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## Port Orange Pavement Management System (Popms): Condition Survey Manual

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**PORT ORANGE  
PAVEMENT MANAGEMENT SYSTEM  
(POPMS)**

**CONDITION SURVEY MANUAL**

prepared by the  
Center for Urban Transportation Research  
University of South Florida

August, 1991

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## **EXECUTIVE SUMMARY**

The Port Orange Pavement Management System (POPMS) Condition Survey Manual is the first of two separate pavement maintenance management documents to be prepared by the Center for Urban Transportation Research (CUTR) at the University of South Florida for the City of Port Orange.

This manual is intended to provide a guideline for the survey of existing pavement conditions. The second document, entitled POPMS Evaluation Report, will utilize the pavement condition survey data to determine system-wide maintenance costs and the most appropriate pavement maintenance strategy.

## **INTRODUCTION**

The Port Orange Pavement Management System (POPMS) Condition Survey Manual has been prepared by the Center for Urban Transportation Research (CUTR) at the University of South Florida to provide a guideline for collection of pavement distress data. The distress identification criteria herein has been adopted by the City of Port Orange so that resulting data bases will offer opportunities for consistent evaluation and understanding of pavement condition and performance.

Four asphaltic concrete pavement distress types, common to the City of Port Orange, have been delineated for detailed data collection. These four distress types include:

- (1) Alligator Cracking
- (2) Block Cracking
- (3) Edge Cracking
- (4) Patch Deterioration

Each of these distress types are described, along with typical causes and location. Associated severity levels for each distress type are also described with accompanying photographic representation.

Additionally, three additional distress types (rutting, raveling, and polished aggregate) have been included for general information gathering purposes only. These distress types, if present, will be measured for extent of distress.

Finally, a POPMS Pavement Condition Survey form has also been included in this manual. This form indicates that for each sample segment both a general inventory and pavement distress inventory will be recorded. All information gathered on the form will be utilized as input to the maintenance priority assessment model to be documented separately, by CUTR, in the POPMS Evaluation Report.

# ALLIGATOR CRACKING

## Description

Alligator (or fatigue) cracking is a series of interconnecting cracks which are many-sided, sharp-angled pieces, usually less than one foot on the longest side.

## Causes

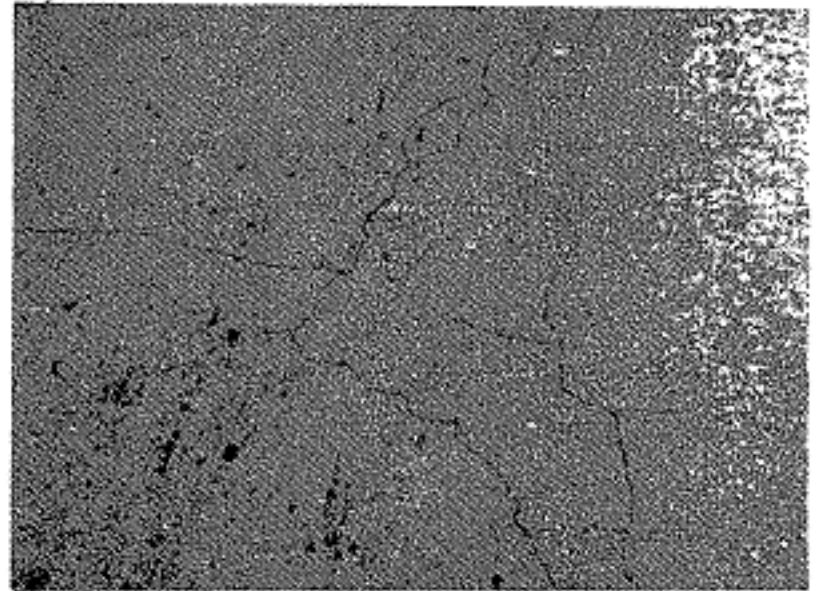
Alligator cracking is a load associated distress, caused by fatigue failure of the surface or stabilized base under repeated traffic loading. Alligator cracking is initiated at the bottom of the asphalt surface where tensile stress and strain is highest under a wheel load. Temperature and moisture may accelerate the initiation and propagation of the cracks to the surface. Initially appears as longitudinal cracks.

