

EAR
Workshop

***FDOT Pavement
Performance***

PAVEMENT CONDITION SURVEY UNIT



PAVEMENT MATERIALS SECTION

PAVEMENT CONDITION SURVEY

- ANNUAL SURVEY OF THE STATE HIGHWAY SYSTEM TO EVALUATE THE CONDITION OF THE WEARING SURFACE
- ANNUAL RIDE SURVEY OF HIGHWAY PERFORMANCE MONITORING SYSTEM (HPMS)

2004 – 2005 PAVEMENT CONDITION SURVEY STATE MAINTAINED SYSTEM

	RATED MILES	LANE MILES
FLEXIBLE	18,159	40,381
RIGID	363	976
TOTAL	18,522	41,357

PCS DATA COLLECTION

- DETERMINE PRESENT CONDITION
- COMPARE PRESENT WITH PAST CONDITION
- PREDICT DETERIORATION RATES

PCS DATA COLLECTION

- PREDICT FUNDING NEEDS
- JUSTIFY STATEWIDE ANNUAL BUDGET REQUEST FOR REHABILITATION
- BASIS FOR DISTRICTS' PROJECT REHABILITATION FUNDING

FLEXIBLE PAVEMENT SURVEY

- RIDE
 - AUTOMATED
- RUTTING
 - AUTOMATED
 - MANUAL
- CRACKING (PLUS PATCHING AND RAVELING)
 - WINDSHIELD SURVEY

RIDE & RUT DATA

- HIGH SPEED PROFILER
Class 1 by ASTM E-950

RIDE QUALITY INDEX

- RN - ASTM E-1489

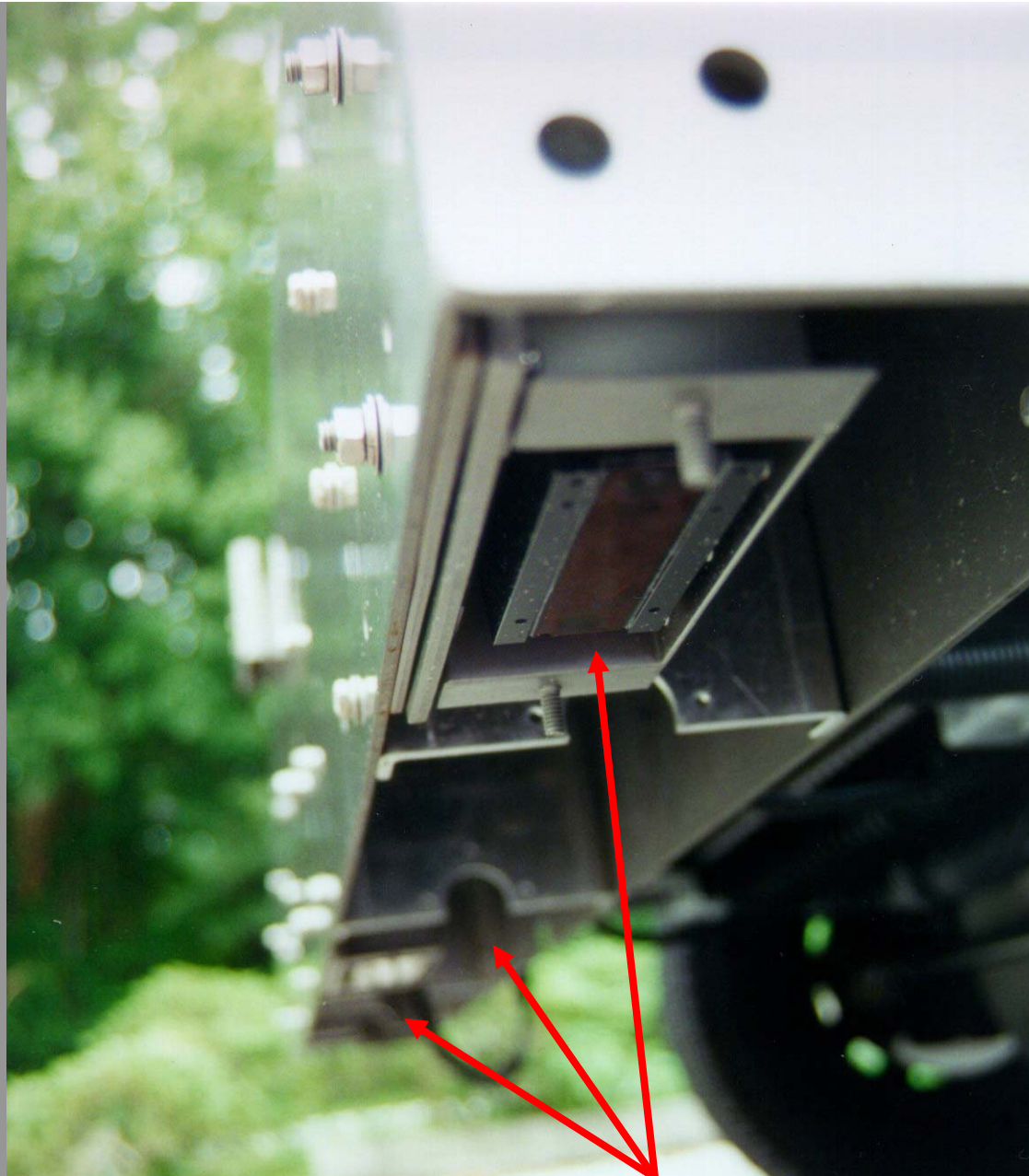
Used For Pavement Management System
and For Ride Acceptance Testing On New
Projects

