

# White Topping-

## Redefining City Roads in India

## FLEXIBLE PAVEMENT

**BITUMEN**

Consists of a mixture of asphalt or bituminous material and aggregates placed on a bed of compacted granular material of appropriate quality in layers over the subgrade



## RIGID PAVEMENT

**FULL CONCRETE**

A rigid pavement is constructed from cement concrete or reinforced concrete slabs. Grouted concrete roads are in the category of semi-rigid pavements

**WHITE TOPPING**

White Topping (TWT) is the covering of existing asphalt pavement with PQC between 100mm to 200mm.



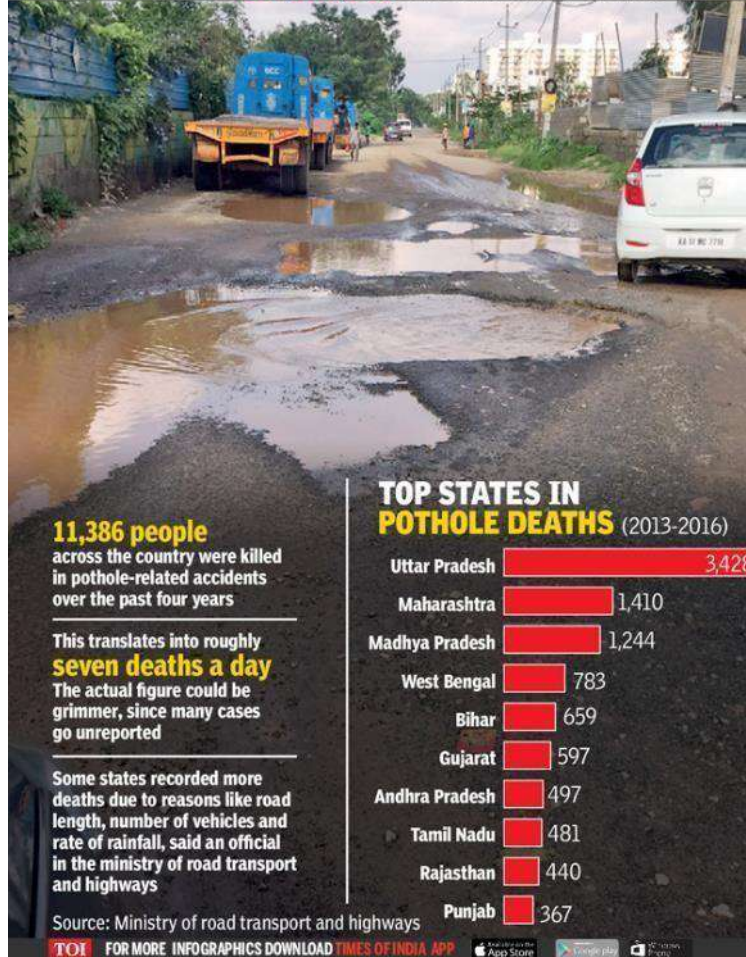


# Issues- Pertaining to poor quality roads



**PUBLIC  
INCONVENIENCE**

## POTHoles KILLED OVER 11,000 INDIANS IN 4 YEARS



**NEGATIVE PUBLICITY FOR  
BUREAUCRACY**



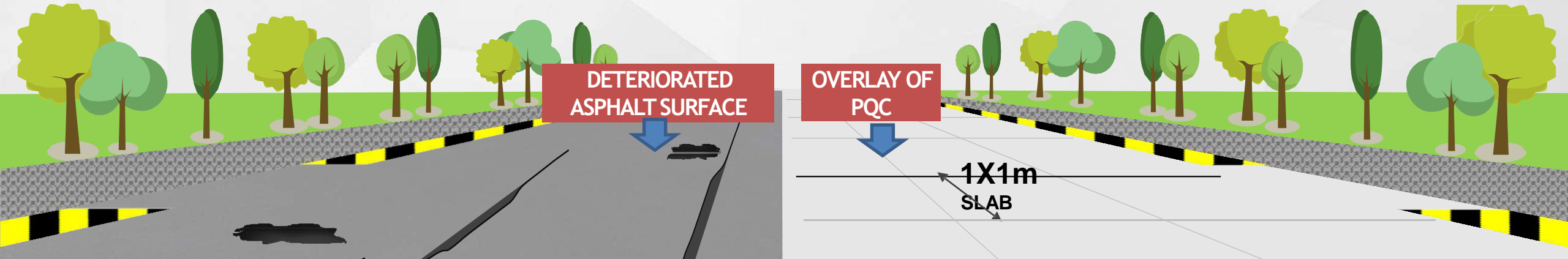
**RECURRING EXPENSE FOR  
GOVT EX-CHEQUER**



