*	1.25" Class 'S'*
Crack and Seat PCC with AC Overlay	N/A	Edge Drains	Edge Drains	Edge Drains
		Crack & Seat	Crack & Seat	Crack & Seat
		3" AC Surfacing	3" AC Surfacing	3" AC Surfacing
		*1.25" Class 'S'	*1.25" Class 'S'	*1.25" Class 'S'
Rubblize PCC with AC Overlay (Interstate)	Edge Drains	Edge Drains	Edge Drains	Edge Drains
	Rubblize PCC	Rubblize PCC	Rubblize PCC	Rubblize PCC
	2.5" Base Course	2.5" Base Course	2.5" Base Course	2.5" Base Course
	6" AC Surfacing	6" AC Surfacing	6" AC Surfacing	6" AC Surfacing
	1.25" Class 'S'	1.25" Class 'S'	1.25" Class 'S'	1.25" Class 'S'
Rubblize PCC with AC Overlay (Non-Interstate)	Edge Drains	Edge Drains	Edge Drains	Edge Drains
	Rubblize PCC	Rubblize PCC	Rubblize PCC	Rubblize PCC
	2.5" Base Course	2.5" Base Course	2.5" Base Course	2.5" Base Course
	4" AC Surfacing	4" AC Surfacing	4" AC Surfacing	4" AC Surfacing
	1.25" Class 'S'*	1.25" Class 'S'*	1.25" Class 'S'*	1.25" Class 'S'*
Remove PCC and Replace with Jointed PCC	Remove existing PCCP + 5" Gravel	Remove existing PCCP + 5" Gravel	Remove existing PCCP + 5" Gravel	Remove existing PCCP + 5" Gravel
	Add 5" Gravel	Add 5" Gravel	Add 5" Gravel	Add 5" Gravel
	8" - PCC Surfacing	8" - PCC Surfacing	8" - PCC Surfacing	8" - PCC Surfacing
Unbonded Jointed PCC Overlay	Geotextile Bond Breaker Fabric	Geotextile Bond Breaker Fabric	Geotextile Bond Breaker Fabric	Geotextile Bond Breaker Fabric
	8" - PCC Surfacing	8" - PCC Surfacing	8" - PCC Surfacing	8" - PCC Surfacing
Undersealing/ Dowel Bar Retrofit	N/A	Underseal	Underseal	Underseal
		20' Joint Spacing	20' Joint Spacing	20' Joint Spacing
		6 dowels per 12'	6 dowels per 12'	6 dowels per 12'
Reconstruct to AC Surface	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)	Base Course and AC Surfacing (Table 24)
Reconstruct to PCC Surface	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (Table 25)	Gravel Cushion and PCC Surfacing (Table 25)

Note: These designs are for cost estimating purposes only. The Pavement Management Unit only recommends treatments, not designs. (updated 4/25/2022)
N/A = Treatment is Not Applicable to Pavement Type * Applicable on Interstate or where Average Daily Truck Traffic >400.

Table C2: Rigid Rural Pavement Designs (Continued on next page)

TREATMENT	Continuous Reinforced	Thick Short Jointed	Thick Short Jointed with Dowels	Thin Short Jointed
PCC Diamond Grinding	N/A	Pavement Grinding	Pavement Grinding	Pavement Grinding
		Saw and Seal Joints	Saw and Seal Joints	Saw and Seal Joints
Joint and Spall Repair, Level 1	N/A	<40% Full Depth J&S Repair	<40% Full Depth J&S Repair	<40% Full Depth J&S Repair
		Reseal Joints and random cracks	Reseal Joints and random cracks	Reseal Joints and random cracks
Joint and Spall Repair, Level 2	N/A	>40% Full Depth J&S Repair	>40% Full Depth J&S Repair	>40% Full Depth J&S Repair
		Reseal Joints and random cracks	Reseal Joints and random cracks	Reseal Joints and random cracks
Mill and Replace AC Shoulders	Mill 2”	Mill 2”	Mill 2”	Mill 2”
	2” AC Overlay	2” AC Overlay	2” AC Overlay	2” AC Overlay

Note: These designs are for cost estimating purposes only. The Pavement Management Unit only recommends treatments, not designs. (updated 4/25/2022)

N/A = Treatment is Not Applicable to Pavement Type * Applicable on Interstate or where Average Daily Truck Traffic >400.

Table C2: Rigid Rural Pavement Designs (continued from previous page)

BASE DESIGNS FOR URBAN TREATMENTS USED IN dTims BA

FLEXIBLE PAVEMENT TYPES

TREATMENT	Full Depth	Thick	Thin On Strong	Thin on Weak	AC on PCC
AC Overlay (Urban)	2" AC Overlay	2" AC Overlay	2" AC Overlay	2" AC Overlay	N/A
Mill and AC Overlay (Urban)	Mill 2"	Mill 2"	Mill 2"	Mill 2"	Mill 2"
	2" AC Overlay	2" AC Overlay	2" AC Overlay	2" AC Overlay	2" AC Overlay
Mill and PCC Overly (Urban)	Mill 5" AC	Mill 5" AC*	N/A	N/A	N/A
	5" - PCC Overlay	5" - PCC Overlay			
Reconstruct to AC Surface (Urban)	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter
	12" Base Course	12" Base Course	12" Base Course	12" Base Course	12" Base Course
	4" – AC Surfacing	4" – AC Surfacing	4" – AC Surfacing	4" – AC Surfacing	4" – AC Surfacing
Reconstruct to PCC Surface (Urban)	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter
	5"- Gravel Cushion	5"- Gravel Cushion	5"- Gravel Cushion	5"- Gravel Cushion	5"- Gravel Cushion
	8" – PCC Surfacing	8" – PCC Surfacing	8" – PCC Surfacing	8" – PCC Surfacing	8" – PCC Surfacing

Note: These designs are for cost estimating purposes only. The Pavement Management Unit only recommends treatments, not designs. (updated 4/25/2022)
N/A = Treatment is Not Applicable to Pavement Type *Existing AC pavement depth must be greater than 7 inches.

Table C3: Flexible Urban Pavement Designs

RIGID PAVEMENT TYPES

TREATMENT	Continuous Reinforced	Thick Short Jointed	Thick Short Jointed with Dowels	Thin Short Jointed	Mesh Reinforced
Joint and Spall Repair (Urban)	N/A	>40% Full Depth J&S Repair	>40% Full Depth J&S Repair	>40% Full Depth J&S Repair	>40% Full Depth J&S Repair
		Reseal Joints and random cracks	Reseal Joints and random cracks	Reseal Joints and random cracks	Reseal Joints and random cracks
Reconstruct to AC Surface (Urban)	N/A	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter
		12" - Base Course	12" - Base Course	12" - Base Course	12" - Base Course
		4" – AC Surfacing	4" – AC Surfacing	4" – AC Surfacing	4" – AC Surfacing
Reconstruct to PCC Surface (Urban)	N/A	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter
		5" - Gravel Cushion	5" - Gravel Cushion	5" - Gravel Cushion	5" - Gravel Cushion
		8"- PCC Surfacing	8"- PCC Surfacing	8"- PCC Surfacing	8"- PCC Surfacing

Note: These designs are for cost estimating purposes only. The Pavement Management Unit only recommends treatments, not designs. (updated 4/25/2022)
N/A = Treatment is Not Applicable to Pavement Type

Table C4: Rigid Urban Pavement Designs

APPENDIX D: ROADWAY WIDTH CHARTS

RECONSTRUCTION WIDTH

When a rural section of highway is reconstructed, it is reconstructed to the width in Table D1 below. Please refer to Table 7-1 of the SDDOT Road Design Manual.

	Projected 20-year ADT Range	NHS and STP
Rural	≤1499	36
Two-lane	≥ 1500	40
Four-lane Divided	Non-Interstate	38
	Interstate ≤ 29,999	40
	Interstate ≥ 30,000	56

Table D1: Widths (feet) for Rural Reconstruction Treatments

MINIMUM RESURFACING ELIGIBLE

For a rural section of highway to be eligible for resurfacing, the roadway width must be greater than or equal to the value in ***Table D2*** shown below. Please refer to Table 7-2 and 7-3 of the Road Design Manual.

	Current ADT Range	Minimum Resurface Width	
Truck ADT		≤ 99	≥ 100
NHS - Rural Two-lane	≤399	28	30
	400 - 2499	30	30
	≥ 2500	36	36
Non NHS - Rural Two-lane	≤1499	24	26
	≥1500	26	28
Four-lane Divided	Non-Interstate	36	36
	Interstate (ADT≥ 29,999)	38	38
	Interstate (ADT≥30,000)	56	56

Table D2: Minimum Width Limit (feet) for Resurfacing Treatments

URBAN RECONSTRUCTION WIDTHS

When an urban section of highway is reconstructed, the roadway is reconstructed to the width in ***Table D3*** which is shown below. Please refer to Table 15-10 of the SDDOT Road Design Manual.