- IRI - ASTM E-1926

Used For HPMS Monitoring

LASER PROFILER

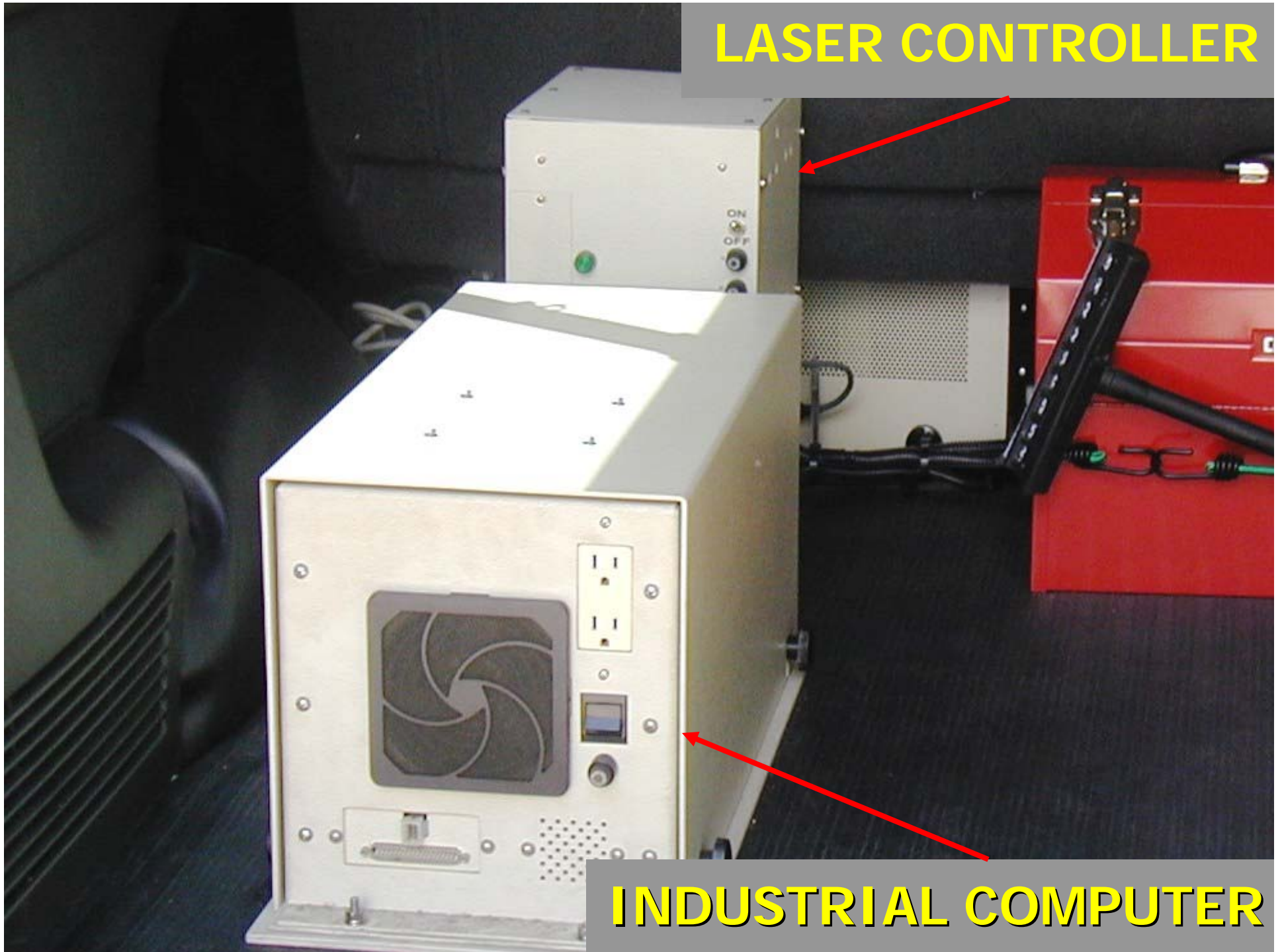




LASER SENSORS

LASER CONTROLLER

INDUSTRIAL COMPUTER



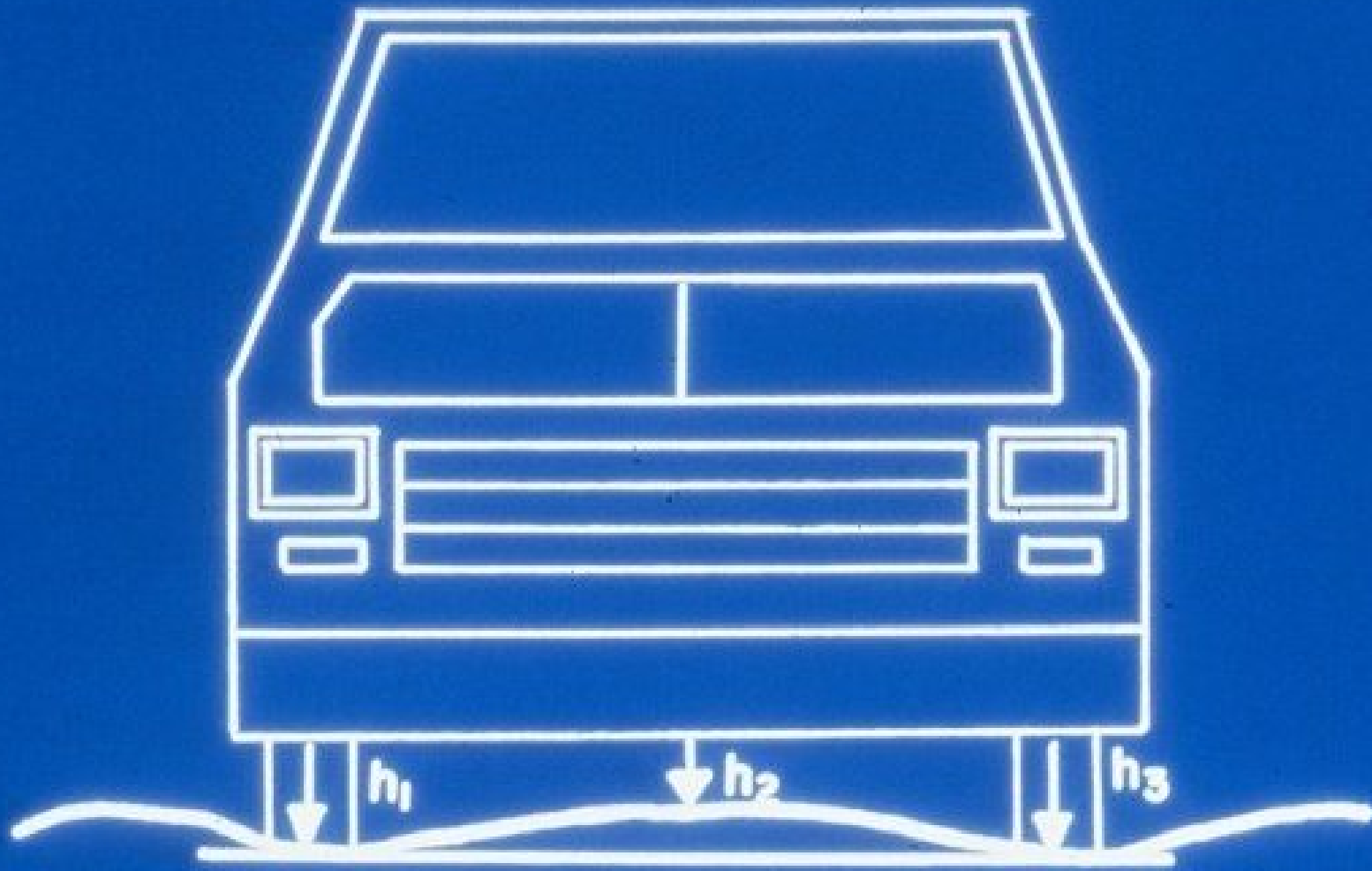


OPERATOR CONSOLE



We Measure Ruts With Precision

Using a Road Profiler



PROFILER RUTTING DEDUCT POINTS

Rut Depth (inches)	Range (inches)	Deduct Points
0	0.00 - 0.06	0
1/8	0.07 - 0.19	1
1/4	0.20 - 0.31	2
3/8	0.32 - 0.44	3
1/2	0.45 - 0.56	4
5/8	0.57 - 0.69	5
3/4	0.70 - 0.81	6
7/8	0.82 - 0.94	7
1	0.95 - 1.06	8
1 1/8	1.07 - 1.19	9
1 1/4 +	1.20 +	10



MANUAL RUT DEPTH

MANUAL RUTTING DEDUCT POINTS

Rut Depth (inches)	Deduct Points
0	0
1/8	1
1/4	2
3/8	3
1/2	4
5/8	5
3/4	6
7/8	7
1	8
1 1/8	9
1 1/4 +	10



CLASS 1B CRACKING



HAIRLINE CRACKS \leq 1/8 INCH (3.18 mm).

CLASS 1B CRACKING



MAY HAVE SLIGHT SPALLING AND SLIGHT TO MODERATE BRANCHING.

CLASS II CRACKING



CRACKS $>1/8$ INCH (3.18 mm) TO $\leq 1/4$ INCH (6.35 mm)
WHICH MAY HAVE SPALLING OR BRANCHING

CLASS II CRACKING



CRACKS LESS THAN 1/4 INCH (6.35 mm) WIDE WHICH HAVE FORMED CELLS LESS THAN 2 FEET (0.61 m) ON THE LONGEST SIDE (ALLIGATOR CRACKING).

CLASS III CRACKING



**CRACKS >1/4 INCH (6.35 mm) REACHING DOWN TO THE
BASE OR UNDERLYING MATERIAL**

CLASS III CRACKING



PROGRESSIVE CLASS II CRACKING RESULTING IN SEVERE SPALLING WITH CHUNKS OF PAVEMENT BREAKING OUT, AND SEVERE RAVELING (LOSS OF SURFACE AND

SEVERE RAVELING (LOSS OF SURFACE AGGREGATE).

RAVELING



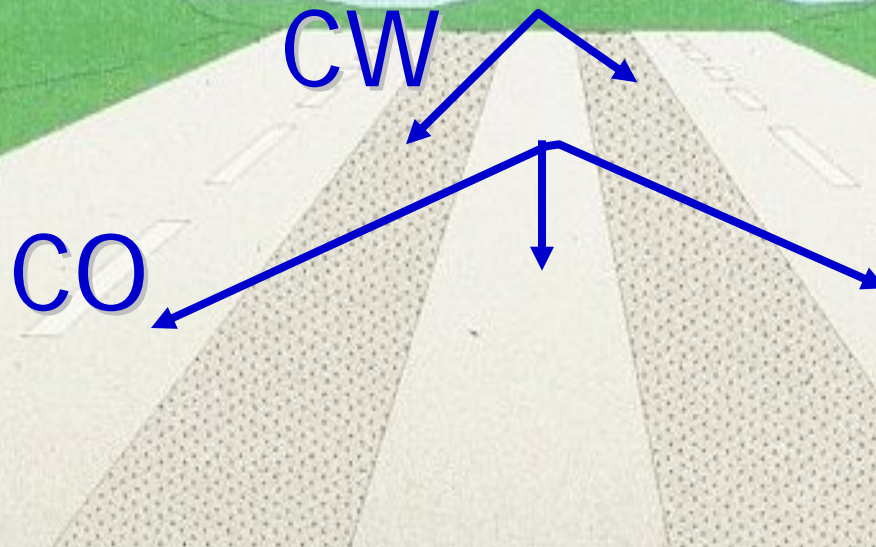
THE DISLODGING OF AGGREGATE PARTICLES AND LOSS OF ASPHALT BINDER.

PATCHING



PORTION OF PAVEMENT SURFACE > 0.1 SQ. FT THAT HAS BEEN REMOVED AND REPLACED.

WHEEL PATH AREAS



CONFINED TO THE WHEEL PATHS (CW)

% of PVT Area affected by Cracking	PREDOMINATE CRACKING CLASS					
	IB CRACKING		II CRACKING		III CRACKING	
	CODE	DEDUCT	CODE	DEDUCT	CODE	DEDUCT
00-05	A	0.0	E	0.5	I	1.0
06-25	B	1.0	F	2.0	J	2.5
26-50	C	2.0	G	3.0	K	4.5
51 +	D	3.5	H	5.0	L	7.0

OUTSIDE THE WHEEL PATHS (CO)

% of PVT Area affected by Cracking	PREDOMINATE CRACKING CLASS					
	IB CRACKING		II CRACKING		III CRACKING	
	CODE	DEDUCT	CODE	DEDUCT	CODE	DEDUCT
00-05	A	0.0	E	0.0	I	0.0
06-25	B	0.5	F	1.0	J	1.0
26-50	C	1.0	G	1.5	K	2.0
51 +	D	1.5	H	2.0	L	3.0

