



**FIGURE 15. MANUAL RUT DEPTH**

## 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 16 (page 34). Longitudinal profile data are collected at the smallest sample interval possible, usually less than one inch. The data is then processed using a profile distance of 6 inches, a moving average of 12 inches, and 300 foot wavelength filtering. The longitudinal profile data is used to calculate Ride Number (RN) and International Ride Index (IRI).

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

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

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

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

Where:   RN=       =       Ride Number (0 to 5 scale)  
          RR<sub>10</sub>   =       Ride Rating (0 to 10 scale)  
          RR<sub>100</sub> =       Ride Rating (0 to 100 scale)

Ride Rating on a scale of 0 to 100 is calculated from Ride Number primarily for use by the rater while in the field. When Ride Number is inputted into the database, it is then used to determine Ride Rating on a 0 to 10 scale. A Ride Rating of 10 indicates a pavement that is perfectly smooth. This value of 10 is only hypothetical and not achievable.

IRI is also a mathematical processing of the longitudinal profile generated by the profiler. IRI is a standard practice for computing and reporting road roughness (ASTM E1926). IRI is reported in units of inches per mile (in/mi) and is scaled with 0 being the

smoothest and the upper limit being infinite. IRI is reported to the Federal Highway Administration (FHWA) annually. IRI is reported as the average of the left and right wheel paths. IRI data for each individual wheel path may be reported upon request.

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

1. Ride Rating Check: The Ride Rating (RR<sub>100</sub>) should be within minus (-) eight (8) and plus (+) four (4) points of the previous year's survey. When RR<sub>100</sub> is determined to be out of tolerance, rerun the section in accordance with Appendix B
2. Braking abruptly or accelerating rapidly (greater than 3 mph per second) produces invalid data. If this occurs the section must be re-tested.
3. Moisture on the surface of the pavement may affect the signal being returned from the sensor, causing invalid data. Do not test if pavement is wet.

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

Use the following table to determine which situations to exclude from or include in profiler data.

Excluded from Ride Rating (Hold Out)	Included in Ride Rating (Leave In)
<p align="center"><b>Bridges, railroad crossings, speed attenuating devices (Rumble Strips), and Rigid Intersections</b></p>	<p align="center"><b>All Crosswalks, manholes, intersections and raised lettering</b></p>





**FIGURE 16. INERTIAL PROFILER**

## **IV. Flexible Pavement Condition Survey Field Workbook**

The Flexible Pavement Condition Survey Field Workbook is used by the rater in the field to record cracking data and any comments as well as any changes in mileposts or pavement type. Profiler data (Ride and Rut) are imported into this electronic field workbook then all defects are uploaded to the database. The information on pages 36 through 37 describes each data column on the Flexible Pavement Condition Survey Field Workbook.

## FIELD RATING FORM FOR FLEXIBLE PAVEMENT CONDITION SURVEY

COLUMN TITLE	DESCRIPTION
CNTY	<u>County</u> number (see page 37)
SEC	State Roadway County <u>Section</u> Number
SUB SEC	State Roadway County <u>Subsection</u> Number
SR	<u>State Road Number</u> Example: 0008; 0369 NOTE: First Digit indicates: 1 - Alternate 2 - Business Example: 1008 or 2369
US	<u>US Road Number</u> Example: 0027; 0301 NOTE: First Digit indicates: 1 - Alternate 2 - Business Example: 1027; 2301
SYS	<u>System</u> Code  1 - Primary                      2 - Secondary 3 - Toll                            4 - Interstate 5 - Turnpike
RDWY	<u>Roadway</u> direction (see pages 3 & 4)
TYPE	<u>Pavement Type</u> (see pages 5 to 7)
BMP	<u>Beginning Milepost</u> of the rated section.
EMP	<u>Ending Milepost</u> of the rated section.
LANES	Travel <u>Lanes</u> (see pages 7 & 8)
RATED LANE	Rated Lane (see page 8)
CW	Cracking <u>Confined to the wheel path</u> . See pages 13 to 19.
CO	Cracking <u>out of the wheel path</u> . See pages 13 to 19.
LT RAV	<u>Light Raveling</u> (see pages 12)
MD RAV	<u>Moderate Raveling</u> (see pages 12)
SV RAV	<u>Severe Raveling</u> (see pages 12)
MAN RUT	<u>Manual Rut Depth</u> (see pages 28 to 31)
PT	<u>Patching</u> (see page 13)
CRK TYPE	<u>Crack Type</u> (see page 14)
VER	<u>Verification</u> results (see page 8)
COMBINED REMARKS	Comments about the section of pavement (see pages 8 & 9)

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**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