Projected 20-year ADT Range	Number of Lanes	Roadway Width (feet)
≤ 2,499	2	24
2,500 to 15,999	3	36
16,000 to 29,999	5	60
≥30,000	6	72

Table D3: Urban Reconstruction Widths (feet)

APPENDIX E: RECONSTRUCTION ELIGIBILITY

Reconstruction Eligible Trigger

Through the SDDOT Pavement Management System, reconstruction can be triggered on rural sections of highway based on surface condition and highway width. Historically the triggers used to identify reconstruction eligible width was based on RD-1998-03 (SDDOT Highway Width and Surfacing Type Standards) and RD-1998-04 (South Dakota's Scoping Process for Highway Construction Projects). ***Tables E1 and E2*** will replace the current triggers with a simplified lane and shoulder width analysis based on funding category.

Currently, what is being done within the Pavement Management System for reconstruction eligibility is listed below.

1) All Pavement Management analysis sections are initially set to "Resurfacing only"
2) The funding category/highway system, lane widths, shoulder widths and ADT criteria are processed through the tables below. If these variables do not meet the minimum criteria, they are flagged as "Reconstruction Eligible" (See table D3 and D4)
3) Any section that is part of the Interstate, Municipal or Urban funding category or has curb and gutter is flagged as "Reconstruction Eligible"
4) Any section that is a Non-Significant highway is flagged as "Non-Significant Highway"
5) Sections that are highways in the Black Hills National Forest or within National Park jurisdiction is flagged as "Scenic Highway"
6) The Pavement Management System uses the inverse of the performance curves to calculate a "virtual age". This virtual age is compared to the actual age of the pavement. This comparison yields factor of "diminishing returns"
   a) If the virtual age is less than or equal to the actual age for all indices, the pavement is performing as expected and the return on our investment has not diminished.
   b) If the virtual age is greater than the actual age, the return on investment is diminishing
   c) A score of 0 to 20 is applied to those pavements that are showing a diminishing return.
   d) If the score is 15 or great, the reconstruction eligible flag is turned on automatically.
7) The Pavement Management Engineer can, for the purpose of analysis, manually set the Reconstruction Eligibility to "Reconstruction Eligible" or "Shoulder Widening Candidate" if a section meets the criteria for this treatment as per roadbed conditions and safety criteria from the Safety Engineer and at the request of the Project Development Program Manager.

Current ADT	≤ 399*	400-2499	≥ 2500
Lane Width	12	12	12
Minimum Shoulder width	2	3	6

* If Truck ADT>100 Minimum Shoulder width is 3'

Table E1: Reconstruction Eligible Criteria for Rural, NHS Non-Interstate

Current ADT	≤ 1499*	≥ 1500*
Lane Width	10	11
Minimum Shoulder width	2	2

* If Truck ADT>100 Minimum Shoulder width is 3'

Table E2: Reconstruction Eligible Criteria for Rural STP

APPENDIX F: TRIGGER LIMITS FOR CAPITAL IMPROVEMENTS

RURAL MESH PAVEMENT TREATMENT TRIGGERS

AC Overlay (No Crack & Seat)

PMS->DTIMS_DATA__RECONFLAG<>'6' And
dav_PAV_CTEGRY='R' And
(dav_PAVETYPE='MESH' Or dav_PAVETYPE='CRCP') And
(aav_DASR>=2.3 or aav_CRCBlock>=2.3) And
aav_XAGE>15.0 And
((aav_DASR<=3.6 Or aav_CRCBlock<=3.6) Or
(PMS->NEEDS_BOOK__CURB_GUTTR='1' And
(aav_JTSP<=3.0 And aav_CRCR<=2.8)) Or
(PMS->NEEDS_BOOK__CURB_GUTTR='1' And
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG<>'1') And
(dav_PAVETYPE='MESH' And (aav_JTSP<=3.3 And (aav_CRCR<=3.3 Or aav_FLTG<=2.3 Or aav_RUFF<=4.0)) Or
(dav_PAVETYPE='CRCP' And (aav_POUT<=3.3 Or aav_RUFF<=4.0)))))

AC Overlay (Rubblize)

PMS->DTIMS_DATA__RECONFLAG<>'6' AND
((aav_DASR<3.6 OR aav_CRCBlock<3.6) OR (aav_JTSP<=3.3 AND (aav_CRCR<=3.3 OR aav_FLTG<=2.3 OR
aav_RUFF<=4.0))) AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1') AND
((PMS->DTIMS_DATA__DIV_CODE='2' AND PMS->DTIMS_DATA__INSD_SHLDW>=6.0) OR PMS-
>DTIMS_DATA__DIV_CODE<>'2') AND
PMS->NEEDS_BOOK__CURB_GUTTR='1' AND
((dav_PAVETYPE='CRCP' AND aav_XAGE>15.0) OR ((dav_PAVETYPE='MESH' OR dav_PAVETYPE='TKSJD') AND
aav_XAGE>30.0))

Bonded Overlay- currently inactive, retain for future use

aav_DASR >= 4.0 And
aav_JTSP >= 3.5 And
aav_CRCR >= 4.5 And
aav_FLTG >= 3.0 And
aav_RUFF <= 4.0 And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ') And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
aav_XAGE > 29.0

Pavement Restoration 1

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_DASR >= 4.0 And (aav_JTSP >= 2.0 And aav_JTSP <= 3.8) And aav_RUFF >= 3.3 And aav_CRCR > 4.0) And
dav_PAVETYPE = 'MESH' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_XAGE < 35.0

RURAL MESH PAVEMENT TREATMENT TRIGGERS (Continued)

Pavement Restoration 2

PMS->DTIMS_DATA__RECONFLAG <> '6' And
aav_FLTG >= 1.0 And
(aav_JTSP <= 3.8 Or aav_FLTG <= 3.8) And
aav_DASR >= 4.0 And
aav_CRCR > 4.0 And
aav_RUFF >= 3.0 And
dav_PAVETYPE = 'MESH' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_XAGE < 35.0

Remove & Replace Rigid Pavement

PMS->DTIMS_DATA__RECONFLAG <> '6' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
((aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
(dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'MESH') And
(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And aav_CRCR <= 2.3) Or (aav_JTSP <= 3.3 And aav_FLTG <= 2.3)) And
aav_XAGE > 19.0) OR
(dav_PAVETYPE = 'CRCP' And
(aav_DASR <= 3.3 Or aav_CRCBlock <= 3.3 Or aav_POUT <= 2.3) And
aav_XAGE > 19.0)

Unbonded Overlay (Interstate, All jointed PCC)

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
PMS->DTIMS_DATA__INSD_SHLDW >= 6.0 And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
aav_XAGE > 29.0

Unbonded Overlay (Major Arterial Only, All jointed PCC)

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(aav_DASR <= 3.3 And (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
PMS->NEEDS_BOOK__FUND_CAT = 'MAJA' And
aav_XAGE > 29.0

RURAL MESH PAVEMENT TREATMENT TRIGGERS (Continued)

Grinding (Stand alone)

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(((aav_DASR >= 4.8 And aav_JTSP > 3.8 And aav_FLTG < 3.6) Or (aav_DASR >= 4.8 And aav_JTSP > 3.8 And aav_RUFF <= 3.6) And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ')) Or
(aav_DASR >= 4.8 And aav_POUT >= 4.0 And aav_RUFF <= 4.2 And dav_PAVETYPE = 'CRCP')) And
PMS->NEEDS_BOOK__CURB_GUTTR = '1'

Reconstruction to Flexible Pavement

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
aav_AADT < 2500.0 And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD') And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

Reconstruction to Rigid Pavement (For Mesh and TKSJD pavetype only)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
(aav_AADT >= 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD') And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

Reconstruction to CRC Pavement (not currently used, retain for future use)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And aav_CRCR <= 2.3) Or (aav_JTSP <= 3.3 And aav_FLTG <= 2.3)) And
aav_AADT >= 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD')

RURAL CRCP PAVEMENT TREATMENT TRIGGERS

AC Overlay (No Crack & Seat)

```
PMS->DTIMS_DATA__RECONFLAG <> '6' And
dav_PAV_CTEGRY = 'R' And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'CRCP') And
(aav_DASR >= 2.3 or aav_CRCBlock >= 2.3) And
aav_XAGE > 15.0 And
((aav_DASR <= 3.6 Or aav_CRCBlock <= 3.6) Or
(PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
(aav_JTSP <= 3.0 And aav_CRCR <= 2.8)) Or
(PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
(dav_PAVETYPE = 'MESH' And (aav_JTSP <= 3.3 And (aav_CRCR <= 3.3 Or aav_FLTG <= 2.3 Or aav_RUFF <= 4.0)) Or
(dav_PAVETYPE = 'CRCP' And (aav_POUT <= 3.3 Or aav_RUFF <= 4.0)))))
```