# WHITETOPPING

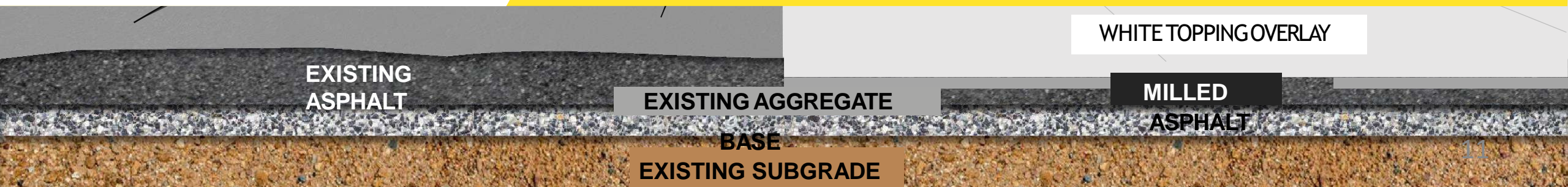
The IRC:SP:76-2015 guidelines defines WhiteTopping in the following way:

- White Topping(WT) is an overlay of existing asphalt pavement with PQC
- It's an effective measure for the rehabilitation of existing asphalt pavement.



## Construction Process

The existing road is utilized as a sub-base. The asphalt layer is simply milled and the new concrete overlay is laid on the milled asphalt surface.



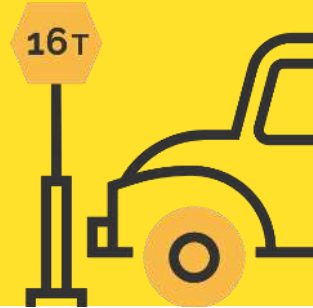
# White Topping: Classification as per IRC SP: 76- 2015

## CONVENTIONAL WHITETOPPING



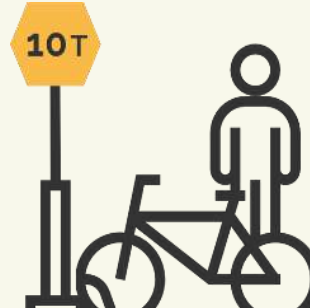
- **Overlay thickness:** greater than 200 mm
- Treats the existing bituminous surface as overlay, similar to DLC
- Condition of existing surface is not significant
- Bond between layers not accounted for. Hence, no composite action

## THIN WHITETOPPING



- **Overlay thickness:** between 100-200 mm
- Bond between layers considered, but not mandatory. Not considered in the design
- High strength concrete (M 40 & above) with fibres is used
- Joints at shorter spacing: 0.6 to 1.25 m, both ways

## ULTRA-THIN WHITETOPPING



- **Overlay thickness:** less than 100mm
- Not recommended for Indian roads
- Suitable only for interior roads of colony, where heavy traffic is not expected
- Consideration of bonding between old & new layers is mandatory.
- Joints at shorter spacing: 0.6 to 1.25 m, both ways



# White Topping- Process



**Milling & Profile Correction**



**Surface Preparation**



**Concrete Overlay**



**Surface Finishing**



**Final Road**



**Curing & Testing**



**Groove Cutting**



**Texturing**





## **LIFECYCLE COST**

**Average maintenance period** for asphalt road is 2-4 years while for White Topping is negligible

**Average resurfacing period** for asphalt road is 8-10 years where as White Topping lasts for more than 20-25 years

**Lifetime cycle cost** (25 yrs) for Bituminous Toppings ~4.5 times the costlier than White Topping



## **FUEL SAVING & EMISSION REDUCTION**

Concrete overlays have **lesser pavement deflection** resulting in reduced vehicle fuel consumption(10-15%)

**Lower fuel consumption** results in reduced CO<sub>2</sub>, SO<sub>2</sub> & NO<sub>2</sub> emissions



## **ENERGY SAVING**

Concrete pavements have **better reflectivity** resulting in reduced illumination load/km thus **saves energy** (20-30%)

—  
**Reduced Heat Island Effects** on concrete pavements results in lesser energy consumption for air conditioning to cool urban buildings (8-10 degrees of temperature difference)



## **ROAD SAFETY**

**Reduces accidents** caused due to potholes

—  
Surface reflectance of concrete overlays is 4-5 times higher **enhancing driver visibility during night**

**Braking distance** for concrete overlays is lesser in both wet & dry conditions



## **SUSTAINABILITY**

Bituminous pavements result in 2-5 times more **energy consumption** as compared to concrete pavements

—  
Concrete pavement is a **100 per cent recyclable** material and can be crushed and re-used

**Continuous aggregate consumption** is required to maintain bitumen roads



## LIFE & LIFE CYCLE COST

Long lasting concrete overlay does not require rehabilitation frequently & thus consumes less raw materials in the long run.