NOTES FOR CW & CO WHEEL PATHS

- PERCENTAGES FOR CW AND CO ARE ESTIMATED SEPARATELY. EACH REPRESENTING 100% OF ITS RESPECTIVE AREA.
- CRACKING PERCENTAGES ARE COMBINED BUT ONLY THE PREDOMINATE TYPE OF CRACKING PRESENT WILL BE CODED
- CRACKING DEFECT RATING = $10 - (CW + CO)$.

```

+FSEDIT MYLIB.FPCS99A-----OBS 1500 -+
| COMMAND ==>
|
| MONTH:          ___ YEAR:          ___
| UNIT:           1
| DISTRICT:       5 COUNTY:           92
| SECTION:        090 SUB SECTION:    000
| STATE ROAD:     0530 US ROAD:       0192
| SYSTEM:         1 ROADWAY:          3
| TYPE:           1
| BMP:            12.759 EMP:           13.874
| NET LENGTH:     _____
| CW:             - CO:                -
| LASER RUT:      _____ SPEED:      -
| LT RAVEL:       - MD RAVEL:         -
| SV RAVEL:       -
| IRI:            _____ RN:         _____
| LANES:          3 MANUAL RUT:        _____
| PATCHING:       - CRKTYPE:          -
| REMARKS:        _____ VERIFY:     -
|
+-----+

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Flexible Pavement Condition Survey Data Entry Screen

RIGID PAVEMENT SURVEY

- RIDE RATING
- DEFECT RATING

DISTRESS FACTORS IN DEFECT RATING

- 1) Surface Deterioration
- 2) Spalling
- 3) Patching
- 4) Transverse Cracking
- 5) Longitudinal Cracking
- 6) Corner Cracking
- 7) Shattered Slab
- 8) Faulting
- 9) Pumping
- 10) Joint Condition

SURFACE DETERIORATION



SPALLING



PATCHING



TRANSVERSE CRACKING



LONGITUDINAL CRACKING



CORNER CRACKING



SHATTERED SLAB



FAULTING



FAULTING



PUMPING



JOINT CONDITION



DEDUCT VALUES FOR RIGID PAVEMENT

TYPE OF DISTRESS	SEVERITY	NUMERIC VALUE
Surface Deterioration	Moderate	0.003 per square foot
	Severe	0.006 per square foot
Spalling	Moderate	0.01 per linear foot
	Severe	0.02 per linear foot
