TECHFAB GEOSYNTHETICS

Presented To

NRRDA, NEW DELHI
CONTENTS

1. OVERVIEW OF TECHFAB GEOSYNTHETICS PRODUCTS

2. TFI - CASE STUDIES FOR USE OF GEOSYNTHETICS IN GOVERNMENT ORGANISATION’S - MAHARASHTRA STATE

3. CONCLUSION
At the Heart of Geosynthetic Activity

STARTED IN THE YEAR 2003

With a Dream to give India “World Class Geosynthetic Products” With Indigenous Manufacturing Facility Under One Roof

RE Walls Coastal Protection River Training

Ground Improvement Urban Roads Airports Highways
Offices & Departments

Head Office

Mumbai

Regional Sales Offices

Ahmedabad
Bangalore
Chennai
Delhi
Kolkata

Sales & Marketing
Team of 15 highly qualified & experienced engineers

Design & Tech. Services
Team of 8 highly qualified & experienced Geotechnical Engineers

Construction & Projects
Team of 40 graduate /diploma engineers / supervisors
Manufacturing Plants

- Woven Geotextiles
- Polymer Gabions
- Techgrid Geogrids
- Techdrain PVD
- Nonwoven Geotextiles
- Metal Gabions

Year of Start of commercial production:
- 2003
- 2004
- 2005
- 2008
- 2009
- 2010

Location of Plant:
- Silvassa
- Daman
# Geosynthetics from TFI

<table>
<thead>
<tr>
<th>S.N0.</th>
<th>Product</th>
<th>Production started in</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TFI 5000 Woven PP Tape Geotextiles</td>
<td>2003</td>
</tr>
<tr>
<td>2</td>
<td>TFI 1000 Woven PP multifilament Geotextiles</td>
<td>2004</td>
</tr>
<tr>
<td>3</td>
<td>TFI 3000 Woven PET Geotextiles</td>
<td>2004</td>
</tr>
<tr>
<td>4</td>
<td>Polymer Rope Gabions</td>
<td>2004</td>
</tr>
<tr>
<td>5</td>
<td>Techgrid knitted &amp; PVC coated Geogrids</td>
<td>2005</td>
</tr>
<tr>
<td>6</td>
<td>Techfab TGC Reinforced nonwoven composites</td>
<td>2006</td>
</tr>
<tr>
<td>7</td>
<td>Techdrain PVD</td>
<td>2008</td>
</tr>
<tr>
<td>8</td>
<td>Techglass bitumen coated glass fibre grids</td>
<td>2008</td>
</tr>
<tr>
<td>9</td>
<td>TechGeo nonwoven geotextiles</td>
<td>2009</td>
</tr>
<tr>
<td>10</td>
<td>TechPave Paving fabrics</td>
<td>2009</td>
</tr>
<tr>
<td>11</td>
<td>TechBox steel wiremesh Gabions</td>
<td>2010</td>
</tr>
</tbody>
</table>
USE OF GEOSYNTHETICS IN ROADS (PAVEMENTS)

- Geotextile (TechGeo) as filter for trench drain/collector pipe
- Geocomposite drains (TGC)
- Glass Grid (Techglass) for Asphaltic Reinforcement
- Paving fabric (TechGeo) for overlays
- Geotextile (TechGeo) as filter for trench drain/collector pipe
- Geocomposite drains (TGC)
- Geogrids (TGB Series)/Geotextile (TechGeo) for separation
- Geogrids (TGB Series) / Woven Geotextile (TFI Series) for reinforcement
- Geotextile (TechGeo) for filtration
- Geotextile (TechGeo) / Geomembrane for capillary cut off
WOVEN GEOTEXTILE
PRODUCT – WOVEN GEOTEXTILES (TFI SERIES)

- Manufactured at Khadoli, Silvassa.
- **Functions** – Separation, Filtration & Reinforcement
- **Applications** – Paved & Unpaved roads, Track – bed stabilization, Silt fence, Geotextile bags and Tubes.
- **Major clients**: Railways, Irrigation Depts., BRO, etc.
- **Governing Specification**: ASTM & BIS.
- In-house testing & Third-party test certificates (BTRA).
- Exports – UK, USA & Vietnam
- ISO 9001 QMS
Manufacturing capacity of 35 Lacs SQM per year

TAPE PLANT

14 Nos. 5.4 M SULZER LOOMS
NONWOVEN GEOTEXTILE
PRODUCT – NONWOVEN GEOTEXTILES

- Manufactured at Daman - UT.
- **Functions** – Separation, drainage, filtration
- **Applications** – Drainage systems for pavements, Roadway / Railroad stabilization, moisture barrier for asphalt pavements, hard armor underlayment etc.
- **Major clients**: Irrigation, landscaping consultants, architects, Infrastructure Authorities, Ports, municipalities etc.
- **Governing Specification**: ASTM / EN ISO
- In-house testing & Third-party test certificates (BTRA).
- **Exports** – Lebanon & New Zealand
- **ISO 9001 QMS**
Project: Open Air Auditorium
Location: Kharghar, Navi Mumbai, India
Product: TechGeo PR20 Non Woven Geotextile
Manufacturer: TechFab India Industries Ltd.
Function: Separator between Top Soil & Drainage Layer
<table>
<thead>
<tr>
<th>Project</th>
<th>Tunnel Works</th>
<th>Product</th>
<th>TechGeo PR30 Non Woven Geotextile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client</td>
<td>Delhi Metro Rail Corporation Ltd (DMRC)</td>
<td>Manufacturer</td>
<td>TechFab India Industries Ltd.</td>
</tr>
<tr>
<td>Location</td>
<td>New Delhi</td>
<td>Function</td>
<td>Protection, Separation, Drainage between Top Shotcrete Lining &amp; Yellow Geomembrane sheet</td>
</tr>
</tbody>
</table>
NONWOVEN GEOTEXTILES PLANT PHOTO
At the Heart of Geosynthetic Activity