AC Overlay (Rubblize)

```
PMS->DTIMS_DATA__RECONFLAG<>'6' And
((aav_DASR<3.6 Or aav_CRCBlock<3.6) Or (aav_JTSP<=3.3 And (aav_CRCR<=3.3 Or aav_FLTG<=2.3 Or
aav_RUFF<=4.0))) And
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG<>'1') And
((PMS->DTIMS_DATA__DIV_CODE='2' And PMS->DTIMS_DATA__INSD_SHLDW>=6.0) Or PMS-
>DTIMS_DATA__DIV_CODE<>'2') And
PMS->NEEDS_BOOK__CURB_GUTTR='1' And
((dav_PAVETYPE='CRCP' And aav_XAGE>15.0) Or ((dav_PAVETYPE='MESH' Or dav_PAVETYPE='TKSJD') And
aav_XAGE>30.0))
```

Grinding (Stand alone)

```
PMS->DTIMS_DATA__RECONFLAG <> '6' And
(((aav_DASR >= 4.8 And aav_JTSP > 3.8 And aav_FLTG < 3.6) Or (aav_DASR >= 4.8 And aav_JTSP > 3.8 And
aav_RUFF <= 3.6) And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ')) Or
(aav_DASR >= 4.8 And aav_POUT >= 4.0 And aav_RUFF <= 4.2 And dav_PAVETYPE = 'CRCP')) And
PMS->NEEDS_BOOK__CURB_GUTTR = '1'
```

Remove & Replace CRCP Pavement with CRCP (not currently used, retain for future use)

```
PMS->DTIMS_DATA__RECONFLAG <> '6' and
(aav_CRCBlock <= 3.3 Or aav_DASR <= 3.3 Or aav_POUT <= 2.3) And
(aav_AADT > 2000.0 And PMS->DTIMS_DATA__NO_TRUCKS > 500.0) And
aav_XAGE > 19.0 And
dav_PAVETYPE = 'CRCP' And
PMS->NEEDS_BOOK__FUND_CAT = 'INT'
```

RURAL CRCP PAVEMENT TREATMENT TRIGGERS (Continued)

Remove & Replace CRCP Pavement with Jointed PCC

PMS->DTIMS_DATA__RECONFLAG <> '6' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
((aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
(dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'MESH') And
(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And aav_CRCR <= 2.3) Or (aav_JTSP <= 3.3 And aav_FLTG <= 2.3)) And
aav_XAGE > 19.0) OR
(dav_PAVETYPE = 'CRCP' And
(aav_DASR <= 3.3 Or aav_CRCBlock <= 3.3 Or aav_POUT <= 2.3) And
aav_XAGE > 19.0)

Unbonded Overlay (On Interstate, CRCP pavement only)

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(aav_DASR <= 3.3 Or aav_POUT <= 2.3) And
PMS->DTIMS_DATA__INSD_SHLDW >= 6.0 And
dav_PAVETYPE = 'CRCP' And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
aav_XAGE > 29.0

Reconstruction to Flexible Pavement

(aav_DASR <= 3.3 Or aav_POUT <= 2.3) And
aav_AADT < 2500.0 And
dav_PAVETYPE = 'CRCP' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

Reconstruction to Rigid Pavement

(aav_CRCBlock <= 3.3 Or aav_DASR <= 3.3 Or aav_POUT <= 2.3) And
(aav_AADT >= 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
dav_PAVETYPE = 'CRCP' And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

RURAL CRCP PAVEMENT TREATMENT TRIGGERS (Continued)

Reconstruction to CRC Pavement (not currently used, retain for future use)

(aav_DASR <= 3.3 Or aav_POUT <= 2.3) And
aav_AADT > 2000.0 And
dav_PAVETYPE = 'CRCP' And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL JOINTED PAVEMENTS TREATMENT TRIGGERS (INCLUDES TKSJ, TKSJD, TNSJ)

Bonded Overlay- currently inactive, retain for future use

aav_DASR >= 4.0 And
aav_JTSP >= 3.5 And
aav_CRCR >= 4.5 And
aav_FLTG >= 3.0 And
aav_RUFF <= 4.0 And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ') And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
aav_XAGE > 29.0

AC Overlay (Crack & Seat)

PMS->DTIMS_DATA__RECONFLAG <> '6' And
aav_DASR >= 2.3 And
(aav_DASR <= 3.6 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 3.3 Or aav_FLTG <= 2.3 Or aav_RUFF <= 4.0))) And
(dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
aav_XAGE > 30.0

AC Overlay (Rubblize) for TKSJD only

PMS->DTIMS_DATA__RECONFLAG<>'6' And
((aav_DASR<3.6 Or aav_CRCBlock<3.6) Or (aav_JTSP<=3.3 And (aav_CRCR<=3.3 Or aav_FLTG<=2.3 Or aav_RUFF<=4.0))) And
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG<>'1') And
((PMS->DTIMS_DATA__DIV_CODE='2' And PMS->DTIMS_DATA__INSD_SHLDW>=6.0) Or PMS->DTIMS_DATA__DIV_CODE<>'2') And
PMS->NEEDS_BOOK__CURB_GUTTR='1' And
((dav_PAVETYPE='CRCP' And aav_XAGE>15.0) Or ((dav_PAVETYPE='MESH' Or dav_PAVETYPE='TKSJD') And aav_XAGE>30.0))

AC Overlay (Rubblize) for TKSJ and TNSJ only

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_DASR < 3.6 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 3.3 Or aav_FLTG <= 2.3 Or aav_RUFF <= 4.0))) And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
((PMS->DTIMS_DATA__DIV_CODE = '2' And PMS->DTIMS_DATA__INSD_SHLDW >= 6.0) Or PMS->DTIMS_DATA__DIV_CODE <> '2') And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
aav_XAGE > 30.0 And
(dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'TKSJ')

RURAL JOINTED PAVEMENTS TREATMENT TRIGGERS (Continued) (INCLUDES TKSJ, TKSJD, TNSJ)

Pavement Restoration 1

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_DASR >= 4.0 And (aav_JTSP >= 2.0 And aav_JTSP <= 3.8) And aav_RUFF >= 3.3 And aav_CRCR > 3.0) And
(dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_XAGE < 35.0

Pavement Restoration 2

PMS->DTIMS_DATA__RECONFLAG <> '6' And
((aav_JTSP <= 3.8 Or (aav_FLTG >= 1.0 And aav_FLTG <= 3.8)) And aav_DASR >= 4.0 And aav_CRCR > 3.0 And
aav_RUFF >= 3.0) And
(dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TKSJD') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_XAGE < 35.0

Remove & Replace Rigid Pavement

PMS->DTIMS_DATA__RECONFLAG <> '6' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
((aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
(dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'MESH') And
(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And aav_CRCR <= 2.3) Or (aav_JTSP <= 3.3 And aav_FLTG <= 2.3)) And
aav_XAGE > 19.0) OR
(dav_PAVETYPE = 'CRCP' And
(aav_DASR <= 3.3 Or aav_CRCBlock <= 3.3 Or aav_POUT <= 2.3) And
aav_XAGE > 19.0)

Unbonded Overlay (Interstate, All jointed PCC)

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
PMS->DTIMS_DATA__INSD_SHLDW >= 6.0 And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
aav_XAGE > 29.0

RURAL JOINTED PAVEMENTS TREATMENT TRIGGERS (Continued) (INCLUDES TKSJ, TKSJD, TNSJ)

Unbonded Overlay (Major Arterial Only, All jointed PCC)

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(aav_DASR <= 3.3 And (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
PMS->NEEDS_BOOK__FUND_CAT = 'MAJA' And
aav_XAGE > 29.0

Grinding (Stand alone)

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(((aav_DASR >= 4.8 And aav_JTSP > 3.8 And aav_FLTG < 3.6) Or (aav_DASR >= 4.8 And aav_JTSP > 3.8 And
aav_RUFF <= 3.6) And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ')) Or
(aav_DASR >= 4.8 And aav_POUT >= 4.0 And aav_RUFF <= 4.2 And dav_PAVETYPE = 'CRCP')) And
PMS->NEEDS_BOOK__CURB_GUTTR = '1'

Undersealing/ Dowel Bar Retrofit (TKSJ Only)

