2026 Rigid Pavement Condition Survey Handbook

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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 (roughness)

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 the 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 in the "History of Florida Pavement Condition Survey" at the following address:

http://www.fdot.gov/materials/pavement/performance/pcs/pcshistory.pdf

II. Pavement Section Selection and Identification

The length of the pavement to be evaluated will vary depending upon several 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.
6. Flexible pavement longer than 0.25 miles within a rigid pavement section
7. Changes in the number of lanes (2 to 3 lanes, etc.)
8. A division between roadway directions 0.50 miles or more
9. System status

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 Pavement Condition Survey (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.

Section Length

Pavement sections less than 0.25 miles should not be rated separately. Combine any sections shorter than 0.25 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.

Undivided (Composite)

Pavement sections without dividers or sections where any consecutive divided segment is less than 0.50 miles are considered undivided. Undivided 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 Roadway Code is coded in the Roadway (RDWY) column of the Field Workbook and is determined by the pavement division and milepost direction of the rated lane. See **Table 1** below.

TABLE 1

ROADWAY DIRECTION

ROADWAY CODE	PAVEMENT DIVISION	MILEPOST DIRECTION	DIRECTION (NOTE1)
1	Undivided	Ascending	North or East
4	Undivided	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 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. Type codes must match between Rigid and Flexible Workbooks. The following is a list of all Type codes used:

Pavement Improvement (Type 2)

Type 2 is for sections that have been partially rehabilitated or modified to improve the section. 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 may influence the Defect or Ride Ratings. This can result in either positive or negative changes to the ratings. Workbook comments must be provided to explain why the section was rated Type 2. In the following survey year this code must be changed, usually to Type 4, unless additional improvements are made.

If a section that is Pavement Improvement (Type 2) is also a No Ride (Type 6), code as Pavement Improvement (Type 2) and do not enter any ride values. Include No Ride (NR) in the Remarks column.

Rigid Pavement (Type 4)

Type 4 is for standard rigid pavement sections; these sections must include both Defect and Ride Ratings.

New Construction (Type 5)

Type 5 is for a newly constructed section of roadway. As an example, when an undivided 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 code must change, usually to Type 4.

If a section that is New Construction (Type 5) is also a No Ride (Type 6), code as New Construction (Type 5) and do not enter any ride values. Include New Pavement (NP) and No Ride (NR) in the Remarks column.

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 cross streets with signalized intersections and radical intersecting profiles. Collect Laser Crack Measurement System (LCMS) data, but do not report Ride Ratings for these sections.

New Pavement (Type 7)

Type 7 is for sections of existing roadway, where previous pavement, flexible or rigid, has been completely replaced with rigid pavement. The following year this code must change, usually to Type 4.

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 ride values. Include New Pavement (NP) and No Ride (NR) in the Remarks column.

Under Construction (Type 8)

Type 8 is for areas that are under construction during the survey. Areas having signs indicating the section is 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 construction is noted in the next survey. After construction is complete the section will typically change to Type 2 or Type 7 depending on the scope of the project. Upon returning the following year, it may be evident that no rehabilitation took place. In this case the section must be coded Type 4 and Not New Pavement (Not NP) coded in Remarks.

Lanes

For undivided roadways, this is the total number of 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 total number of lanes must agree with RCI feature code 212 (Thru Lanes).

Rated Lane

The lane having the worst pavement condition shall be the rated lane for the direction being tested. This value is noted by ascending (R) or descending (L) followed by the count of through lanes starting from the inside lane to the lane being rated. 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
Rigid Pavement (A)	Rigid Pavt
No Ride (A)	NR
New Surface	NS
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 column above indicates an automated remark (based upon an entry in another field).

Comments

The Comments column is used to record information specific to the section that will assist the rater in future surveys. Examples include County section numbers for exceptions and any other non-standard remarks that will help identify the section. This column can also be used to record standardized remarks that exceed the seventeen-character limit of the Remarks column. This column is also used to provide detailed comments as to why an area is a Type 2 or comments that can assist the reviewer of the section rating and should be followed by SYXX. PCS Administrator may also use this to pass along information to the Rater the following year. Raters should remove comments that do not need to be carried over to next year.