GEOTEXTILE TESTING LAB (TECHFAB INDIA)
GABIONS
At the Heart of Geosynthetic Activity

PRODUCT – COPPER & POLYMER GABION

- Manufactured at Daman - UT.
- Functions – Slope protection, Erosion Control
- Applications – Sea Shore & River Bank protection, Channel linings, Scour protection, reclamation bunds, anti-erosion structures.
- Major clients: Irrigation, Infrastructure Authorities, Ports etc.
- Governing Specification: ASTM.
- In-house testing & Third-party test certificates (BTRA).
- ISO 9001 QMS
At the Heart of Geosynthetic Activity

<table>
<thead>
<tr>
<th>Client:</th>
<th>Meghalaya State Electricity Board, Shillong</th>
<th>Product:</th>
<th>TFI Copper &amp; Polymer Rope Gabions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor:</td>
<td>M/s D. Wahlang, Shillong</td>
<td>Rope Diameter:</td>
<td>9mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mesh Size:</td>
<td>150mm x 150mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gabion Unit:</td>
<td>2m x 1m x 1m</td>
</tr>
<tr>
<td>Manufacturer:</td>
<td>TechFab India Industries Ltd.</td>
<td>Function:</td>
<td>• Flexible Earth Retaining Wall.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• River / Coastal Erosion Control.</td>
</tr>
<tr>
<td>Location:</td>
<td>Burnyhat, Meghalaya, India</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PROJECT : Constructing Protection Wall against sea erosion of coast at Kolak, Gujarat.

CLIENT : Irrigation Department, Govt. of Gujarat.

CONTRACTOR : M/s D.P. Vekaria

ESTIMATED COST : 1.0 Crore.
Techfab-Metal steel wire mesh Gabions

Features

• Double twisted
• Zinc & PVC coated
• Available in various sizes

Applications

• Retaining walls
• Bed/bank/shore protection
• Scour protection
• Hydraulic structures
Techfab-Metal steel wire mesh Products
TechBox-Gabion is MWM (metal wire mesh) product comprised double twisted hexagonally woven steel wire mesh with zinc galvanized and PVC coated compartmented baskets with a rectangular box shape.

- Filled with natural stone at the site of use, to form flexible, permeable, monolithic structures for earth retention and the diaphragms assure minimum stone migration within the basket.
- Even distribution of the stone even in abnormal conditions, and adding strength to the container.
Typical Cross Section
At the Heart of Geosynthetic Activity

GEOGRIDS

TECHGRID
PRODUCTS – GEOGRID

- Manufactured at Rakholi, Silvassa.
- Functions – Reinforcement
- Applications – Reinforced soil walls & slopes, Basal reinforcement, Track-bed stabilization, Load transfer platforms etc.
- Major clients: Railways, State PWDs, NHAI, Municipalities etc.
- Governing Specification: ASTM.
- In-house testing & Third-party test certificates (TRI / USA, IIT).
- Exports – USA & Italy
- CE certification & ISO 9001 QMS
HIGH SPEED COMPUTERIZED WARPING UNIT
Reinforced soil structures: Reinforced soil retaining walls (RSW), Steep slopes, Noise barriers, Bridge abutments, Sea Walls

Basal reinforcement of embankments (Embankment on soft ground)

Veneer reinforcement

Reinforcement of granular road base and sub base (Roads & Airports)

Area stabilization

Track bed stabilization

Load transfer flat forms
WRAP AROUND - FACING
At the Heart of Geosynthetic Activity

GLASS FIBRE GRID
PRODUCT – GLASS FIBER GRID

- Manufactured at Rakholi, Silvassa.
- Functions – Asphalt Reinforcement
- Applications – Airport runways & taxiways, Highways, Industrial Roads, Asphalt over PCC, Lane widening, etc.
- Major clients: MES Airports, AAI Airports, Infrastructure authorities.
- Governing Specification: MES
- In-house testing & Third-party test certificates (TRI / USA, IIT).
- ISO 9001 QMS
At the Heart of Geosynthetic Activity