(aav_DASR >= 4.8 And aav_JTSP > 3.8 And aav_CRCR > 3.5 And aav_FLTG < 4.5) And
dav_PAVETYPE = 'TKSJ' And
PMS->DTIMS_DATA__R_U_CAT <> 'U' And
aav_XAGE < 20.0

Reconstruction to Flexible Pavement (For TKSJD pavetype only)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
aav_AADT < 2500.0 And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD') And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

Reconstruction to Flexible Pavement(For TKSJ and TNSJ pavetype only)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
aav_AADT < 2500.0 And
(dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'TKSJ') And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

RURAL JOINTED PAVEMENTS TREATMENT TRIGGERS (Continued) (INCLUDES TKSJ, TKSJD, TNSJ)

Reconstruction to Rigid Pavement (For Mesh and TKSJD pavetype only)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
(aav_AADT >= 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD') And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

Reconstruction to Rigid Pavement (For TKSJ and TNSJ pavetype only)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And (aav_CRCR <= 2.3 Or aav_FLTG <= 2.3))) And
(aav_AADT >= 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
(dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'TKSJ') And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT'))

Reconstruction to CRC Pavement (For MESH and TKSJD only) (not currently used, retain for future use)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And aav_CRCR <= 2.3) Or (aav_JTSP <= 3.3 And aav_FLTG <= 2.3)) And
aav_AADT >= 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD')

Reconstruction to CRC Pavement (For TNSJ and TKSJ only) (not currently used, retain for future use)

(aav_DASR <= 3.3 Or (aav_JTSP <= 3.3 And aav_CRCR <= 2.3) Or (aav_JTSP <= 3.3 And aav_FLTG <= 2.3)) And
aav_AADT >= 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
(dav_PAVETYPE = 'TNSJ' Or dav_PAVETYPE = 'TKSJ')

RURAL FULL DEPTH (FD) PAVEMENT TREATMENT TRIGGERS

Mill and Class ‘S’ - AC Overlay (Interstate)

```
PMS->NEEDS_BOOK__FUND_CAT='INT' AND
(dav_PAVETYPE='AONC' Or dav_PAVETYPE='FD' Or dav_PAVETYPE='THK') AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 Or aav_FTCR<=3.5 Or aav_RUT<=3.0 Or aav_PTCH<=3.5 Or aav_BLCR<=3.4 Or aav_RUFF<=2.8)
```

Mill and Class ‘S’ - AC Overlay (Non-Interstate)

```
PMS->DTIMS_DATA__RECONFLAG <> '6' AND PMS->NEEDS_BOOK__FUND_CAT <> 'INT' AND
dav_AC_Mainline_Special_Code = 'S' AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 OR aav_FTCR<=3.5 OR aav_RUT<=3.0 OR aav_PTCH<=3.5 OR aav_BLCR<=3.4 OR aav_RUFF<=2.8) AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1')
```

Mill and AC Overlay

```
(PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' and
aav_PTCH >= 2.0 And
aav_BLCR >= 2.0 And
aav_TRCR < 4.0 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'FD' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI')
Or
(PMS->DTIMS_DATA__RECONFLAG <> '6' and
dav_AC_Mainline_Special_Code <> 'S' and
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'FD' And
PMS->DTIMS_DATA__RECONFLAG <> '1' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI')
```

Mill and PCC Overlay

```
PMS->DTIMS_DATA__RECONFLAG <> '6' and
aav_TRCR < 4.0 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'FD' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
dav_RD_WID >= 24.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
(aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0)
```

RURAL FULL DEPTH (FD) PAVEMENT TREATMENT TRIGGERS (Continued)

Full Depth Reclamation

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_TRCR <= 4.0 Or aav_FTCR <= 2.5 Or aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_BLCR <= 2.5 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'FD' And NOT
PMS->DTIMS_DATA__FOR_HWY And
dav_RD_WID >= 36.0 And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
PMS->DTIMS_DATA__RECONFLAG <> '2' And
aav_ZAGE>30.0

Reconstruct to Gravel

aav_AADT <= 100.0 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
dav_PAV_CTEGRY <> 'R' And
aav_ZAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reconstruct to Blotter

(aav_TRCR <= 4.0 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'FD' And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
aav_AADT < =249.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0

Reconstruction to Flexible Pavement

(aav_TRCR <= 4.0 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'FD' And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
aav_AADT < 2500.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL FULL DEPTH (FD) PAVEMENT TREATMENT TRIGGERS (Continued)

Reconstruction to Rigid Pavement

(aav_TRCR <= 4.0 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'FD' And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
(aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

Reconstruction To CRC Pavement (currently not used, retained for possible future use)

(aav_TRCR <= 4.0 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'FD' And
aav_AADT > 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL THICK (THK) ASPHALT PAVEMENT TREATMENT TRIGGERS

AC Overlay – Removed, is obsolete. Will maintain
Milled and Overlaid or Original Pavement (Only)

PMS->DTIMS_DATA__RECONFLAG <> '6' and
dav_AC_Mainline_Special_Code <> 'S' AND
aav_RUT >= 1.0 And
aav_FTCR >= 2.0 And
aav_PTCH >= 2.0 And
aav_BLCR >= 2.0 And
(aav_TRCR <= 4.0 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF < 2.9) And
dav_CURVE_FLAG <> 'A' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
dav_PAVETYPE = 'THK' And
PMS->DTIMS_DATA__R_U_CAT <> 'U'

Mill and Class ‘S’ - AC Overlay (Interstate)

PMS->NEEDS_BOOK__FUND_CAT='INT' AND
(dav_PAVETYPE='AONC' Or dav_PAVETYPE='FD' Or dav_PAVETYPE='THK') AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 Or aav_FTCR<=3.5 Or aav_RUT<=3.0 Or aav_PTCH<=3.5 Or aav_BLCR<=3.4 Or aav_RUFF<=2.8)

Mill and Class ‘S’ - AC Overlay (Non-Interstate)

PMS->DTIMS_DATA__RECONFLAG <> '6' AND PMS->NEEDS_BOOK__FUND_CAT <> 'INT' AND
dav_AC_Mainline_Special_Code = 'S' AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 OR aav_FTCR<=3.5 OR aav_RUT<=3.0 OR aav_PTCH<=3.5 OR aav_BLCR<=3.4 OR aav_RUFF<=2.8) AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1')

RURAL THICK (THK) ASPHALT PAVEMENT TREATMENT TRIGGERS (Continued)

Mill and AC Overlay

PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' AND
aav_TRCR <= 3.5 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'THK' And
PMS->DTIMS_DATA__RECONFLAG <> '1' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'
Or
PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' AND
aav_TRCR <= 3.5 And
aav_PTCH >= 2.0 And
aav_BLCR >= 2.0 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'THK' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Mill and PCC Overlay

PMS->DTIMS_DATA__RECONFLAG <> '6' and
aav_TRCR < 3.5 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'THK' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
dav_RD_WID >= 24.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
(aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
dav_THICK > 7.0

Cold in Place Recycle and AC Overlay

PMS->DTIMS_DATA__RECONFLAG<>'6' And
aav_PTCH>=4.0 And
(aav_TRCR<=2.5 Or aav_FTCR<=2.5 Or aav_BLCR<=2.5 Or aav_RUFF<=2.8) And
aav_RUT>=3.0 And
(dav_THICK>=4.0 And dav_THICK<=7.5) And
dav_RD_WID>=28.0 And
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG<>'1') And
PMS->DTIMS_DATA__BASE_CODE<>'L' And
PMS->NEEDS_BOOK__CURB_GUTTR='1' And
PMS->DTIMS_DATA__BASE_THICK>=8.0 And
dav_PAVETYPE<>'AONC' And
dav_PAV_CTEGRY='F' And
aav_ZAGE>30.0 And
dav_CIP_Flag<>'PC'

RURAL THICK (THK) ASPHALT PAVEMENT TREATMENT TRIGGERS (Continued)

Full Depth Reclamation

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_TRCR <= 3.5 Or aav_FTCR <= 2.5 Or aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_BLCR <= 2.5 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'THK' And NOT
PMS->DTIMS_DATA__FOR_HWY And
((dav_RD_WID >= 36.0 And dav_THICK >= 8.0) or (dav_RD_WID >= 28.0 And dav_THICK < 8.0)) And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
PMS->DTIMS_DATA__RECONFLAG <> '2' And
aav_ZAGE>30.0

Reconstruct to Gravel

aav_AADT <= 100.0 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
dav_PAV_CTEGRY <> 'R' And
aav_ZAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reconstruct to Blotter

(aav_TRCR <= 3.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'THK' And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
aav_AADT < =249.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0

