Quantification of distress data from the selected sections

Surface Distress	Distress _Weight	Measured as	Severity_Score					Measured as	Extent_Weight				
			0	**25**	**50**	**75**	**100**		**0.0**	**0.25**	**0.50**	**0.75**	**1.0**
Cracking	0.20	Crack width (mm)	0	0-6	6-12	12-19	>19	% of area	Nill	0-25	25-50	50-75	Through out
Rutting	0.20	Rut depth (mm)	0	0-6	6-12	12-25	>25	% of area	Nill	0-25	25-50	50-75	Through out
Ravelling	0.20	Visual Inspection	Nill	Noticeable loss of material	Surface texture appears as open	Wide open texture with loose materials	Severe stripping of aggregates	% of area	Nill	0-25	25-50	50-75	Through out
Pothole	0.20	Volume (cc)	0	<130	130-500	500-1000	>1000	Nos.	Nill	0-5	5-10	10-20	>20
Edge break	0.10	Affected distance from edge (mm)	0	Less than 50 mm from edge	50-100 mm from edge	100-200 mm from edge	More than 200 mm from edge	% of length	Nill	0-25	25-50	50-75	Through out
Shoulder drop off	0.10	Difference in height (mm)	0	0-10	10-50	50-100	>100	% of length	Nill	0-25	25-50	50-75	Through out
	Distress Score_1 (DS_1) = $\sum$(Distress_Weight $\times$ Severity_Score $\times$ Extent_Weight)												
Failed Section	-	Visual Inspection	100: Surface course worn off and damaged					% of area	Nill	0-25	25-50	50-75	Through out
	Distress Score_2 (DS_2) = 100 $\times$ Extent_Weight against failed section												
	PCI = 100 – Maximum of [DS_1, DS_2]												

For every 100 metre road section
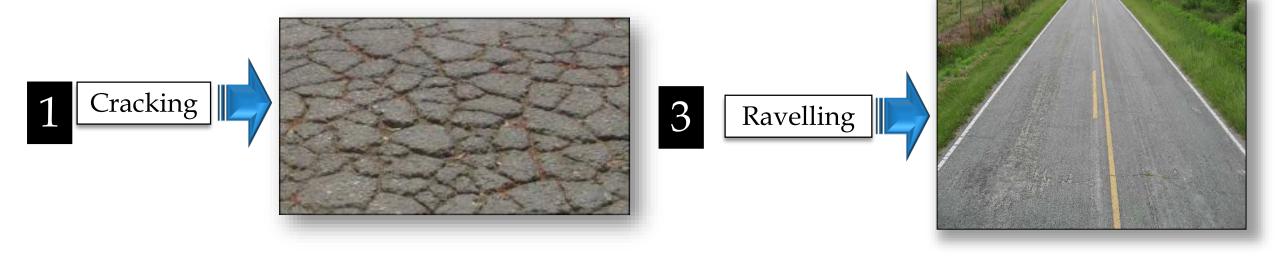
Pavement Condition Index

- It is a numerical index representing the condition of the surface of the road network.
- There are different ways to formulate PCI
- A typical PCI formula takes into account of major distresses only
- Many of the distresses in of Indian roads are not covered in the existing PCI formulae

REPRESENTATIVE PAVEMENT SURFACE

PCI: 100

PCI: 60

PCI: 40

PCI: 5

Most common distresses in flexible pavement (considered in PCI)

1 Cracking →

2 Rutting →

3 Ravelling →

4 Potholes →

5 Edge Break

6 Shoulder Drop off

7 Failed Section

Quantification of severity and extent of distress

- ## Cracking:

1 | Cracks

- **Severity Calculation**
- **Extent Calculation**

$$C = \frac{Ac}{A} \times 100 \%$$

Where, C = % of area under cracking

Ac = Area of cracking zone

A = Area of the road Section

= Average width of the section × Length of the section

• Rutting

2	Rutting

• **Severity Calculation** →

• **Extent Calculation** →

Rutting area, $R = w_R \times l_R$

Where,

w_R =Width of rutting

l_R =Length of Rutting

Then, % of effected area of rutting is given by,

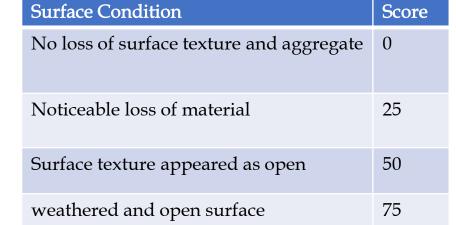$$d_R = \frac{R}{A} \times 100\%$$

Where, A= Average width of the section × Length of the section

- # Ravelling

3 | Ravelling →

Surface Condition	Score
No loss of surface texture and aggregate	0
Noticeable loss of material	25
Surface texture appeared as open	50
weathered and open surface	75
Severe stripping of aggregate	100

- **Severity Calculation** →

- **Extent Calculation** ↓

$$r = \frac{d}{A} \times 100\ \%$$

Where, r = % of area of ravelling
d = Ravelled/disintegrated area on the section
A = Area of that section
= Average width of the section ×
Length of the section

- ## Pothole

4 | Pothole

- **Severity Calculation**

Based on the volume of water consumed by the pothole the severity score is provided.

- **Extent Calculation**

Number of potholes present in the section.

- **Edge break**

5 | Edge break

- **Severity Calculation**

The length from the edge to the inner side of the pavement up to which the break is present

- **Extent Calculation**

The extent will be based on the percentage of longitudinal length of the crack present in the pavement.

• Shoulder drop-off

6	Shoulder drop-off

• **Severity Calculation**

• **Extent Calculation**

• The extent is based on the percentage of longitudinal length of the shoulder drop-off present in the pavement.
• Percentage lengths shoulder drop-off is given as-

$$L_{sd} = \frac{l_e}{L} \times 100 \ \%$$ Where,

l_e- longitudinal length of shoulder drop-off

• Failed Section

• **Severity Calculation** →

Analysis of any distress is difficult and impossible .(i.e; the maximum severity score, 100)

• **Extent Calculation** →

a_f, area of failed section is given as-
$$a_f = w_f \times l_f$$
Where,
w_f= Average width of the ravelled section
l_f= Length of ravelled section
A_f , percentage area of failed section is given as-
$$A_f = \frac{a_f}{A} \times 100\%$$
Based on A_f, the extent weight is given.

Distress type		Extent Weight				
	Measured as	0	0.25	0.50	0.75	1.0
Failed Section	% of area	0	0-25	25-50	50-75	Through out