FLORIDA DEPARTMENT OF TRANSPORTATION

RIGID PAVEMENT CONDITION SURVEY HANDBOOK

March 2012

STATE MATERIALS OFFICE

Table of Contents

Title **Page**

List of Tables

Table **Page**

List of Figures

Executive Summary

This handbook has been developed as a guide for personnel responsible for conducting the Florida Department of Transportation Pavement Condition Survey (PCS) on rigid pavements and to ensure consistency among raters. This reference describes the procedures for conducting a visual, mechanical and automated condition evaluation of the Department's rigid pavement system. Items evaluated in the survey include:

1. Surface Deterioration
2. Spalling
3. Patching
4. Transverse Cracking
5. Longitudinal Cracking
6. Corner Cracking
7. Shattered Slabs
8. Faulting
9. Pumping
10. Joint Condition
11. Ride Quality

The data collected during the PCS is used as input into the pavement management system and for project prioritization purposes.

Keywords: Defect Rating, Ride Rating, International Roughness Index (IRI), Ride Number (RN), Pavement Evaluation, Rigid Pavement Condition Survey, Profiler, Roadway Characteristics Inventory (RCI), Straight Line Diagram (SLD)

I. Introduction

The present condition of Florida's rigid pavement system is of interest to Pavement Management, Design, Planning, Maintenance, consultants, and other groups within the Florida Department of Transportation.

The information provided in this handbook describes the methods used to evaluate surface distresses and determine the ride quality of the rigid pavement. Any mention of flexible pavement is only discussed when necessary for the completion of the Rigid Pavement Condition Survey. For information relating to the evaluation of flexible pavements, please refer to the Flexible Pavement Condition Survey Handbook.

The results of this evaluation provide information that is used in conjunction with other data for the following purposes:

1. Determine the present condition of the State Highway System
2. Compare present with past condition
3. Predict future deterioration rates
4. Estimate rehabilitation funding needs
5. Provide justification for annual pavement rehabilitation budget
6. Provide justification for prioritizing rehabilitation projects
7. Provide justification for distribution of rehabilitation funds to Districts

The various changes and enhancements that have been implemented with each survey are recorded. The "History of Florida Pavement Condition Survey" is located at the following web address:

http://www.dot.state.fl.us/statematerialsoffice/pavement/performance/pcs/pcshistory.pdf

II. Pavement Section Selection and Identification

The length of pavement to be evaluated will vary depending upon a number of factors. Typical factors that create section limits (rated sections) include the following:

1. County line
2. County section or subsection
3. Construction Limits
4. Significant changes in pavement condition.
5. Structures in excess of 0.25 mile.
6. Flexible Pavement in excess of 0.50 mile in length within a Rigid Pavement section.

As implied by the list above, a certain amount of office preparation is required prior to the field evaluation. The Rater should have access to Construction Plans, Straight Line Diagrams (SLD), Video-logs, Maps, Roadway Characteristics Inventory (RCI) data, and historical PCS Data for those highways to be evaluated.

Construction Limits

Section limits should be based initially upon construction project limits. The section may deteriorate at different rates, requiring additional "breaks" within the overall section, but the beginning and ending mileposts must not be modified. To preserve the history of PCS data, section limits must only be changed if the limits of a new construction project extend into previously existing project limits. For new construction projects equal to or greater than one mile in length, provide a financial project number (FIN), if possible.

Section Length

Pavement sections less than 0.50 miles should not be rated separately. Combine any sections shorter than 0.50 miles with the adjacent section having the most similar condition.

Roadway Direction

The direction a section is rated depends on the following criteria:

Divided

Any pavement section 0.50 miles or greater that has a physical median or permanent barrier wall separating traffic traveling in different directions. One lane in each direction must be rated for divided roadways.

Composite (Undivided)

Pavement sections without dividers or sections where any consecutive divided segment is less than 0.50 miles are considered composite. Composite pavement sections include areas with paved center turn lanes. One lane in only one direction must be rated. Rate these sections in the same direction each year, unless an obvious difference exists based upon visual observation of the pavement condition. In this case, the rater must rate the direction having the greatest amount of distresses.

The direction rated is coded in the Roadway (RDWY) column of the Field Workbook. See Table 1 below.

TABLE 1

ROADWAY DIRECTION

ROADWAY CODE	PAVEMENT DIVISION	MILEPOST DIRECTION	DIRECTION (NOTE1)
1	Composite	Ascending	North or East
4	Composite	Descending	South or West
2	Divided	Descending	South or West
3	Divided	Ascending	North or East

Note 1: A limited number of sections have mileposts that are descending in the North or East direction or are ascending in the South or West direction. For example, the PCS Roadway designation of a 1 or 3 could be South or West. Refer to the construction plans or SLD's for clarification if needed. Regardless of these exceptions to the rule, a roadway code of 1 or 3 is always evaluated in the ascending direction and a code of 2 or 4 is always evaluated in the descending direction.

Pavement Type (Type)

The Type column of the Field Workbook is used to denote the surface type of the roadway as well as other conditions the rater observes while performing the survey. The following is a list of all Type codes used:

Exceptions (type 0)

Exceptions include pavement sections that are not state-maintained or sections that overlap other sections that have been surveyed and are state-maintained. Only code Remarks and/or Comments for sections having type 0.

Pavement Improvement (type 2)

Type 2 is for sections that have been partially rehabilitated. This includes but is not limited to: slab replacements, crack sealing or longitudinal grinding. This code is used to note that changes to the pavement surface were made that influence the Crack, Rut or Ride ratings. This can result in either positive or negative changes to the ratings. Unless additional improvements are made this type must change in the following year. This new type will be assigned by rater. Normally this will be type 4.

Rigid Pavement (type 4)

Type 4 is for standard rigid pavement sections that do not fall under any of the other pavement type codes.

New Construction (type 5)

Type 5 is for a newly constructed section of roadway. When a new roadway is opened to traffic each section is noted as type 5. When a composite roadway has new construction that changes it to a divided roadway, the lanes added in the new direction are coded as type 5. The following year this type must change to a different code assigned by the rater, usually type 4. Provide a financial project number (FIN), for projects equal to or greater than one mile in length, if possible.

No Ride (type 6)

Type 6 is for sections where the profiler is unable to achieve a repeatable ride rating. These are normally sections that are very short, but sometimes other longer sections have characteristics that the profiler is unable to repeat. These sections are usually in urban areas and have features such as many cross streets with signalized intersections and radical intersecting profiles. Do not report Ride Number (RN) for these sections, but process data for faulting.

If a section that is New Pavement (type 7) is also a No Ride (type 6), code as New Pavement (type 7) and do not enter any values for RN, or International Roughness Index (IRI). Include comments for New Pavement (NP) and No Ride (NR) in the remarks.

