Florida Department of Transportation

# 2017 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 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 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. Structures in excess of 0.25 mile.
6. Flexible pavement in excess of 0.50 mile within a rigid pavement section.
7. Changes in the number of lanes (2 to 3 lanes, etc.)

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. 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 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 state-maintained sections and have been rated under another county section number.

### Pavement Improvement (Type 2)

Type 2 is for sections that have been partially rehabilitated or modified in an effort 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 were made.

### 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 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 code must change, usually to 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 cross streets with signalized intersections and radical intersecting profiles. Collect profiler data, but do not report Ride Ratings for these sections. Profiler data is used only for processing fault index.

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.

### 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. 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 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 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.

### 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. Defect and Ride Ratings must not be reported for any structure.

Mileposts recorded for structures and exceptions must come from SLD or RCI whenever possible, not from distance-measuring instrument. This allows for data cross checks with RCI feature code 258.

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.

Type 9 is also used to record pavement sections that have been added to the state-maintained system since the PCS was completed. This allows the mileage to be included in the survey and serves as a reminder for the rater to rate the section the next year. When Type 9 is used in these instances always code the number of lanes and Remarks containing ADD in xx, where xx = year of next survey.

## 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 total number of lanes must agree with RCI feature code 212 (Thru Lanes).

### Rated Lane

The lane having the worst pavement condition shall be rated for the direction being tested. It is coded in the Rated Lane 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 column above indicates an automated remark (based upon an entry in another field).
**Note[2]:** Bridge number must be entered as a 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 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.

# 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 14). 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 (page 13) to convert IRI values to Ride Rating.

RN is also a mathematical processing of the longitudinal profile measurements. RN is an estimate of subjective ride quality (ASTM Standard E1489) and 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 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 of the previous year's survey. For sections of New Pavement 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 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.

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. 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 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, 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" (12.7 mm) deep.

Severe - Most of the coarse aggregate is exposed and some has been removed. The wearing surface has disintegrated more than ½" (12.7 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 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 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 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 inch); 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 both the patching and cracking should be counted. 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 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).


**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 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" (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. 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 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. 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" (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. Only record cracks that are 1 foot long or greater. A concrete slab may have more than one longitudinal crack.

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 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" (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: 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" or 6.35 mm) and repair is needed.

Severe - 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. Individual cracks are not recorded. For example, 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.

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 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 normally collected using a laser profiler 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 36-04 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 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 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 <u>percent within the rated section</u>.