Patching	Fair	0.018 per square yard
	Poor	0.045 per square yard
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

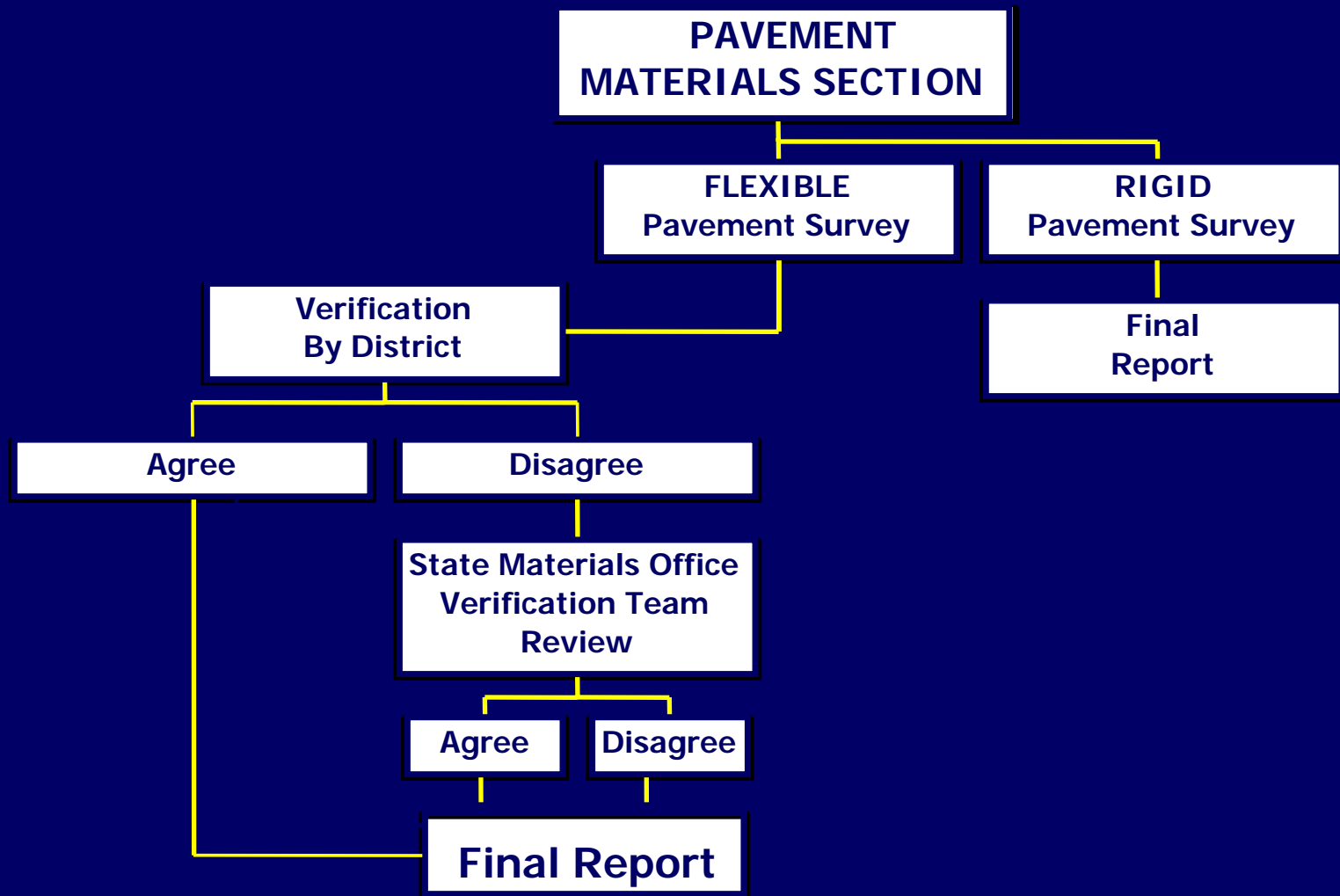
DEDUCT VALUES FOR RIGID PAVEMENT

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

DATA QUALITY CHECKS

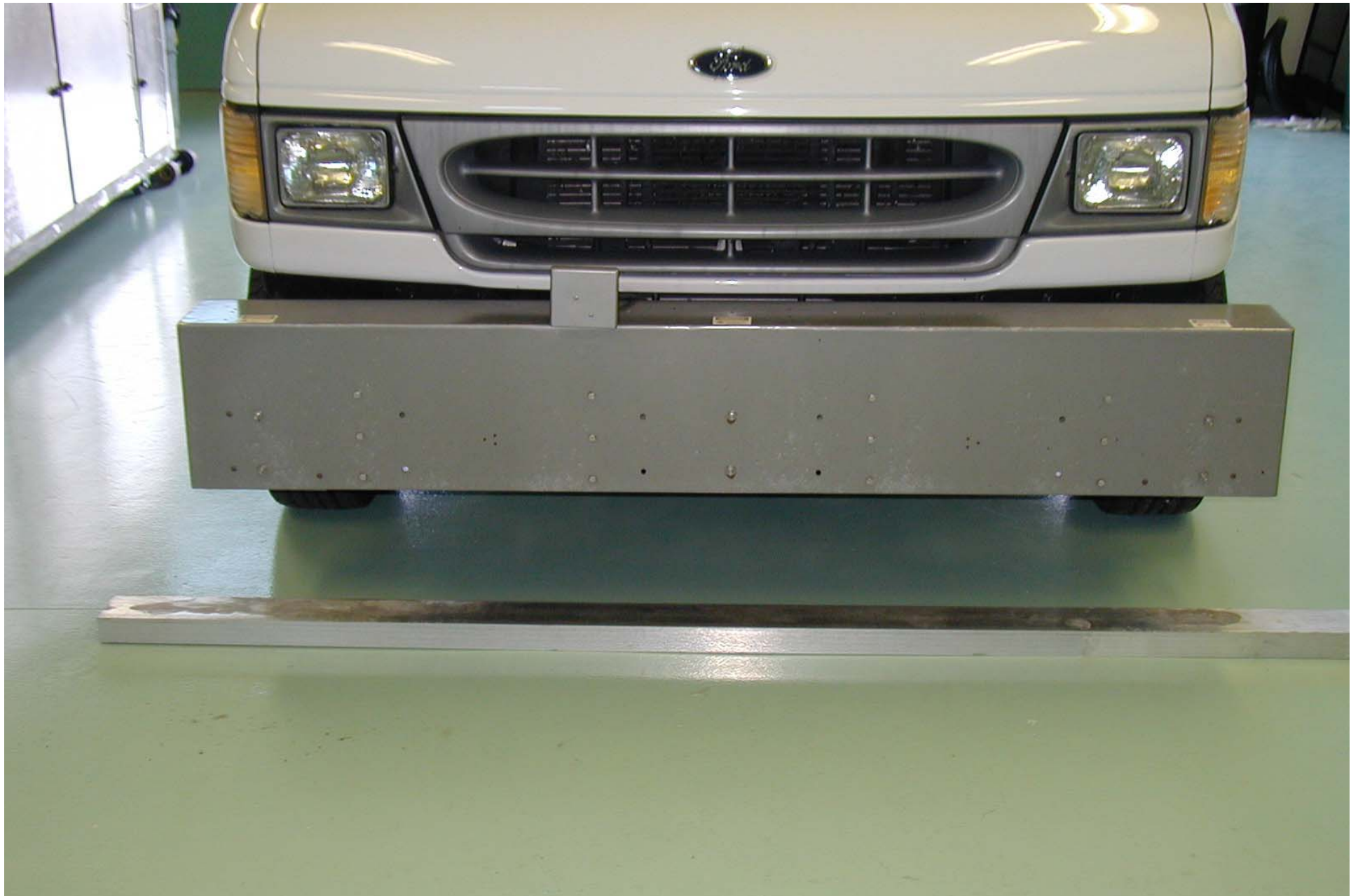
- 150 + EDITS ON CODING ENTRIES
- YEAR TO YEAR COMPARE
- RCI EDIT CHECK

PCS VERIFICATION PROCESS



CALIBRATION

- PROFILERS RECEIVE ELABORATE CALIBRATION
- STRAIGHTEDGE CALIBRATION
- PLATE CALIBRATION
- SECTION CALIBRATION WITH DIPSTICK



STRAIGHTEDGE CALIBRATION

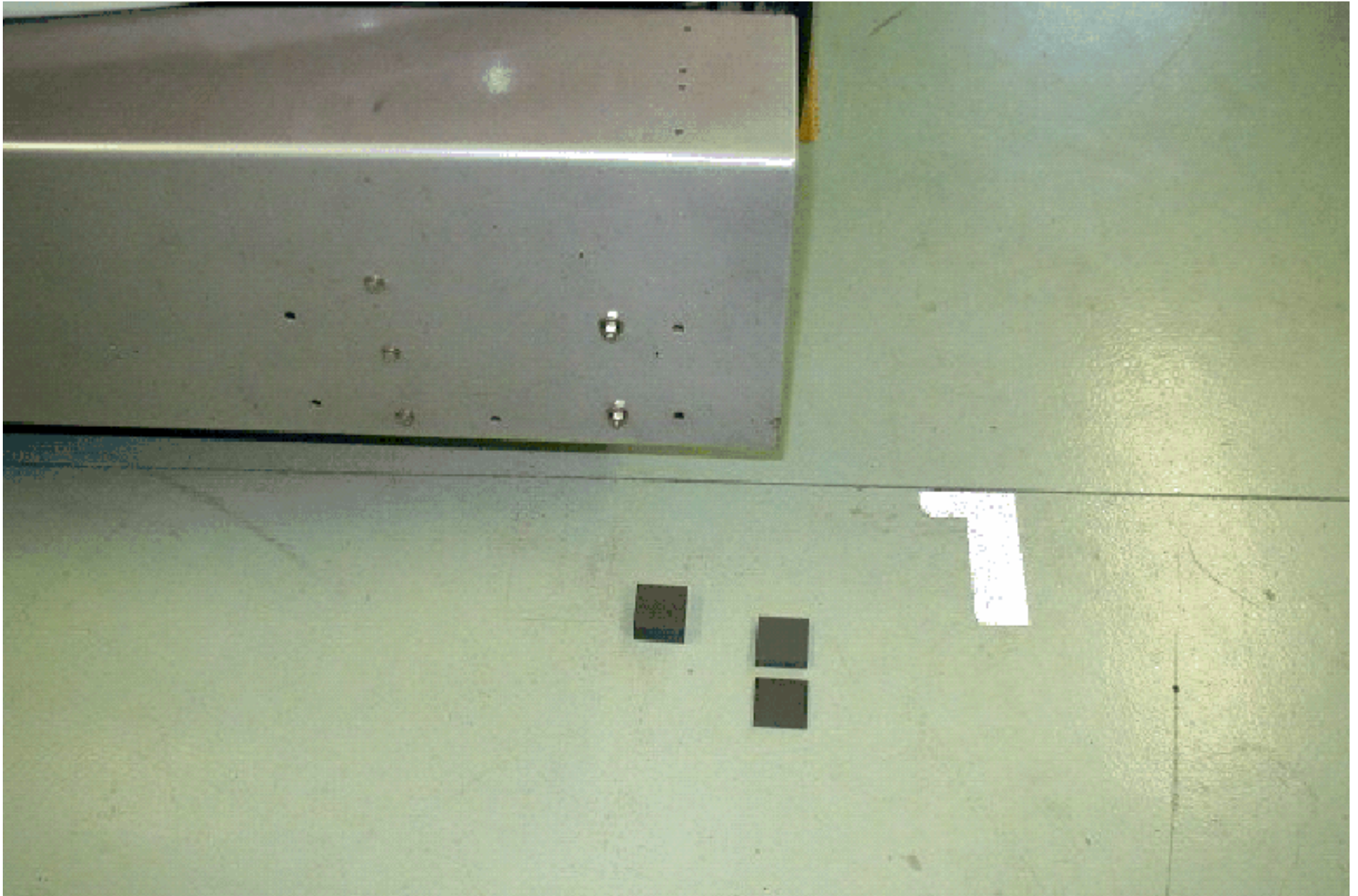


PLATE CALIBRATION

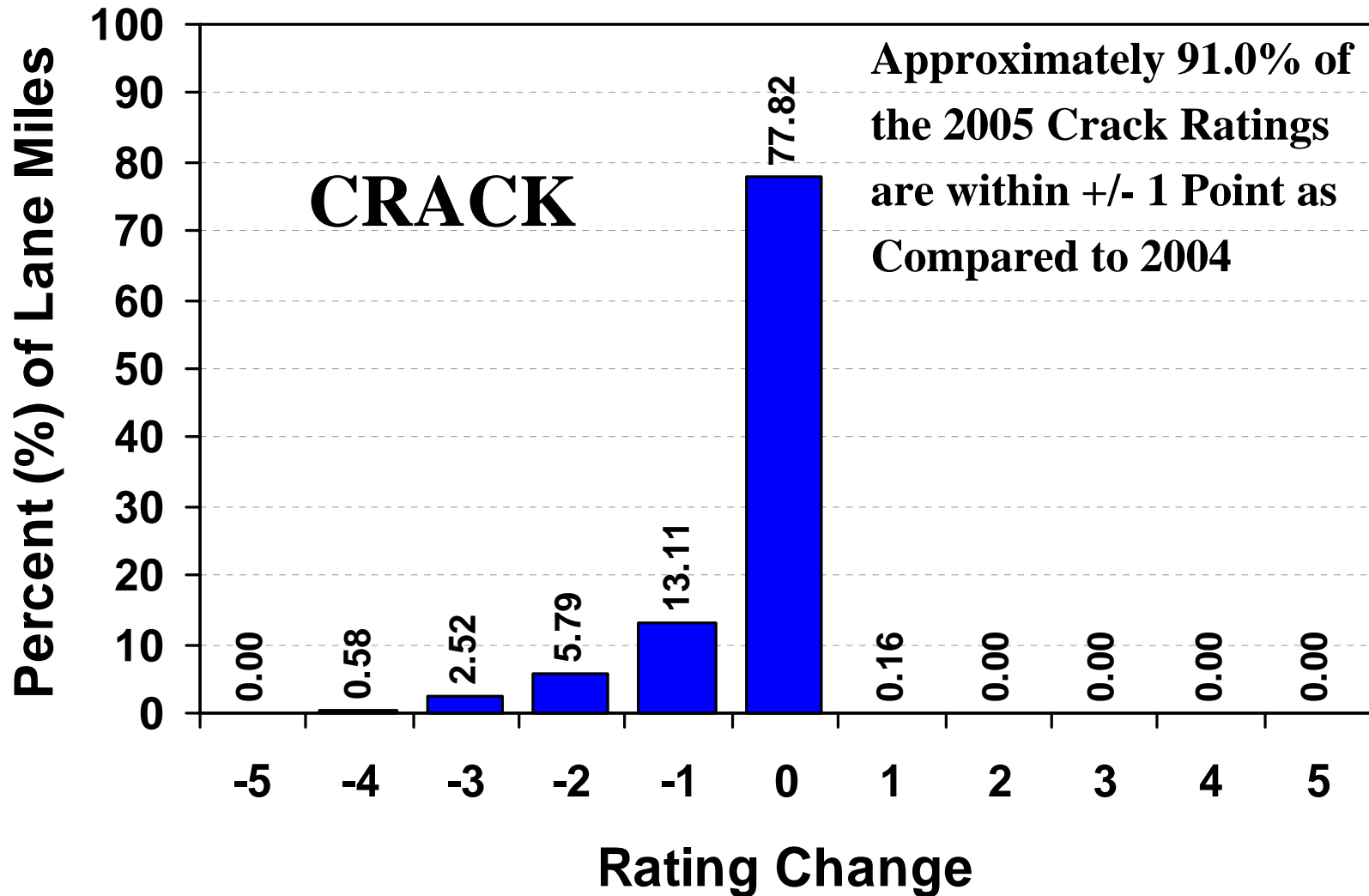


TRAINING

- RATERS ARE COMPARED ANNUALLY ON PAVEMENTS THAT EXHIBIT A RANGE OF CONDITIONS

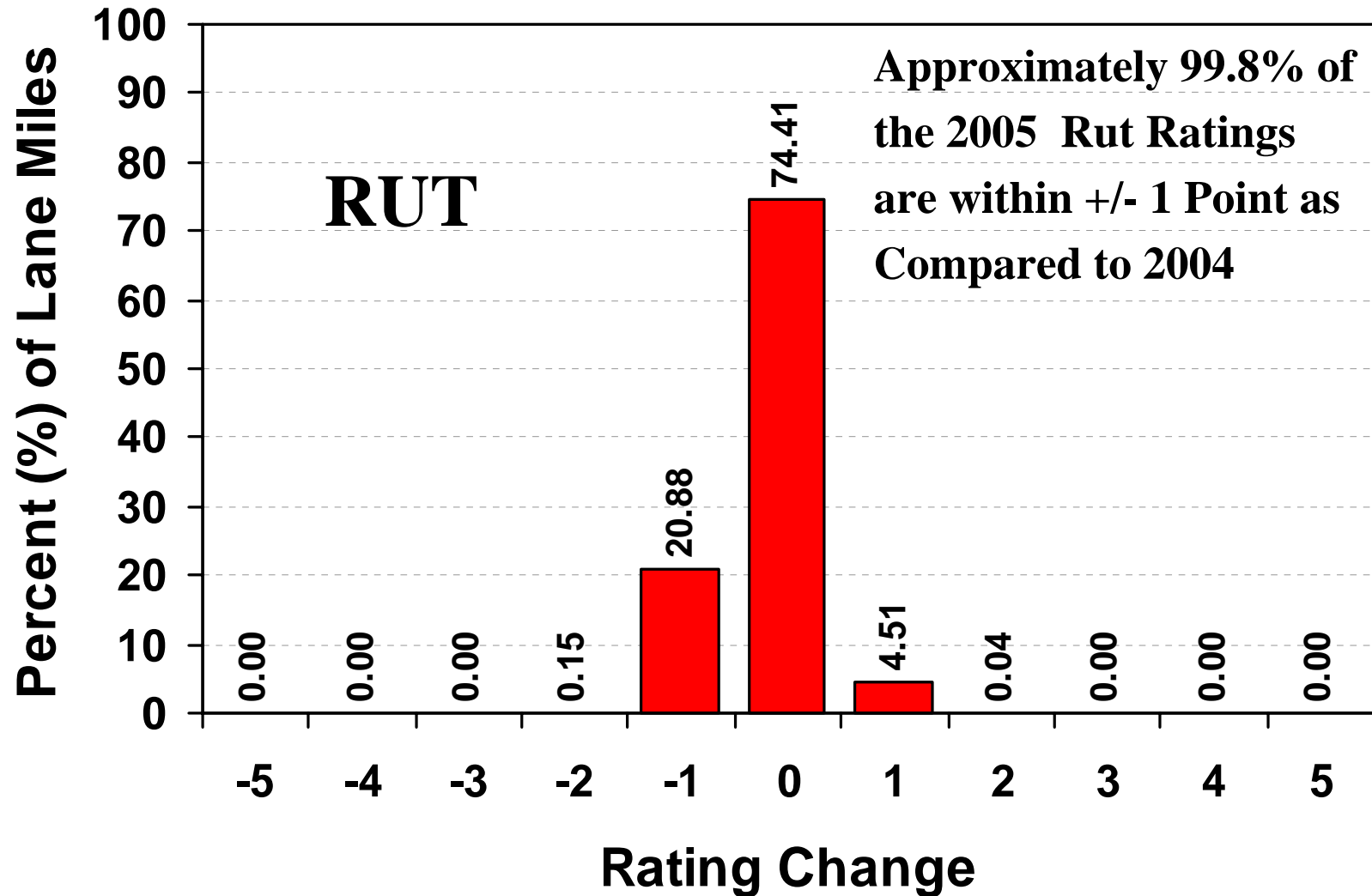
Crack Changes

2005 as Compared to 2004



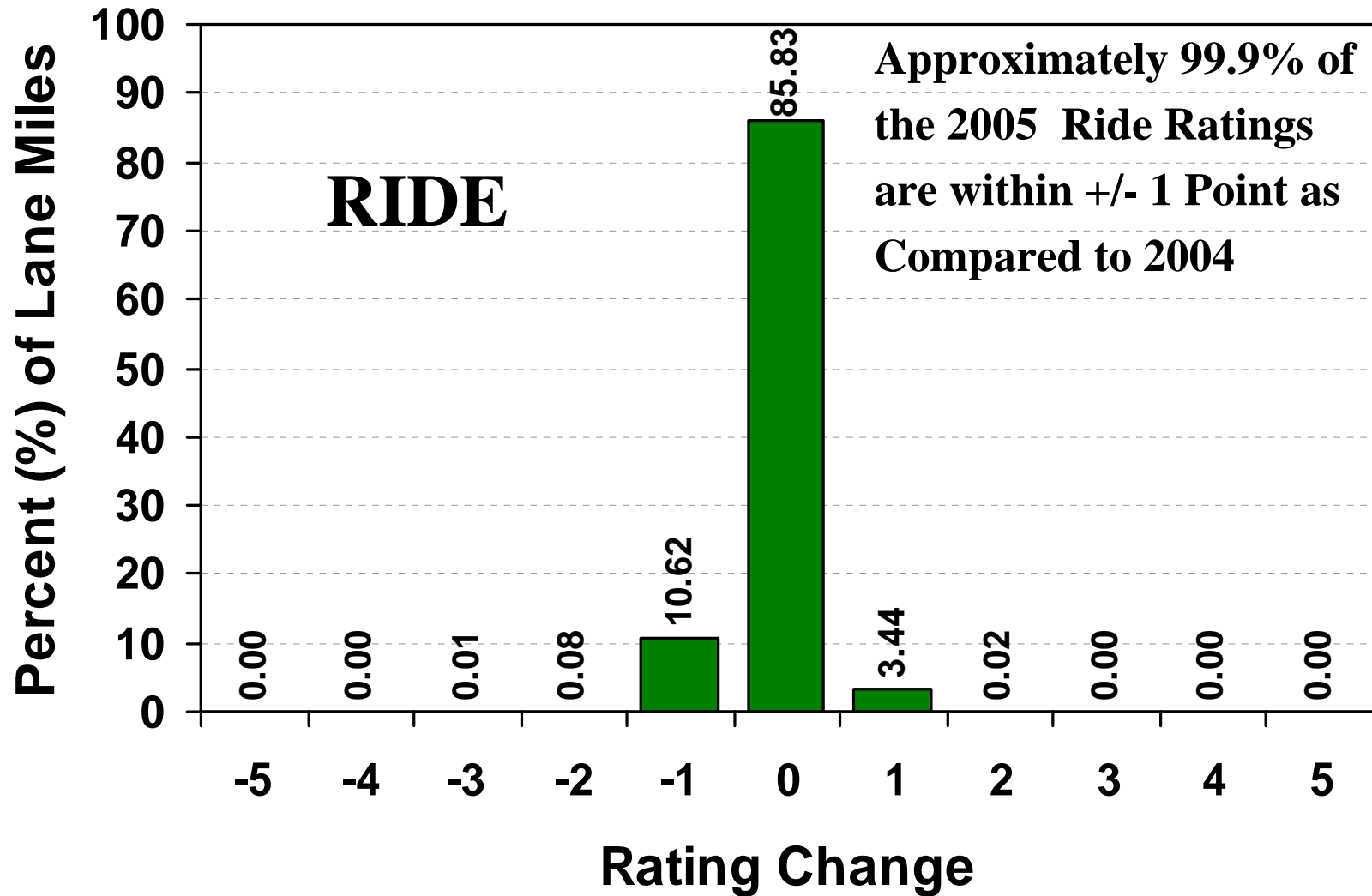
Rut Changes