New Pavement (type 7)

Type 7 is to be used on sections of existing roadway, where previous pavement, flexible or rigid, has been completely replaced with rigid pavement. The following year this type must change to a different code assigned by the rater, usually type 4. Provide a financial project number (FIN), for projects equal to or greater than one mile in length, if possible.

Under Construction (type 8)

Type 8 is for areas that are under construction during the survey. Areas that are signed as under construction can be rated providing the original surface is undisturbed and no lane shifts or other deviations from the previously surveyed roadway exists. This code can be used for more than one year. If type 8 is used and upon returning the next survey it is determined that no rehabilitation took place, the section must be coded type 4 and Not New Pavement (Not NP) coded in the remarks.

Structures (type 9)

Type 9 is for Structures including bridges, box culverts and other permanent objects that are equal to or greater than 0.25 miles. These structures should be

represented by separate pavement section limits and coded as type 9. Any structure less than 0.25 miles must remain combined with the larger section and profiler roughness turned off. Do not provide RN or faulting data for any structure.

Mileposts recorded for structures (bridges, box culverts and other permanent objects) as well as exceptions must come from SLD's or RCI whenever possible, not from distance-measuring instrument. This allows for data cross checks with Department RCI data. Milepost limits for structures must be in agreement with RCI feature code 258 (Structures).

If a structure is located between a flexible and rigid pavement section, coding as type 9 in the rigid pavement survey adds the structure to the rigid pavement system. If coded as type 0 the structure is excluded from the rigid pavement system. It is important to ensure any structures coded as type 9 in the rigid pavement survey are coded as type 0 in the flexible pavement survey. Not doing so would add the mileage for the structure to both surveys.

Mileage from sections coded type 9 is also used to denote pavement sections that have been added to the state-maintained system since the PCS was completed. This allows the mileage to be added to the survey and also serves as a reminder for the rater to rate the section the next year. Always code number of Travel Lanes and Remarks for sections listed as type 9.

Lanes

For composite roadways, this is the total number of through travel lanes. For divided roadways, this is the number of through lanes in the direction of travel. Do not include turn lanes, parking lanes or emergency lanes in the number of Lanes. The value used for Lane must be in agreement with RCI feature code 212 (Thru Lanes). Include the total number of lanes in the Lanes (LN) column of the Field Workbook.

Rated Lane

The lane having the worst pavement condition shall be rated for the direction being tested. It is coded in the Rated Lane (RL) column of the Field Workbook. This value is noted by ascending (R) or descending (L) followed by the count of through lanes starting from the inside lane. For example, a road with 3 lanes in each direction, the middle lane in the ascending direction is R2, and the inside lane in the descending direction is L1.

Remarks

The Remarks column is used to record information regarding the condition of the section being rated. See Table 2 below for a detailed listing of all standard remarks.

TABLE 2

STANDARD REMARKS

REMARKS	STANDARD CODE
New Pavement (A) (see note[1])	NP
New Construction (A)	NC
Under Construction (A)	UC
Not New Pavement (A)	NOT NP
Bridge Number	BR #### (see note[2])
Rigid Pavement (A)	Rigid Pavt
No Ride (A)	NR
Off RCI	Off RCI
Exception COSECSUB (see note[3])	EX COSECSUB (see note[3])
Survey Next Year	Add in XX (XX = Survey Year)
Lane Realignment	RAL
Brick Crosswalks	BW
Manholes in wheel path	MH
Sealed Cracks	SLD CRK

Note[1]: An (A) after the remark in the REMARKS above column indicates an automated remark (based upon an entry in another field).
Note[2]: Bridge number must be entered as four digit bridge number. Example BR 0024.
Note[3]: COSECSUB contains County Number - Section Number - Sub Section Number. A minimum of five digits must be entered. Examples are 16250001 or 52010.

Comments

The Comments column is used to record information specific to the section that will assist raters in future surveys. Examples include County section numbers for exceptions and any other non-standard remarks that will help in identifying the section. This column can also be used to record standardized comments that exceed the seventeen character limit of the Remarks column.

III. Evaluation Methods

Data collection is accomplished by visually estimating distresses present within each roadway section and through use of an inertial profiler to collect Ride and Faulting data at highway speeds.

Ride Rating

The longitudinal profile of each wheel path is measured at highway speeds by an ASTM E-950 Class I non-contact inertial profiler. See Figure 1 (page 13). Longitudinal profile data are collected at the smallest sample interval the profiler is capable of using, usually less than one inch. The data is then processed using a profile distance of 6 inches, a moving average of 12 inches, and 300 foot wavelength filtering. This longitudinal profile data is then used to calculate Ride Number (RN) and International Ride Index (IRI).

RN is a mathematical processing of the longitudinal profile measurements. RN is an estimate of subjective ride quality (ASTM Standard E1489) and it is presented on a 0 to 5 scale that is not represented by any units. A RN of 5 represents a pavement that is perfectly smooth; however this value is unachievable even with the smoothest of pavements. RN is reported as the average of the left and right wheel paths. RN data for each individual wheel path may be reported upon request.

The Ride Rating (RR) is calculated from RN average using methods below:

$$RR_{100} = RN \times 20$$
$$RR_{10} = RN \times 2$$

Where:	RN=	=	Ride Number (0 to 5 scale)
	RR_{10}	=	Ride Rating (0 to 10 scale)
	RR_{100}	=	Ride Rating (0 to 100 scale)

Ride Rating on a scale of 0 to 100 is calculated from Ride Number primarily for use by the rater while in the field. When Ride Number is inputted into the database, it is then used to determine Ride Rating on a 0 to 10 scale. A Ride Rating of 10 indicates a

pavement that is perfectly smooth. This value of 10 is only hypothetical and not achievable.

IRI is also a mathematical processing of the longitudinal profile generated by the profiler. IRI is a standard practice for computing and reporting road roughness (ASTM E1926). IRI is reported in units of inches per mile (in/mi) and is scaled with 0 being the smoothest and the upper limit being infinite. IRI is reported to the Federal Highway Administration (FHWA) annually. IRI is reported as the average of the left and right wheel paths. IRI data for each individual wheel path may be reported upon request.

The following points are critical to the collection and reporting of Ride Rating:

1. Ride Rating Check: The Ride Rating (RR_{100}) should be within $\pm$ eight (8) points of the previous year's survey. When RR_{100} is determined to be out of tolerance by more than the $\pm$ eight (8) points, rerun the section in accordance with Appendix B
2. Braking abruptly or accelerating rapidly (greater than 3 mph per second) produces invalid data. If this occurs the section must be re-tested.
3. Moisture on the surface of the pavement may affect the signal being returned from the sensor, causing invalid data. Do not test if pavement is wet.

A thorough calibration and verification must be completed to ensure the accuracy of the longitudinal profile data. See Appendix C, ("**Profiler Calibration Instructions**") for information on the calibration process.

