Flexible Pavement Distress

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Topic 2 – Flexible Pavement Distress

1. Alligator or Fatigue Cracking

Series of interconnecting cracks caused by the fatigue failure of asphalt surface or stabilized base under repeated traffic loading.

- Initiates at
- Cracks propagate to
- Occurs only in areas
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1. Alligator or Fatigue Cracking (cont.)

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Moderate High

Low

SHOULDER

Edge Stripe

Traffic

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1. Alligator or Fatigue Cracking (cont.)
2. Block Cracking (Thermal Cracking)

Block cracks divide the asphalt surface into approximately rectangular pieces. Blocks range from 1 to 100 ft$^2$ in area.

- Caused mainly
- Not
- Caused by

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2. Block Cracking (cont)

- Moderate
- Low
- High

Edge Stripe

Moderate - Adjacent Low Severity Cracking
High - Adjacent Moderate Severity Cracking
3. Joint Reflection Cracking from Concrete Slab
Occur on pavements that have an asphalt surface over a jointed concrete slab. Cracks occur over transverse and longitudinal joints – were pavement was widened. Why?
- Caused by the
- Generally

4. Lane/Shoulder Drop-off or Heave
Difference in elevation between the traffic lane and the shoulder.
Main Causes:
- Drop-off due to
- Heave
- Soil shoulder drop-off due to
Longitudinal Cracking

Longitudinal cracks are running parallel to the pavement centreline, while transverse cracks extend across the centreline.

Main Causes

- Asphalt
- Reflective

- Poor construction of paving lane joint
- Usually
6. Water Bleeding & Pumping

Water bleeding occurs when water seeps out of joints or cracks or through an excessively porous HMA layer. Pumping occurs when water and fine material is ejected from underlying layers through cracks in the HMA layer under moving loads.

Main Causes:
- Porous pavement as a result of
  - High
  - Poor drainage

7. Rutting

Rutting is characterized by depressions that form in the wheel paths.

Main Causes:
- High
- Low
- Structural problems –
- Asphalt cement grade –
7.1 Consolidation Rutting

The result of excessive consolidation of the pavement along the wheel path due to either reduction of the air voids in the asphalt concrete layer, or the permanent deformation of the base or subgrade.
7.1 Consolidation Rutting

Failure is attributed strictly to the asphalt mixture properties and usually occurs within the top 2 inches of the asphalt concrete layer.

7.2 Instability Rutting

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7.2 Instability Rutting
8. **Bleeding**
Bleeding is characterized by excess asphalt binder on the surface of the pavement.

Main Causes:
- Excess
- Excess
- Drain-down
- Contamination with diesel or similar

9. **Slippage**
Slippage is characterized by crescent or half-moon shaped cracks generally having two ends pointed into the direction of traffic.

Main Causes:
- Thin Layers
- Tracking of tack coat with equipment
- Contamination –
- Rolling process
9. **Slippage (cont)**

![Image of flexible pavement distress]

9. **Other types of Distress**

- Swell
- Corrugation
- Depression
- Potholes
- Ravelling and weathering