# Reliance

Industries Limited

# POLYPROPYLENE GEOTEXTILES:

## Indian Scenario and Supply Chain

FICCI

National Conference

On

Stimulating Investment in Technical Textiles: Meditech and Geotech

**V.Kannan**

**Reliance Industries Ltd.**

**19th Nov 2010**

# Geotextiles: An Introduction

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**Geotextiles** are permeable fabrics which, when used in association with soil, have the ability to separate, filter, reinforce, protect, or drain.

**Three basic forms:**

- ❑ Woven (looks like mail bag sacking),
- ❑ Needle punched (looks like felt), or
- ❑ Heat bonded (looks like ironed felt).

**Material:** Generally Polypropylene or Polyesters.

# Polypropylene : Versatile Plastic

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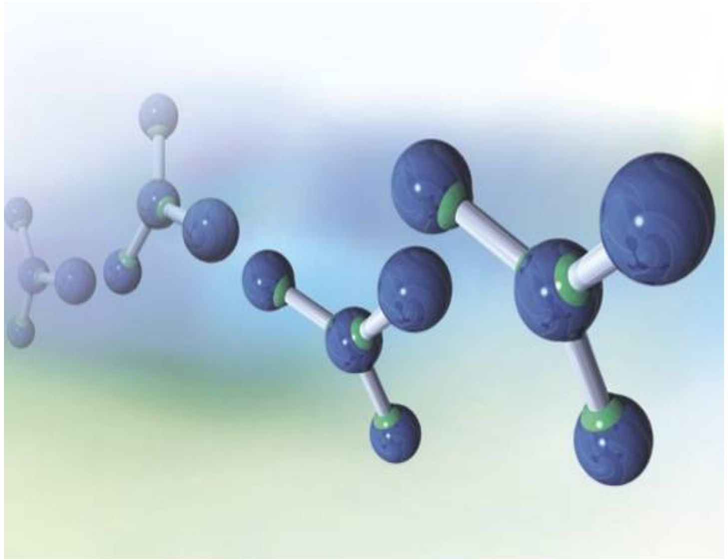

- Lightest Plastic – Density 0.90 g/cc
- Excellent Mechanical Properties
- Excellent chemical and fungal resistance
- Low cost
- Easy Availability

# Polypropylene from Reliance

**PP**

- ❑2.7 MMTA capacity
- ❑5th Largest producer in the world
- ❑Wide Range of Grades to choose from
- ❑Superior Technological Strengths
- ❑Strong Focus on Innovations and R&D

**PP at your doorsteps from 185 Marketing outlets in India**

# Polypropylene : Capacity in India

| Manufacturer | Present Capacity |
|---|---|
| RIL | 2.700 |
| Haldia | 0.35 |
| IOCL | 0.650 |
| Total | 3.7 |

*All Figures in Million Metric Tones per Annum*

- Domestic Consumption(2009-10) = 2.5 Million Tones per Annum
- Growing at the rate of 20% CAGR

**Abundant supply of PP to ensure growth**

# Geotextiles Scenario in India

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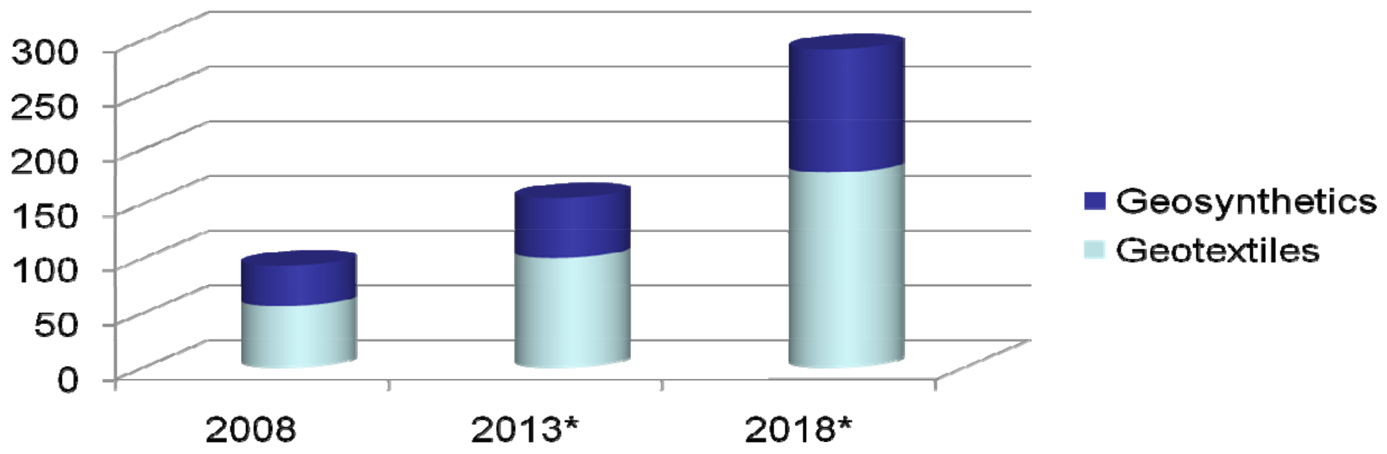
| YEAR | Geotextiles rolled out ( million m² ) | Geosynthetics rolled out ( million m² ) |
|---|---|---|
| 2008 | 37 | 56 |
| 2013* | 65 | 100 |
| 2018* | 113 | 178 |




* Study by Freedonia Group

**Prospects of Geotextiles in India are very High**

# Global Scenario v/s India Scenario

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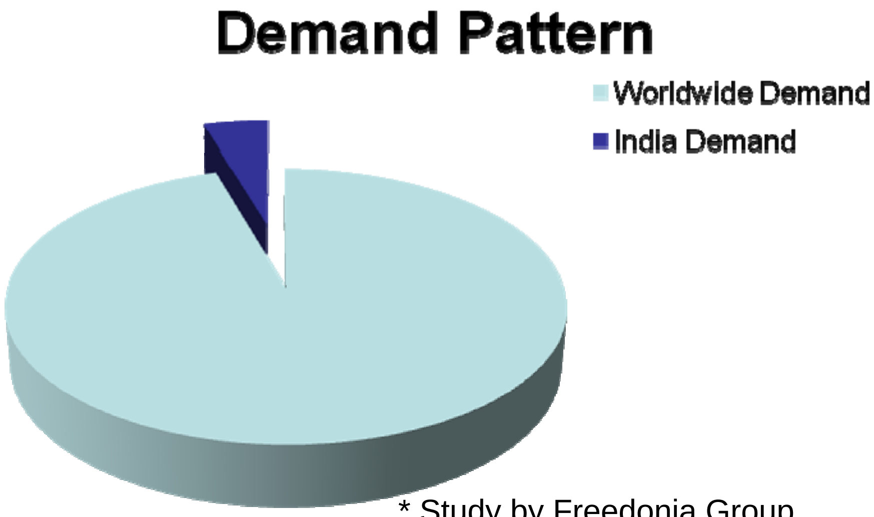
**Expected Demand - 2013***

