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Application of Foam Bitumen in Asphalt Pavement Recycling: A Case Study

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INTRODUCTION

- ✓India has 5.4 million kilometers of road network, which is the second largest in the world.
- ✓Majority of the roads in India are Flexible (Bituminous) Pavement Roads

Wearing Course (Bituminous)

Bituminous Base Layer

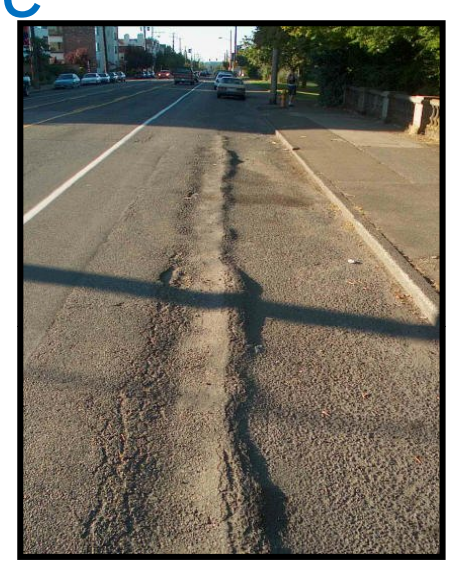
Granular Layer

Subgrade

Most of the road projects executed are implemented by Flexible Pavements, the failures of which are *Rutting*, *Cracking* and *Moisture Damage*

Cracking

Moisture induced damage



Rutting

Indian Road Construction Scenario

MATERIAL

- In india, about 15,000 tonnes of aggregates are required per kilometer of highway
- A typical NHDP of 60 km road improvement requires 20 lakh ton of material

ENERGY

- 90,000 litres of fuel for drying and heating of aggregates per kilometer of highway
- For a lead of 200 km (very common in North India), 180 lakh litre of diesel in transportation is consumed

EMISSIONS

- Caused by heating of bituminous binder and HMA
- Amount of emissions doubles for every 10°C increase in production temperature

Concern & Need of Study

- ***Stone aggregates constitute more than 80-85% by volume of the pavement materials for construction***
- ***With the increased unrestricted use, sources are fast depleting and may vanish in near future***
- ***The energy sources are diminishing as well***
- ***The greenhouse gases are increasingly emitted, causing disturbance in the environment and ecological balance***

Alarming Need to explore conservation of Material and environment protection techniques/measures leading to sustainable roads

Recycling of Pavements

Reclaimed Asphalt Pavement (RAP)

Removal and reuse of asphalt layer of existing Pavement is termed as Recycling of existing bituminous pavement materials to produce new pavement material results in considerable savings of material, money and energy

for its foaming characteristics:

bitumen will

Finer aggregates "spot-welds" the 

determined by sand replacement method.

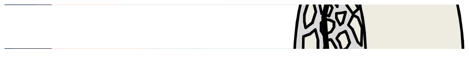
Amount of bitumen being foamed

		5	12	15

optimum heating condition. The best result was

observed at temperature of [illegible]°C and at [illegible]

case) is used to determine the Optimum Foam Binder




350

Test Parameters

(average of 3 tests)

pavements

Loading frequency	10 Hz

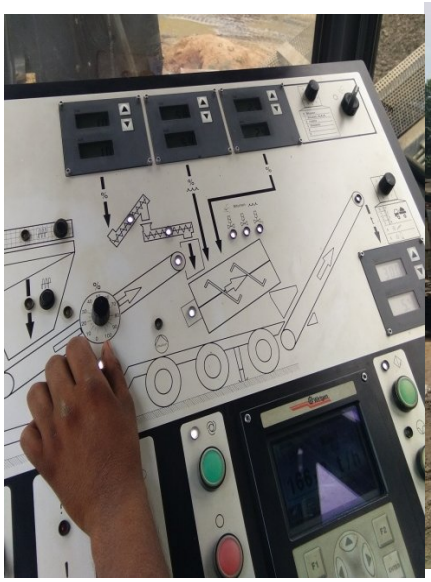
| Granular Sub Base | 450 | | Granular Sub Base | 450 |

Cold in situ recycling taking place

Foam Bituminous Mix (Base Course) on Section of NH 44

Application of Tack Coat on BSM Layer before laying of BC

Collection of Foamed Stabilized Mix from Plant



View of Foaming Plant

Close view of Foamed Stabilized Mix

Laying and Compaction of Foamed Stabilized Mix

- Any road furniture is excluded and hence no calculations for the

Consolidated results:	tCO2eq	Consolidated results:	tCO2eq

about 833 and 31 tonne, respectively using the foam