

## **Module 2-2**

---

### **Condition Data Collection and Processing**

## **Objectives**

---

- Describe factors that characterize distress
- List field procedures for distress survey
- Describe roughness measurement
- Describe roughness survey equipment
- Describe friction measurement

## **Definitions**

---

- Pavement condition
- Pavement distress
- Pavement roughness
- Pavement surface friction

## **Condition Survey Overview**

---

- Essential to identify feasible maintenance and rehabilitation alternatives
- Involves distress, roughness, and friction
- Functional vs. structural performance

## **Utility**

---

- Identify repair locations and quantities
- Quantify variations in condition
- Document existing condition
- Identify additional testing needs
- Determine causes and mechanisms of deterioration

## **Distress Surveys**

---

- Characterization of distress by
  - Type
  - Severity
  - Extent

## Distress Identification Manual

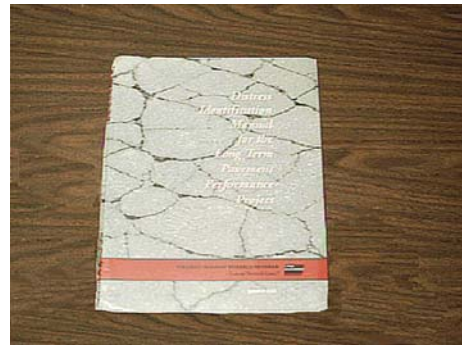
### Benefits

- Consistent definitions
- Standardized
- Calibration

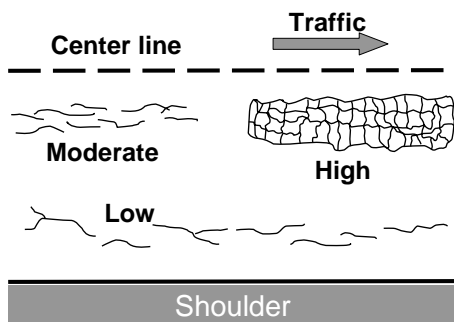
### Degree of sophistication

- LTPP (research oriented)
- Project Level (design oriented)

## Distress Identification Manual



## Fatigue Severity



## Fatigue - Low Severity



## Fatigue - High Severity and Medium Extent



## Fatigue - High Severity and Extent



**Potholes**



**Large Potholes-Signing ?**



**Extra High Severity and Extent**



**Transverse Crack - Medium Severity**



**Transverse Crack - Medium Severity**



**Transverse Crack - Medium Severity**



**Transverse Crack - High Severity**



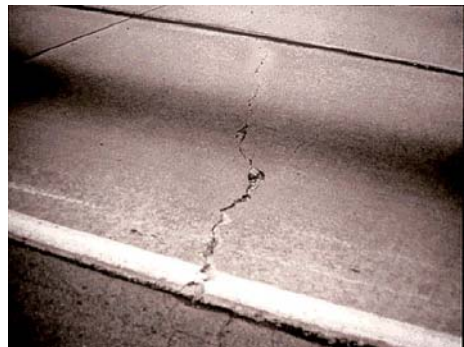
**Rutting**



**Flushing**



**Transverse Crack - Spalling**



**Transverse Crack - High Severity**



**What is the Problem Here?**



### What is the Problem Here?



### Pumping - High Severity



### Alkali-Silica Reactivity (ASR) Damage



### Close Up View of ASR Distress



### Manual Distress Surveys

- Preferred methodology
- Equipment
- Pre-survey activities
- Initial windshield survey
- Detailed distress survey
- Examples of distress

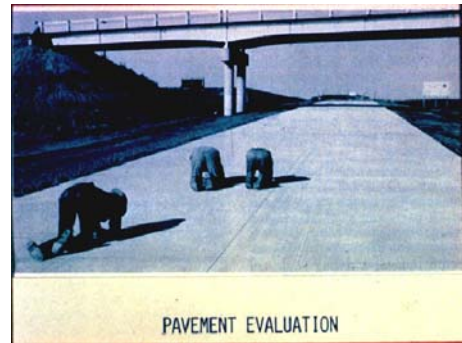
### Windshield Survey



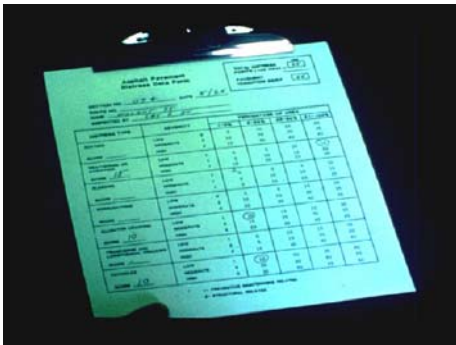
## Walking Survey



## Knees and Elbows Survey



## Data Forms



## Hand-Held Computer



## Flexible Pavement Distress:

### Load-related

- Fatigue cracking
- Permanent deformation
- Potholes

### Climate and materials-related

- Bleeding
- Transverse cracking
- Raveling / weathering

## JCP / JRCP Distress

### Load-related

- Corner breaks
- Faulting
- Pumping

### Climate and materials-related

- Blowups
- D-cracking
- Longitudinal / transverse cracking
- Spalling

## CRCP Distress

### Load-related

- Punchouts
- Transverse crack deterioration
- Pumping

### Climate / materials-related

- Blowups
- D-cracking
- Longitudinal / transverse cracking

## Automated Distress Surveys

### Equipment

### Advantages

### Limitations

## Pasco Equipment



## Pave Tech Equipment



## Roughness Surveys

### Roughness

- Deviations in pavement surface that affect ride quality
- Caused by:
  - Built-in surface irregularities
  - Irregularities caused by traffic and environment
- Standard measure: IRI

## Serviceability

### Measure of user's perception of pavement rideability

- Scale
  - Zero (very poor) to Five (very good)
  - Working range: 1.5 to 4.5
- Trigger levels
  - High traffic
  - Medium traffic
  - Low traffic
- Highly correlated with roughness

## Typical Ride Measuring Equipment

### IRPS

- K.J. Law Profilometer
- South Dakota Profiler
- PURD

### RTRRM

- Maysmeter
- PCA Roadmeter
- Cox Meter
- BPR Roughometer

## K.J. Law Profilometer



## Maysmeter



## Surface Friction Surveys

### Surface friction

- a.k.a. Skid resistance
- Safety concerns
  - Hydroplaning
  - Wet weather accidents
- Influenced by
  - Microtexture
  - Macrotexture
  - Cross-slope

## Measurement Equipment

Primary: locked wheel skid

Mu meter

British Pendulum Tester

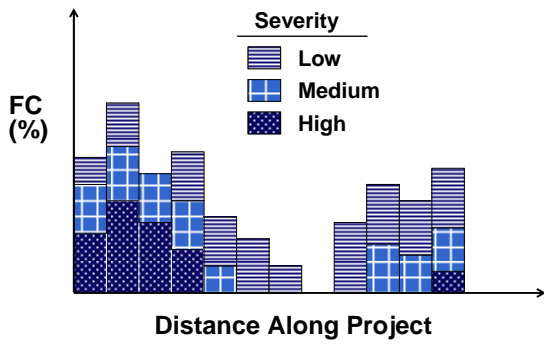
## Condition Data Processing

Summarize for evaluation

Strip charts



### Example Strip Chart - Fatigue Cracking



### Summary

#### Condition surveys

- Types
  - Distress
  - Roughness
  - Friction
- Collection
  - Procedures
  - Equipment
- Processing