## Location

Alligator cracking occurs only in specific areas that are subjected to repeated traffic loadings (usually in wheelpaths).

## Severity Levels

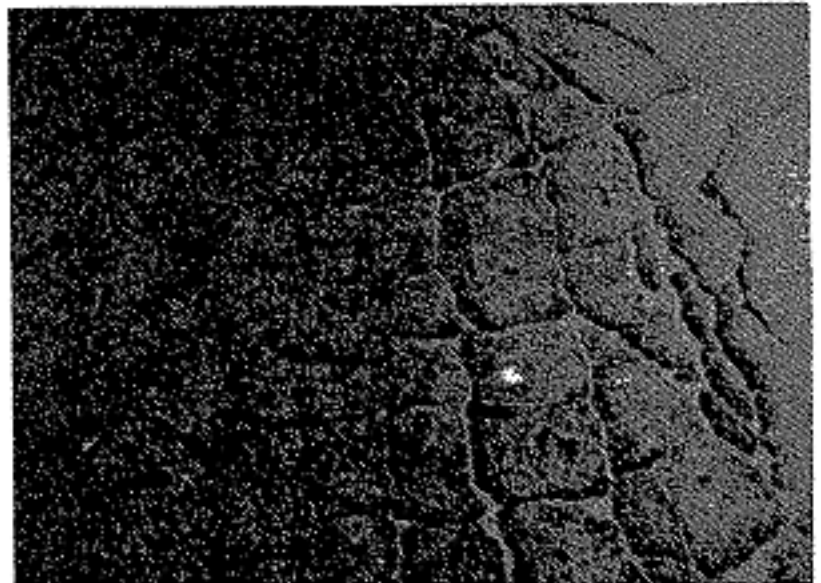
- Low - longitudinal disconnected hairline crack(s) running parallel to each other.
- Moderate - a pattern of pieces formed by cracks that may be lightly spalled.
- Severe - cracking has progressed so that pieces are more severely spalled at the edges, and loosened under traffic.



Low @ Madeline Ave./Hammocks



Moderate @ Herbert near Old Sugar Mill Road



Severe @ Madeline Ave./Hammocks

# LONGITUDINAL AND TRANSVERSE CRACKING (BLOCK CRACKING)

## Description

Block cracking divides the asphalt surface into rectangular pieces ranging in size from approximately 1 to 100 square feet. When the distance between transverse cracks is almost the same as the width of the lane, the pavement may also crack in the longitudinal direction connecting adjacent transverse cracks.

## Causes

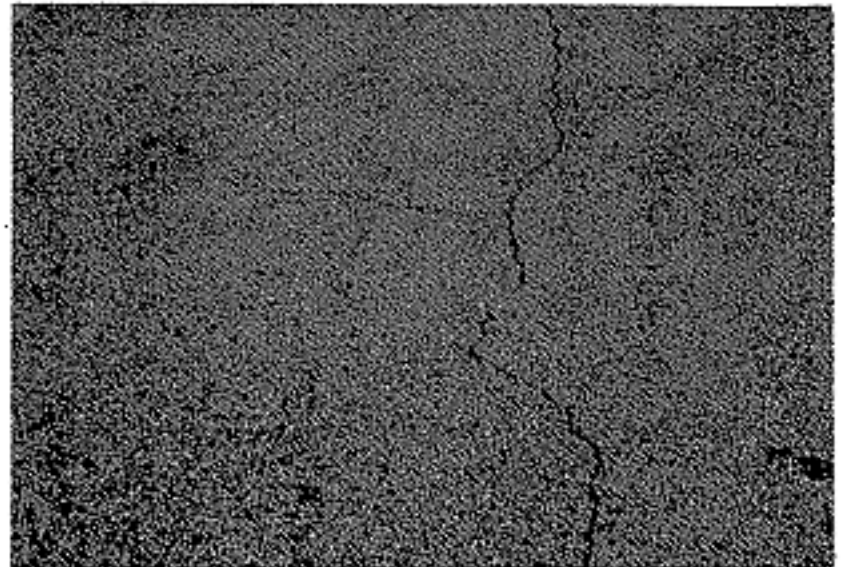
Block cracking is caused mainly by shrinkage of the asphalt surface and temperature cycling. Block cracking is not a load associated distress.