TECHGLASS 50 kN/m
TECHGLASS 100 kN/m
TECHGLASS 100 / 200 kN/m
# TYPES OF TECHGLASS

<table>
<thead>
<tr>
<th>Properties</th>
<th>Specification</th>
<th>Techglass 50</th>
<th>Techglass 100</th>
<th>Techglass 100 /200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength</td>
<td>ASTM 6637 ISO13439</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Machine Direction kN/m</td>
<td>50</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>b) Cross Machine Direction kN/m</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Elongation at Break %</td>
<td>&lt; 4</td>
<td>&lt; 4</td>
<td>&lt; 4</td>
<td></td>
</tr>
<tr>
<td>Aperture size- mm (Centre to centre)</td>
<td>25 x 25</td>
<td>12.5 x 12.5</td>
<td>12.5 x 12.5</td>
<td></td>
</tr>
<tr>
<td>Melting Point Deg C</td>
<td>&gt; 270</td>
<td>&gt; 270</td>
<td>&gt; 270</td>
<td></td>
</tr>
<tr>
<td>Roll width (Mtrs)*</td>
<td>5 max</td>
<td>5 max</td>
<td>5 max</td>
<td></td>
</tr>
<tr>
<td>Roll Length (Mtrs)*</td>
<td>100</td>
<td>100</td>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

* As per customer requirements.
# TECHNICAL COMPARISON:
(EXISTING SPECS VS TECHGLASS 100)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Existing Specs at MES</th>
<th>Tech Glass 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Longitudinal (KN/m)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>(b) Transverse (KN/m)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Elongation at Break (%)</td>
<td>&lt; 5%</td>
<td>&lt; 4%</td>
</tr>
<tr>
<td>Melting Point (Deg. Cel)</td>
<td>&gt;218</td>
<td>&gt;220</td>
</tr>
<tr>
<td>Mass/Area (Gm/Sqm)</td>
<td>380</td>
<td>&gt;380</td>
</tr>
<tr>
<td>Mesh Size</td>
<td>12.5 x 12.5</td>
<td>12.5 x 12.5</td>
</tr>
<tr>
<td>Maximum Width</td>
<td>1.5 m</td>
<td>5.0 m</td>
</tr>
<tr>
<td>Self Adhesive</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Young's Modulus (MPa)</td>
<td>69000</td>
<td>72400</td>
</tr>
</tbody>
</table>
Project Profile:

Reflective cracking on flexible and rigid PCC pavements are a common phenomenon encountered in all pavements.

The best option to retard this reflective cracking and also top down cracking is to strengthen the top asphalt surface with TechGlass reinforcement, which enhances pavement life, reduces maintenance cost and improves riding comfort.

A small service road running across the main runway was to be strengthened. GMR preferred TechGlass 100 for strengthening this small stretch of flexible pavement.

TechGlass Case Study

Client: Airport Authority of India - Cochin International Airport Ltd (CIAL).
Consultant: Scott Wilson Bangalore.
Site: Cochin International Airport - Kerala.
Contractor: Roman tarmac Ltd.
Product: TechGlass 100.
Quantity: 90,000 m2.

Project Profile:

Reflective cracking on flexible and rigid PCC pavements are a common phenomenon encountered in all pavements.

The best option to retard this reflective cracking and also top down cracking is to strengthen the top asphalt surface with TechGlass reinforcement, which enhances pavement life, reduces maintenance cost and improves riding comfort.

CIAL chose TechGlass reinforcement for strengthening the existing runway as well as resurfacing the worn out rigid PCC with an asphalt overlay.
### Project Profile:

Reflective cracking on flexible and rigid PCC pavements is a common phenomenon encountered in all pavements.

The best option to retard this reflective cracking and also top down cracking is to strengthen the top asphalt surface with TechGlass reinforcement, which enhances pavement life, reduces maintenance cost, and improves riding comfort.

Lane widening from two lane to four lane involved extension of the pavement area. High stresses that develop on the joints are reinforced with TechGlass 100, self-adhesive type, which enables the contractor to speed up the operation as well as ensure the joints to not develop cracks at a later date.

<table>
<thead>
<tr>
<th>Client</th>
<th>National Highway Authority of India (NHAI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Raipur - Aurang - NH7.</td>
</tr>
<tr>
<td>Contractor</td>
<td>DSC Ltd.</td>
</tr>
<tr>
<td>Product</td>
<td>TechGlass 100 - Self adhesive type</td>
</tr>
<tr>
<td>Quantity</td>
<td>92,000 m²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client</th>
<th>National Highway Authority of India (NHAI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Lucknow - Sitapur NH 24</td>
</tr>
<tr>
<td>Contractor</td>
<td>DSC Ltd.</td>
</tr>
<tr>
<td>Product</td>
<td>TechGlass 100 - Self adhesive type</td>
</tr>
<tr>
<td>Quantity</td>
<td>1,250000 m²</td>
</tr>
</tbody>
</table>
At the Heart of Geosynthetic Activity

Client : National Highway Authority of India (NHAI).
Site : Jaipur - Kishenganj - Nh8.
Contractor : GVK Ltd.
Sub Contractor : Savvy Pvt.Ltd.
Product : TechGlass 50.
Quantity : 10,000 m2.
PERFORMANCE CERTIFICATE:

PERFORMANCE CERTIFICATE FROM M/s AAI, COCHIN INTERNATIONAL AIRPORT

PERFORMANCE CERTIFICATE FROM M/s ROMAN TARMAT
Third Party Testing

- TRI/Environmental Inc., USA
- SGI Testing Services, USA
- BICS, UK
- BTTG, UK
- Asian Center for Ground Improvement & Geosynthetics, AIT Bangkok
- University of Wollongong, Australia
- tBU, Germany
- CRRI, IIT Madras, IIT Bombay, IIT Delhi
OTHER CERTIFICATIONS