2005 as Compared to 2004



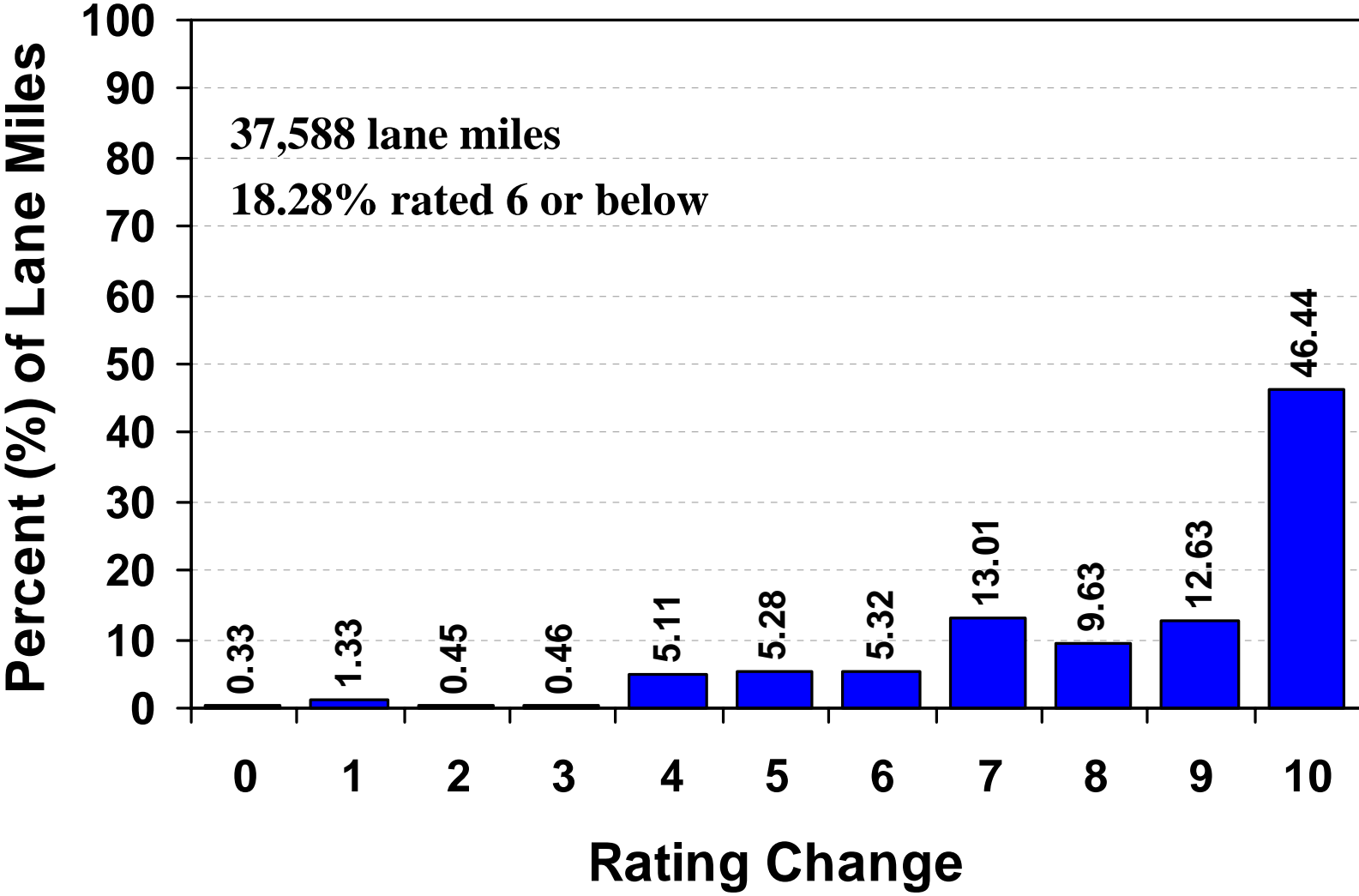
Ride Changes

2005 as Compared to 2004



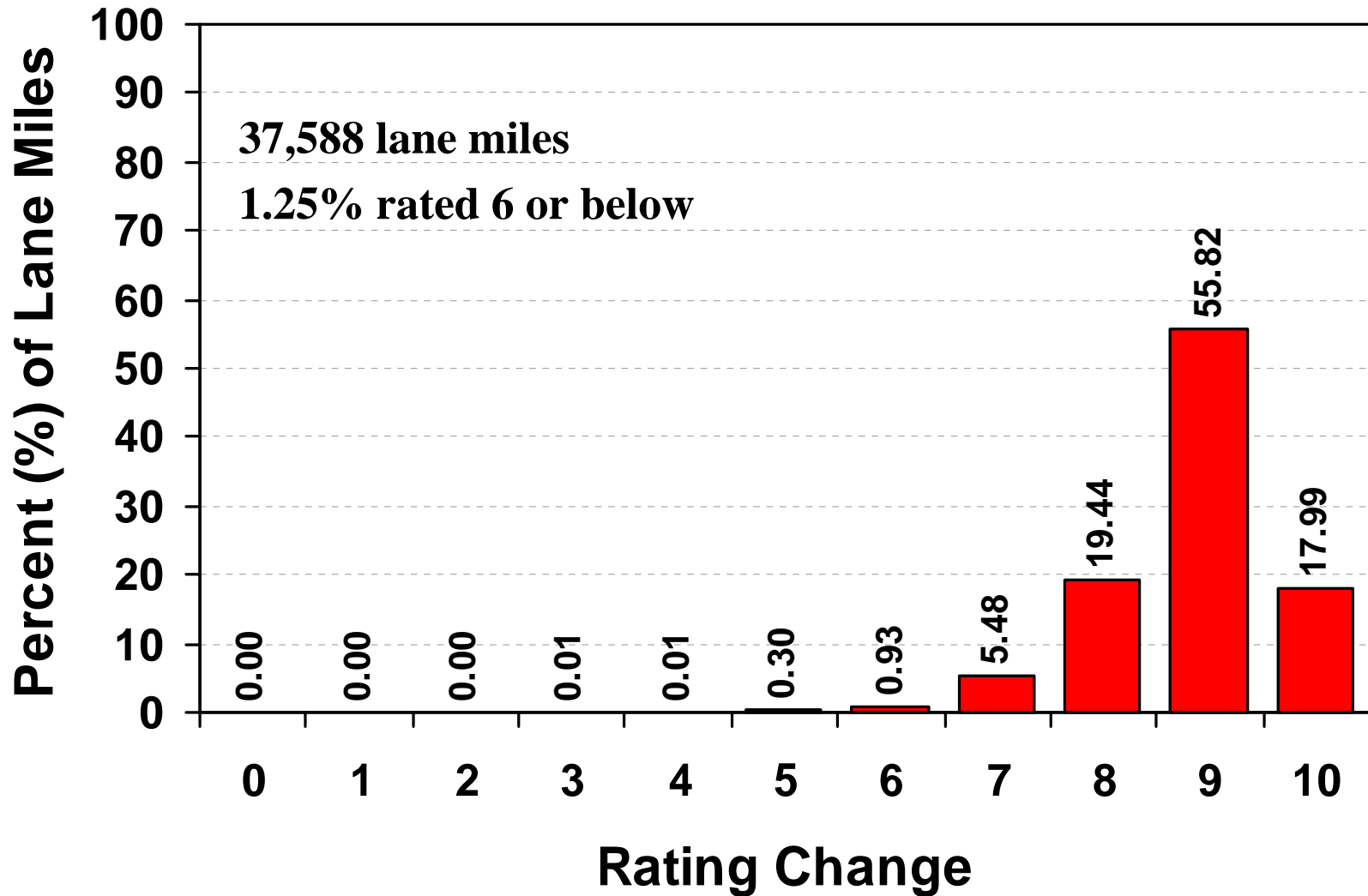
2005 Crack Distribution

Statewide (All Systems)



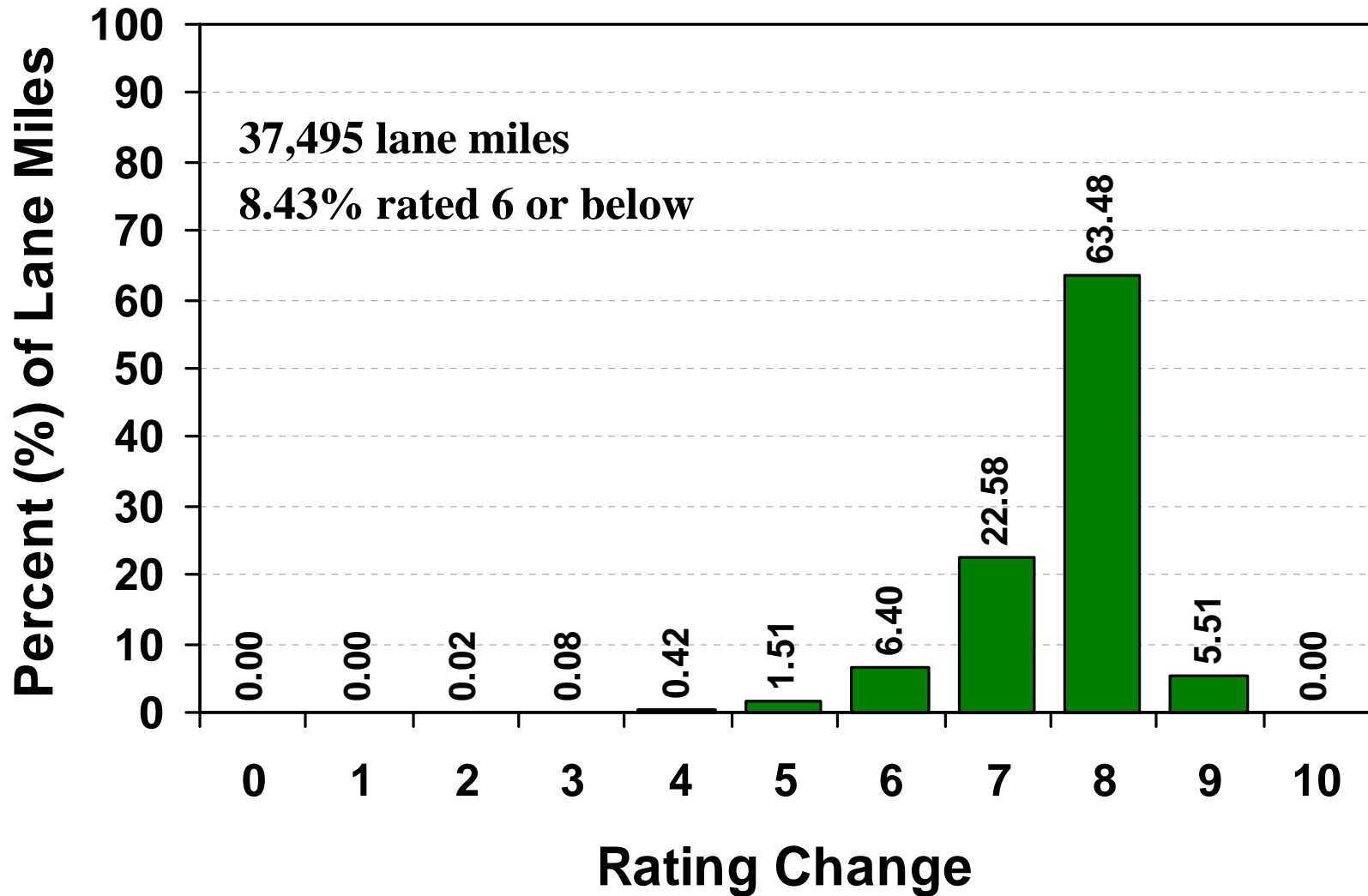
2005 Rut Distribution

Statewide (All Systems)

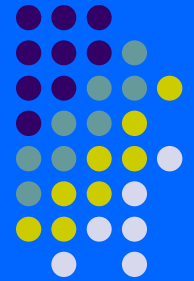


2005 Ride Distribution

Statewide (All Systems)



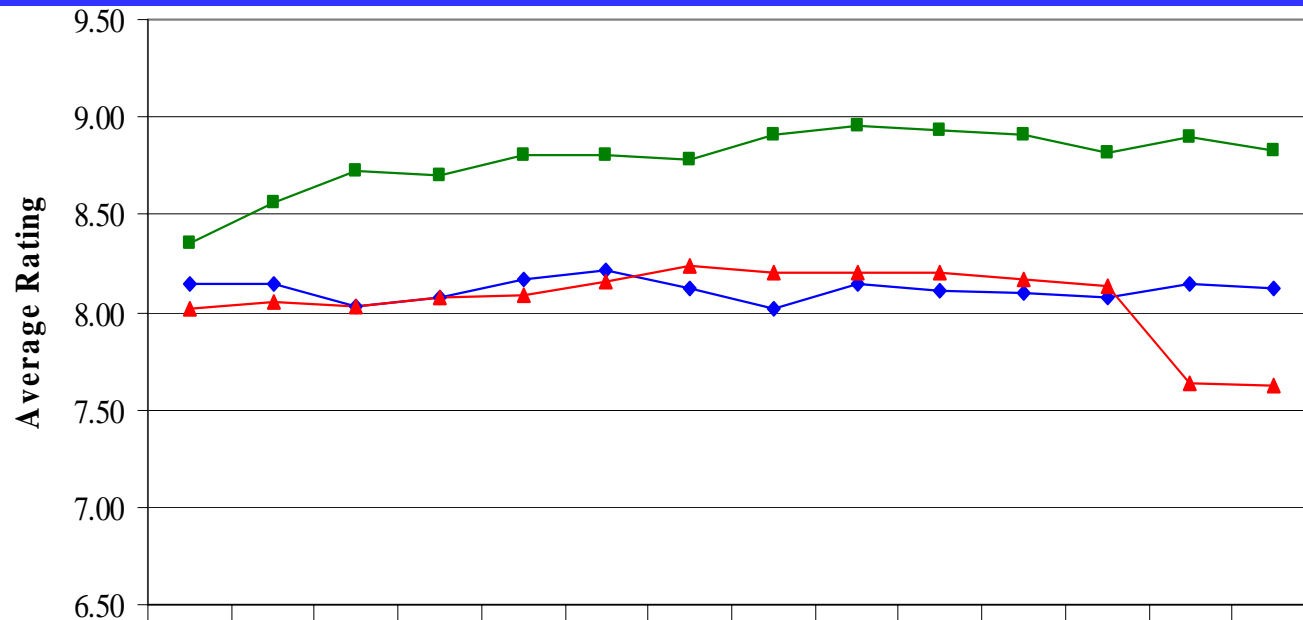
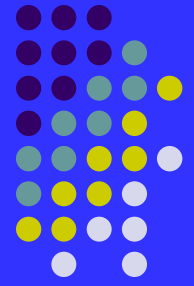
Deficient Lane Miles



Year	2003	2004	2005
Ride	2.6% 1063 Miles	6.3% 2556 Miles	5.6% 2311 Miles
Crack	15.8% 6410 Miles	16.5% 6718 Miles	17.0% 7006 Miles
Rut	1.5% 596 Miles	1.2% 498 Miles	1.2% 474 Miles

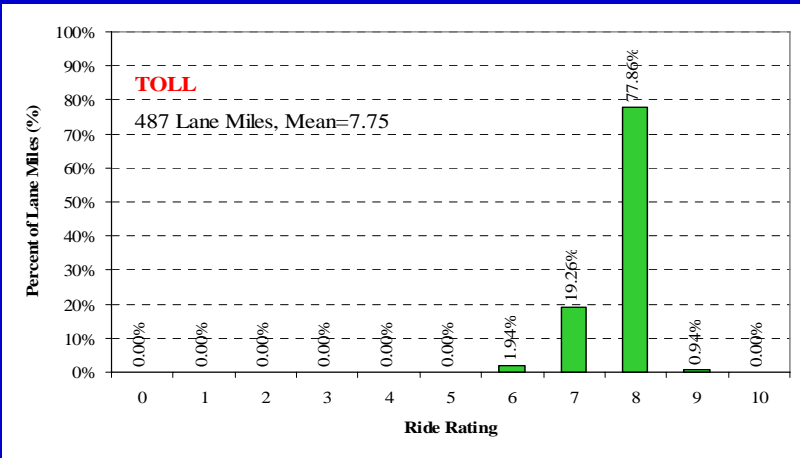
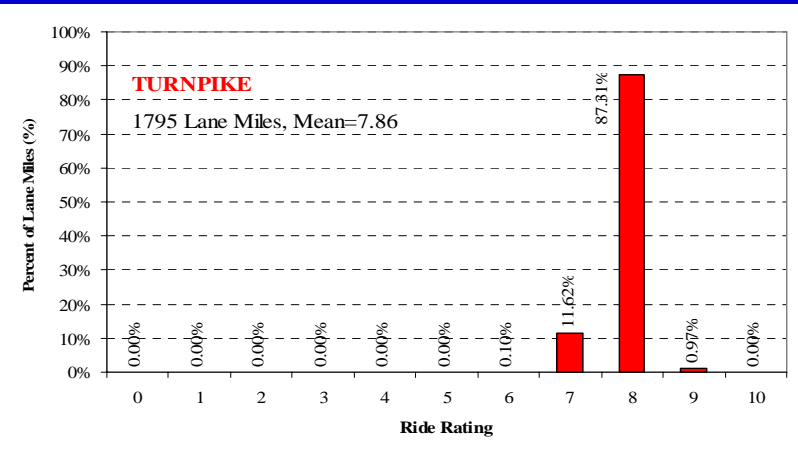
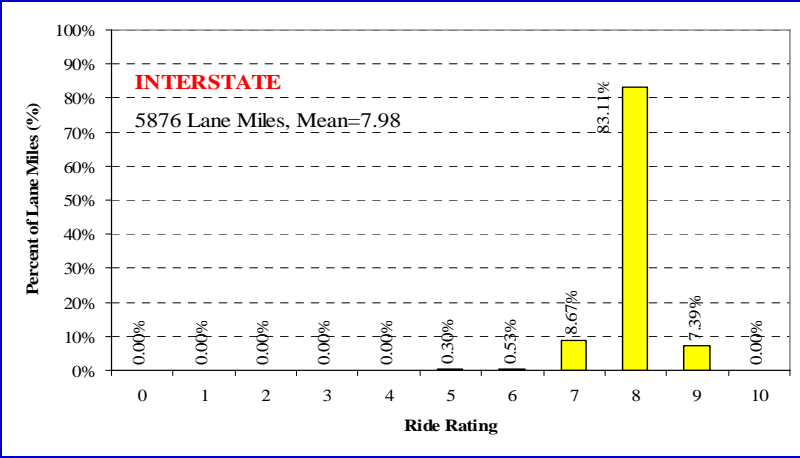
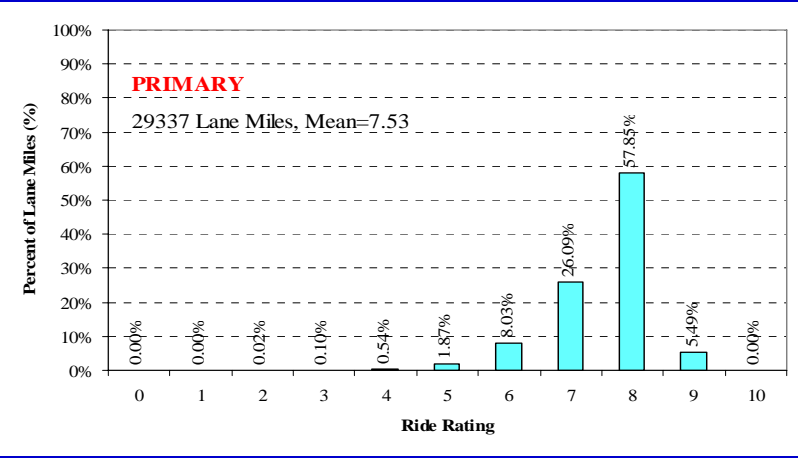
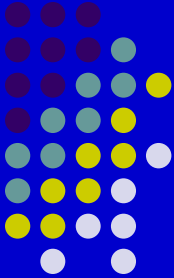
Historical Distress Ratings