III. Evaluation Methods

Data collection is accomplished with an LCMS together with an inertial profiler. The LCMS system collects forward and 20 ft downward (3D and Range) images of the pavement surface. Images are manually reviewed in the office and distresses and joints present within each roadway section are marked by a technician using International Cybernetics Company (ICC) Connect software. Ride and faulting data are collected at highway speeds.

Ride Rating

The longitudinal profile of each wheel path is measured at highway speeds by an **ASTM E950** Class I non-contact inertial profiler, see **Figure 1**. Longitudinal profile data is collected at the smallest sample interval possible, usually less than one inch. This longitudinal profile data is then used to calculate the International Roughness Index (IRI).

IRI is 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.

Ride Rating (RR) is based upon a scale 0 (very rough) to 10 (very smooth). IRI is used to determine RR. Refer to **Table 3** to convert IRI values to Ride Rating.

RN is also a mathematical processing of longitudinal profile measurements. RN is an estimate of subjective ride quality (**ASTM E1489**) and is presented on a 0 to 5 scale that is not represented by any units. An 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 following points are critical to the collection and reporting of Ride Rating:

1. The Ride Rating (RR) must not decrease more than 0.8 points or increase by more than 0.4 points from the previous year's survey. For sections of New Surface or New Construction, RR values must be 8.0 or more. Sections that do not meet the above requirements require reruns to be made according to rules in **Appendix A**.
2. Braking abruptly or accelerating rapidly (greater than 3 mph/s) 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 the pavement is wet.

Some of the pavement sections contain specific elements that are intentionally excluded from profiler data because the Department does not wish to include in the Ride Rating values. These are listed below:

- Bridges
- Railroad crossings
- Speed attenuating devices (rumble strips and speed bumps/humps)
- Flexible pavement intersections

Other elements determined to be valid when establishing Ride Ratings are:

- All crosswalks (brick or textured pattern)
- Manholes
- Intersections (other than flexible surfaces)
- Raised lettering and stop bars

TABLE 3

IRI to RIDE RATING VALUES

IRI Range	Ride Rating	IRI Range	Ride Rating
1 – 12	10.0	162 – 166	5.5
13 – 28	9.2	167 – 170	5.4
29 – 32	9.1	171 – 175	5.3
33 – 34	9.0	176 – 180	5.2
35 – 37	8.9	181 – 185	5.1
38 – 39	8.8	186 – 190	5.0
40 – 42	8.7	191 – 195	4.9
43 – 46	8.6	196 - 200	4.8
47 – 50	8.5	201 – 206	4.7
51 – 54	8.4	207 – 212	4.6
55 – 58	8.3	213 – 218	4.5
59 – 62	8.2	219 – 224	4.4
63 – 66	8.1	225 – 230	4.3
67 – 70	8.0	231 – 236	4.2
71 – 74	7.9	237 – 242	4.1
75 - 78	7.8	243 – 249	4.0
79 – 82	7.7	250 – 256	3.9
83 – 86	7.6	257 – 264	3.8
87 – 89	7.5	265 – 271	3.7
90 – 93	7.4	272 – 278	3.6
94 – 97	7.3	279 – 285	3.5
98 – 100	7.2	286 – 293	3.4
101 – 104	7.1	294 – 300	3.3
105 – 107	7.0	301 – 310	3.2
108 – 111	6.9	311 – 318	3.1
112 – 115	6.8	319 – 327	3.0
116 – 118	6.7	328 – 337	2.9
119 – 122	6.6	338 – 345	2.8
123 – 125	6.5	346 – 354	2.7
126 – 129	6.4	355 – 362	2.6
130 – 133	6.3	363 – 371	2.5
134 – 137	6.2	372 – 373	2.4
138 – 140	6.1	374 – 385	2.3
141 – 144	6.0	386 – 397	2.2
145 – 149	5.9	398 – 406	2.1
150 - 152	5.8	407 – 533	2.0
153 - 157	5.7	>=534	1.0
158 - 161	5.6		

FIGURE 1. LCMS w/ INERTIAL PROFILER

Defect Rating

The Defect Rating is determined by a manual review of forward and downward images produced by the LCMS. The rater imports previous year's distresses and then reviews previous distresses for changes and marks new distresses within each rated section by distress type and severity level using ICC Connect Software. Each of these values is weighted according to distress type and severity level and normalized per mile. All the weighted values are then combined in SQL 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.