Long lived concrete overlays demonstrates economic advantage in terms of life cycle cost.

Lifetime cycle cost (25 yrs) for Bituminous Toppings is ~4.5 times the cost of White Topping (Concrete Overlay).

## COST COMPARISON

of Asphalt & Concrete Roads (2 lane road per km)

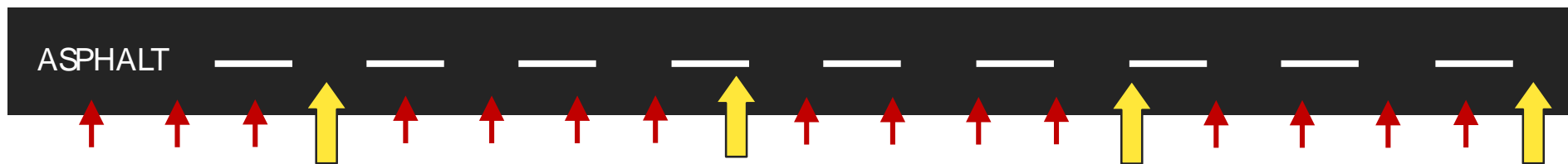
SR.NO	DESCRIPTION	ASPHALT (IN LAKHS)	DESIGN LIFE (YRS)	CONCRETE (IN LAKHS)	DESIGN LIFE (YRS)	MAINTENANCE
1	New Road	231.33	8 - 10	258.76	35-40	Asphalt - 3.4 lac/km Concrete - 0.5lac/km
2	Overlay	71.66	3 - 5	98.0	20-25	

### WHITE TOPPING



Small arrows indicate rehab at about 12-16 years. Large arrows indicate replacement at 30-40 years.

40 YEARS



Small arrows indicate maintenance every 2-4 years. Large arrows indicate resurfacing every 8-14 years.





## **FUEL SAVING & EMISSION REDUCTION**

# **Low Fuel Consumption & Emission**

Road transport accounts for **77%** of total fuel consumed in transport sector

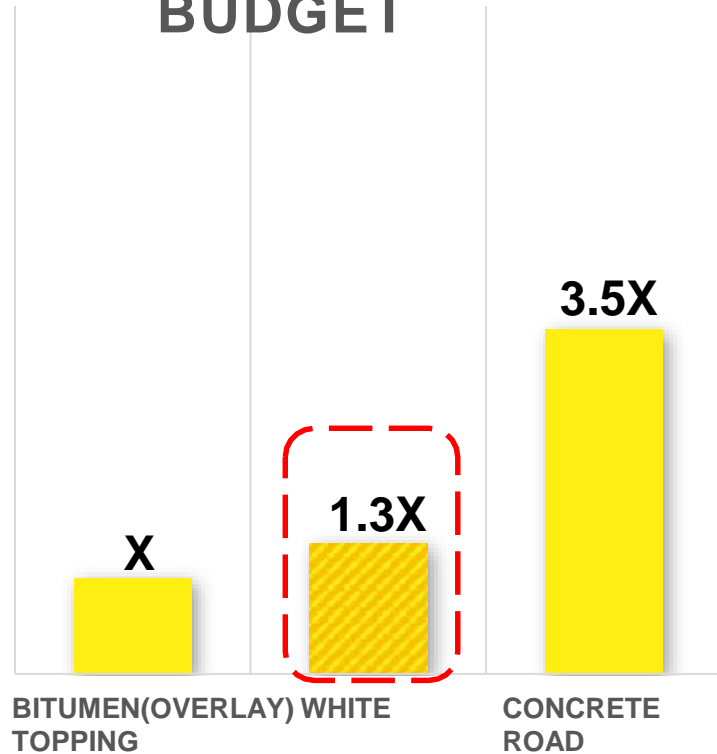
The amount of fuel consumed by a vehicle is directly proportional to the amount of deflection encountered under the vehicle wheels



Several studies have pointed out that deflection by heavy vehicle wheels on asphalt surface overlays is greater than resistance on concrete overlays. Thus more fuel is required to move heavy vehicles on asphalt /bitumen roads.