- ❑Worldwide Demand :4.7 billion sq. m.
- ❑India Demand :100 million sq. m.
- ❑Share of INDIA : 2.2 % Only




* Study by Freedonia Group

**Market Size for Geotech ( Value in Rupees Crores)**

| | 2007 – 08 | | | | 2012-13 | |
|---|---|---|---|---|---|---|
| | Production | Imports | Exports | Domestic Consumption | Domestic Consumption | Export Potential |
| TOTAL | 167 | 105 | 87 | 185 | 326 | 128 |

•Baseline survey of the technical textile industry in India

**Huge Potential exist with Growth of Infrastructure**

# Infrastructure Development

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| Phases | Total Length (in Km) | Phase Cost Approved (Rs Crore) |
|---|---|---|
| Phase I GQ,EW-NS corridors, Port connectivity & others | 7498 | 30300 |
| Phase II 4/6-laning North South- East West Corridor, Others | 6647 | 34339 |
| Phase III, Upgradation,4/6-laning | 12109 | 80626 |
| Phase IV , 2-laning with paved shoulders | 20000 | N.A |
| V 6-laning of GQ and High density corridor | 6500 | 41210 |
| VI Expressways | 1000 | 16680 |
| VII Ring Roads, Bypasses and ring roads/flyovers and other structures | 700 Km of ring roads/ bypass + flyovers etc | 16680 |

Source: NHAI, Ministry of Surface Transport

| Sectors | Investment Needs during 2006-07 to 2010-11 (INR Crore) | Investment Needs during 2006-07 to 2010-11 (USD million*) – approx. |
|---|---|---|
| Roads (excluding PMGSY) | 245,000 | 54,400 |
| Power | 665,000 | 148,000 |
| Ports | 86,000 | 19,000 |
| Airports | 40,000 | 8,900 |
| Railways | 122,000 | 27,100 |
| Urban Infrastructure | 22,000 | 4,900 |
| Others (Gas pipelines, SEZs, and tourism) | 420,000 | 93,300 |
| Total | 16,00,000 | 355,550 |

*Source: Various Programs of GoI, Reports of various Committees and IMaCS analysis*

**Infrastructure Growth ensures opportunities for New players also**

# Growth Opportunity

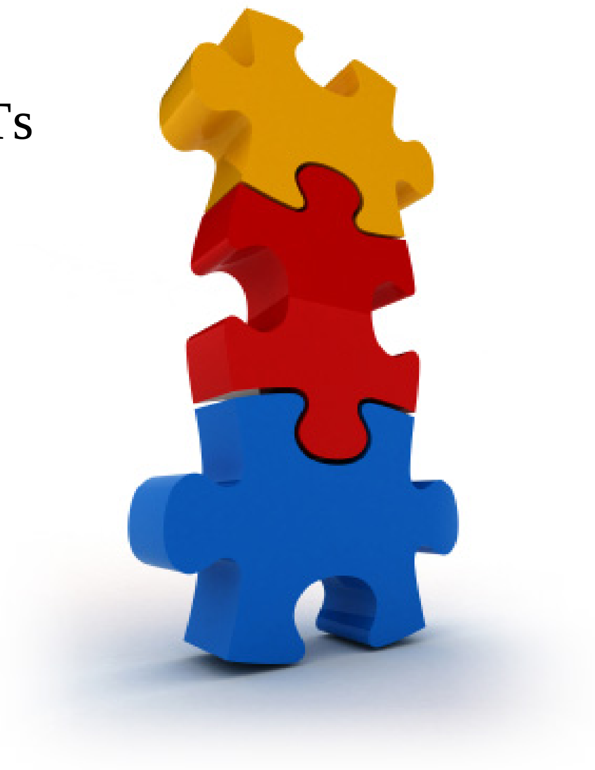
- New paved road to be come up by 2013 – 300,000KM*
- BOT & DBOT Methodology
- Growing stress on Life Cycle Cost Investments rather than Capital cost Investments

* Study Office of Textile Commissioner

**Changing Mindset fueling the Growth Opportunities**

# Approach towards faster growth

- Awareness creation
- Inclusion of Geotextiles in SOR of all states & UTs
- Developing experts
- Strong supply chain
- Geo-Synthetics Manufacturer Associations
- India-Specific case study collection
- Standards and Specifications



**Crossing the hurdles indeed**

# Standards

- IRC SP-59, Guidelines for use of Geotextiles in Roads pavements and associated works is available- under revision
- Draft Standards submitted to TX-30, BIS Geo-Synthetics Sectional Committee under wide circulation.
- User guides for selection of Geosynthetics to be developed.