FIGURE 1. INERTIAL PROFILER

Defect Rating

The Defect rating is determined by a visual inspection of distress indicators that are present within each rated section. The Rater records the distress type, number, and severity level of each critical distress indicator. Each of these values is weighted according to distress type and severity level. All of the weighted values are then combined into a total weighted deduct then subtracted from 100 to determine the Defect Rating of a rated section. A detailed explanation of how these indicators are identified and classified by severity begins on the next page.

NAME OF DISTRESS: **Surface Deterioration**

DESCRIPTION: Progressive disintegration and loss of concrete wearing surface.

EXPLANATION: This category includes pop-outs, raveling, scaling and disintegration. If the distressed areas are small (less than 15% of the slab area) and are not severe (less than ¼" or 6.35 mm deep), they will not significantly interfere with the performance of the roadway. As the areas increase in size and severity, the effect on other properties such as skid resistance and riding quality will become apparent and further reduce the composite score of the pavement.

SEVERITY OF DISTRESS:

Moderate - Some coarse aggregate exposed and the wearing surface has disintegrated ¼" (6.35 mm) to ½" (12.70 mm) deep.

Severe - Most of the coarse aggregate is exposed and some has been removed. The wearing surface has disintegrated more than ½" (12.70 mm) deep.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Surface deterioration is measured and coded in square feet for the rated section.

Both severity levels may be coded.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the number of square feet of surface deterioration in rated section for each severity level.

Line 2 of the output represents the number of square feet of surface deterioration per mile of net length in rated section for each severity level.

Line 3 of the output is the negative deduct value of rated section based on number of square feet of surface deterioration per mile of net length for each severity level.

Moderate distress - 0.003 per square foot (0.032 per square meter).

Severe distress - 0.006 per square foot (0.065 per square meter).

FIGURE 2. SURFACE DETERIORATION

NAME OF DISTRESS: **Spalling**

DESCRIPTION: Breakdown or disintegration of slab edges at joints or cracks usually resulting in the loss of sound concrete.

EXPLANATION: Spalling occurs at joints and cracks and is observable to some degree at almost every location. However, until its progress reaches more than one inch in width, it will not significantly impair serviceability. It will reduce riding quality as it increases in severity and extent.

SEVERITY OF DISTRESS:

Moderate - Spalled areas are 1" (25.40 mm) to 3" (76.20 mm) wide.

Severe - Spalled areas are greater than 3" (76.20 mm) wide.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Spalling is measured and coded in linear feet for the rated section.

Both severity levels may be coded.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the number of linear feet of spalling in rated section for each severity level.

Line 2 of the output represents the number of linear feet of spalling per mile of net length in rated section for each severity level.

Line 3 of the output is the negative deduct value of rated section based on number of linear feet of spalling per mile of net length for each severity level.

Moderate distress - 0.01 per linear foot (0.033 per meter).

Severe distress - 0.02 per linear foot (0.066 per meter).

FIGURE 3. SPALLING

NAME OF DISTRESS: **Patching**

DESCRIPTION: Corrections made to pavement defects.

EXPLANATION: Patching implies that a pavement repair has been made. The repair is measured in terms of the ability of the patch to carry traffic and perform the function for which it was placed. A good patch will prolong the serviceability of the pavement. However, as the quality of the patch decreases, the serviceability of the pavement also decreases.

SEVERITY OF DISTRESS:

Fair - The surface patch is providing marginal performance and is expected to serve its function from 1 to 2 years.

Poor - The surface patch has deteriorated to the extent that it no longer serves its function and should be replaced as soon as scheduling allows.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Patching is measured and coded in square yards for the rated section.

Both severity levels may be coded.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the number of square yards of patching in rated section for each severity level.

Line 2 of the output represents the number of square yards of patching per mile of net length in rated section for each severity level.

Line 3 of the output is the negative deduct value of rated section based on number of square yards of patching per mile of net length for each severity level.

Fair distress - 0.018 per square yard (0.022 per square meter).

Poor distress - 0.045 per square yard (0.054 per square meter).

NOTES:

1) If a patch has cracking then both the patching and cracking should be counted.

2) If half or more of the slab is replaced, do not record as patching.

3) If less than half of the slab is replaced, record as patching.

FIGURE 4. PATCHING

NAME OF DISTRESS: **Transverse Cracking**

DESCRIPTION: A crack or break approximately at a right angle to the pavement centerline.

EXPLANATION: Thermal expansion and contraction along with normal shrinkage of a slab may result in the formation of transverse cracking. Compared to longitudinal cracking, this category will have a greater effect upon the serviceability of the pavement because load transfer across the cracked slab results in a more rapid rate of deterioration. As long as the cracks are hairline or closed so as to prevent the intrusion of water and provide aggregate interlock, the cracks are not considered detrimental to pavement serviceability. However, cracks that open excessively permit the intrusion of water and cause the loss of aggregate interlock resulting in loss of load transfer between slabs.

SEVERITY OF DISTRESS:

Light - Visible cracks less than ⅛" (3.18 mm) wide that show no evidence of faulting, loss of aggregate interlock, or the intrusion of debris.

Moderate - Cracks ⅛" (3.18 mm) to ¼" (6.35 mm) wide that exhibit little or no faulting and no evidence of the intrusion of debris.

Severe - Cracks greater than ¼" (6.35 mm) that show loss of aggregate interlock and the obvious intrusion of water and debris. Faulting and spalling may also occur.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Transverse cracks are measured and coded by the number of cracks for the rated section.

If a longitudinal joint separates the rated lane into two or more slabs, individual transverse cracks are counted as one crack unless the separation between transverse cracks along the longitudinal joint is more than one foot. When this separation is more than one foot, count each crack individually.

Any or all of the severity levels may be coded.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the total number of transverse cracks in rated section for each severity level.

Line 2 of the output represents the number of transverse cracks per mile of net length in rated section for each severity level.

Line 3 of the output is the negative deduct value of rated section based on transverse cracks per mile of net length for each severity level.

Light distress - 0.30 per crack

Moderate distress - 0.38 per crack

Severe distress - 0.50 per crack

NOTES:

1) When moderate or severe cracks have been sealed, they must be rated as light severity level. Only when there is partial loss of the sealant can crack be rated according to actual width.

2) Joints at replaced slabs will not be recorded as cracks.

FIGURE 5. TRANSVERSE CRACKING

NAME OF DISTRESS: **Longitudinal Cracking**

DESCRIPTION: A crack or break approximately parallel to the pavement centerline.

EXPLANATION: Although this category is unsightly, it is not necessarily detrimental to the serviceability of the pavement. As long as the crack is not open or faulted to the extent that aggregate interlock is lost, load transfer across the crack will occur and the pavement will be serviceable. If the crack opens and permits the intrusion of water and/or debris, the deterioration of the pavement will be accelerated.

SEVERITY OF DISTRESS:

Light - Visible cracks less than ⅛" (3.18 mm) wide that show no evidence of faulting, loss of aggregate interlock or the intrusion of debris.