## Location

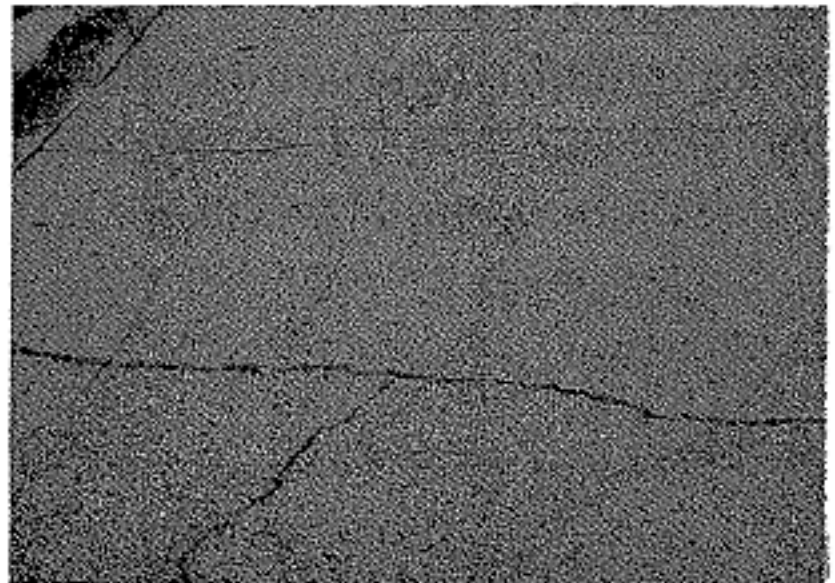
Block cracking normally occurs over a large portion of the pavement area, but sometimes it may occur only in non-traffic areas.

## Severity Levels

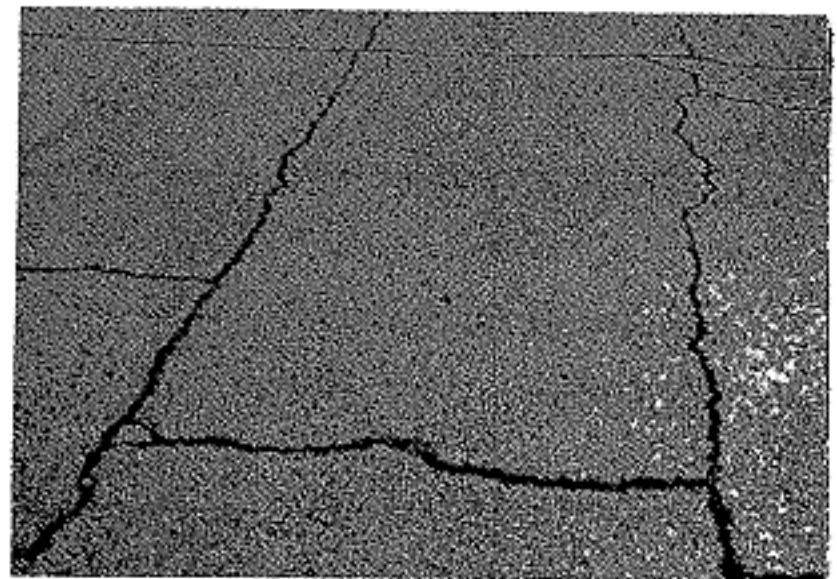
- Low - blocks outlined by cracks less than 1/4 inch in width with little or no spalling.
- Moderate - blocks are outlined by cracks greater than 1/4 inch in width with moderate spalling.
- High - blocks are well defined by cracks that are severely spalled.



Low @ Kendrew Drive/Millers Way



Moderate @ Whippoorwill north end



Severe @ Kingswood (entrance road)



## EDGE CRACKING

### Description

Crescent-shaped cracks or fairly continuous cracks, parallel to, and usually within 1-2 feet of the outer edge of the pavement.