All Systems (All Districts)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
—◆— Crack Rating	8.15	8.15	8.03	8.07	8.17	8.21	8.12	8.02	8.14	8.11	8.10	8.07	8.14	8.12
—■— Rut Rating	8.35	8.56	8.72	8.70	8.81	8.81	8.78	8.91	8.96	8.93	8.91	8.82	8.90	8.83
—▲— Ride Rating	8.02	8.05	8.03	8.08	8.09	8.16	8.24	8.20	8.20	8.20	8.17	8.13	7.63	7.62

2005 Ride Distribution by System Statewide





Smooth Pavement Means Happy Drivers

AUTOMATED DISTRESS EQUIPMENT

ROADWARE





PATHWAY



PATHWAY

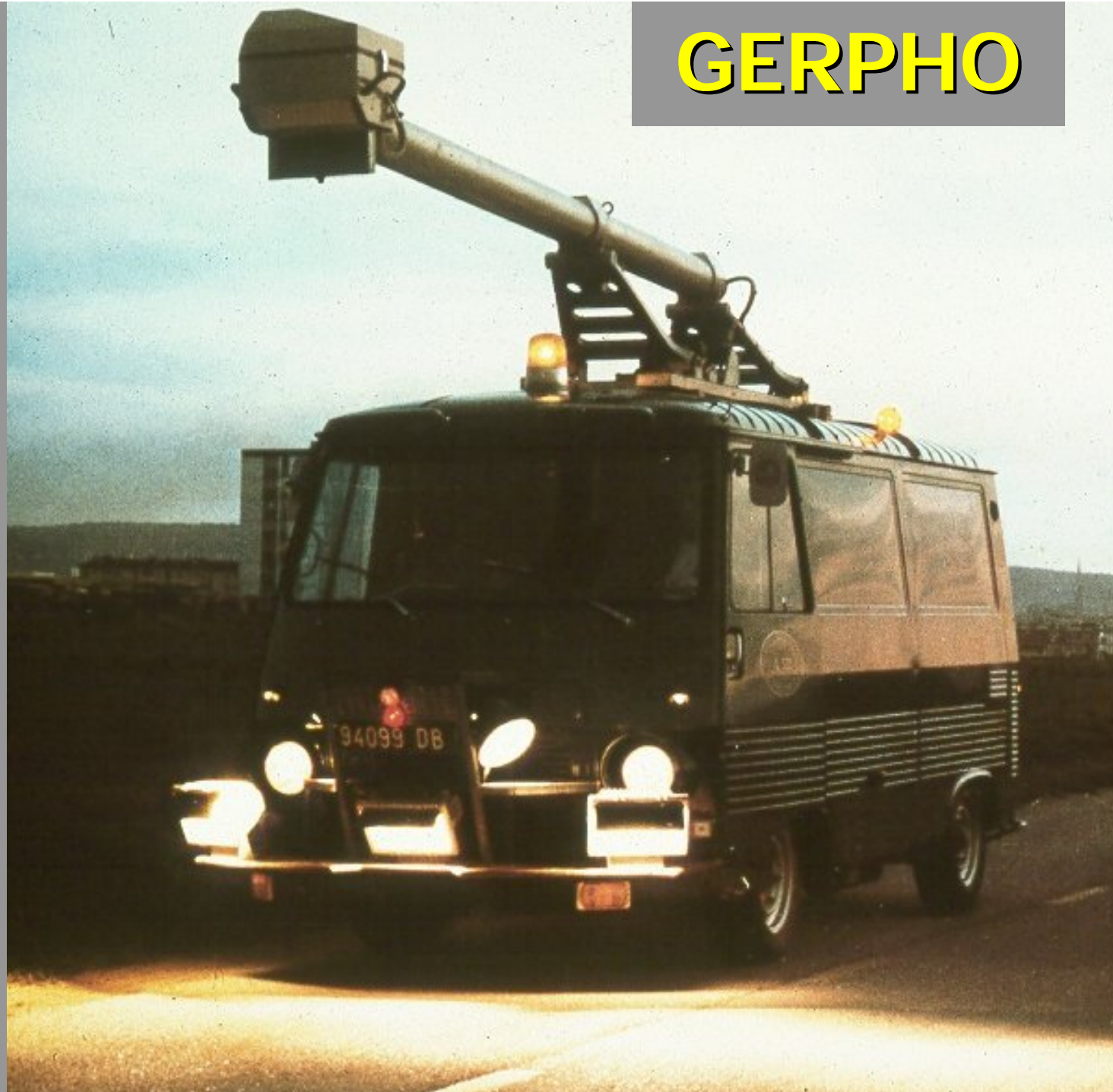
IMS





IMS

GERPHO





PASCO USA

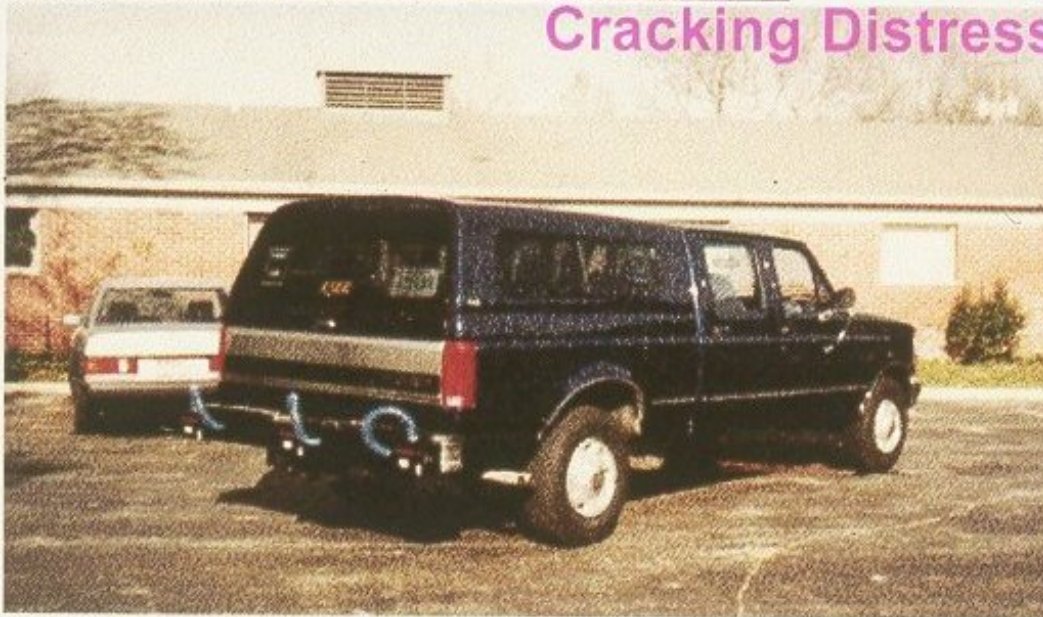
Fault Detection System



MHM
Associates, Inc.

ARIA
AUTOMATED
ROAD SENSE
ANALYSIS

Roughness IRI
Rutting
Ride Quality
Faulting
Cracking Distress



Phone: 219-291-4793 Fax: 219-291-4800 E-mail: JHMOH@AOL.COM
1920 Ridgedale Road, South Bend, IN 46614, USA