Moderate - Cracks ⅛" (3.18 mm) to ¼" (6.35 mm) wide that exhibit little or no faulting and no evidence of intrusion of debris.

Severe - Cracks greater than ¼" (6.35 mm) that show loss of aggregate interlock and the obvious intrusion of water and debris. Faulting and spalling may also occur.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Longitudinal cracks are measured and coded by the number of cracks for the rated section.

Any or all of the severity levels may be coded.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the total number of longitudinal cracks in rated section for each severity level.

Line 2 of the output represents the number of longitudinal cracks per mile of net length in rated section for each severity level.

Line 3 of the output is the negative deduct value of rated section based on longitudinal cracks per mile of net length for each severity level.

Light distress - 0.15 per crack

Moderate distress - 0.19 per crack

Severe distress - 0.25 per crack

NOTES:

1) When moderate or severe cracks have been sealed, they must be rated as light severity level. Only when there is partial loss of the sealant can crack be rated according to actual width.

2) Joints at replaced slabs will not be recorded as cracks.

FIGURE 6. LONGITUDINAL CRACKING

NAME OF DISTRESS: **Corner Cracking**

DESCRIPTION: A crack or break which intersects both the transverse and longitudinal joint.

EXPLANATION: The formation of a corner crack may result from loads imposed on a slab that has insufficient support. This can be caused by the presence of free water and loss of subgrade material that has been pumped out from beneath the slab at the transverse or longitudinal joint. Even though a hairline corner crack may not affect the serviceability of the pavement, it indicates a loss of support that may have been caused by pumping. As the severity of the corner crack increases and permits the intrusion of water, the loss of support may progress to the adjacent slab and significantly reduce serviceability.

SEVERITY OF DISTRESS:

Light - Visible cracks less than ⅛" (3.18 mm) wide that show no evidence of faulting, loss of aggregate interlock or the intrusion of debris.

Moderate - Cracks ⅛" (3.18 mm) to ¼" (6.35 mm) wide that exhibit little or no faulting or evidence of intrusion of debris.

Severe - Cracks greater than ¼" (6.35 mm) that show loss of aggregate interlock, obvious intrusion of water and debris. Faulting and spalling may also occur.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Corner cracks are measured and coded by the number of cracks for the rated section.

Any or all of the severity levels may be coded.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the total number of corner cracks in rated section for each severity level.

Line 2 of the output represents the number of corner cracks per mile of net length in rated section for each severity level.

Line 3 of the output is the negative deduct value of rated section based on corner cracks per mile of net length for each severity level.

Light distress - 0.25 per crack

Moderate distress - 0.31 per crack

Severe distress - 0.40 per crack

NOTES:

1) When moderate or severe cracks have been sealed, they must be rated as light severity level. Only when there is partial loss of the sealant can crack be rated according to actual width.

2) Joints at replaced slabs will not be recorded as cracks.

FIGURE 7. CORNER CRACKING

NAME OF DISTRESS: **Shattered Slab**

DESCRIPTION: Shattered slab is cracking or breaking up of the slab into four or more pieces.

EXPLANATION: If a slab contains one longitudinal and one transverse crack that divide the slab into four or more pieces, the slab will not be counted as a longitudinal and transverse crack but simply as a shattered slab. A section of pavement that has deteriorated to this extent may be an indicator of other detrimental types of distress such as loss of subgrade support. Eventually loose pieces will develop which may "rock" and disintegrate or pop out creating a potentially dangerous hazard to the motorist.

SEVERITY OF DISTRESS:

Moderate - The shattered slab is broken into pieces with some interlock remaining (cracks less than ¼" or 6.35 mm) and repair is needed.

Severe - The shattered slab is broken into pieces that are acting independently (cracks greater than ¼" or 6.35 mm) and the slab or a portion thereof needs to be replaced.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Shattered slabs are measured and coded in units of one for each shattered slab.

Both severity levels may be coded.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the total number of shattered slabs in rated section for each severity level.

Line 2 of the output represents the number of shattered slabs per mile of net length in rated section for each severity level.

Line 3 of the output is the negative deduct value of rated section based on shattered slabs per mile of net length for each severity level.

Moderate distress - 1.15 per shattered slab

Severe distress - 1.50 per shattered slab

FIGURE 8. SHATTERED SLAB

NAME OF DISTRESS: **Faulting**

DESCRIPTION: Differential vertical displacement of abutting slabs at joints or cracks creating a "step" deformation in the pavement surface.

EXPLANATION: Faulting per section does not decrease the structural adequacy of the pavement though it may severely reduce the riding quality. Faulting may be an observable forecaster of severe pavement damage because it usually relates to a void under the pavement or to movement of the subgrade.

SEVERITY OF DISTRESS:

Fault measurements are utilized to compute a Fault Index (FI), which represents the average faulting for the rated section in thirty-seconds of an inch.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Faulting data is normally collected using a laser profiler during the collection of the Ride Rating data. Average faulting values for each rated section are calculated according to AASHTO R 36-04 using a utility that considers the following:

- Length of section
- Longitudinal Profile data from laser profiler
- Average Slab Length

Any areas on bridges or structures are excluded from the longitudinal profile data so that faulting values only represent sections of rigid pavement.

The FI is calculated by multiplying the average fault measurement by 32. (0.250 in. X 32 = 8 FI)

Occasionally, usually only on very short pavement sections, the rater determines that automated ride and faulting values are not reliable for a rated section. In this case the section is made a No Ride (type 6), and faulting values are obtained through manual methods.

When manual faulting is required, five consecutive joints are measured and the values are summed. The FI is then obtained by multiplying the values by 6.4.

Fault Index = 1.0 Deduct point per 1/32” (1.26mm).

The information below describes the information contained in the output of the permanent file.

Line 1 of the output represents the FI.

Line 3 of the output represents the negative deduct value which is equal to the FI.

FIGURE 9. FAULTING

NAME OF DISTRESS: **Pumping**

DESCRIPTION: The ejection of water and subgrade materials along or through transverse or longitudinal joints, cracks or pavement edges. Pumping is characterized by vertical slab movement under passing loads. This vertical movement results in the ejection of water trapped below the slab through joints or cracks. As the water is ejected, it carries with it particles of small gravel, sand, clay or silt, resulting in progressively less pavement support.

EXPLANATION: Pumping has been observed in early construction of PCC pavement, especially where untreated bases and/or subgrades were utilized in areas of poor drainage. In more recent construction, where typically the subgrade is stabilized and a treated base course is used under the pavement, pumping has been reduced. However, when it does occur, it is a serious type of distress and the negative values are significant. Pumping occurs through any and all joints and cracks and along pavement edges. Free water must be present for pumping to occur.

SEVERITY OF DISTRESS:

Silt and clay slurries pumped onto the pavement surface may result in the pavement becoming slippery, but the most serious consequence is that as pumping continues, the slab receives progressively less support, and eventually cracking and faulting develop.