# Creating Awareness

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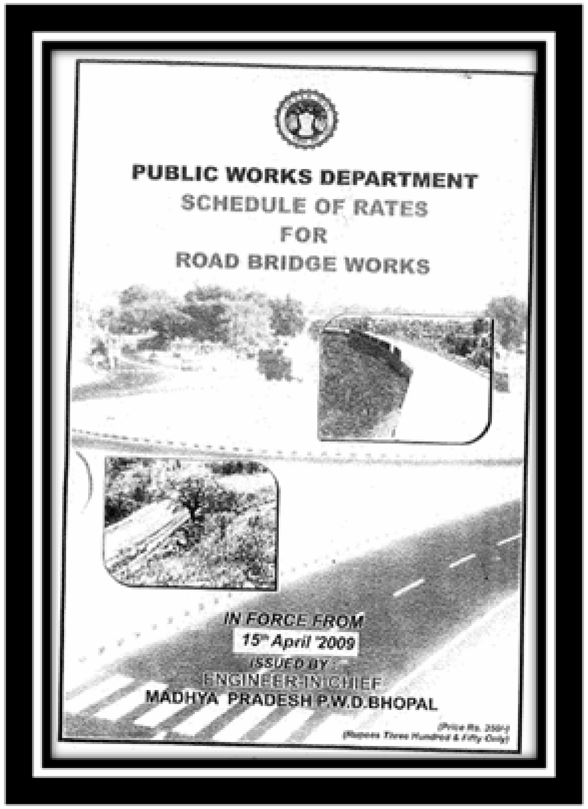
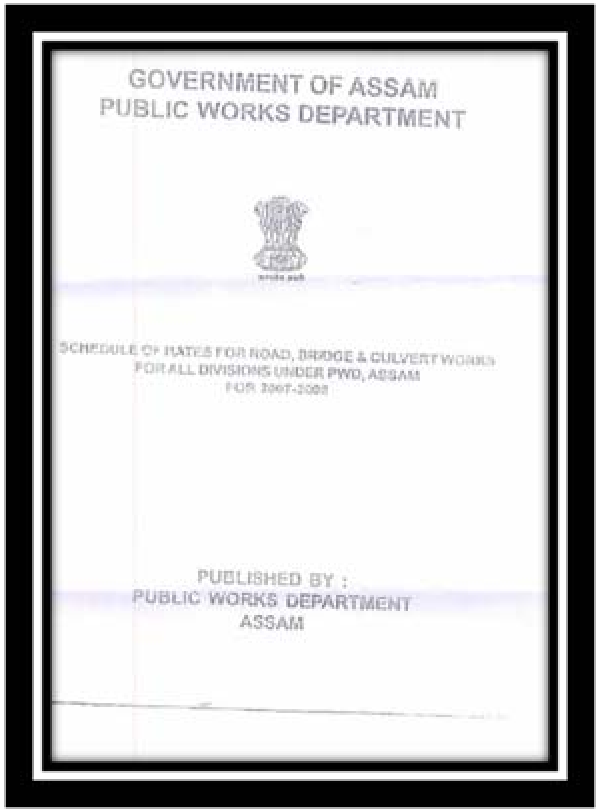
- Awareness creation among stake holders- Never ending process.
- Even developed countries like US still continues to do it.
- FICCI, BTRA, IRC, IITs, other educational institutes and Engineers Associations are doing pioneering works in awareness creation.

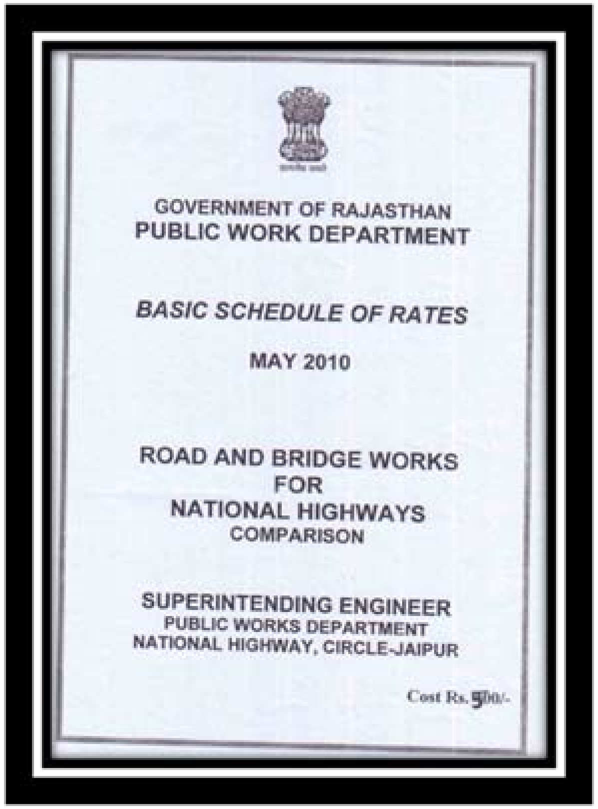
**Awareness creation will lead to increased usage**

# Inclusion of Geotextiles in SOR

Total Released SOR till date =7


PUBLIC WORKS DEPARTMENT
SCHEDULE OF RATES
FOR
ROAD BRIDGE WORKS
IN FORCE FROM
15th April 2009
ISSUED BY :
ENGINEER-IN-CHIEF
MADHYA PRADESH P.W.D.BHOPAL


GOVERNMENT OF ASSAM
PUBLIC WORKS DEPARTMENT
SCHEDULE OF RATES FOR ROAD, BRIDGE & CULVERT WORKS
FOR ALL DIVISIONS UNDER PWD, ASSAM
PUBLISHED BY :
PUBLIC WORKS DEPARTMENT
ASSAM


GOVERNMENT OF RAJASTHAN
PUBLIC WORK DEPARTMENT
BASIC SCHEDULE OF RATES
MAY 2010
ROAD AND BRIDGE WORKS
FOR
NATIONAL HIGHWAYS
COMPARISON
SUPERINTENDING ENGINEER
PUBLIC WORKS DEPARTMENT
NATIONAL HIGHWAY, CIRCLE-JAIPUR