• ISO CERTIFICATION FOR ALL PLANTS

• BTTG-CE CERTIFICATION

• BBA CERTIFICATION
Approval by Government Agencies

- Government of Tamilnadu - all products
- Government of Karnataka - all products
- Airports Authority of India - TechGlass
- Military Engineer Services - TechGlass
- CRRI - TechPave Paving fabric
- Maharashtra PWD - Aurangabad - Geotextile
We also export our products

<table>
<thead>
<tr>
<th>Products</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woven Geotextiles</td>
<td>USA</td>
</tr>
<tr>
<td>Nonwoven geotextiles</td>
<td>UK</td>
</tr>
<tr>
<td>Techgrid geogrids</td>
<td>Italy</td>
</tr>
<tr>
<td>Techglass</td>
<td>Russia</td>
</tr>
<tr>
<td></td>
<td>Norway</td>
</tr>
<tr>
<td></td>
<td>Turkey</td>
</tr>
<tr>
<td></td>
<td>UAE</td>
</tr>
</tbody>
</table>
2. TFI-
CASE STUDY -
GOVT. ORGANISATION’S -
MAHARASHTRA STATE
1. Geotextile Reinforced Road
   Along
   MDR-82-Daund, Pune
CASE STUDY

GEOTEXTILE REINFORCED ROAD ALONG MDR-82

• Client: M/s Public Works Department, Pune.

• Consultant: IIT Powai, Mumbai.

• Location: MDR -82, Dapodi - Kadethan near Kedgaon off Pune - Solapur Highway.

• Product Used: TFI 5200 Woven Tape x Tape PP Geotextile.

• Year of Completion: April 2004.
The Problem

**Site Description:** Black Cotton Soil; CBR less than 2; High Water table.
Traffic Intensity: Medium. Commercial vehicles mainly carrying sand and Sugarcane ply on this route. Usually the road constructed in this section would not last for more than 6 months, developing severe rut depths and pot holes and would become almost unmotorable.
Installation of Geotextile

Surface preparation

Geotextile being unrolled
Placing of Subbase

Soft murum layer being placed over Geotextile

Leveling of soft murum layer on top of the Geotextile
Proposed Solution with Woven Geotextile

Cross Section of the Geotextile Reinforced Road along MDR 82

- Geotextile layer
- Existing ground surface
- 1.2
- 0.5
- 0.3
- 0.45
- Lime + Black cotton soil mix trench
- 0.75
- 2.5
- 2.5
- 2.5
- 0.75
- Lime treated Sub base
- 10.0
- 1.2
- 1
- 0.5 (Minimum)
- 0.3
- 520 mm select aggregate layer (as per MORTH Specs)
- 170 mm select soil shoulder
- 25 mm Dense Bituminous Concrete
- [Not to scale]
At the Heart of Geosynthetic Activity

**Performance of Road After 5 Years (as on 14.10.2009) “With & Without Installation of Woven Geotextile TFI 5200 in April 2004”**

<table>
<thead>
<tr>
<th>Client</th>
<th>Public Works Department (P.W.D), Pune</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant</td>
<td>IIT Powai, Mumbai</td>
</tr>
<tr>
<td>Location</td>
<td>MDR 82 (Dapodi Kadethan) near Kedgaon off Pune - Solapur Highway</td>
</tr>
<tr>
<td>Product</td>
<td>Polypropylene Tape x Tape Woven Geotextile (TFI 5200 Series)</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>TechFab India Industries Ltd.</td>
</tr>
<tr>
<td>Function</td>
<td>Reinforcement, Stabilisation, Separation, Filtration.</td>
</tr>
<tr>
<td>Client</td>
<td>Public Works Department (P.W.D), Pune</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Consultant</td>
<td>IIT Powai, Mumbai</td>
</tr>
<tr>
<td>Location</td>
<td>MDR 82 (Dapodi Kadethan) near Kedgaon off Pune - Solapur Highway</td>
</tr>
<tr>
<td>Product</td>
<td>Polypropylene Tape x Tape Woven Geotextile (TFI 5200 Series)</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>TechFab India Industries Ltd.</td>
</tr>
<tr>
<td>Function</td>
<td>Reinforcement, Stabilisation, Separation, Filtration.</td>
</tr>
</tbody>
</table>

With TFI 5200 Woven Tape Geotextile - After 6 Years

With TFI 5200 Woven Tape Geotextile - After 7 Years
7 Yrs Performance Certificate from PWD Pune

**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, IIT Bombay, MERI Nasik and Techfab India.


**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 unreinforced stretches in adjoining areas.

**Observations, Monitoring and Inferences** - Seven years 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 seven years; 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 seven years, 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 slit film Geotextile appears to be a viable and economical alternative.

   1. PP Geotextile has been successfully used in the construction of Lingale Boribel Road (ODR 123) – 1 Km during the FY 2010-11 which is approach road to Daund Sugar Mill subjected to heavy traffic load of sugarcane trucks, tractors and bullock carts.
   2. We have recommended this fabric to our Engineers & Contractors to use in similar soil condition cases for enhancing life of the road.
   3. We have initiated the process of inclusion of Polypropylene Woven Geotextile fabric in Schedule of Rates (SOR) and will be completed shortly.