Note: Approach and Departure Slabs on bridges are considered to be a part of the bridge structure and therefore should be excluded from the manual review of Rigid Pavement.

Surface Deterioration

Description: Progressive disintegration and loss of concrete wearing surface.

Explanation: This category is not typical but includes pop-outs, scaling and disintegration. If the distressed areas are small (less than 15% of the slab area) and are not severe (less than ¼ in 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 in (6.35 mm) to ½ in (12.7 mm) deep.

Severe - Most of the coarse aggregate is exposed and some has been removed. The wearing surface has disintegrated more than ½ in (12.7 mm) deep.

Measurement and computation of distress:

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

Both severity levels may be marked.

The information below describes how this defect deduct is calculated.

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

Spalling

Description: Breakdown or disintegration of slab edges at joints or cracks resulting in the loss of 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" (25.4 mm) to 3" (76.2 mm) wide.

Severe - Spalled areas are greater than 3" (76.2 mm) wide.

Measurement and computation of distress:

Spalling is measured and coded in linear feet for the rated section. Only record spalls that have a length of 1 foot or greater. If spalling occurs on both sides of a joint (but not cracks), count both occurrences independently.

Both severity levels may be marked.

The information below describes how this defect deduct is calculated.

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

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 has moderate distress of any type; no measurable faulting, and pumping is not evident.

Poor - The surface patch has a high severity distress of any type; a Fault Index of greater than or equal to 8 (i.e., 0.25 in); or evident pumping.

Measurement and computation of distress:

Patching is measured and coded in square yards for the rated section. If a patch has cracking then the patch should be considered poor and cracking will not be marked. Full depth slab replacements that are 6 feet long or greater and full width are not considered patches. Full depth slab replacements may also include a minimum length of 3 feet on both sides of a transverse joint that when combined is 6 feet or greater.

Both severity levels may be marked.

The information below describes how this defect deduct is calculated.

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

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

FIGURE 4. PATCHING

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 loss of load transfer across the cracked slab results in a more rapid rate of deterioration. If the cracks are hairline or closed 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 - Cracks less than ⅛ in (3.18 mm) wide that show no evidence of faulting, loss of aggregate interlock, or the intrusion of debris.

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

Severe - Cracks greater than ¼ in (6.35 mm) that show loss of aggregate interlock and the obvious intrusion of water and debris. Faulting and spalling may also occur. (See Note 1 below)

Measurement and computation of distress:

Transverse cracks are measured and coded by the number of cracks for the rated section. Only record cracks that are 1 foot long or greater. A concrete slab may have more than one transverse crack.

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 the severity levels may be marked.

The information below describes how this defect deduct is calculated.

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 properly through a rigid rehabilitation project, they must be rated as light severity level. Only when there is partial loss of the sealant can the crack be rated according to actual width.
2) Joints at replaced slabs will not be recorded as cracks.

FIGURE 5. TRANSVERSE CRACKING

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. If 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 - Cracks less than ⅛ in (3.18 mm) wide that show no evidence of faulting, loss of aggregate interlock or the intrusion of debris.

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

Severe - Cracks greater than ¼ in (6.35 mm) that show loss of aggregate interlock and the obvious intrusion of water and debris. Faulting and spalling may also occur. (See Note 1 below)

Measurement and computation of distress:

Longitudinal cracks are measured and coded by the number of cracks for the rated section. Only record cracks that are 1 foot long or greater. A concrete slab may have more than one longitudinal crack.

Any or all the severity levels may be marked.

The information below describes how this defect deduct is calculated.

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 properly through a rigid rehabilitation project, they must be rated as light severity level. Only when there is partial loss of the sealant can the crack be rated according to actual width.

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

FIGURE 6. LONGITUDINAL CRACKING

Corner Cracking

Description: A crack or break which intersects both the transverse and longitudinal joint at an angle of approximately 45 degrees from the centerline. The total length of the sides is from 1 foot to one-half the width of the slab on each side of the corner.

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

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

Severe - Cracks greater than ¼ in (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 the severity levels may be marked.

The information below describes how this defect deduct is calculated.

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 properly through a rigid rehabilitation project, they must be rated as light severity level. Only when there is partial loss of the sealant can the crack be rated according to actual width.