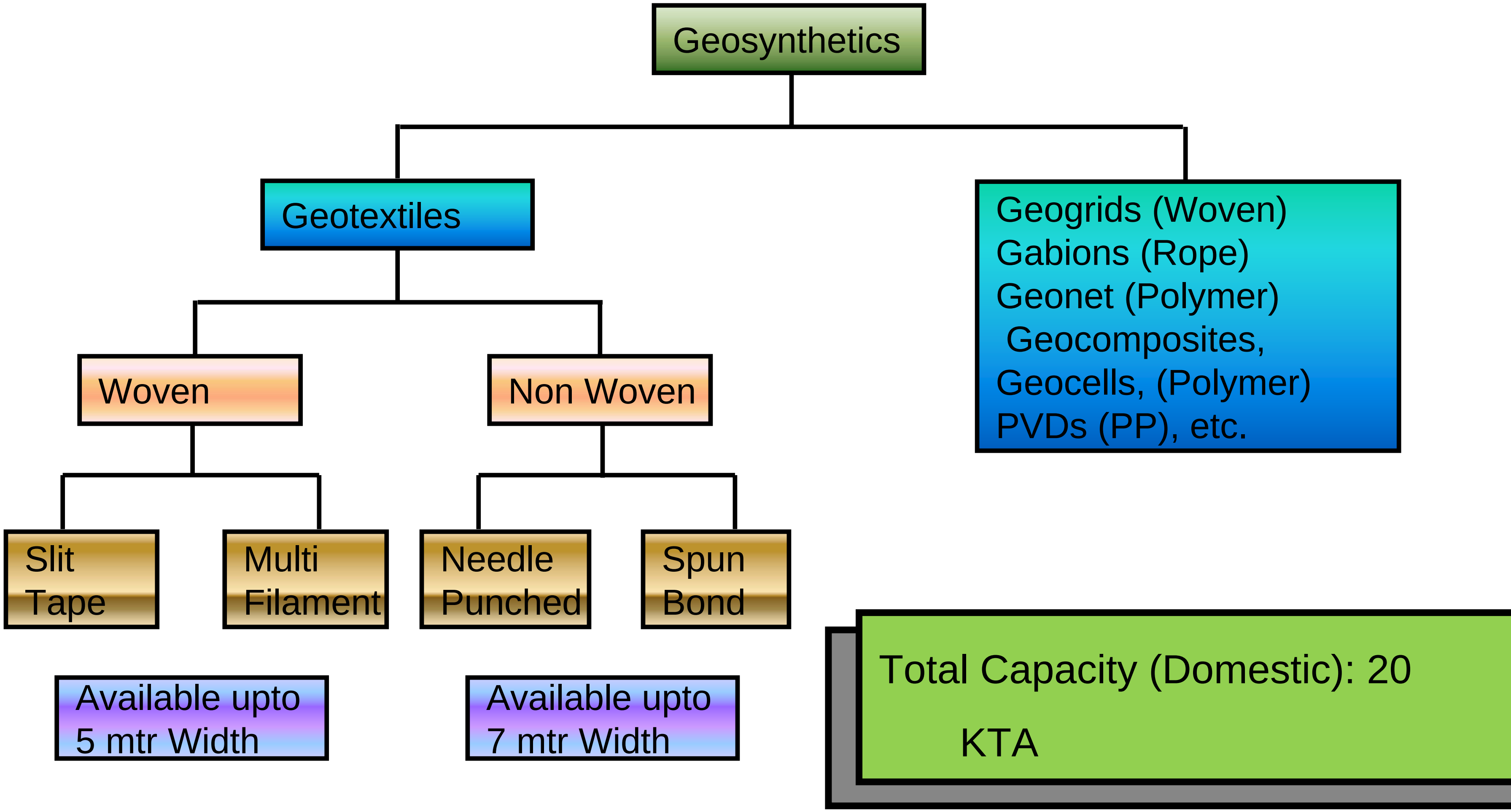
**The first step for Geotextile specification in Project**

# Technical Experts

- Indian consultants with rich experience in Geo-Technical field are our strength.
- Various consultancies with International Backing are also supporting us.
- Geosynthetics subjects to be taught at graduate level