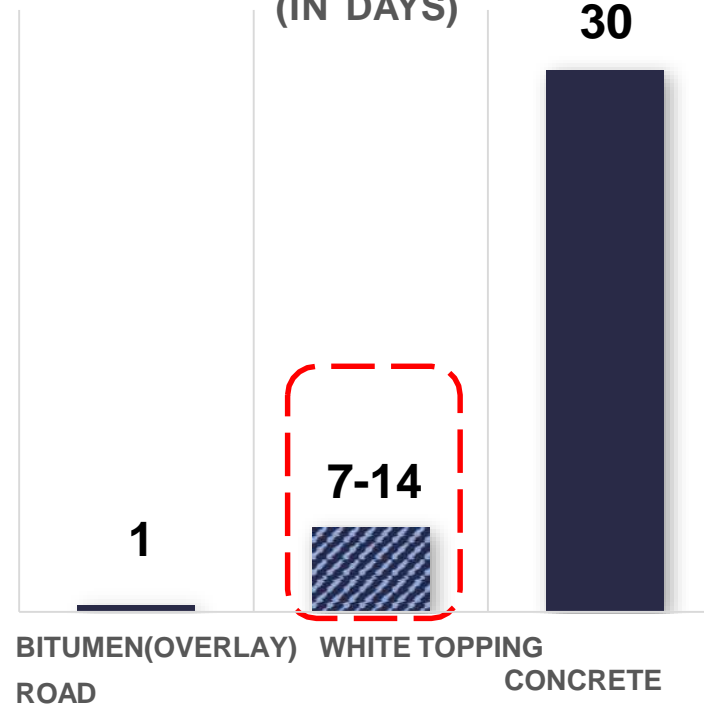
# White Topping- The optimum solution

## INITIAL BUDGET



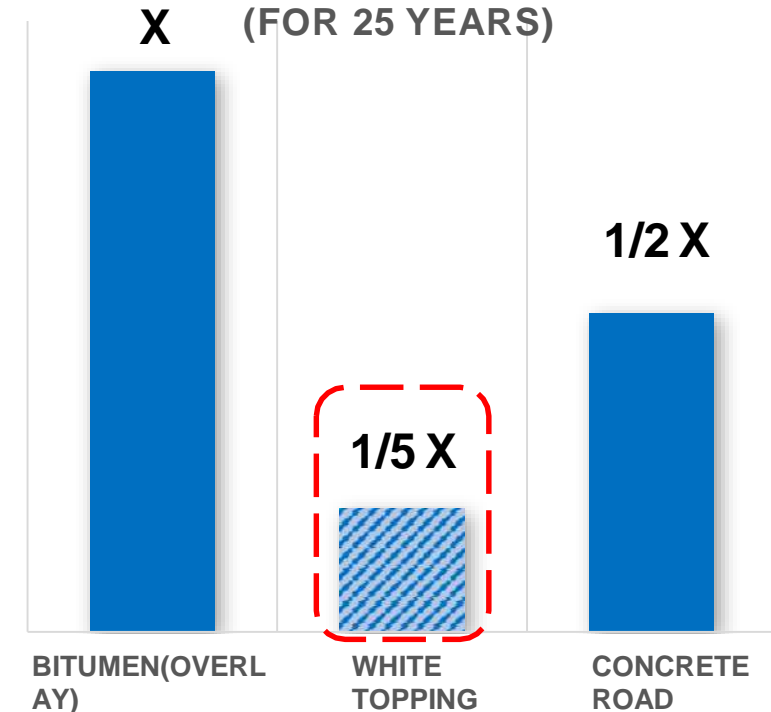
‘Benefit of Concrete nearly at the price of Bitumen’

## TURNAROUND TIME (IN DAYS)



‘Much faster, can be addressed further’

## LIFE CYCLE COST (FOR 25 YEARS)



‘Lowest overall’

### Considerations for calculation :

1. Discount rate = 7%
2. Inflation rate = 5% p.a
3. All the cost are for 1Km x 2 lane CBR-5 road
4. Lifespan of 25 years
5. Frequency of Bitumen overlay : 27 yrs



# PROJECT DETAILS

HIGHWAY ROAD BENGALURU



1<sup>ST</sup>

First White topped highway project in the country

90 LANE KMS

This is largest /longest White topped Road in the country



First White topped Project on PPP model

489<sub>MSA</sub>

Designed for heavy vehicles

60<sup>+</sup> YEARS

Design life of concrete road

120 DAYS

Completed in record time

## DESIGN DETAILS

- Design Load = 9000 kgs
- Traffic Intensity = 10497 cvpd
- k-value = 12 kg/cm<sup>2</sup>
- Modulus of Elasticity of concrete =  $3 \times 10^5$  kg/cm<sup>2</sup>
- Poisson's ratio = 0.15
- Co-efficient of thermal expansion =  $10 \times 10^{-6}$  /°C

- Concrete flexural strength = 45 kg/cm<sup>2</sup>
- Panel Size = 1 m x 1 m
- Subgrade CBR = 7% to 10%
- \*IRC referred: IRC: SP-76-2008, 58-2002 & 2011
- Axle Load – 489 msa

## TECHNICAL SPECIFICATIONS

Cement - 430kgs

Mineral Additive (GGBS) - 60kgs

20 mm Coarse aggregate - 681kgs

12 mm Coarse aggregate - 435kgs

Manufactured Sand - 739kgs

Water - 160kgs

Poly-propylene Fibre - 0.9 kg/cum.