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 |

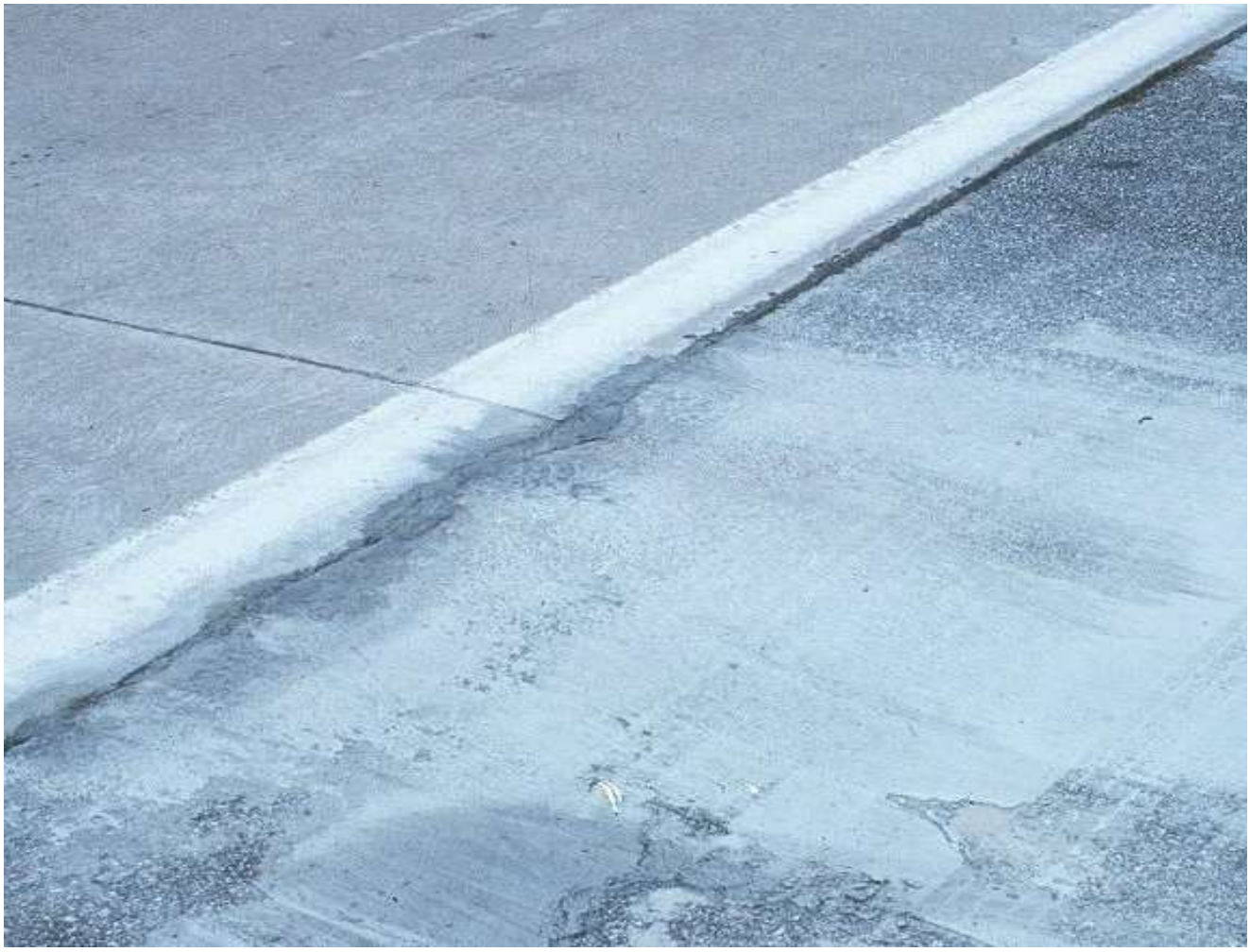

**FIGURE 10. PUMPING**

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 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 then the completed workbook is uploaded to 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 (page 43) |
| SEC | State Roadway County Section Number |
| SUB | State Roadway County Subsection Number |
| SR | State Road Number<br>Example: 0008; 0369 |
| US | US Road Number<br>Example: 0027; 0301 |
| SYS | System code<br>1 - Primary 2 - Secondary<br>3 - Toll 4 - Interstate<br>5 - Turnpike |
| RDWY | Roadway direction (page 4) |
| TYPE | Pavement Type (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:<br>3 - 30 mph 4 - 40 mph<br>5 - 50 mph 6 - 60 mph |
| LN | Number of through Travel Lanes (page 7) |
| RL | Rated Lane (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 per rated section |
| TRANSVERSE CRACKING (page 22) | Light | - | Total Number of Cracks |
| | Moderate | - | Total Number of Cracks |
| | Severe | - | Total Number of Cracks |
| LONGITUDINAL CRACKING (page 25) | Light | - | Total Number of Cracks |
| | Moderate | - | Total Number of Cracks |
| | Severe | - | Total Number of Cracks |
| SPALLING (page 18) | Moderate | - | Total Linear Feet |
| | Severe | - | Total Linear Feet |
| CORNER CRACKING (page 28) | Light | - | Total Number of Cracks |
| | Moderate | - | Total Number of Cracks |
| | Severe | - | Total Number of Cracks |
| PATCHING (page 20) | Fair | - | Total Square Yards |
| | Poor | - | Total Square Yards |
| SHATTERED SLABS (page 31) | Moderate | - | Total Number of Shattered Slabs |
| | Severe | - | Total Number of Shattered Slabs |
| SURFACE DETERIORATION (page 16) | Moderate | - | Total Square Feet |
| | Severe | - | Total Square Feet |
| PUMPING (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 (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 in Table 2 (page 8) to record 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 rater in future surveys. (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

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

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 |

## RIGID PAVEMENT CONDITION SURVEY

## AREA FLAT FILE

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

Note: **xx** = Year of Survey

Data is coded in accordance with the following layout:

### LINE NUMBER 2 (continued)

| 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 |

## 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

**Continued**

| 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 2 OF OUTPUT) | |
| 119-122 | A) MODERATE (SQ. FT / MILE) | 4 |
| 123-126 | B) SEVERE (SQ. FT. / MILE) | 4 |
| | SPALLING (LINE 2 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 |

## 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

**Continued**

| COLUMN | DESCRIPTION | LENGTH |
|---|---|---|
| | 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 | B) SEVERE | 1 |
| | 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 |

## 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

**Continued**

| COLUMN | DESCRIPTION | LENGTH |
|---|---|---|
| | 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 |
| 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 |
| | PATCHING (LINE 3 OF OUTPUT) | |
| 302-305 | A) FAIR (NEGATIVE DEDUCT VALUE) | 4 |
| 306-309 | B) POOR (NEGATIVE DEDUCT VALUE) | 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 |

## 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

**Continued**

| COLUMN | DESCRIPTION | LENGTH |
|---|---|---|
| 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

(See page 12 for tolerances)