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

FIGURE 7. CORNER CRACKING

Shattered Slab

Description: A shattered slab is cracking or breaking up of the slab into four or more pieces.

Explanation: 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 - Slab is broken into pieces with some interlock remaining (cracks less than ¼ in or 6.35 mm) and repair is needed.

Severe - Slab is broken into pieces that are acting independently (cracks greater than ¼ in 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. Individual defects or cracks are not recorded. For example, if a slab contains one longitudinal and one transverse crack that divides 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.

Both severity levels may be marked.

The information below describes how this defect deduct is calculated.

Moderate distress - 1.15 per shattered slab
Severe distress - 1.50 per shattered slab

FIGURE 8. SHATTERED SLAB

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 ride quality. Faulting may be a 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 collected using the LCMS during the collection of the Ride Rating data. Fault measurements are made in the outside wheel path. Average faulting values for each rated section are calculated according to **AASHTO R 36 Method C** on all identified joints.

Areas on bridges 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)

Fault Index = 1.0 deduct point per 1/32 in (1.26mm).

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

FIGURE 9. FAULTING

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 its particles of small gravel, sand, clay or silt, resulting in progressively less pavement support.

Explanation: Pumping has been observed in older PCC pavements, especially where untreated bases and/or subgrades were utilized in areas of poor drainage. Pumping has been minimized in more recent PCC construction, where an asphalt base is used under the pavement. However, when it does occur, it is a serious type of distress and the negative impact is significant. Pumping occurs through 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 develops.

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 in or 3.18 mm - 1/4 in 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 in 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 marked.

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 1 in the column for Light severity level pumping.

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

SEVERITY	PERCENT	CODE	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

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:

Sealed – Used for new or rehabilitated concrete pavement, or any concrete pavement where the joint sealant is still performing properly, with no loss of adhesion or cohesion and no water entering the joint.

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 Joint Conditions are used to indicate the representative severity level and negative deduct value for the rated section.

Sealed – 0
Partially Sealed - 5
Not Sealed – 10

FIGURE 11. JOINT CONDITION

TABLE 4

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 defect data and any comments as well as any changes in mileposts or pavement type. Profiler data is imported into this electronic field workbook and once images have been manually reviewed LCMS data is imported into the completed workbook. The Rigid Pavement Condition Survey Field Workbook is then merged into the Flexible Pavement Condition Survey Field Workbook. They are uploaded together from the Flexible Pavement Condition Survey Field Workbook into the SQL database. The information on pages 36 and 38 describes each data column on the Rigid Pavement Condition Survey Field Workbook.