Reconstruction to Flexible Pavement

(aav_TRCR <= 3.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'THK' And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
aav_AADT < 2500.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL THICK (THK)ASPHALT PAVEMENT TREATMENT TRIGGERS (Continued)

Reconstruction to Rigid Pavement

(aav_TRCR <= 3.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'THK' And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
(aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6')

Reconstruction To CRC Pavement (currently not used, retained for possible future use)

(aav_TRCR <= 3.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'THK' And
aav_AADT > 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL ASPHALT OVER PCCP (AONC) PAVEMENT TREATMENT TRIGGERS

Mill and Class ‘S’ - AC Overlay (Interstate)

PMS->NEEDS_BOOK__FUND_CAT='INT' AND
(dav_PAVETYPE='AONC' Or dav_PAVETYPE='FD' Or dav_PAVETYPE='THK') AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 Or aav_FTCR<=3.5 Or aav_RUT<=3.0 Or aav_PTCH<=3.5 Or aav_BLCR<=3.4 Or aav_RUFF<=2.8)

Mill and Class ‘S’ - AC Overlay (Non-Interstate)

PMS->DTIMS_DATA__RECONFLAG <> '6' AND PMS->NEEDS_BOOK__FUND_CAT <> 'INT' AND
dav_AC_Mainline_Special_Code = 'S' AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 OR aav_FTCR<=3.5 OR aav_RUT<=3.0 OR aav_PTCH<=3.5 OR aav_BLCR<=3.4 OR aav_RUFF<=2.8) AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1')

Mill and AC Overlay

PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' AND
(aav_TRCR <= 3.0 Or aav_RUT <= 3.0 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'AONC' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
PMS->DTIMS_DATA__RECONFLAG <> '1'
Or
PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' AND
aav_TRCR > 2.0 And aav_FTCR >= 2.0 And aav_PTCH >= 2.0 And aav_BLCR >= 2.0 And
(aav_TRCR <= 3.0 Or aav_RUT <= 3.0 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'AONC' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1')

RURAL ASPHALT OVER PCCP (AONC) PAVEMENT TREATMENT TRIGGERS (Continued)

Remove & Replace with PCC Pavement

PMS->DTIMS_DATA__RECONFLAG <> '6' and
aav_TRCR < 3.5 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.8) And
dav_PAVETYPE = 'AONC' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
dav_RD_WID >= 24.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
(aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0)

Reconstruct to Gravel

aav_AADT <= 100.0 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
dav_PAV_CTEGRY <> 'R' And
aav_ZAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reconstruct to Blotter

(aav_TRCR < 3.0 Or aav_FTCR <= 3.5 Or aav_RUT <= 2.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF < 2.9)
And dav_PAVETYPE = 'AONC' And
aav_AADT < =249.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD

Reconstruction to Flexible Pavement

(aav_TRCR < 3.0 Or aav_FTCR <= 3.5 Or aav_RUT <= 2.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF < 2.9)
And dav_PAVETYPE = 'AONC' And
aav_AADT < 2500.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 50.0 And
aav_XAGE > 19.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL ASPHALT OVER PCCP (AONC) PAVEMENT TREATMENT TRIGGERS (Continued)

Reconstruction to Rigid Pavement

(aav_TRCR < 3.0 Or aav_FTCR <= 3.5 Or aav_RUT <= 2.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF < 2.9)
And dav_PAVETYPE = 'AONC' And
(aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

Reconstruction To CRC Pavement (currently not used, retained for possible future use)

(aav_TRCR < 3.0 Or aav_FTCR <= 3.5 Or aav_RUT <= 2.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF < 2.9)
And dav_PAVETYPE = 'AONC' And
aav_AADT > 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL THIN ASPHALT PAVEMENT TREATMENT TRIGGERS (INCLUDES TONS & TONW)

AC Overlay
Milled and Overlaid or Original Pavement (Only)

(PMS->DTIMS_DATA__RECONFLAG <> '6' And dav_AC_Mainline_Special_Code <> 'S' AND
aav_RUT >= 1.0 And
aav_FTCR >= 2.0 And
aav_PTCH >= 2.0 And
aav_BLCR >= 2.0 And
(aav_TRCR <= 2.6 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF < 2.9) And
dav_CURVE_FLAG <> 'A' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
dav_RD_WID >= 26.0 And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI')
Or
((dav_PAVETYPE='TONS' OR dav_PAVETYPE='TONW') AND
dav_AC_Mainline_Special_Code <> 'S' AND
dav_CURVE_FLAG='O' AND
aav_XAGE>=18.0 AND
PMS->DTIMS_DATA__RECONFLAG<>'6' AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1')
AND
PMS->NEEDS_BOOK__CURB_GUTTR='1' AND
PMS->NEEDS_BOOK__FUND_CAT<>'URB' AND
PMS->NEEDS_BOOK__FUND_CAT<>'MUNI' AND
dav_RD_WID>=26.0)

Mill and Class ‘S’ - AC Overlay (Non-Interstate)

PMS->DTIMS_DATA__RECONFLAG <> '6' AND PMS->NEEDS_BOOK__FUND_CAT <> 'INT' AND
dav_AC_Mainline_Special_Code = 'S' AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 OR aav_FTCR<=3.5 OR aav_RUT<=3.0 OR aav_PTCH<=3.5 OR aav_BLCR<=3.4 OR aav_RUFF<=2.8) AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1')

RURAL THIN ASPHALT PAVEMENT TREATMENT TRIGGERS (Continued) (INCLUDES TONS & TONW)

Mill and AC Overlay

```
(PMS->DTIMS_DATA__RECONFLAG <> '6' and
 dav_AC_Mainline_Special_Code = 'S' AND
aav_FTCR >= 2.0 And
aav_PTCH >= 2.0 And
aav_BLCR >= 2.0 And
(aav_TRCR <= 2.5 Or aav_FTCR <= 3.5 Or aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <=
2.8) And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI')
Or
(PMS->DTIMS_DATA__RECONFLAG <> '6' and
dav_AC_Mainline_Special_Code = 'S' AND
(aav_TRCR <= 2.5 Or aav_FTCR <= 3.5 Or aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <=
2.8) And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
PMS->DTIMS_DATA__RECONFLAG <> '1' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI')
Or
(PMS->DTIMS_DATA__RECONFLAG <> '6' AND
dav_AC_Mainline_Special_Code <> 'S' AND
(dav_PAVETYPE='TONS' OR dav_PAVETYPE='TONW') AND
dav_CURVE_FLAG='O' AND
aav_XAGE>=18.0 AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1') AND
PMS->NEEDS_BOOK__FUND_CAT<>'URB' AND
PMS->NEEDS_BOOK__FUND_CAT<>'MUNI' )
```

RURAL THIN ASPHALT PAVEMENT TREATMENT TRIGGERS (Continued) (INCLUDES TONS & TONW)

Cold in Place Recycle and AC Overlay

PMS->DTIMS_DATA__RECONFLAG<>'6' And
aav_PTCH>=4.0 And
(aav_TRCR<=2.5 Or aav_FTCR<=2.5 Or aav_BLCR<=2.5 Or aav_RUFF<=2.8) And
aav_RUT>=3.0 And
(dav_THICK>=4.0 And dav_THICK<=7.5) And
dav_RD_WID>=28.0 And
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG<>'1') And
PMS->DTIMS_DATA__BASE_CODE<>'L' And
PMS->NEEDS_BOOK__CURB_GUTTR='1' And
PMS->DTIMS_DATA__BASE_THICK>=8.0 And
dav_PAVETYPE<>'AONC' And
dav_PAV_CTEGRY='F' And
aav_ZAGE>30.0 And
dav_CIP_Flag<>'PC'

Full Depth Reclamation

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_TRCR <= 2.5 Or aav_FTCR <= 2.5 Or aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_BLCR <= 2.5 Or aav_RUFF <= 2.8) And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And NOT
PMS->DTIMS_DATA__FOR_HWY And
dav_RD_WID >= 28.0 And
PMS->DTIMS_DATA__RECONFLAG <> '2' And
aav_ZAGE>30.0

Reconstruct to Gravel

aav_AADT <= 100.0 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
dav_PAV_CTEGRY <> 'R' And
aav_ZAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

RURAL THIN ASPHALT PAVEMENT TREATMENT TRIGGERS (Continued) (INCLUDES TONS & TONW)

Reconstruct to Blotter

(aav_TRCR <= 2.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
aav_AADT < =249.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0

Reconstruction to Flexible Pavement

(aav_TRCR <= 2.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
aav_AADT < 2500.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

Reconstruction To Rigid Pavement

(aav_TRCR <= 2.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
(aav_AADT > 1500.0 Or PMS->DTIMS_DATA__NO_TRUCKS > 275.0) And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6')