**No: 5129 / PB: Daund/13.04.2011**
Office of the Executive Engineer
P.W. Division (East), Pune
Dated: 13.04.2011

Executive Engineer
P.W. Division (East), Pune

Cc: SE PW circle Pune
Cc: CE PW region Pune for information and n.a.
Cc: Maharashtra Engg. Research Institute, Nashik
Cc: PWD Ministry, Govt. of Maharashtra
Cc: Mr. Vivekanand A. Sane, Vice President, Reliance Industries Ltd
Cc: Mr. Satyajeet Bhonsle, Reliance Industries Ltd
Cc: Dr. B.V.S. Visvanadham, Associate Professor, Dept. of Civil Engineering, IIT Bombay, Mumbai
Cc: Mr. Anant Kanoi, Director, TechFab India, Mumbai
### Specifications - Woven Geotextile 5200

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Unit</th>
<th>TFI 5200</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tensile Strength MD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td>KN/m</td>
<td>28.0</td>
</tr>
<tr>
<td>Tensile Strength CD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td></td>
<td>28.0</td>
</tr>
<tr>
<td>Elongation MD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td>%</td>
<td>15.0</td>
</tr>
<tr>
<td>Elongation CD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td></td>
<td>12.0</td>
</tr>
<tr>
<td>Static puncture resistance CBR</td>
<td>IS 13162 (Part 4) / EN ISO 12236</td>
<td>N</td>
<td>4500</td>
</tr>
<tr>
<td>Dynamic perforation resistance - Cone drop</td>
<td>EN 918</td>
<td>mm</td>
<td>5</td>
</tr>
<tr>
<td><strong>Hydraulic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velocity index normal to plane</td>
<td>IS 14324 / EN ISO 11058</td>
<td>ms⁻¹</td>
<td>6x10⁻³</td>
</tr>
<tr>
<td>Water Flow Normal to the Plane</td>
<td>IS 14294 / EN ISO 12956</td>
<td>l/m²/s</td>
<td>6.0</td>
</tr>
<tr>
<td>Characteristic opening size O₉₀</td>
<td>IS 14294 / EN ISO 12956</td>
<td>mm</td>
<td>190</td>
</tr>
<tr>
<td><strong>Composition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% Polypropylene Woven Geotextile</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Woven Geotextile for Sub grade Stabilization At Jejuri - Morgon Road MDR-65
CASE STUDY

WOVEN GEOTEXTILE TFI 5300 FOR SUBGRADE STABILISATION

- Client: PWD Pune/ Integrated Public Works Division, Pune.
- Contractor: M/s H.J. Tekawade, Taluka-Purandhar, Dist-Pune.
- Location: Jejuri - Morgon Road MDR-65
  
  Km 6/100 to 6/500 & 8/065 to 8/475.
- Product Used: TFI 5300 Woven Geotextile.
- Year of Completion: May 2011.
Salient Features of the Project

Geotextile Quantity: 12150.00 Sqm

Length of Stretch: 810.0 m

Width of Stretch: 15.0 m

Site Condition:

Black Cotton Soil,

Heavy Water Logging,

Heavy Traffic Intensity
The Challenge

• Passes through rich black cotton soil area having a very low CBR value of 0.67.

• Water logging,

• Heavy vehicular load of 80 MT

• Presence of sugarcane fields in the vicinity.
Failures Observed

- Fatigue cracks (both crocodile & block types),
- Raveling
- Rutting
- Stripping
- Pot-holes
- Settlement
- Shoulder drop-off
**The Solution**

- TechFab (India) Industries Ltd suggested the use of Woven Geotextile TFI-5300 for the Sub grade stabilization.

- Approved by the Executive Engineer and the Superintending Engineer of P.W.D, Pune.
Execution

• Slight removal of soil from top

• Surface re prepared with appropriate camber & cross slope.

• TFI 5300 Woven Geotextile laid over the surface

• Design thickness of various layers of road crust were laid and properly compacted
Functions of TFI 5300

• Separation of Dissimilar Materials

• Reinforcement of Sub grade/Base/Sub base Course

• Filtration of Fine Material

• Efficient Drainage
**Benefits**

- Prevents contamination of granular sub base/ base
- Prevents loss of aggregate
- Sub-grade stabilization.
- Increases the structural strength of the pavement by tensile strength and shear interaction of the Geotextile.
- Minimizes rutting and disturbance of the sub-grade during compaction.
# Specifications - Woven Geotextile 5300