**Educational Institutes to play a major role**

# Geosynthetics – Supply Chain



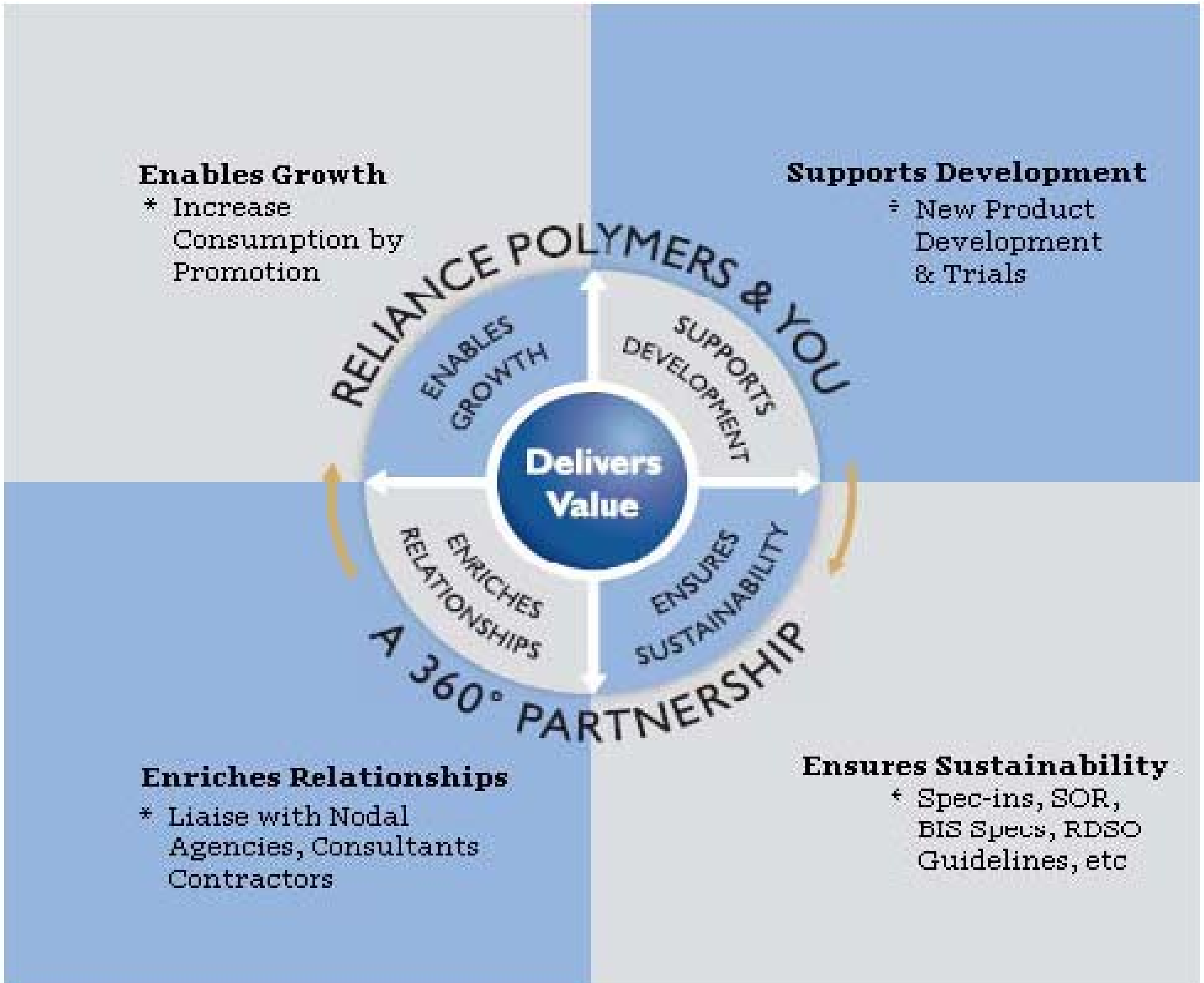

**Supply chain already in place in India**

# Case study collection – Mutual cooperation

- ❑Need to consolidate all Indian Case studies.
- ❑Growing awareness is the key to Infrastructure Development using Geotextiles.
- ❑Healthy competition and increased usage are key to success.


**We will rise together**

# Reliance Role

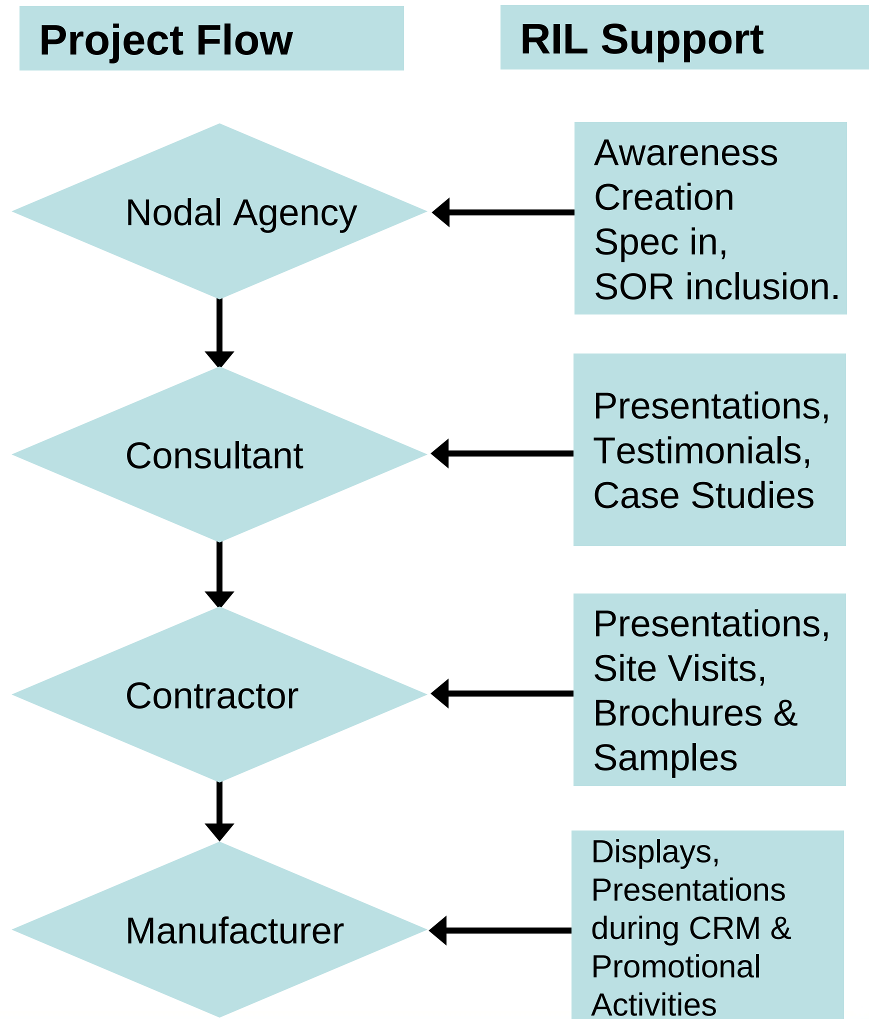



**A 360 degree partnership- Supports Everyone**

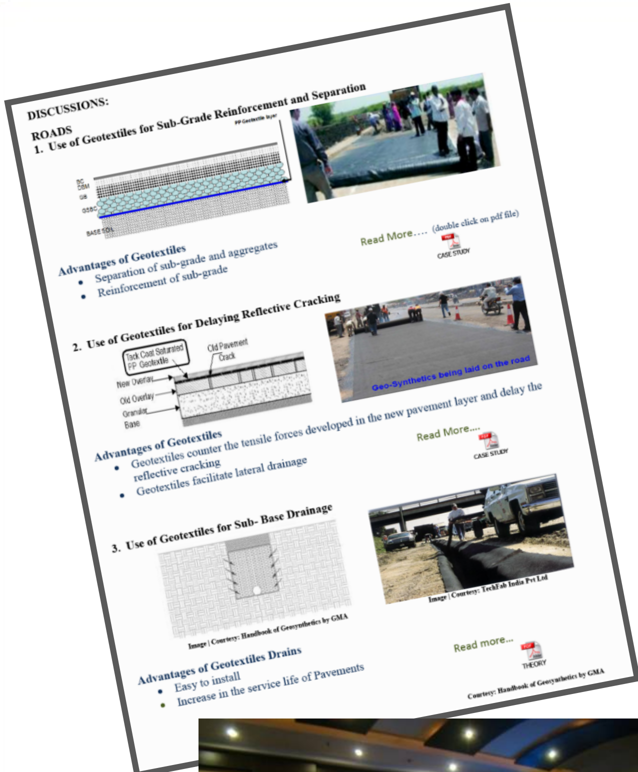
# Reliance Role



- Actions initiated by Reliance Industries
- Promotion through
  - Nodal Agencies -> NHAI, RDSO, IRC, CRRI, BRO
  - Govt Departments -> PWD, Irrigation, R&B, CPWRS
  - Consultants and Contractors
  - FICCI task force
- Sponsored case studies
  - MDR82
  - CRRI
  - Gurgaon SEZ
  - NMSEZ
- Link manufacturers to end users
  - Through CRMs
  - Site Visits



# Reliance Role: Awareness Creation


DISCUSSIONS:

ROADS

1. Use of Geotextiles for Sub-Grade Reinforcement and Separation



Read More.... (double click on pdf file)

CASE STUDY

Advantages of Geotextiles
- Separation of sub-grade and aggregates
- Reinforcement of sub-grade

2. Use of Geotextiles for Delaying Reflective Cracking



Advantages of Geotextiles
- Geotextiles counter the tensile forces developed in the new pavement layer and delay the reflective cracking
- Geotextiles facilitate lateral drainage

Read More....