Light - Visible deposits of material or light stains at the pavement shoulder or shoulder settlement at transverse joint.

Moderate - Visible deposits of material or moderate stains at the pavement shoulder with slight faulting (1/8" or 3.18 mm - 1/4" or 6.35 mm) of the pavement slabs or settlement of the shoulder at transverse joint.

Severe - Visible deposits of material or heavy stains at the pavement shoulder with moderate to severe faulting (greater than 1/4" or 6.35 mm) of the pavement slabs or settlement of the shoulder at transverse joint.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Pumping is measured in terms of both severity and percent within the rated section.

Only the predominate of the three severity levels is to be coded.

The percent of pumping within the rated section is divided into four categories indicated by the following code numbers:

1% - 25%	Code - 1
26% - 50%	Code - 2
51% - 75%	Code - 3
76% - 100%	Code - 4

Use one of the codes above in the column for the appropriate severity level. For example, if there is 15% light pumping in the rated section use code 3 in the column for Light severity level pumping.

The information below describes the information contained in the output of the permanent file.

Line 1 of the output identifies the severity level of pumping. The following designations will be represented depending upon the severity level indicated on the coding sheet.

If severity level is:
Light, then “LT" is indicated.
Moderate, then “MD" is indicated.
Severe, then “SV" is indicated.

Line 2 of the output identifies the percent of pumping by the code indicated in the table below.

Line 3 of the output is the negative deduct value for the specified severity level and percent within the rated section as indicated in the table below.

SEVERITY	PERCENT	CODE	NEGATIVE DEDUCT VALUE
Light	1% - 25%	1	2
	26% - 50%	2	3
	51% - 75%	3	4
	76% - 100%	4	5
Moderate	1% - 25%	1	4
	26% - 50%	2	6
	51% - 75%	3	8
	76% - 100%	4	10
Severe	1% - 25%	1	6
	26% - 50%	2	9
	51% - 75%	3	12
	76% - 100%	4	15

FIGURE 10. PUMPING

NAME OF DISTRESS: **Joint Condition**

DESCRIPTION: The ability of a joint sealant to maintain cohesion and remain bonded to the edges of the slabs for protection of the joints and prevention of water infiltrating the pavement's supporting foundation.

EXPLANATION: For a jointed pavement to maintain its serviceability, the joints must be sealed against the intrusion of water and incompressible materials. If soil or rocks accumulate in the joints between the concrete slabs, the slabs will be prevented from expanding and may buckle, shatter or spall.

SEVERITY OF DISTRESS:

Partially sealed - The joint sealant has deteriorated to the extent that adhesion or cohesion has failed and water is infiltrating the joint.

Not sealed - The joint sealant is either non-existent or has deteriorated to the extent that both water and incompressible materials are infiltrating the joint.

MEASUREMENT AND COMPUTATION OF DISTRESS:

Joint Condition is measured in terms of the most representative severity within the rated section.

The following codes are used to indicate the representative severity level of Joint Condition defect.

Partially Sealed - Code 1
Not Sealed - Code 2

The information below describes the information contained in the output of the permanent file.

Line 1 of the output identifies the severity level of the joint condition.

If Partially Sealed - "PS" is indicated.
If Not Sealed - "NS" is indicated.

Line 3 of the output is the negative deduct value for the specified severity within the rated section.

Partially Sealed - 5
Not Sealed – 10

FIGURE 11. JOINT CONDITION

TABLE 3

NUMERICAL DEDUCT VALUES FOR RIGID PAVEMENT DISTRESSES

TYPE OF DISTRESS	SEVERITY	NUMERIC VALUE
Surface Deterioration	Moderate	0.003 per square foot (0.032 per square meter)
	Severe	0.006 per square foot (0.065 per square meter)
Spalling	Moderate	0.01 per linear foot (0.033 per linear meter)
	Severe	0.02 per linear foot (0.066 per linear meter
Patching	Fair	0.018 per square yard (0.022 per square meter)
	Poor	0.045 per square yard (0.054 per square meter
Transverse Cracking	Light	0.30 per crack
	Moderate	0.38 per crack
	Severe	0.50 per crack
Longitudinal Cracking	Light	0.15 per crack
	Moderate	0.19 per crack
	Severe	0.25 per crack
Corner Cracking	Light	0.25 per crack
	Moderate	0.31 per crack
	Severe	0.40 per crack
Shattered Slab	Moderate	1.15 per shattered slab
	Severe	1.50 per shattered slab

TYPE OF DISTRESS	SEVERITY	NUMERIC VALUE
Faulting		1.0 per 1/32 inch (1.26 per mm) faulting
Pumping	Light	1% - 25% -- 2
		26% - 50% --- 3
		51% - 75% --- 4
		76% - 100% --- 5
	Moderate	1% - 25% --- 4
		26% - 50% --- 6
		51% - 75% --- 8
		76% - 100% --- 10
	Severe	1% - 25% --- 6
		26% - 50% --- 9
		51% - 75% --- 12
		76% - 100% --- 15
Joint Condition	Partially Sealed	5
	Not Sealed	10

IV. Rigid Pavement Condition Survey Field Workbook

The Rigid Pavement Condition Survey Field Workbook is used by the rater in the field to record cracking data and any comments as well as any changes in mileposts or pavement type. Profiler data (Ride Number and Faulting) is not input on this form since it is imported directly into the database. The information on pages 42 through 45 describes each data column on the Rigid Pavement Condition Survey Field Workbook.

FIELD RATING FORM FOR RIGID PAVEMENT CONDITION SURVEY

COLUMN TITLE	DESCRIPTION
MO	Month in which survey was performed.
YR	Year in which survey was performed.
CO	County number (see page 43)
SEC	State Roadway County Section Number
SUB	State Roadway County Subsection Number
SR	State Road Number Example: 0008; 0369
US	US Road Number Example: 0027; 0301
SYS	System code 1 - Primary 2 - Secondary 3 - Toll 4 - Interstate 5 - Turnpike
RDWY	Roadway direction (see page 4)
TYPE	Pavement Type (see pages 5 to 7)
BMP	Beginning Milepost of the rated section.
EMP	Ending Milepost of the rated section.
SP	The uniform speed at which the vehicle travels over the rated section. Speeds are coded as follows: 3 - 30 mph 4 - 40 mph 5 - 50 mph 6 - 60 mph
LN	Number of through Travel Lanes (see page 7)
RL	Rated Lane (see page 8)