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OTHER PAVEMENT SYSTEMS EVALUATION SERVICES



CALIFORNIA PROFILOGRAPH



LIGHTWEIGHT PROFILER

PROSCAN - PROFILOGRAM SCANNING SYSTEM
VERSION V4.56 - DEVORE SYSTEMS, INC.

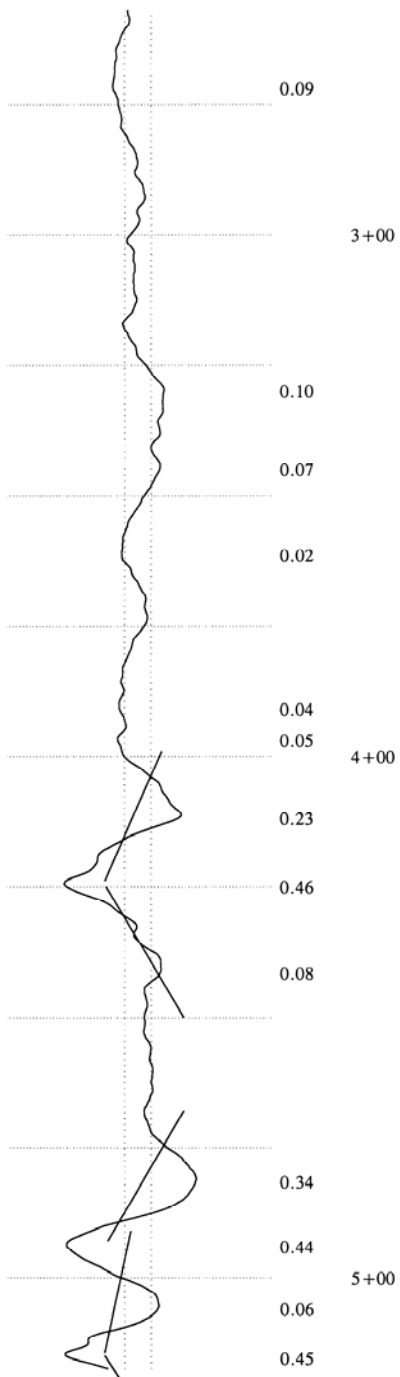
File R16MPH1
Track 1 Segment 1 Page 2 of 3

Station 0+00.0 to 5+28.0
Segment length 21.12in (528ft, .100mi)

Up is to the right

Scallop (Filter 15)
minimum height 0.020 in
minimum width (300:1) 0.08 in
resolution 0.01 in
Blanking band 0.20 in
Defect template height 0.30 in

Profile Roughness Index 29.8 in/mi
Defect at 4+11.5 Bump
4+39.0 Bump
4+82.0 Bump
5+05.5 Bump
5+25.0 Bump



LIGHTWEIGHT PROFILER TRACE



FRICTION UNIT



RUNWAY FRICTION TESTER



FALLING WEIGHT DEFLECTOMETER



DYNAFLECT



GROUND PENETRATING RADAR UNIT



GROUND PENETRATING RADAR UNIT



HEAVY VEHICLE SIMULATOR

THE PCS TEAM

THE PCS TEAM

THE PCS TEAM



ANY

QUESTIONS ?