### Causes

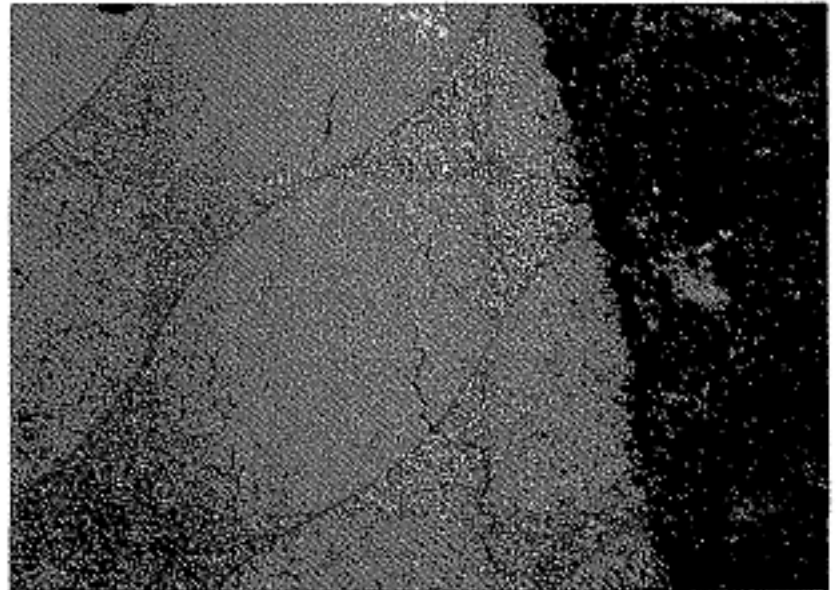
Edge cracking is generally a non-load initiated distress, created by settlement or pumping of the material underlying the edge of the pavement or the loss of material from non-stabilized shoulders.

### Location

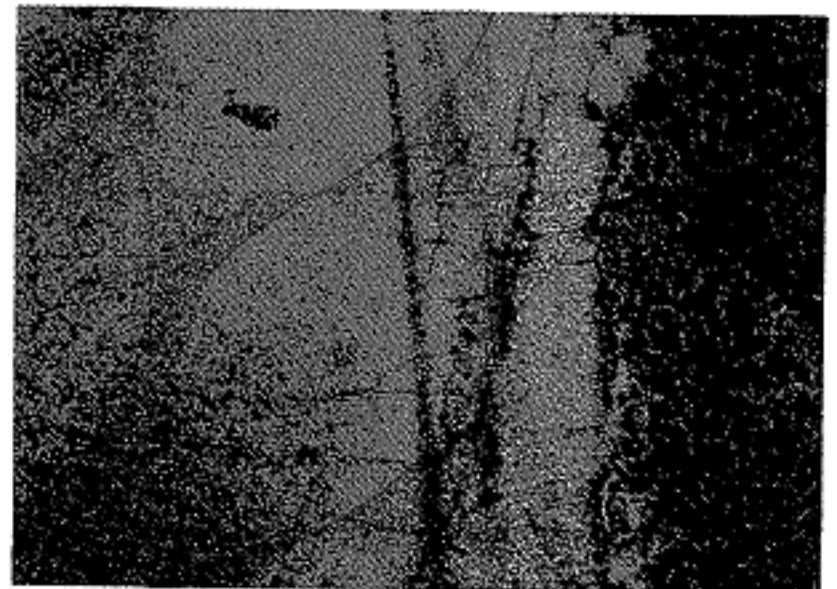
Edge cracking occurs at the lane/shoulder contact area, or usually where paved shoulders (or curb and gutter) do not exist.