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Unit</th>
<th>TFI 5300</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tensile Strength MD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td>KN/m</td>
<td>30.0</td>
</tr>
<tr>
<td>Tensile Strength CD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td>KN/m</td>
<td>30.0</td>
</tr>
<tr>
<td>Elongation MD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td>%</td>
<td>15.0</td>
</tr>
<tr>
<td>Elongation CD</td>
<td>IS 13162 (Part 5) / EN ISO 10319</td>
<td>%</td>
<td>12.0</td>
</tr>
<tr>
<td>Static puncture resistance CBR</td>
<td>IS 13162 (Part 4) / EN ISO 12236</td>
<td>N</td>
<td>5000</td>
</tr>
<tr>
<td>Dynamic perforation resistance – Cone drop</td>
<td>EN 918</td>
<td>mm</td>
<td>5</td>
</tr>
<tr>
<td><strong>Hydraulic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velocity index normal to plane</td>
<td>IS 14324 / EN ISO 11058</td>
<td>ms⁻¹</td>
<td>6x10⁻³</td>
</tr>
<tr>
<td>Water Flow Normal to the Plane</td>
<td></td>
<td>l/m²/s</td>
<td>6.0</td>
</tr>
<tr>
<td>Characteristic opening size O₉₀</td>
<td>IS 14294 / EN ISO 12956</td>
<td>mm</td>
<td>180</td>
</tr>
<tr>
<td><strong>Composition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% Polypropylene Woven Geotextile</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CASE STUDY

TECHGRID BIAXIAL GEOGRID TGB40
for
SUBGRADE STABILIZATION

- **Client:** PWD Region Aurangabad/ PWD Circle Osmanabad/ PWD Division Nilanga, District-Latur.

- **Contractor:** Chairman Wagheshwar Majur Sahkari Sanstha Maryadit, Shiradhon, Chairman Azad Magaswargiya Majur Sahkari Sanstha Maryadit, Latur

- **Location:** Gharni-Nitur-Nilanga Road SH-167, Taluka-Nilanga, District- Latur, Maharashtra.

- **Product Used:** TBG 40 (Knitted & Polymer Coated Polyester Geogrid with CE Mark)

- **Year of Completion:** March 2011.
Salient Features of the Project

*TechGrid Quantity:* 6676.00 Sqm

*Length of Stretch:* 1300.0 m

*Width of Stretch:* 5.5 m

*Site Condition:*

Rich Black Cotton Soil,

Heavy Water Logging,

Heavy Vehicular Traffic
The Challenge

- Passes through rich black cotton soil area
- Very low CBR value of 2.90
- Irrigable Land on both sides
- Water logging,
- Heavy vehicular load of 2640 CV/Day
The Solution

• TechFab (India) Industries Ltd suggested the use of TechGrid Biaxial Geogrid TGB-40 for the Sub grade stabilization.

• Approved by the Executive Engineer and the Superintending Engineer of Public Works Department.
Execution

• Slight removal of soil from top.

• 200mm thick layer of Murrum was laid over the prepared surface.

• WBM (40/60 metal) was laid in two layers for a total thickness of 225mm over the murrum layer.

• TGB 40 laid over the prepared surface.
Execution

• Burnt Bitumen Macadam (BBM) of 75 mm thick laid over TGB 40.

• Asphalt carpet 20 mm laid over the 75 mm thick BBM.

• Road remains intact after 1 Monsoon period.
Applications of TechGrid Biaxial Geogrid

• Reinforcement of granular road base and sub base

• Area Stabilization

• Rail Track bed Stabilization

• Load Transfer Platforms
Benefits

• Improved lateral confinement of aggregates
• Distributes load over a larger area
• Increase in bearing capacity & shear strength of sub grade
• Reduction in sub base thickness
• Increase in life of pavement
## Specifications – TechGrid Biaxial Geogrid TGB40

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>TechGrid B-40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultimate Tensile Strength (KN/m) - MD</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Ultimate Tensile Strength (KN/m) - CD</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Elongation at max load (%) - MD</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Elongation at max load (%) - CD</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Tensile Strength at 1% Elongation (KN/m) - MD</td>
<td>IS 13162 (part 5) : 1992</td>
<td>-</td>
</tr>
<tr>
<td>Tensile Strength at 1% Elongation (KN/m) - CD</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Tensile Strength at 2% Elongation (KN/m) - MD</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>Tensile Strength at 2% Elongation (KN/m) - CD</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>Tensile Strength at 5% Elongation (KN/m) - MD</td>
<td></td>
<td>14.0</td>
</tr>
<tr>
<td>Tensile Strength at 5% Elongation (KN/m) - CD</td>
<td></td>
<td>14.0</td>
</tr>
<tr>
<td>Aperture Size (mm)</td>
<td></td>
<td>25x25</td>
</tr>
<tr>
<td>MD x CD</td>
<td></td>
<td>(± 2mm)</td>
</tr>
</tbody>
</table>

Aperture Size: ±2mm
4. Gabion Wall V/s RCC Wall
At SH-55 on Ghod River Bridge,
Shirur, Pune
CASE STUDY

GABION RETAINING WALL v/s R.C.C RETAINING WALL

• Client: PWD Region Pune, PWD East-Division, Pune.

• Location: SH-55 Shikrapur - Nhavra - Inamgaon on Ghod River Bridge at Km 105.000, Taluka - Shirur, District -Pune, Maharashtra.

• Product Used: TechGeo Nonwoven Geotextile PR-20
  
  (Meets requirement of Type -II of IRC SP 59-2002)

  TechFab Metal Gabion / Mattresses (Zinc + PVC Coated)
Salient Features of the Project

Metal Gabion Quantity: 839.50 Cum

Length of Stretch: 51.0 m

Width of Stretch: 8.0 m

Site Condition:

Rich Black Cotton Soil Area
The Challenge

• Sever Erosion near the Abutment of the Ghod River Bridge.