RURAL THIN ASPHALT PAVEMENT TREATMENT TRIGGERS (Continued) (INCLUDES TONS & TONW)

Reconstruction To CRC Pavement (currently not used, retained for possible future use)

(aav_TRCR <= 2.5 Or aav_BLCR <= 2.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW') And
aav_AADT > 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS >= 500.0 And
aav_ZAGE > 50.0 And
aav_XAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT = 'INT' And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

Gravel Surfacing on Blotter or TONW

(aav_TRCR <= 2.6 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.9) And
aav_AADT < 50.0 And
(dav_PAVETYPE = 'BLOT' Or dav_PAVETYPE = 'OTHR' Or dav_PAVETYPE = 'TONW') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

RURAL BLOTTER (BLOT) PAVEMENT TREATMENT TRIGGERS

AC Overlay on Blotter

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_TRCR < 3.5 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 4.0 Or aav_RUFF < 3.4) And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
(dav_PAVETYPE = 'BLOT' Or dav_PAVETYPE = 'OTHR') And
aav_AADT < 500.0 And
dav_RD_WID >= 26.0 And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' and
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reapplication Blotter

PMS->DTIMS_DATA__RECONFLAG <> '6' And
aav_RUT >= 1.0 And
aav_TRCR >= 2.5 And
aav_FTCR >= 3.0 And
aav_PTCH >= 3.0 And
aav_BLCR >= 3.0 And
aav_RUFF >= 3.0 And
(aav_TRCR <= 3.5 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 4.0 Or aav_RUFF < 3.4) And
aav_AADT < 500.0 And
PMS->DTIMS_DATA__NO_TRUCKS < 75.0 And
(dav_PAVETYPE = 'BLOT' Or dav_PAVETYPE = 'OTHR') And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Full Depth Reclamation & Blotter Surfacing

PMS->DTIMS_DATA__RECONFLAG <> '6' And
(aav_TRCR <= 3.5 Or aav_FTCR <= 3.5 Or aav_RUT <= 1.8 Or aav_PTCH <= 3.5 Or aav_BLCR <= 4.0 Or aav_RUFF <= 3.4) And
aav_AADT < 100.0 And
PMS->DTIMS_DATA__NO_TRUCKS < 25.0 And
(dav_PAVETYPE = 'BLOT' Or dav_PAVETYPE = 'OTHR') And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' and
dav_RD_WID >= 28.0 and
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

RURAL BLOTTER (BLOT) PAVEMENT TREATMENT TRIGGERS (Continued)

Gravel Surfacing on Blotter or TONW

(aav_TRCR <= 2.6 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.4 Or aav_RUFF <= 2.9) And
aav_AADT < 50.0 And
(dav_PAVETYPE = 'BLOT' Or dav_PAVETYPE = 'OTHR' Or dav_PAVETYPE = 'TONW') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reconstruct to Blotter

(aav_TRCR <= 3.0 Or aav_BLCR <= 3.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'BLOT' And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
aav_AADT < =249.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' And
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0

Reconstruction to Flexible Pavement

(aav_TRCR <= 3.0 Or aav_BLCR <= 3.5) And
(aav_RUT <= 1.8 Or aav_PTCH <= 2.5 Or aav_FTCR <= 2.5) And
aav_RUFF <= 2.8 And
dav_PAVETYPE = 'BLOT' And
((dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD) Or (PMS->NEEDS_BOOK__FUND_CAT = 'INT')) And
aav_AADT < 2500.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')

Reconstruct to Gravel

aav_AADT <= 100.0 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
dav_PAV_CTEGRY <> 'R' And
aav_ZAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

RURAL GRAVEL SURFACED TREATMENT TRIGGERS

Gravel Resurfacing

dav_PAVETYPE = 'GRAV' And
aav_GRAV < 3.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reconstruction to Gravel Surfacing

dav_PAVETYPE = 'GRAV' And
aav_GRAV <= 2.75 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
aav_ZAGE > 29.0 And
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reconstruct to Blotter

aav_GRAV <= 2.75 And
aav_AADT < =249.0 And
dav_RD_WID < PMS->DTIMS_DATA__MAX_REC_WD And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') and
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' and
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

Reconstruction to Flexible Pavement

aav_GRAV <= 2.75 And
dav_PAVETYPE = 'GRAV' And
aav_AADT >= 200.0 And
aav_AADT <= 2500.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' or PMS->DTIMS_DATA__RECONFLAG = '6') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI'

URBAN ASPHALT TREATMENT TRIGGERS

AC Overlay

PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' AND
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
aav_RUT >= 1.0 And
aav_FTCR >= 2.0 And
aav_PTCH >= 2.0 And
aav_BLCR >= 2.0 And
(aav_TRCR <= 3.5 Or aav_FTCR <= 3.5 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.0) And
dav_CURVE_FLAG <> 'A' And
(dav_PAVETYPE = 'TONS' Or dav_PAVETYPE = 'TONW')

Mill and Class ‘S’ - AC Overlay (Non-Interstate)

PMS->DTIMS_DATA__RECONFLAG <> '6' AND PMS->NEEDS_BOOK__FUND_CAT <> 'INT' AND
dav_AC_Mainline_Special_Code = 'S' AND
aav_FTCR>=2.0 AND
aav_PTCH>=2.0 AND
aav_BLCR>=2.0 AND
(aav_TRCR<=2.5 OR aav_FTCR<=3.5 OR aav_RUT<=3.0 OR aav_PTCH<=3.5 OR aav_BLCR<=3.4 OR aav_RUFF<=2.8) AND
(dav_RD_WID>=PMS->DTIMS_DATA__MIN_RES_WD OR PMS->DTIMS_DATA__RECONFLAG<>'1')

Mill and AC Overlay

(PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' AND
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
aav_TRCR < 3.5 And
aav_FTCR >= 2.0 And
aav_PTCH >= 2.0 And
aav_BLCR >= 2.0 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.0 Or aav_FTCR <= 3.5) And
(dav_PAVETYPE = 'AONC' Or dav_PAVETYPE = 'FD' Or dav_PAVETYPE = 'THK' Or dav_PAVETYPE = 'TONS' Or
dav_PAVETYPE = 'TONW'))
Or
(PMS->DTIMS_DATA__RECONFLAG <> '6' and dav_AC_Mainline_Special_Code <> 'S' AND
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
aav_TRCR < 3.5 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.0 Or aav_FTCR <= 3.5) And
(dav_PAVETYPE = 'AONC' Or dav_PAVETYPE = 'FD' Or dav_PAVETYPE = 'THK' Or dav_PAVETYPE = 'TONS' Or
dav_PAVETYPE = 'TONW')

URBAN ASPHALT TREATMENT TRIGGERS (Continued)

Mill and PCCP Overlay

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
aav_TRCR < 3.5 And
(aav_RUT <= 3.0 Or aav_PTCH <= 3.5 Or aav_BLCR <= 3.0 Or aav_FTCR <= 3.5) And
aav_AADT > 1500.0 And
dav_THICK > 7.0 And
(dav_PAVETYPE = 'THK' Or dav_PAVETYPE = 'FD')

Reconstruction to Flexible Pavement (TONS or TONW pavement type only)

(PMS->NEEDS_BOOK__FUND_CAT = 'URB' OR PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') AND
aav_AADT < 12000.0 AND
PMS->DTIMS_DATA__NO_TRUCKS < 600.0 AND
(aav_TRCR <= 2.8 OR aav_BLCR <= 2.5) AND
(aav_FTCR <= 2.5 OR aav_PTCH <= 2.5 OR aav_RUT <= 1.8) AND
(dav_PAVETYPE = 'TONS' OR dav_PAVETYPE = 'TONW') AND
aav_ZAGE > 29.0 AND
(PMS->DTIMS_DATA__RECONFLAG = '1' OR PMS->DTIMS_DATA__RECONFLAG = '6')

Reconstruction to Flexible Pavement (AONC, FD or THK pavement type only)

(PMS->NEEDS_BOOK__FUND_CAT = 'URB' OR PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') AND
aav_AADT < 12000.0 AND
PMS->DTIMS_DATA__NO_TRUCKS < 600.0 AND
(aav_TRCR <= 2.8 OR aav_BLCR <= 2.5) AND
(aav_FTCR <= 2.5 OR aav_PTCH <= 2.5 OR aav_RUT <= 1.8) AND
(dav_PAVETYPE = 'AONC' OR dav_PAVETYPE = 'FD' OR dav_PAVETYPE = 'THK') AND
aav_ZAGE > 29.0 AND
(PMS->DTIMS_DATA__RECONFLAG = '1' OR PMS->DTIMS_DATA__RECONFLAG = '6')