### Severity Levels

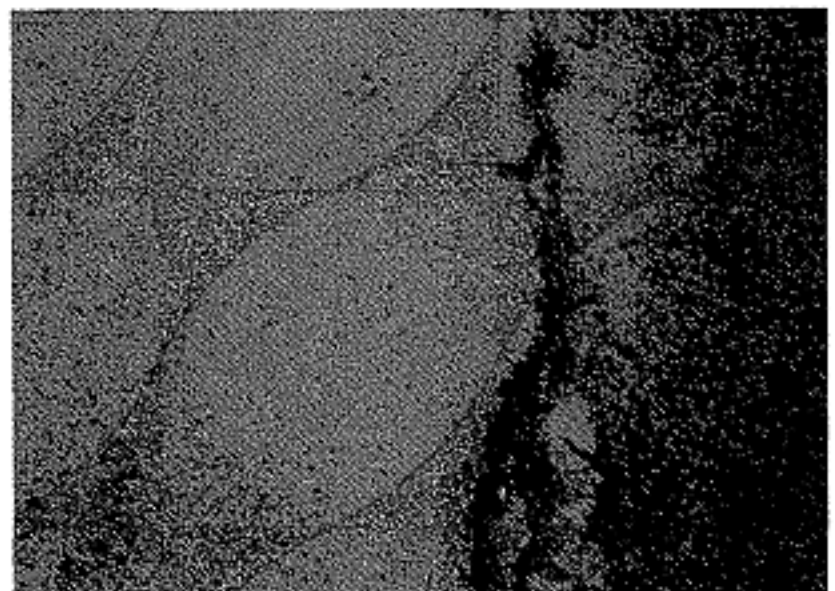
- Low - cracks with no breakup or raveling.
- Moderate - cracks with some breakup or raveling.
- Severe - Cracks with considerable breakup or raveling along the edge.



Low @ Kingsway/Wexford Way



Moderate @ Madeline/Hammocks



Severe @ Willow Run Blvd. near Clyde Morris Blvd.



# PATCH DETERIORATION

## Description

Deterioration in an area where the original pavement has been removed and replaced with either similar or different material.

## Causes

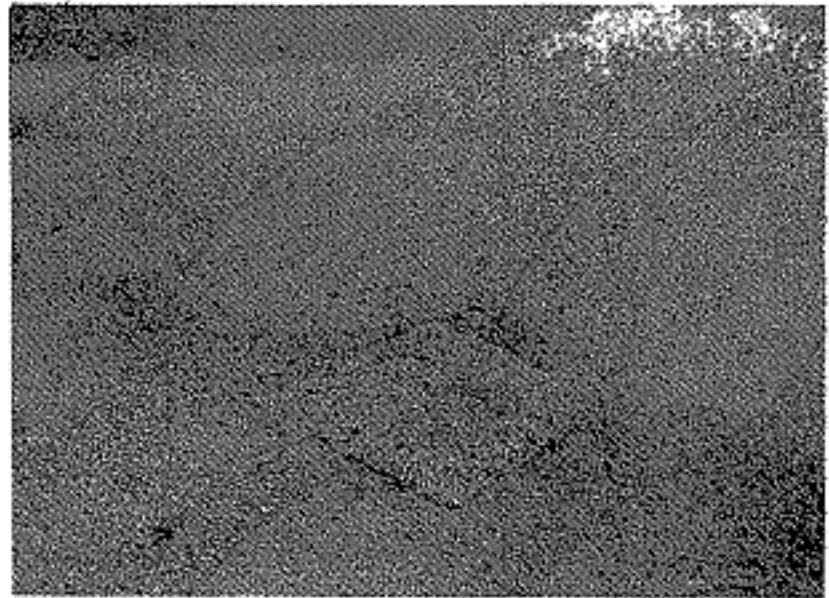
Traffic load, material, environment, and/or poor construction practice.

## Location

Any asphalt patch area or utility cut.

## Severity Levels

- Low - patch is in very good or excellent condition, and has little or no distress of any type.
- Moderate - patch is somewhat deteriorated, having low to medium levels of any types of distress.
- Severe - patch is badly deteriorated and is in need of replacement.