FIELD RATING FORM FOR RIGID PAVEMENT CONDITION SURVEY

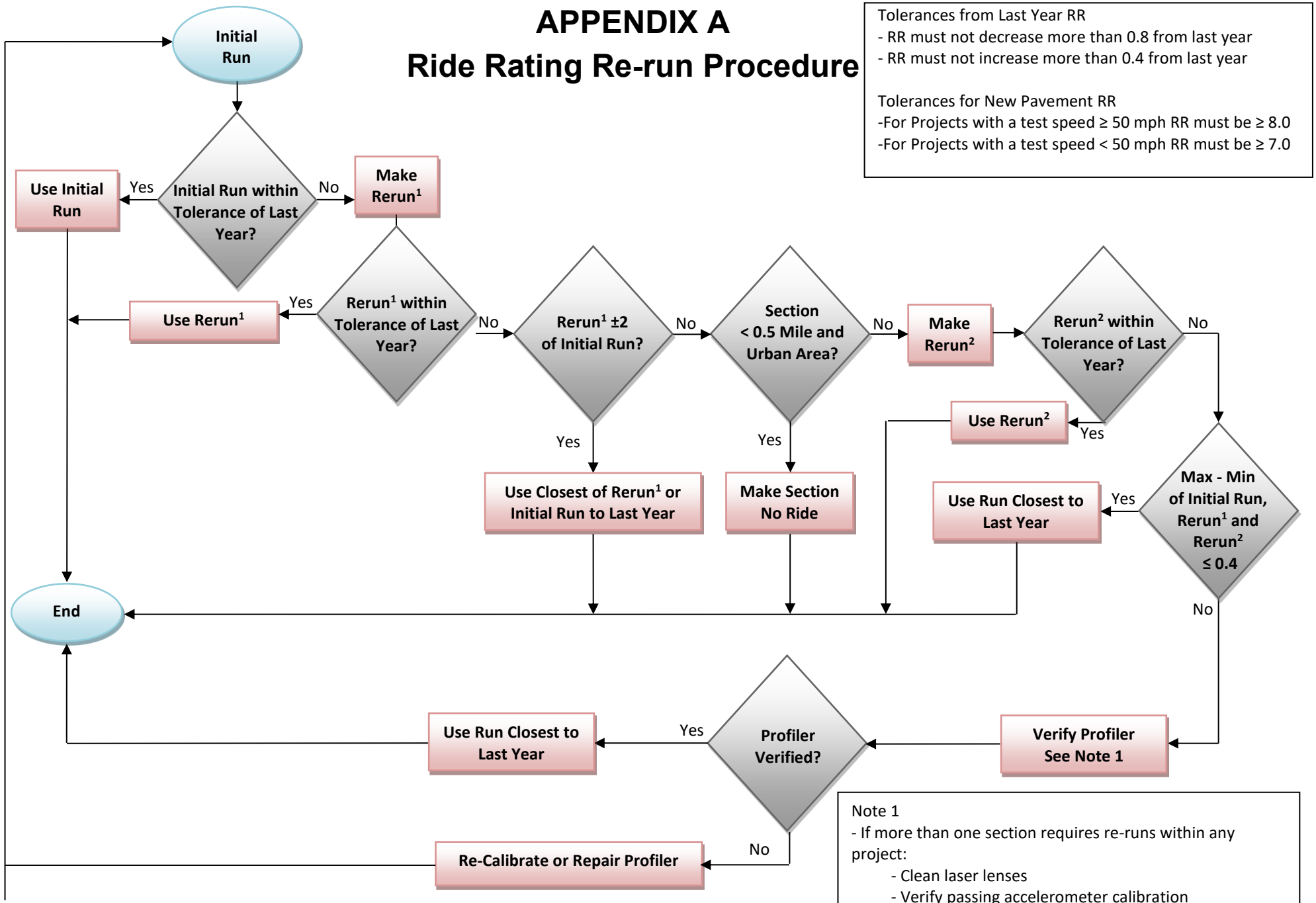
COLUMN TITLE	DESCRIPTION
TEST DATE	**Date Section Tested (Imported from Data)**
CNTY	**County number**
SEC	**State Roadway County Section Number**
SUB SEC	**State Roadway County Subsection Number**
SR	**State Road Number** **Example: 0008; 0369** **NOTE: First Digit indicates:** **1 - Alternate** **2 - Business** **Example: 1008 or 2369**
US	**US Road Number** **Example: 0027; 0301** **NOTE: First Digit indicates:** **1 - Alternate** **2 - Business** **Example: 1027; 2301**
RDWY	**Roadway Code**
TYPE	**Pavement Type**
BMP	**Beginning Milepost of the rated section.**
EMP	**Ending Milepost of the rated section.**
SPEED	**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**
LANES	**Number of Travel Lanes**
RATED LANE	**Rated Lane**
REMARKS	**Entered using Toolbar "Remarks" button, select from list of Standard Remarks.**
COMMENTS	**Comments from Technician or Office Staff**
NET LENGTH	**Net Length of Section**
IRI	**IRI value from Data**
RN	**RN from Data**
RERUN	**Was Rerun Used?**
SURFACE TYPE	**Surface Type**
UNIT	**Unit Code**

COLUMN TITLE	DESCRIPTION
RATER 1	Rater 1 Code
RATER 2	Rater 2 Code
SYS	System code 1 - Primary 2 - Secondary 3 - Toll 4 - Interstate 5 - Turnpike

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										

APPENDIX A
Ride Rating Re-run Procedure



Tolerances from Last Year RR
- RR must not decrease more than 0.8 from last year
- RR must not increase more than 0.4 from last year

Tolerances for New Pavement RR
-For Projects with a test speed ≥ 50 mph RR must be ≥ 8.0
-For Projects with a test speed < 50 mph RR must be ≥ 7.0

Note 1
- If more than one section requires re-runs within any project:
  - Clean laser lenses
  - Verify passing accelerometer calibration
  - Verify profiler by re-evaluating project collected earlier that was accurate based upon last year's data.