CASE STUDY

3. Use of Geotextiles for Sub- Base Drainage

Image | Courtesy: Handbook of Geosynthetics by GMA

Image | Courtesy: TechFab India Pvt Ltd

Advantages of Geotextiles Drains
- Easy to install
- Increase in the service life of Pavements

Read more...

THEORY

Courtesy: Handbook of Geosynthetics by GMA

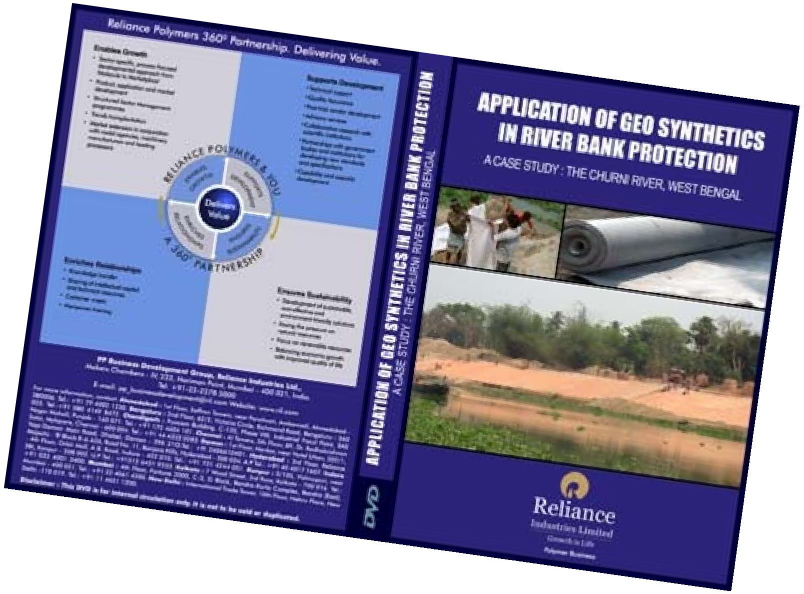
- ❑Shared NH-2 Pavement Overlay Report with stakeholders like NHAI, PWD, Consultants etc.
- ❑Prepared a Geosynthetics Kit for circulation of the same to all consultants and stakeholders.
- ❑CRMs organized across the India for promotion of Geotextiles.
- ❑Participation in various conferences

**Leading from Front**

# Reliance Role: Promotional Videos

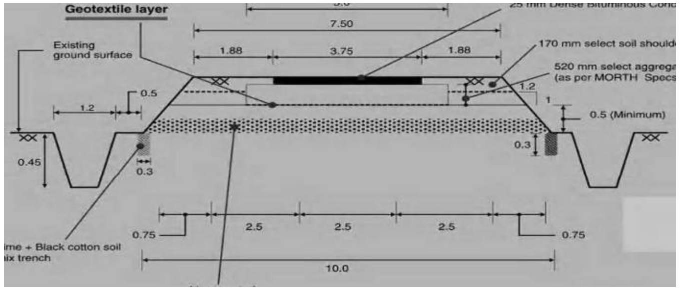
- ❑Promotional Video for Churni River released after all revisions.
- ❑300 copies under production for promotional purpose. To be shared with all stake holders
- ❑A single promotional video for all applications of geotextiles in Roads application under production.

DVD



# Trials across the country: Indian case studies

# Case study # 1:MDR – 82, Kedgaon, Daund , Pune – 2004




**Supported by :**

**PWD – Pune (East), IIT – Mumbai and MERI - Nashik**

Without Geotextile

With Geotextile

**Name of Work:** Construction of Daund – Gar Dapodi Road (Pune District) Km 14/500 to 16/500 with the use of Woven Slit film tape Polypropylene Geotextile fabric as a reinforcing layer at the interface of existing subgrade and granular base along with the involvement of Reliance Industries Ltd. Mumbai, IITB Bombay, MERI Nasik and Techfab India.

**Sub: Report on Performance of PP Woven slit film tape Geotextile Fabric – Six years and six months after laying of Fabric (April 2004 to October 2010)**

**Road Condition and problems before laying of PP Geotextile Fabric:** The road passes through Sugarcane area having Black Cotton soil as a natural subgrade and has inadequate drainage. The root cause of road failure was attributed to CH type of soil, with low cohesion under saturated and undrained conditions, reasonably heavy traffic and high axle loads and inadequate drainage arrangement.

**Role of PP woven Geotextile in Road Construction:** The trial study was executed to arrive at a construction methodology through a_demonstration project involving the use of a_PP Woven Geotextile as a separator cum reinforcement. The project was undertaken to evaluate and compare the performance of a Geotextile reinforced stretch of the road with adjoining stretch of the road constructed_with conventional design under identical conditions. A 2 km long stretch of road along MDR 82 in Daund region of Pune District was selected for this purpose.

**Status of Work:** An indigenously designed Woven slit film Geotextile, manufactured by TechFab India was laid in the first week of April 2004. The Geotextile has identical load elongation characteristics in the machine and cross-machine directions. Design calculations showed that with Geotextile reinforcement, a 30% reduction in the granular base thickness was possible. Construction of the Geotextile reinforced road was completed and opened to traffic in April 2004. However in this study it was decided to introduce PP Geotextile layer along the interface between existing subgrade and granular base by following the conventional method of Construction. This was carried-out to enable to compare the performance of reinforced stretch with an un-reinforced stretches in adjoining areas.

**Observations, Monitoring and Inferences** – Six years and six months after laying of PP Geotextile fabric with **Black top completed**:

1. In the Geotextile reinforced section of the road after Black Top : there are no visible signs of distress even after a period of six years and six months; whereas the earlier experience showed that the road constructed without any Geotextile layer or strengthening measure was observed to deteriorate within six months. This shows a significant influence of the Geotextile layer on the performance of the road.
2. Further, the significant influence of Geotextile layer in improving the performance of the Road stretch along MDR 82 is adequately demonstrated.