Reconstruction to Rigid Pavement (TONS or TONW pavement type only)

(PMS->NEEDS_BOOK__FUND_CAT='URB' OR PMS->NEEDS_BOOK__FUND_CAT='MUNI') AND
(aav_AADT>3500.0 OR
PMS->DTIMS_DATA__NO_TRUCKS>275.0) AND
(aav_TRCR<=2.8 OR aav_BLCR<=2.5) AND
(aav_FTCR<=2.5 OR aav_PTCH<=2.5 OR aav_RUT<=1.8) AND
(dav_PAVETYPE='TONW' OR dav_PAVETYPE='TONS') AND
aav_ZAGE>29.0 AND
(PMS->DTIMS_DATA__RECONFLAG='1' OR PMS->DTIMS_DATA__RECONFLAG='6')

URBAN ASPHALT TREATMENT TRIGGERS (Continued)

Reconstruction to Rigid Pavement (AONC, FD or THK pavement type only)

(PMS->NEEDS_BOOK__FUND_CAT='URB' OR PMS->NEEDS_BOOK__FUND_CAT='MUNI') AND
(aav_AADT>3500.0 OR
PMS->DTIMS_DATA__NO_TRUCKS>275.0) AND
(aav_TRCR<=2.8 OR aav_BLCR<=2.5) AND (aav_FTCR<=2.5 OR aav_PTCH<=2.5 OR aav_RUT<=1.8) AND
(dav_PAVETYPE='AONC' OR dav_PAVETYPE='FD' OR dav_PAVETYPE='THK') AND
aav_ZAGE>29.0 AND
(PMS->DTIMS_DATA__RECONFLAG='1' OR PMS->DTIMS_DATA__RECONFLAG='6')

URBAN CONCRETE TREATMENT TRIGGERS

AC Overlay (No Crack & Seat) For MESH only (non-curb and gutter segments)

```
PMS->DTIMS_DATA__RECONFLAG <> '6' And
dav_PAV_CTEGRY = 'R' And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'CRCP') And
(aav_DASR >= 2.3 or aav_CRCBlock >= 2.3) And
aav_XAGE > 15.0 And
((aav_DASR <= 3.6 Or aav_CRCBlock <= 3.6) Or
(PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
(aav_JTSP <= 3.0 And aav_CRCR <= 2.8)) Or
(PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
(dav_PAVETYPE = 'MESH' And (aav_JTSP <= 3.3 And (aav_CRCR <= 3.3 Or aav_FLTG <= 2.3 Or aav_RUFF <= 4.0)) Or
(dav_PAVETYPE = 'CRCP' And (aav_POUT <= 3.3 Or aav_RUFF <= 4.0)))))
```

Pavement Restoration Urban

```
PMS->DTIMS_DATA__RECONFLAG <> '6' and
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
(aav_DASR >= 4.0 And aav_JTSP <= 3.8 And aav_CRCR > 3.0) And
(dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TNSJ') And
aav_XAGE < 35.0
```

Remove & Replace PCCP

```
PMS->DTIMS_DATA__RECONFLAG <> '6' and
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
aav_AADT > 3500.0 And
(aav_DASR <= 2.8 Or (aav_JTSP <= 3.0 And aav_CRCR <= 2.0)) And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
aav_ZAGE < 50.0 And
aav_ZAGE > 29.0
```

Reconstruction to Flexible Pavement (TKSJ or TKSJD pavement type only)

```
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' OR PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') AND
aav_AADT < 12000.0 AND
PMS->DTIMS_DATA__NO_TRUCKS < 600.0 AND
(aav_DASR <= 2.8 OR (aav_JTSP <= 3.0 OR aav_CRCR <= 2.0)) AND
(dav_PAVETYPE = 'TKSJD' OR dav_PAVETYPE = 'TKSJ') AND
aav_ZAGE > 29.0 AND
(PMS->DTIMS_DATA__RECONFLAG = '1' OR PMS->DTIMS_DATA__RECONFLAG = '6')
```

URBAN CONCRETE TREATMENT TRIGGERS (Continued)

Reconstruction to Flexible Pavement (MESH or TNSJ pavement type only)

```
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' OR PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') AND
aav_AADT < 12000.0 AND
PMS->DTIMS_DATA__NO_TRUCKS < 600.0 AND
(aav_DASR <= 2.8 OR (aav_JTSP <= 3.0 OR aav_CRCR <= 2.0)) AND
(dav_PAVETYPE = 'MESH' OR dav_PAVETYPE = 'TNSJ') AND
aav_ZAGE > 29.0 AND
(PMS->DTIMS_DATA__RECONFLAG = '1' OR PMS->DTIMS_DATA__RECONFLAG = '6')
```

Reconstruction to Rigid Pavement (MESH or TNSJ pavement type only)

```
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
aav_AADT > 2000.0 And
PMS->DTIMS_DATA__NO_TRUCKS > 200.0 And
((aav_DASR <= 2.8) Or (aav_JTSP <= 3.0 And aav_CRCR <= 2.0) Or
(aav_AADT > 6000.0 And dav_RD_WID < 55.0 And aav_CMP < 3.0)) And
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TNSJ') And
aav_ZAGE > 29.0 And
(PMS->DTIMS_DATA__RECONFLAG = '1' Or PMS->DTIMS_DATA__RECONFLAG = '6')
```

Reconstruction to Rigid Pavement (TKSJ or TKSJD pavement type only)

```
(PMS->NEEDS_BOOK__FUND_CAT='URB' OR PMS->NEEDS_BOOK__FUND_CAT='MUNI') AND
(aav_AADT>3500.0 OR
PMS->DTIMS_DATA__NO_TRUCKS>275.0) AND
(aav_DASR<=2.8 OR (aav_JTSP<=2.5 OR aav_CRCR<=2.0)) AND
(dav_PAVETYPE='TKSJD' OR dav_PAVETYPE='TKSJ') AND
aav_ZAGE>29.0 AND
(PMS->DTIMS_DATA__RECONFLAG='1' OR PMS->DTIMS_DATA__RECONFLAG='6')
```

APPENDIX G: TRIGGER LIMITS FOR ANCILLARY IMPROVEMENTS

RIGID PAVEMENTS

Grinding
Available with Pavement Restoration 1 & 2

aav_DASR >= 4.8 And
aav_FLTG < 3.6 And
dav_PAV_CTEGRY = 'R' And
PMS->DTIMS_DATA__R_U_CAT <> 'U' And
PMS->COM_YEAR < 1.0

Undersealing/Dowel Bar Retrofit
ONLY TKSJ
Available with Pavement Restoration 1 & 2 and Grinding

aav_DASR >= 4.8 And
aav_CRCR > 4.0 And
dav_PAVETYPE = 'TKSJ' And
PMS->DTIMS_DATA__R_U_CAT <> 'U' And
PMS->COM_YEAR < 1.0 And
aav_XAGE < 20.0

Mill and Replace AC shoulders
Available with Pavement Restoration 1 & 2 and Grinding (stand-alone)

(dav_AC_Shoulder_Seal_Code='C' or dav_AC_Shoulder_Seal_Code='U' or dav_AC_Shoulder_Seal_Code='S') AND
aav_AC_Shoulder_Surface_Age<>99.0 AND
aav_AC_Shoulder_Surface_Age>=20.0 And
aav_AC_Shoulder_Surface_Age<=25.0 AND
aav_XAGE<=30.0 And
abf_RIGID

APPENDIX H: TRIGGER LIMITS FOR MAINTENANCE IMPROVEMENTS

RIGID PAVEMENTS

Mill and Replace AC Shoulders

(dav_AC_Shoulder_Seal_Code='C' or dav_AC_Shoulder_Seal_Code='S' or dav_AC_Shoulder_Seal_Code='U') AND
aav_AC_Shoulder_Surface_Age<>99.0 AND
aav_AC_Shoulder_Surface_Age>=26.0 AND
aav_AC_Shoulder_Surface_Age<=29.0 AND
aav_XAGE<=30.0 AND abf_RIGID

Chip Seal of AC Shoulders

(PMS->NEEDS_BOOK__FUND_CAT='INT' or
(PMS->NEEDS_BOOK__FUND_CAT<>'INT' And
(dav_PAVETYPE='MESH' or dav_PAVETYPE='TKSJ' or dav_PAVETYPE='TKSJD' or dav_PAVETYPE='TNSJ' or PMS->DTIMS_DATA__AC_SPEC_CODE='S'))) And
dav_AC_Shoulder_Special_Code<>'CL_S' And
aav_AC_Shoulder_Surface_Age<>99.0 And
((dav_AC_Shoulder_Seal_Code='C' and aav_AC_Shoulder_Surface_Age>=3.0 and
aav_AC_Shoulder_Surface_Age<=5.0) OR
(dav_AC_Shoulder_Seal_Code='U' and aav_AC_Shoulder_Surface_Age>=4.0 and
aav_AC_Shoulder_Surface_Age<=6.0) OR
(dav_AC_Shoulder_Seal_Code='S' and aav_AC_Shoulder_Seal_Age>=7.0 and
aav_AC_Shoulder_Surface_Age<=9.0))