• High Flood Levels,

• Submerged Bridge With HFL>FRL

• Black cotton soil area

• Low CBR value 1.37

• High water current 4.10 m/sec
The Solution

• TechFab (India) Industries Ltd suggested the use of TechFab Metal Gabion & Nonwoven Geotextile PR-20 for the Erosion Protection.

• Approved by the Executive Engineer and the Deputy Executive Engineer of Public Works Department.

Cross Section of R.C.C Retaining Wall (M-15 concrete)
Execution

Cross Section of 4m high Gabion Wall

Cross Section of Gabion with Gabion Mattress on the Slopes (for a length of 8m)

Cross Section for Drainage Protection (For a length of 26m and 18m right and left respectively)
Execution

Elevation of Metal Gabion Retaining Wall on LHS of Road Adjoining Ghod River Bridge
Execution

Plan showing Gabion Wall & Mattress Location
**Benefits**

- Flexible structure which can accommodate differential settlement
- Free draining structure with no pore pressure development behind wall
- Easy in construction, as it does not require skilled labourers.
- Does not require curing time as in case of R.C.C Retaining wall.
- Eco-friendly, as the vegetation growth over it, is compatible with surrounding environment.
- Does not corrode under areas which are in constant / partial submergence.
- Cost incurred is very less compared to R.C.C Retaining Wall and depends only on the local availability of boulders.
Conclusions

• TechFab Metal Gabion Retaining Wall costs Rs 17.52 Lacs

• R.C.C Retaining Wall of the dimension and grade given by the PWD Department, Pune, costs Rs 52.79 Lacs,

• A cost saving of 67%.
## Specifications – Metal Gabion

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Property</th>
<th>Test Method</th>
<th>Metal Gabion 100/2.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mesh Size</td>
<td></td>
<td>100 mm x 120 mm</td>
</tr>
<tr>
<td>2</td>
<td>Mesh Wire</td>
<td>EN 10223-3</td>
<td>2.70 mm (±0.06mm)</td>
</tr>
<tr>
<td>3</td>
<td>Selvedge Wire</td>
<td>EN 10223-3</td>
<td>3.40 mm (±0.07mm)</td>
</tr>
<tr>
<td>4</td>
<td>Lacing Wire</td>
<td>EN 10223-3</td>
<td>2.20 mm (±0.06mm)</td>
</tr>
<tr>
<td>5</td>
<td>Mesh Tolerance</td>
<td>EN 10223-3</td>
<td>+16% to -4%</td>
</tr>
<tr>
<td>6</td>
<td>Tensile Strength</td>
<td>EN 10223-3</td>
<td>350-500 N/mm²</td>
</tr>
<tr>
<td>7</td>
<td>Elongation in gauge length of 250mm</td>
<td>EN 10223-3</td>
<td>Min 10%</td>
</tr>
<tr>
<td>8</td>
<td>Zinc Coating for Mesh Wire</td>
<td>EN 10244-2</td>
<td>245 g/m²</td>
</tr>
<tr>
<td>9</td>
<td>Zinc Coating for Selvedge Wire</td>
<td>EN 10244-2</td>
<td>265 g/m²</td>
</tr>
<tr>
<td>10</td>
<td>Zinc Coating for Lacing Wire</td>
<td>EN 10244-2</td>
<td>230 g/m²</td>
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<tr>
<td>11</td>
<td>PVC Coating Thickness</td>
<td></td>
<td>0.5 mm</td>
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</tbody>
</table>
**Specifications – Nonwoven Geotextile PR20**