3. After a period of six years and six months, geotextile sample retrieved from its embedded location was found to be intact and in good condition without any punctures.
4. This implies that strengthening of existing roads on Black Cotton Soil/ Soft soil subgrade by using PP woven sli
a viable and economical alternative.

In a meeting with Hon'ble Chief Engineer, P.W.
decided to use PP Geotextile in the constructio

1. Lingade Borvil Road (ODR 123) – 1 Km.
2. Deulgaonraje Vadgaon Dharkar Road – 4
3. Pargaon – Nandgaon Hatvalan RD MDR 9
4. Nimbert Murum hol Sangvi Road, MDR 6
5. Bawda Narsingpur Road MDR 72 and
6. Bridges on Indapur – Baramati Road SH6

No 7682/PB/ Daund/25.10.2010
Office of the Executive Engineer
P.W. Division (East), Pune
Dated: 25.10.2010

Cc: SE PW circle Pune
Cc: CE PW region Pune for information and n.a.
Cc: Maharashtra Engg. Research Institute, Nas
Cc: PWD Ministry, Govt. of Maharashtra
Cc : Mr.Vivekanand A. Sane, Vice President, Re
Cc : Mr.Satyajeet Bhonsle, Reliance Industries
Cc: Dr. B.V.S. Visvanadham, Associate Profess
IIT Bombay, Mumbai
Cc: Mr. Anant Kanoi,Director, TechFab India, M


**Creating awareness through TRIALS**

# Case study # 2: River Bank Protection: Swan River, HP

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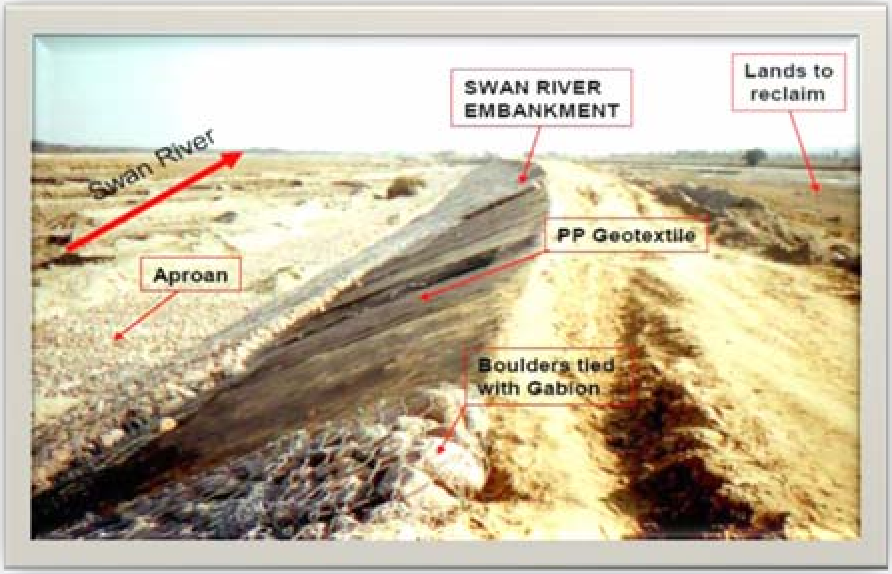
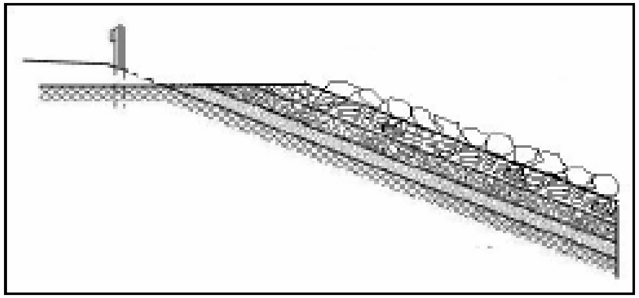
## POLYPROPYLENE GEOTEXTILE FILTERS

Geotextiles are frequently used as a replacement for grades, the advantages associated are

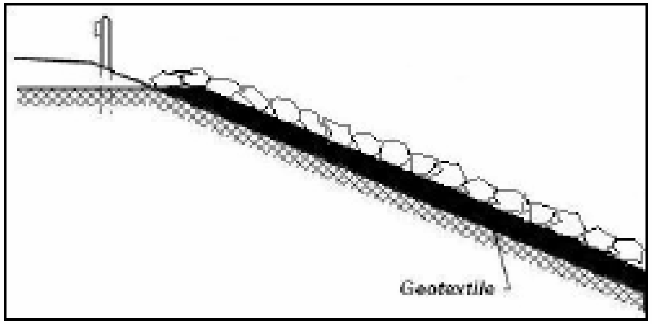
- Improved performance,
- Consistent properties and ease of placement.
- Reduction in number of granular layers
- Faster construction
- Reduced overall cost




Conventional Method



Geotextile Protection



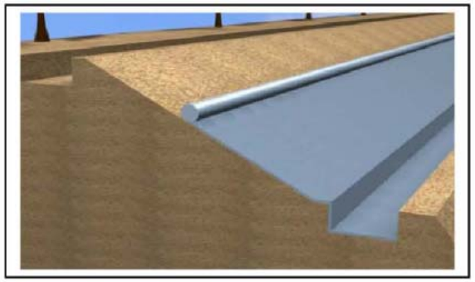
# Case study # 3 : River Bank Protection: Churni River, WB, Mar- 2010

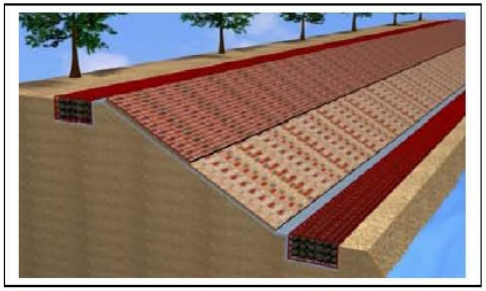
Reliance Industries Limited

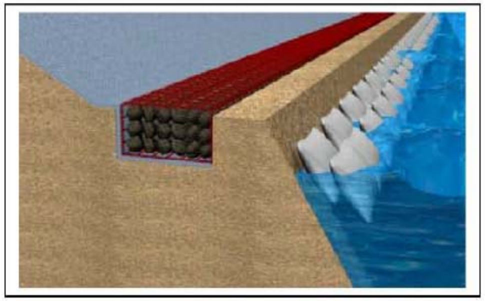
**Advantages of PP Geo-Bags**

❑PP GeoBags provide reinforce ment to the edge of the embank ment.