Rout Seal of AC Shoulders

dav_AC_Shoulder_Seal_Code='U' And
aav_AC_Shoulder_Surface_Age=2.0 And
aav_AC_Shoulder_Surface_Age<>99.0 AND abf_RIGID

Saw and Seal Joints (Rural) - currently inactive, retain for future use

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
PMS->NEEDS_BOOK__FUND_CAT <> 'URB' and
PMS->NEEDS_BOOK__FUND_CAT <> 'MUNI' And
aav_AGE_REH >= 10.0

Saw and Seal Joints (Urban) - currently inactive, retain for future use

PMS->DTIMS_DATA__RECONFLAG <> '6' and
(dav_PAVETYPE = 'MESH' Or dav_PAVETYPE = 'TKSJD' Or dav_PAVETYPE = 'TKSJ' Or dav_PAVETYPE = 'TNSJ') And
(PMS->NEEDS_BOOK__FUND_CAT = 'URB' or PMS->NEEDS_BOOK__FUND_CAT = 'MUNI') And
aav_AGE_REH >= 10.0

Routine Maintenance

aav_AGE_REH >= 1.0

FLEXIBLE PAVEMENTS

Microsurfacing

```
PMS->DTIMS_DATA__RECONFLAG <> '6' and
aav_RUT <= 3.0 And
dav_PAV_CTEGRY = 'F' And
dav_PAVETYPE <> 'BLOT' And
(dav_RD_WID >= PMS->DTIMS_DATA__MIN_RES_WD Or PMS->DTIMS_DATA__RECONFLAG <> '1') And
PMS->NEEDS_BOOK__CURB_GUTTR = '1' And
aav_XAGE < 8.0
```

Chip Seal

```
PMS->NEEDS_BOOK__FUND_CAT<>'INT' AND
dav_AC_Mainline_Special_Code<>'S' AND
dav_PAV_CTEGRY = 'F' AND
dav_PAVETYPE <> 'BLOT' AND
aav_TRCR > 3.5 AND
aav_FTCR >= 3.3 AND
aav_PTCH >= 2.3 AND
aav_BLCR >= 3.4 AND
aav_RUT >= 3.5 AND
(((dav_REHAB = 'C' AND aav_AGE_PER = 1.0 AND aav_RUFF > 4.0) OR
(dav_REHAB = 'S' AND aav_SEAL_AGE > 5.0 AND aav_RUFF > 3.5) OR
(dav_REHAB = 'O' AND aav_XAGE > 2.0 AND aav_RUFF > 4.0)) OR
((dav_REHAB = 'C' AND aav_AGE_PER = 1.0) OR
(dav_REHAB = 'S' AND aav_SEAL_AGE > 5.0) OR (dav_REHAB = 'O' AND aav_XAGE > 2.0)))
```

Rout and Seal - Non-Interstate

```
PMS->NEEDS_BOOK__FUND_CAT <> 'INT' AND
dav_AC_Mainline_Special_Code <> 'S' AND
dav_PAV_CTEGRY='F' AND
dav_PAVETYPE<>'BLOT' AND
dav_REHAB='O' AND
aav_XAGE=2.0
```

Rout and Seal - Interstate

```
dav_PAV_CTEGRY='F' AND
dav_PAVETYPE<>'BLOT' AND
dav_REHAB='O' AND
aav_XAGE=2.0 AND
(PMS->NEEDS_BOOK__FUND_CAT='INT' OR dav_AC_Mainline_Special_Code='S')
```

Routine Asphalt Maintenance

```
aav_AGE_REH >= 1.0
```

APPENDIX I: TREATMENT TRIGGER ANALYSIS VARIABLES

VARIABLE NAME	TYPE	DEFINITION
aav_AADT	Annual Analysis Variable	Average annual daily traffic (AADT)
aav_AC_Shoulder_Seal_Age	Annual Analysis Variable	AC Shoulder Surface Treatment Age
aav_AC_Shoulder_Surface_Age	Annual Analysis Variable	AC Shoulder Surface Age
aav_AGE_PER	Annual Analysis Variable	Age since last periodic
aav_AGE_REH	Annual Analysis Variable	Age since last rehab
aav_BLCR	Annual Analysis Variable	Block cracking
aav_CRCBlock	Annual Analysis Variable	CRCP Block Cracking
aav_CRCR	Annual Analysis Variable	Corner cracking
aav_DASR	Annual Analysis Variable	D-Cracking and ASR
aav_FLTG	Annual Analysis Variable	Faulting
aav_FTCR	Annual Analysis Variable	Fatigue Cracking
aav_GRAV	Annual Analysis Variable	Gravel Index
aav_JTSL	Annual Analysis Variable	Joint Seal Damage
aav_JTSP	Annual Analysis Variable	Joint Spalling
aav_POUT	Annual Analysis Variable	Punchouts
aav_PTCH	Annual Analysis Variable	AC Patch Deterioration
aav_RUFF	Annual Analysis Variable	Roughness
aav_RUT	Annual Analysis Variable	Rutting
aav_SEAL_AGE	Annual Analysis Variable	AC Surface Treatment Age
aav_TRCR	Annual Analysis Variable	Transverse Cracking
aav_XAGE	Annual Analysis Variable	Pavement Surface Age
aav_ZAGE	Annual Analysis Variable	Grade Age
dav_AC_Shoulder_Seal_Code	Dynamic Analysis Variable	The sealed status of the shoulder
dav_AC_Shoulder_Special_Code	Dynamic Analysis Variable	Identifies Class 'S' AC shoulders
dav_CIP_Flag	Dynamic Analysis Variable	For past Cold in Place Recycle Treatment
dav_CURVE_FLAG	Dynamic Analysis Variable	Performance Curve Flag
dav_PAV_CTEGRY	Dynamic Analysis Variable	Pavement Category
dav_PAVETYPE	Dynamic Analysis Variable	Pavement Type
dav_RD_WID	Dynamic Analysis Variable	Roadway width
dav_REHAB	Dynamic Analysis Variable	Rehabilitation Type Flag
dav_THICK	Dynamic Analysis Variable	Thickness of pavement/surface

Definitions:

Annual Analysis Variable – A variable in analysis that is updated or changes annually. This variable is usually reset upon application of a treatment (Example – a condition or age variable)

Dynamic Analysis Variable – A variable that stays the same in an analysis until a treatment is applied. The value of the reset of the treatment determines the new value for this variable. (Example – Pavement Type or pavement thickness)

Table I1: Treatment Trigger Analysis Variables

APPENDIX J: TREATMENT TRIGGER PMS TABLE VARIABLES

VARIABLE NAME	DEFINITION
COM_YEAR	For a committed segment, the year a segment is committed in the STIP.
DTIMS_DATA__AC_SPEC_CODE	Identifies Class 'S' or 'T' asphalt pavements.
DTIMS_DATA__BASE_CODE	Identifies Lime treated base.
DTIMS_DATA__BASE_THICK	Thickness of the Base layer.
DTIMS_DATA__DIV_CODE	Flag to show if roadway is a divided highway.
DTIMS_DATA__FOR_HWY	Identifies highways within the Black Hills National Forest.
DTIMS_DATA__INSD_SHLDW	The inside or median side shoulder width for divided highways.
DTIMS_DATA__MAX_REC_WD	The maximum roadway width limit for reconstruction. See ***Table D1***.
DTIMS_DATA__MIN_RES_WD	Minimum allowable resurfacing width as annotated by ***Table D2***.
DTIMS_DATA__NO_TRUCKS	The calculated number of trucks within a section.
DTIMS_DATA__R_U_CAT	Identifies Rural or Urban section.
DTIMS_DATA__RECONFLAG	Flag to note reconstruction eligibility.
NEEDS_BOOK__CURB_GUTTR	Flag to show if section has curb and gutter.
NEEDS_BOOK__FUND_CAT	The funding category of the PMS section.

Note: The variables listed above are static or constant throughout the analysis period. All variables in the PMS table have the prefix "PMS->".

Table J1: Treatment Trigger PMS Table Variables

APPENDIX K: PERFORMANCE CURVE EQUATIONS

AVAILABLE, UPON REQUEST, AS A SEPARATE DOCUMENT