## Computer Use for Pavement Condition Survey Data

### FLEXIBLE PAVEMENT CONDITION SURVEY AREA COMBINED FILE

Completed field data is stored in 'D5580954.FLEXxx.AREACOMB'

Note: xx = Year of Survey

Data is coded by columns in the following order:

COL.	DESCRIPTION	LENGTH
1	BLANK (NOT USED)	1
2-3	MONTH	2
4-5	YEAR	2
6	BLANK (NOT USED)	1
7	UNIT NUMBER	1
8-9	COUNTY	2
10-12	SECTION	3
13-15	SUB-SECTION	3
16-19	STATE ROAD NUMBER	4
20-23	U.S. ROAD NUMBER	4
24	SYSTEM	1
25	ROADWAY	1
26	TYPE	1
27-31	BEGINNING MILEPOST	5
32-36	ENDING MILEPOST	5
37-41	NET LENGTH	5
42	CRACKING CODE (CW)	1
43	CRACKING CODE (CO)	1
44-47	PROFILER RUT DEPTH	4

COL.	DESCRIPTION	LENGTH
48	SPEED	1
49	RAVELING - LIGHT	1
50	RAVELING - MODERATE	1
51	RAVELING - SEVERE	1
52-54	IRI AVERAGE	3
55-56	NUMBER OF LANES	2
57-58	PROFILER RUT DEDUCT	2
59-60	MANUAL RUT	2
61	PATCHING	1
62	CRACKING TYPE CODE	1
63	VERIFICATION CODE	1
64-80	REMARKS	17
81-84	RN AVERAGE	4
85	RATER 1	1
86	RATER 2	1
87-101	BLANK (NOT USED)	15
102-103	RATED LANE	2
104	BLANK (NOT USED)	1
105-115	FIN NUMBER	11

**FLEXIBLE PAVEMENT CONDITION SURVEY  
PERMANENT FLAT FILE**

The permanent file is stored in '**D5580954.FLEXxx.DATA**'

Note: xx = Year of Survey

Data is coded by columns in the following order:

COL.	DESCRIPTION	LENGTH
1-2	MONTH	2
3-4	YEAR	2
5	BLANK (NOT USED)	1
6	DISTRICT	1
7-8	COUNTY	2
9-11	SECTION	3
12-14	SUB-SECTION	3
15-18	STATE ROAD NUMBER	4
19-22	U.S. ROAD NUMBER	4
23	SYSTEM	1
24	ROADWAY	1
25	TYPE	1
26-31	BEGINNING MILEPOST	6
32-37	ENDING MILEPOST	6
38-43	NET LENGTH	6
44-46	CRACKING DEDUCT (CW)	3
47-49	CRACKING DEDUCT (CO)	3
50-51	SPEED	2
52	RATER 1	1
58-59	NUMBER OF LANES	2
60-63	PROFILER RUT DEPTH	4
64-65	PROFILER RUT DEDUCT	2