Admixture "Glenium Ace 30" - 0.8 - 1 %

W/B ratio - 0.37

Unit weight (Kg/m<sup>3</sup>) - 2445

Target mean Strength (MPa) - 48.25



Concrete Laying by Paving Machine



Surface Finish by Bull Float



Texturing



Curing Compound Spraying



Groove Cutting



Grooved surface





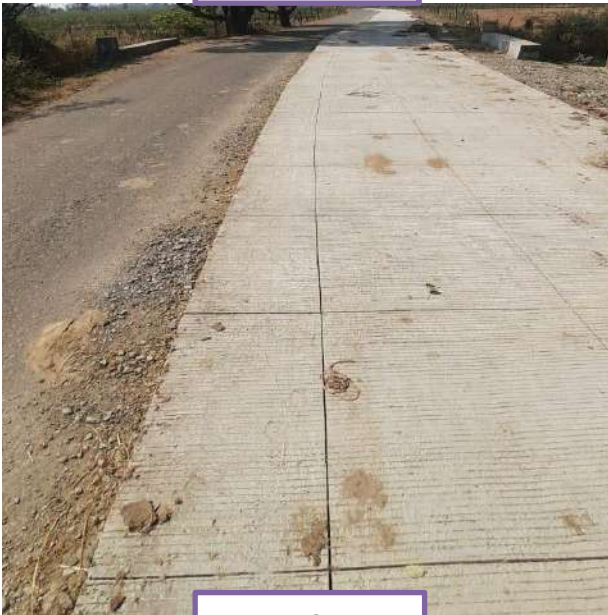
Lucknow



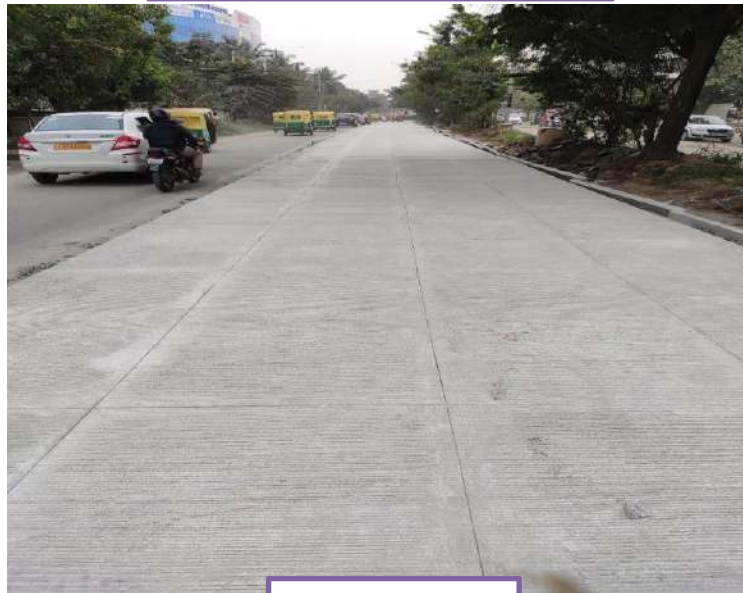
Nice Road, Bengaluru



BRO, Gangtok



Gondia



Bengaluru



Bengaluru

## OUR 3 STAGE APPROACH:

### BREAKING MYTHS

White Topping vs. Bitumen Roads

- ✓ Technology advantages
- ✓ Cost advantage – Life cycle cost
- ✓ Environmental advantages
- ✓ Societal advantages

### KNOWLEDGE TRANSFER

- Technical workshops and seminars by WT Consultants and SMEs
- Sharing success stories/testimonials of WT roads in India and worldwide
- Stage-wise training, best practices of WT roads and Utilities management

### SOLUTION PARTNER

- Support end to end construction journey
- Run accreditation program for certification as White Topping contractors
- Managing Public Sentiments
- On-site Troubleshooting
- Help interface with Equipment suppliers





For any queries, Kindly visit:  
[www.ultratechcement.com](http://www.ultratechcement.com)  
Toll Free No- 1800 210 3311