Low @ Southwinds/South Hampton



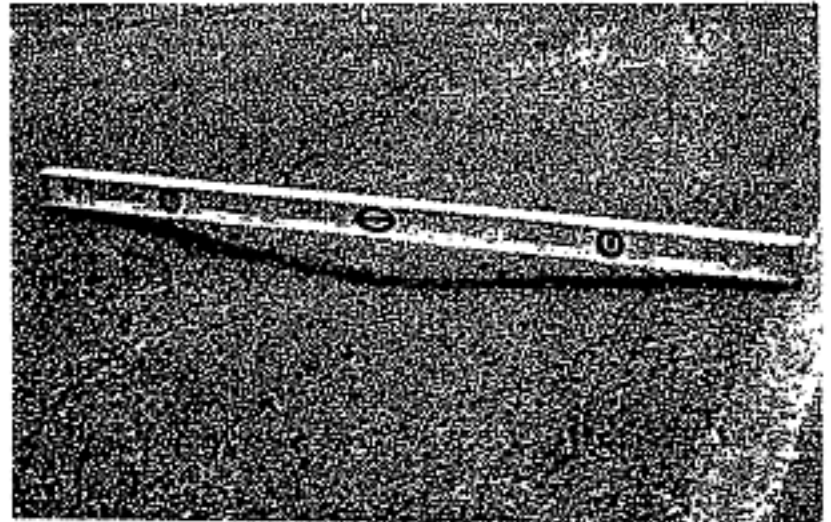
Moderate @ Ravenwood Drive/Woodlake Drive



Severe @ Madeline/Hammocks

## **RUTTING**

Longitudinal surface depression in the wheel path. Pavement uplift may occur along the sides of the rut. Rutting is caused by inadequate compaction during construction, soft asphalt mix, or softening of the materials beneath the pavement due to moisture infiltration.



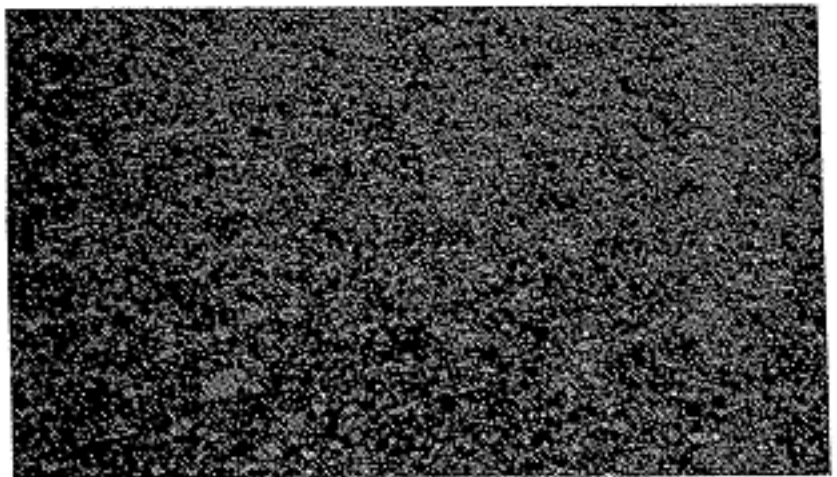
## **RAVELING**

Raveling involves the wearing away of the pavement surface caused by the dislodging of aggregate particles (raveling), and loss of asphalt binder (weathering). Raveling is caused by hardening of the asphalt binder, low adhesion of the asphalt binder, low wear resistance aggregate, water sensitive asphalt-aggregate mixture, or any combination of the above items.



## **POLISHED AGGREGATE**

A portion of the aggregates extending above the asphalt surface are either very small, or there are no rough or angular aggregate particles to provide good skid resistance. Polished aggregate occurs along the pavement surface mainly in the wheel path, and is caused by repeated traffic application.



## REFERENCES

1. AASHTO Guidelines for Pavement Management Systems, July 1990.
2. Baladi, Gilbert Y. and Snyder, Mark B., Highway Pavements Training Course, Course 13114, National Highway Institute, May, 1980.
3. Condition Rating Survey Manual, Illinois Department of Transportation, 1988.
4. Distress Identification Manual for the Long-Term Pavement Performance Studies, Strategic Highway Research Program, National Research Council, Washington, D.C., 1990.
5. Implementation Package-Carson City, Nevada Pavement Management System for City Streets, Research Report UCB-ITS-RR-88-17/7, Institute of Transportation Studies, University of California at Berkeley, October, 1988.
6. 1989 Pavement Condition Survey, California Pavement Management System-Rater's Manual, Caltrans-Division of Highway Maintenance.