❑Life of embankment extends exponentially







BEFORE REHABILITATION

AFTER REHABILITATION

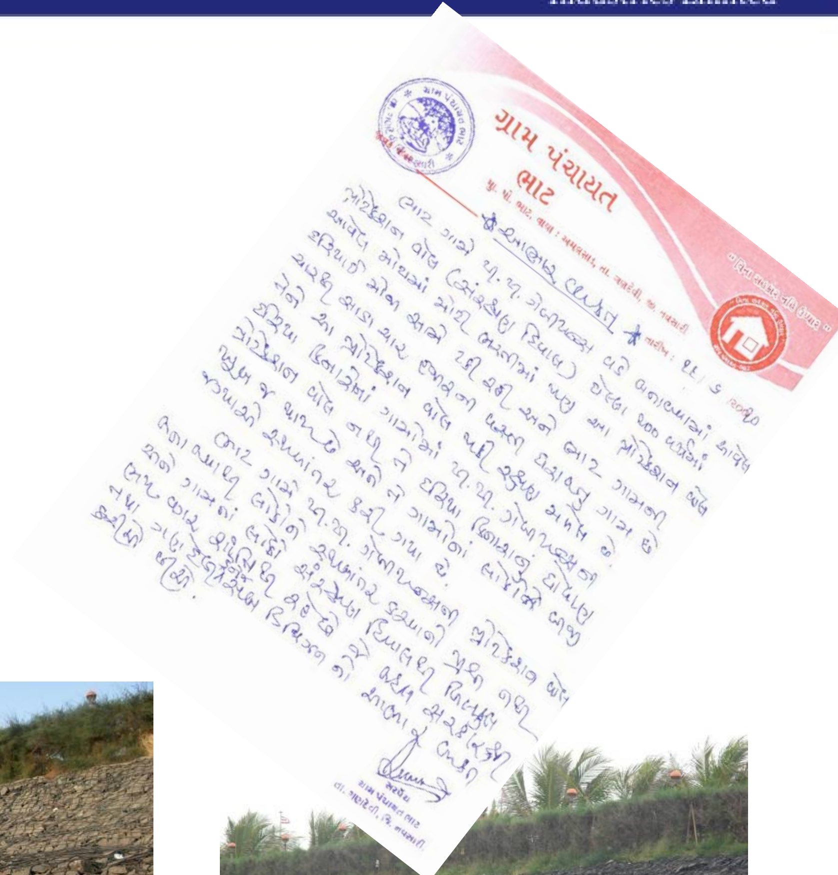

**Geotextile: Useful for so many application**

# Case study # 4 :Sea Shore protection using PP Gabions

**Project initiated with CWPRS**

**Advantages of PP GABIONS**

- ❑High Resistance to corrosion
- ❑High tensile strength
- ❑UV stabilization
- ❑Excellent flexibility.
- ❑Cost Effective solution

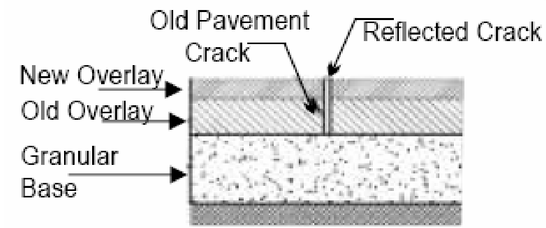

ગ્રામ પંચાયત
ભાટ

**PP Gabions :Saving villages from last 9 years...still intact**

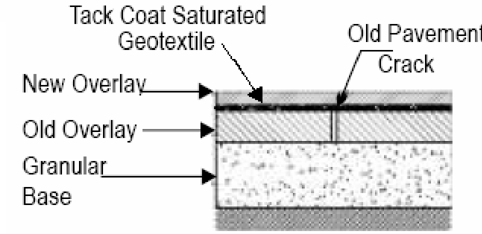
# Case study # 5 : NH-2, Delhi – Mathura project

Reliance Industries Limited

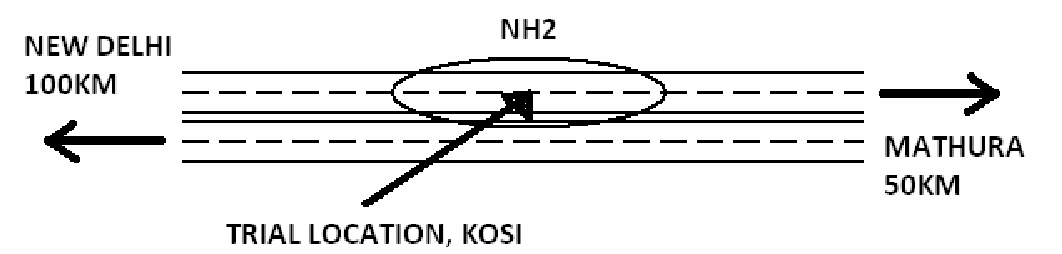
- ❑Project initiated with CRRI for approval of Indian Made Polypropylene NW Geotextile as pavement overlay fabric.
- ❑Used mainly during resurfacing of old cracked pavements.
- ❑Samples developed indigenously by M/s. Techfab India Limited using Repol Polypropylene was approved by CRRI for pilot trial.
- ❑1/2 km stretch 100 km from New Delhi, towards Mathura on NH2 selected for pilot laying. (The stretch carries heavy to very heavy traffic).
- ❑Performance Evaluation will be done after every 6 months



WITHOUT GEOTEXTILE



WITH GEOTEXTILE




# Path Forward

**Lets Join Hands for**

- ❑ Unified Code (Specifications)
- ❑ Inclusion in all SORs' and Guidelines
- ❑ Maximise usage of Geosynthetics
- ❑ Preference to Local Manufacturers

# Let us unite and work towards achieving <u>Geotextiles in Every Road</u>

**Thank You**