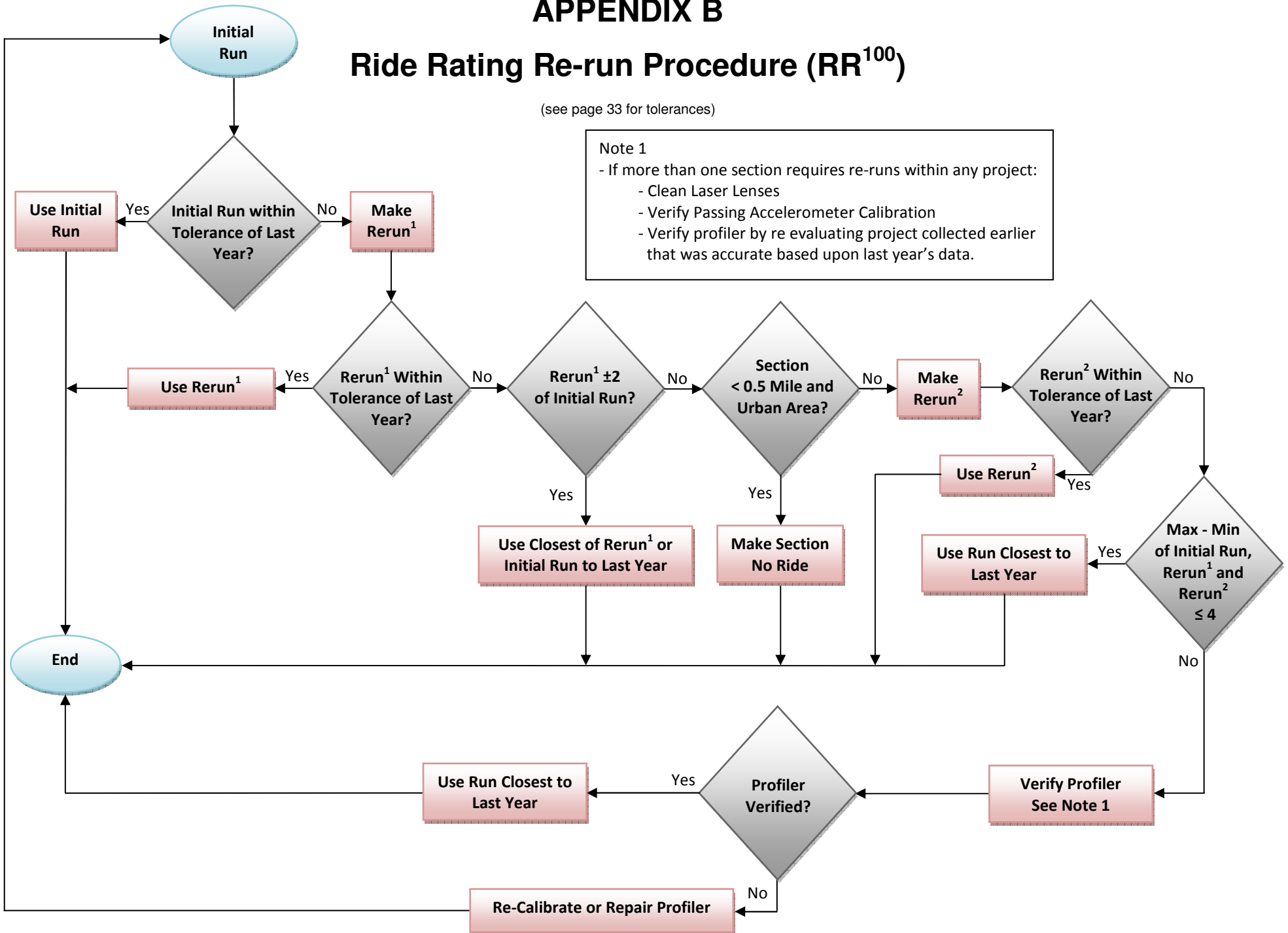
COL.	DESCRIPTION	LENGTH
66-67	MANUAL RUT DEDUCT	2
68	RAVELING - LIGHT	1
69	RAVELING - MODERATE	1
70	RAVELING - SEVERE	1
71	PATCHING	1
72	BLANK (NOT USED)	1
73-75	RIDE RATING (NO DECIMAL GIVEN)	3
76-79	CRACK RATING	4
80-81	RUT RATING	2
82-85	RN AVERAGE	4
86	UNIT NUMBER	1
87	CRACKING CODE (CW)	1
88	BLANK (NOT USED)	1
89	CRACKING CODE (CO)	1
90-91	BLANK (NOT USED)	2
92	CRACKING TYPE CODE	1
93-109	REMARKS	17
110	VERIFICATION CODE	1
111-124	BLANK (NOT USED)	14
125-126	RATED LANE	2
127	BLANK (NOT USED)	1
128-138	FIN NUMBER	11

# APPENDIX B

## Ride Rating Re-run Procedure (RR<sup>100</sup>)

(see page 33 for tolerances)

**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.





# **APPENDIX C**

## **Profiler Calibration Instructions**

Calibration of Profiler: The following calibration procedures are required on all profilers.

- Step 1: Check tire pressure and adjust to manufacturer recommended pressure if necessary.
- Step 2: Prior to calibration, assure unit (vehicle and equipment) is warmed up (between 15 to 30 minutes).
- Step 3: Run electronic straightedge calibration to ensure sensors' alignment accuracy every thirty days, when replacing sensor, or when data is suspect. This must be accomplished in conjunction with steps 4 and 5.
- Step 4: Run block verification every thirty days, when replacing sensor, or when data is suspect to ensure sensors are measuring distance to pavement surface correctly. This must be done in conjunction with steps 3 and 5.
- Step 5: Run section calibration to ensure accurate calculation of IRI and RN every thirty days, when replacing sensor, or when data is suspect. This must be accomplished in conjunction with steps 3 and 4.
- Step 6: Run distance measuring instrument (DMI) calibration every thirty days and/or when tires are replaced. This is done independently from other calibrations.
- Step 7: Accelerometer calibration must be done each time the Profiler is turned on and after the system has warmed up for at least 15 minutes. The vehicle must be on a level section of pavement. Anyone who is going to be in vehicle while testing must be in vehicle while the accelerometer calibration is performed. After calibration is done the new accelerometer values must be accepted.