Continued on page 44

COUNTY NAME AND CODE NUMBER – ARRANGED BY DISTRICT

DISTRICT 1		DISTRICT 2		DISTRICT 3		DISTRICT 4		DISTRICT 5		DISTRICT 6		DISTRICT 7	
Charlotte	01	Alachua	26	Bay	46	Broward	86	Lake	11	Dade	87	Citrus	02
Collier	03	Baker	27	Calhoun	47	Indian River	88	Sumter	18	Monroe	90	Hernando	08
Desoto	04	Bradford	28	Escambia	48	Martin	89	Marion	36			Hillsborough	10
Glades	05	Columbia	29	Franklin	49	Palm Beach	93	Brevard	70			Pasco	14
Hardee	06	Dixie	30	Gadsden	50	St. Lucie	94	Flagler	73			Pinellas	15
Hendry	07	Gilchrist	31	Gulf	51			Orange	75				
Highlands	09	Hamilton	32	Holmes	52			Seminole	77				
Lee	12	Lafayette	33	Jackson	53			Volusia	79				
Manatee	13	Levy	34	Jefferson	54			Osceola	92				
Polk	16	Madison	35	Leon	55								
Sarasota	17	Suwannee	37	Liberty	56								
Okeechobee	91	Taylor	38	Okaloosa	57								
		Union	39	Santa Rosa	58								
		Clay	71	Wakulla	59								
		Duval	72	Walton	60								
		Nassau	74	Washington	61								
		Putnam	76										
		St. Johns	78										

FIELD RATING FORM FOR RIGID PAVEMENT CONDITION SURVEY (Continued)

COLUMN TITLE	DESCRIPTION		
AUTOMATED *	NET L		Net Length of Rated Section
	IRI		International Roughness Index (inches/mile)
	RN		Ride Number
	FAULT		Faulting (inches)
	JOINTS		Number of Joints rated section
TRANSVERSE CRACKING (see page 22)	Light	-	Total Number of Cracks
	Moderate	-	Total Number of Cracks
	Severe	-	Total Number of Cracks
LONGITUDINAL CRACKING (see page 25)	Light	-	Total Number of Cracks
	Moderate	-	Total Number of Cracks
	Severe	-	Total Number of Cracks
SPALLING (see page 17)	Moderate	-	Total Linear Feet
	Severe	-	Total Linear Feet
CORNER CRACKING (see page 28)	Light	-	Total Number of Cracks
	Moderate	-	Total Number of Cracks
	Severe	-	Total Number of Cracks
PATCHING (see page 19)	Fair	-	Total Square Yards
	Poor	-	Total Square Yards
SHATTERED SLABS (see page 31)	Moderate	-	Total Number of Shattered Slabs
	Severe	-	Total Number of Shattered Slabs
SURFACE DETERIORATION (see page 15)	Moderate	-	Total Square Feet
	Severe	-	Total Square Feet
PUMPING (see page 35)	Light	-	Percent of Stained Area
	Moderate	-	Percent of Stained Area
	Severe	-	Percent of Stained Area
	Note: Code only one (predominate severity level only)		
JOINT CONDITION (see page 38)	Not Sealed	-	Code 1
	Partially Sealed	-	Code 2
SLAB ESTIMATES -	LENGTH	-	Approximate slab length in feet (used in Faulting calculation)
	NUMBER *	-	Calculated number of slabs (used in Faulting calculation)
	% CRACKED *	-	Percent of slabs that have at least one crack (used for HPMS)

* Manual data entry is not needed for these fields since information is either imported directly from profiler data, or calculated from other inputs.

FIELD RATING FORM FOR RIGID PAVEMENT CONDITION SURVEY (Continued)

COLUMN TITLE	DESCRIPTION
REMARKS	**Use standardized remarks (Table 2, page 8) to denote specific conditions that exist within rated section**
RATER	**Rater 1 - Code letter for primary rater**
	Rater 2 - Code letter for secondary rater if present
MULTIPLE CRACKS	**Number of slabs with more than one crack (used in % of cracked slabs calculation)**
FIN	**Provide Financial Project Number for new construction or rehabilitation projects greater than 1 mile in length**
COMMENTS	**Record information specific to the section that will assist raters in future surveys. See page 9.**

APPENDIX A

Computer Use

for

Rigid Pavement

Condition Survey Data

RIGID PAVEMENT CONDITION SURVEY

AREA FLAT FILE

Field data file is 'D5580954.RIGID**xx**.AREACOMB'

Note: **xx** = Year of Survey
y = Area Number
Data is coded in accordance with the following layout:

LINE NUMBER 1

COLUMN	DESCRIPTION	LENGTH
1	LINE NUMBER	1
2	DISTRICT	1
3-4	COUNTY	2
5-7	SECTION	3
8-10	SUBSECTION	3
11	ROADWAY	1
12-16	BEGINNING MILEPOST	5
17-18	MONTH	2
19-20	YEAR	2
21	BLANK	1
22	UNIT	1
23	SYSTEM	1
24-27	STATE ROAD NUMBER	4
28-31	US ROAD NUMBER	4
32-36	ENDING MILEPOST	5
37-41	NET LENGTH	5
42	SPEED	1
43-45	BLANK	3
46-48	IRI AVERAGE (AVERAGE OF LEFT AND RIGHT WHEEL PATHS)	3
49-52	RN AVERAGE (AVERAGE OF LEFT AND RIGHT WHEEL PATHS)	4
53	BLANK	1
54-55	TRAVEL LANES	2
56-77	REMARKS	23
78	TYPE	1
79-81	IRI LEFT WHEEL PATH	3
82-84	IRI RIGHT WHEEL PATH	3
85-88	RN LEFT WHEEL PATH	4
89-92	RN RIGHT WHEEL PATH	4
93-133	FIN	11

RIGID PAVEMENT CONDITION SURVEY

AREA FLAT FILE

Field data file is 'D5580954.RIGID**xx**.AREACOMB'

Note: **xx** = Year of Survey
y = Area Number

Data is coded in accordance with the following layout:

LINE NUMBER 2

COLUMN	DESCRIPTION	LENGTH
1	LINE NUMBER	1
2	DISTRICT	1
3-4	COUNTY	2
5-7	SECTION	3
8-10	SUBSECTION	3
11	ROADWAY	1
12-16	BEGINNING MILEPOST	5
	SURFACE DETERIORATION	
17-20	A) MODERATE	4
21-24	B) SEVERE	4
	SPALLING	
25-28	A) MODERATE	4
29-32	B) SEVERE	4
	PATCHING	
33-36	A) FAIR	4
37-40	B) POOR	4
	TRANSVERSE CRACKING	
41-44	A) LIGHT	4
45-48	B) MODERATE	4
49-52	C) SEVERE	4
	LONGITUDINAL CRACKING	
53-56	A) LIGHT	4
57-60	B) MODERATE	4
61-64	C) SEVERE	4
	CORNER CRACKING	
65-68	A) LIGHT	4
69-72	B) MODERATE	4
73-76	C) SEVERE	4