# Port Orange Pavement Condition Survey



## GENERAL INVENTORY

Street Name: \_\_\_\_\_ Street Number: \_\_\_\_\_

Street Sample Number: \_\_\_\_\_ Location of Segment: From: \_\_\_\_\_ To: \_\_\_\_\_

### SAMPLE SEGMENT

Length (ft): \_\_\_\_\_ Width (ft): \_\_\_\_\_ Date of Survey: \_\_\_\_\_ Surveyor: \_\_\_\_\_

#### FUNCTIONAL CLASSIFICATION

- local residential (R)
- Collector (C)
- Arterial (A)

#### LAND USE

- residential (1)
- residential multiple dwelling (2)
- commercial (3)
- light industrial (4)
- combination residential and commercial (5)

#### CURB OR GUTTER ?

- no (N)
- Miami
- Environmental
- High-Back

#### SIDEWALK ?

- no (N)
- yes (Y)

#### TRAFFIC INDEX

- residential dead-end (4.0)
- residential local (4.5)
- collectors (5.5)
- Industrial local (6.0)
- arterials and major streets (6.5)
- truck and bus routes (7.0)

#### RIDE QUALITY

- good (G)
- fair (F)
- poor (P)

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## PAVEMENT DISTRESS INVENTORY

### EXTENT OF OVERALL DISTRESS

- Isolated
- Uniform

### PATCH DETERIORATION

- | <u>Extent</u>                       | <u>Severity</u>                       |
|-------------------------------------|---------------------------------------|
| <input type="checkbox"/> none (0)   | <input type="checkbox"/> slight (S)   |
| <input type="checkbox"/> < 5% (1)   | <input type="checkbox"/> moderate (M) |
| <input type="checkbox"/> 5-19% (2)  | <input type="checkbox"/> severe (V)   |
| <input type="checkbox"/> 20-50% (3) |                                       |
| <input type="checkbox"/> > 50% (4)  |                                       |

### LONGITUDINAL AND TRANSVERSE CRACKING (BLOCK CRACKING)

- | <u>Extent (per 100 ft)</u>                 | <u>Severity</u>                       |
|--|---------------------------------------|
| <input type="checkbox"/> none observed (0) | <input type="checkbox"/> slight (S)   |
| <input type="checkbox"/> 1-100 in. (1)     | <input type="checkbox"/> moderate (M) |
| <input type="checkbox"/> 101-300 in. (2)   | <input type="checkbox"/> severe (V)   |
| <input type="checkbox"/> > 300 in. (3)     |                                       |

### ALLIGATOR CRACKING

- | <u>Extent</u>                       | <u>Severity</u>                       |
|-------------------------------------|---------------------------------------|
| <input type="checkbox"/> none (0)   | <input type="checkbox"/> slight (S)   |
| <input type="checkbox"/> < 10% (1)  | <input type="checkbox"/> moderate (M) |
| <input type="checkbox"/> 11-25% (2) | <input type="checkbox"/> severe (V)   |
| <input type="checkbox"/> 26-50% (3) |                                       |
| <input type="checkbox"/> > 50% (4)  |                                       |

### EDGE CRACKING

- | <u>Extent</u>                            | <u>Severity</u>                       |
|--|---------------------------------------|
| <input type="checkbox"/> none (0)        | <input type="checkbox"/> slight (S)   |
| <input type="checkbox"/> < 100 in. (1)   | <input type="checkbox"/> moderate (M) |
| <input type="checkbox"/> 100-300 in. (2) | <input type="checkbox"/> severe (V)   |
| <input type="checkbox"/> > 300 in. (3)   |                                       |

### RUTTING

- no (N)
- yes (Y) how many L.F.? \_\_\_\_\_

### RAVELING

- no (N)
- yes (Y) how many S.F.? \_\_\_\_\_

### POLISHED AGGREGATE

- no (N)
- yes (Y) how many S.F.? \_\_\_\_\_

ADDITIONAL COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_