COLUMN	DESCRIPTION	LENGTH
	SHATTERED SLAB	
77-80	A) MODERATE	4
81-84	B) SEVERE	4
85-89	FAULT MEASUREMENTS	5
	PUMPING	
90	A) LIGHT	1
91	B) MODERATE	1
92	C) SEVERE	1
93	JOINT CONDITION	1
94	VERIFICATION	1
95-96	RATED LANE	2
97	BLANK	1
98-99	RATER1	2
100	BLANK	1
101-102	RATER2	2
103	BLANK	1
104-105	SLAB LENGTH	2
106	BLANK	1
107-110	NUMBER OF SLABS	4
110-111	BLANK	2
112-115	NUMBER OF JOINTS	4
116	BLANK	1
117-121	PERCENT OF CRACKED SLABS	5
122-125	NUMBER OF SLABS WITH MORE THAN ONE CRACK	4
126	BLANK	1
127-196	LONG COMMENTS	70

RIGID PAVEMENT CONDITION SURVEY

PERMANENT FLAT FILE

The permanent data file is 'D5580954.RIGID**xx**.DATA' and has the following layout:

Note: **xx** = Year of Survey

COLUMN	DESCRIPTION	LENGTH
1	DISTRICT	1
2-3	COUNTY	2
4-6	SECTION	3
7-9	SUBSECTION	3
10-13	STATE ROAD NUMBER	4
14-18	BEGINNING MILEPOST	5
	SURFACE DETERIORATION (LINE 1 OF OUTPUT)	
19-22	A) MODERATE (SQ. FT / SECTION)	4
23-26	B) SEVERE (SQ. FT. / SECTION)	4
	SPALLING (LINE 1 OF OUTPUT)	
27-30	A) MODERATE (LIN FT. / SECTION)	4
31-34	B) SEVERE (LIN FT. / SECTION)	4
	TRANSVERSE CRACKING (LINE 1 OF OUTPUT)	
35-38	A) LIGHT (NO. / SECTION)	4
39-42	B) MODERATE (NO. / SECTION)	4
43-46	C) SEVERE (NO. / SECTION)	4
	LONGITUDINAL CRACKING (LINE 1 OF OUTPUT)	
47-50	A) LIGHT (NO. / SECTION)	4
51-54	B) MODERATE (NO. / SECTION)	4
55-58	C) SEVERE (NO. / SECTION)	4
	CORNER CRACKING (LINE 1 OF OUTPUT)	
59-62	A) LIGHT (NO. / SECTION)	4
63-66	B) MODERATE (NO. / SECTION)	4
67-70	C) SEVERE (NO. / SECTION)	4
	SHATTERED SLAB (LINE 1 OF OUTPUT)	
71-74	A) MODERATE (NO. / SECTION)	4
75-78	B) SEVERE (NO. / SECTION)	4
79-81	FAULT INDEX (SAME AS NEGATIVE DEDUCT VALUE) (LINE 1 OF OUTPUT)	3
82-83	JOINT CONDITION (LISTED AS NS, PS) (LINE 1 OF OUTPUT)	2
84-85	PUMPING (LISTED AS LT, MD, SV) (LINE 1 OF OUTPUT)	2

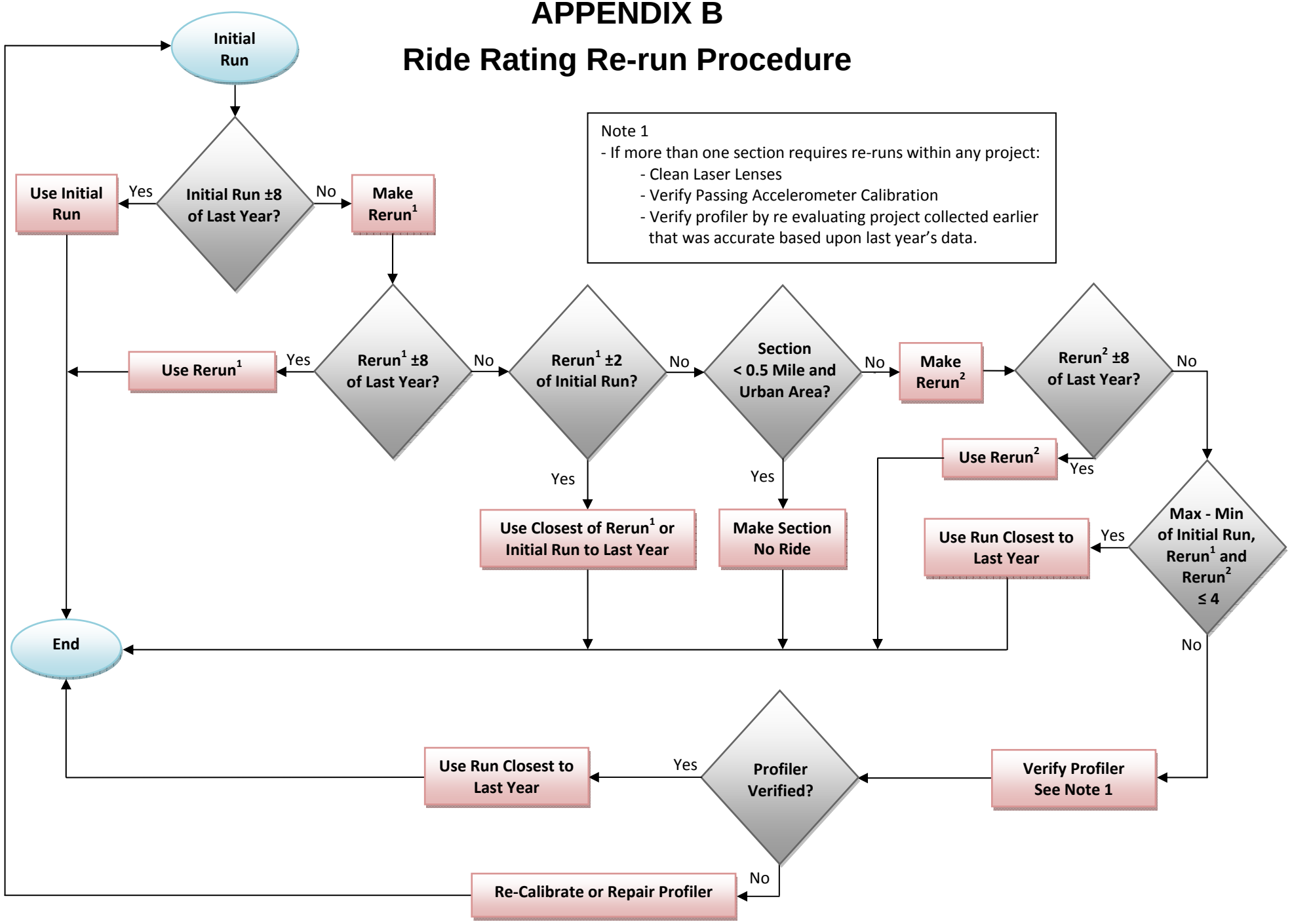
COLUMN	DESCRIPTION	LENGTH
	PATCHING (LINE 1 OF OUTPUT)	
86-89	A) FAIR (SQ. YDS / SECTION)	4
90-93	B) POOR (SQ. YDS / SECTION)	4
94-96	DEFECT RATING	3
97-99	RIDE RATING	3
100-102	BASIC RATING (N/A)	3
103-105	INTERNATIONAL ROUGHNESS INDEX AVERAGE	3
106-107	MONTH	2
108-109	YEAR	2
110-113	US ROAD NUMBER	4
114-118	ENDING MILEPOST	5
	SURFACE DETERIORATION (LINE 3 OF OUTPUT)	
119-122	A) MODERATE (SQ. FT / MILE)	4
123-126	B) SEVERE (SQ. FT. / MILE)	4
	SPALLING (LINE 3 OF OUTPUT)	
127-130	A) MODERATE (LIN FT. / MILE)	4
131-134	B) SEVERE (LIN FT. / MILE)	4
	TRANSVERSE CRACKING (LINE 2 OF OUTPUT)	
135-138	A) LIGHT (NO. / MILE)	4
139-142	B) MODERATE (NO. / MILE)	4
143-146	C) SEVERE (NO. / MILE)	4
	LONGITUDINAL CRACKING (LINE 2 OF OUTPUT)	
147-150	A) LIGHT (NO. / MILE)	4
151-154	B) MODERATE (NO. / MILE)	4
155-158	C) SEVERE (NO. / MILE)	4
	CORNER CRACKING (LINE 2 OF OUTPUT)	
159-162	A) LIGHT (NO. / MILE)	4
163-166	B) MODERATE (NO. / MILE)	4
167-170	C) SEVERE (NO. / MILE)	4
	SHATTERED SLAB (LINE 2 OF OUTPUT)	
171-174	A) MODERATE (NO. / MILE)	4
175-178	B) SEVERE (NO. / MILE)	4
	PUMPING (CODE VALUE) (LINE 2 OF OUTPUT)	
179	A) LIGHT	1
180	B) MODERATE	1
181	C) SEVERE	1

COLUMN	DESCRIPTION	LENGTH
	PATCHING (LINE 2 OF OUTPUT)	
182-185	A) FAIR (SQ. YDS / MILE)	4
186-189	B) POOR (SQ. YDS / MILE)	4
190-191	NUMBER OF LANES	2
192	VERIFICATION CODE	1
193-214	REMARKS	22
215-218	RIDE NUMBER AVERAGE	4
219-222	ROADWAY (LT., RT., COM1, COM4)	4
223-226	SYSTEM (PRI., INT., TOLL, TRPK)	4
227-232	NET LENGTH	6
	SURFACE DETERIORATION (LINE 3 OF OUTPUT)	
233-236	A) MODERATE (NEGATIVE DEDUCT VALUE)	4
237-240	B) SEVERE (NEGATIVE DEDUCT VALUE)	4
	SPALLING (LINE 3 OF OUTPUT)	
241-244	A) MODERATE (NEGATIVE DEDUCT VALUE)	4
245-248	B) SEVERE (NEGATIVE DEDUCT VALUE)	4
	TRANSVERSE CRACKING (LINE 3 OF OUTPUT)	
249-252	A) LIGHT (NEGATIVE DEDUCT VALUE)	4
253-256	B) MODERATE (NEGATIVE DEDUCT VALUE)	4
257-260	C) SEVERE (NEGATIVE DEDUCT VALUE)	4
	LONGITUDINAL CRACKING (LINE 3 OF OUTPUT)	
261-264	A) LIGHT (NEGATIVE DEDUCT VALUE)	4
265-268	B) MODERATE (NEGATIVE DEDUCT VALUE)	4
269-272	C) SEVERE (NEGATIVE DEDUCT VALUE)	4
	CORNER CRACKING (LINE 3 OF OUTPUT)	
273-276	A) LIGHT (NEGATIVE DEDUCT VALUE)	4
277-280	B) MODERATE (NEGATIVE DEDUCT VALUE)	4
281-284	C) SEVERE (NEGATIVE DEDUCT VALUE)	4
	SHATTERED SLAB (LINE 3 OF OUTPUT)	
285-288	A) MODERATE (NEGATIVE DEDUCT VALUE)	4
289-292	B) SEVERE (NEGATIVE DEDUCT VALUE)	4

COLUMN	DESCRIPTION	LENGTH
293-295	FAULTING (NEGATIVE DEDUCT VALUE) (LINE 3 OF OUTPUT)	3
296-298	JOINT CONDITION (NEGATIVE DEDUCT VALUE) (LINE 3 OF OUTPUT)	3
299-301	PUMPING (NEGATIVE DEDUCT VALUE) (LINE 3 OF OUTPUT)	3
 302-305 306-309	PATCHING (LINE 3 OF OUTPUT) A) FAIR (NEGATIVE DEDUCT VALUE) B) POOR (NEGATIVE DEDUCT VALUE)	 4 4
310-313	FAULTING (AVERAGE FAULT VALUE IN INCHES CALCULATED FROM PROFILER DATA)	4
314	BLANK	1
315	SPEED	1
316	BLANK	1
317	UNIT	1
318	TYPE	1
319-320	RATED LANE	2
321	BLANK	1
322-323	RATER	2
324	BLANK	1
325-326	RATER2	2
327	BLANK	1
328-329	SLAB LENGTH	2
330	BLANK	1
331-334	NUMBER OF SLABS	4
335	BLANK	1
336-339	NUMBER OF JOINTS	4
340	BLANK	1
341-344	PERCENT OF CRACKED SLABS	4
345	BLANK	1
346-349	NUMBER OF SLABS WITH MORE THAN ONE CRACK	4
350	BLANK	1
351-420	LONG COMMENTS	70

APPENDIX B

Ride Rating Re-run Procedure



APPENDIX C

Profiler Calibration Instructions

Calibration Check On Profiler: The following calibration checks are required on the Profiler.

Step 1: Prior to calibration assure unit (vehicle and equipment) is warmed up (between 15 to 30 minutes).

Step 2: Check tire pressure and adjust to recommended pressure if necessary.

Step 3: Run electronic straightedge calibration to ensure sensors' alignment accuracy every thirty days, when replacing sensor or when data is suspect. This must be accomplished in conjunction with steps 4 and 5.

Step 4: Run plate calibration every thirty days, when replacing sensor or when data is suspect to ensure sensors are reading distance to pavement surface correctly. This must be done in conjunction with steps 3 and 5.

Step 5: Run section calibration to ensure accurate calculation of IRI and RN every thirty days, when replacing sensor or when data is suspect. This must be accomplished in conjunction with steps 3 and 4.

Step 6: Run distance measuring instrument (DMI) calibration every thirty days and/or when tires are replaced. This is done independently from other calibrations.

Step 7: Accelerometer calibration must be done each time the Profiler is turned on and after the system has warmed up for at least 15 minutes. The vehicle must be on a level section of pavement. Anyone who is going to be in vehicle while testing must be in vehicle while the accelerometer calibration is performed. After calibration is done the new accelerometer values must be accepted.