<table>
<thead>
<tr>
<th>Tests / Property</th>
<th>Unit</th>
<th>Test Method</th>
<th>PR 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass per Unit Area</td>
<td>G/m²</td>
<td>IS 14716 / ASTM D 5261</td>
<td>200</td>
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<tr>
<td>Thickness</td>
<td>mm</td>
<td>IS 13162 (Part 3) / ASTM D 5199</td>
<td>1.6</td>
</tr>
<tr>
<td>Grab tensile strength</td>
<td>N</td>
<td>IS 13162 (Part 5) / ASTM D 4632</td>
<td>720</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>%</td>
<td>IS 13162 (Part 5) / ASTM D 4632</td>
<td>60</td>
</tr>
<tr>
<td>Trapezoidal Tear</td>
<td>N</td>
<td>IS 14293 / ASTM D 4533</td>
<td>300</td>
</tr>
<tr>
<td>Puncture Strength</td>
<td>N</td>
<td>IS 13162 (Part 4) / ASTM D 4833</td>
<td>400</td>
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<tr>
<td>Permittivity</td>
<td>s⁻¹</td>
<td>IS 14324 / ASTM D 4491</td>
<td>2.0</td>
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<tr>
<td>Apparent opening size</td>
<td>μm</td>
<td>IS 14294 / ASTM D 4751</td>
<td>150</td>
</tr>
<tr>
<td>Mullen burst</td>
<td>KPa</td>
<td>ASTM D 3786</td>
<td>2175</td>
</tr>
<tr>
<td>Ultraviolet resistance</td>
<td>%@500 hrs</td>
<td>IS 13162 (Part 2) / ASTM D 4355</td>
<td>70%</td>
</tr>
</tbody>
</table>
5. Over Lay Reinforcement for Pradhan Mantri Gram Sadak Yojana (PMGSY), At Dahanu, Dist-Thane
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Project</th>
<th>Name of Contractor</th>
<th>Location</th>
<th>Qty in sqm</th>
<th>Supply &amp; Laying period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SH-30 to Sarawali-Naikepada-Patilpada Road, Tal-Dahanu, Dist-Thane</td>
<td>M/s Kapil S. Thakur, Dahanu</td>
<td>Dahanu, Thane</td>
<td>750.00</td>
<td>Mar-2010</td>
</tr>
<tr>
<td>2</td>
<td>Improvement to Chinchawali Approach Road, Tal-Alibag, Dist-Raigad</td>
<td>M/s Vishal R. Gawand, Alibag</td>
<td>Alibag, Raigad</td>
<td>1950.00</td>
<td>Mar-2010</td>
</tr>
<tr>
<td>3</td>
<td>Improvement to ODR-36 to Pimpalshet Road, Tal-Dahanu, Dist-Thane</td>
<td>M/s T.R. Construction, Dahanu</td>
<td>Dahanu, Thane</td>
<td>900.00</td>
<td>Mar-2010</td>
</tr>
<tr>
<td>4</td>
<td>Improvement to Tilher-Kharpad Road, Tal-Vasai, Dist-Thane</td>
<td>M/s Gauri Yogesh Parbhu, Thane</td>
<td>Vasai, Thane</td>
<td>1500.00</td>
<td>Mar-2010</td>
</tr>
<tr>
<td>5</td>
<td>Improvement to Kakal-Dahiwali Road, Tal-Mangaon, Dist-Raigad</td>
<td>M/s R.S. Construction, Raigad</td>
<td>Mangaon, Raigad</td>
<td>1125.00</td>
<td>Mar-2010</td>
</tr>
<tr>
<td>6</td>
<td>Improvement to Molde-Kutwalwadi Road, Tal-Kudal, Dist-Sindhudurg</td>
<td>M/s R.D. Samant Contractors Pvt Ltd, Ratnagiri</td>
<td>Kudal, Sindhudurg</td>
<td>3562.50</td>
<td>Apr-2010</td>
</tr>
<tr>
<td>7</td>
<td>Improvement to Karawade-Bhairavwadi Road, Tal-Sawantwadi, Dist-Sindhudurg</td>
<td>M/s Bharat D. Patil, Sawantwadi</td>
<td>Sawantwadi, Sindhudurg</td>
<td>2100.00</td>
<td>Apr-2010</td>
</tr>
<tr>
<td>8</td>
<td>Improvement of Bhatgaon-Deulwadi Road, Tal-Guhagar, Dist-Ratnagiri</td>
<td>M/s D.V. Pawar, Ratnagiri</td>
<td>Guhagar, Ratnagiri</td>
<td>375.00</td>
<td>June-2010</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Total</strong></td>
<td></td>
<td></td>
<td>12262.00</td>
<td></td>
</tr>
</tbody>
</table>
STRENGTHENING & BLACK TOPPING FOR SH-30 TO SARAWALI - NAIKEPADA - PATILPADA ROAD, TAL - DAHANU

Client: Pradhan Mantri Gram Sadak Yojana (PMGSY), by Maharashtra Rural Roads Development Association (MRRDA), under Konkan Region, Thane, Maharashtra

Contractor: M/s Kapil S. Thakur, Dahanu, Dist-Thane.

Location: SH-30 to Sarawali - Naikepada - Patilpada Road, Taluka Dahanu.

Geosynthetic Product: TechGlass 50

Manufacturer: TechFab (India) Industries Ltd, Mumbai.
Unrolling of TechGlass 50 at the site
Laying of TechGlass 50
Overlay being Laid over the TechGlass
Compaction of Overlay
Road Condition After 12 Months (Including Monsoon Period)
## Specifications – TechGlass 50

<table>
<thead>
<tr>
<th>Properties</th>
<th>Tests Method</th>
<th>TechGlass 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength</td>
<td>IS 13162</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>ASTM D 6637 /</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>ISO13439</td>
<td></td>
</tr>
<tr>
<td>b) Cross Machine Direction (KN/m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elongation at Break (%)</td>
<td>ASTMD 276</td>
<td>&gt; 218</td>
</tr>
<tr>
<td>Aperture size - mm (Centre to centre)</td>
<td></td>
<td>25 x 25</td>
</tr>
<tr>
<td>Melting Point (°C)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
THANE ZILLA PARISHAD
PRADHAN MANTRI GRAM SADAK YOJANA

PERFORMANCE CERTIFICATE

This is to certify that M/s TechFab (India) Industries Ltd. (R/o 712, Embassy Centre, Nariman Point, Mumbai- 400 021) have successfully supplied Fiberglass Geogrid TFI-Techlass-50 Qty. 3150 Sqmt on Mar-2010 as per specifications to our three works as under:

1) SH-30 to Sarawali-Nikepada-Patlipada Road, Tal-Dahanu
2) ODR-36 to Pimpalshet Road, Tal-Dahanu
3) Tilher-Kharpada Road, Tal-Vasai

for asphalt over lay reinforcement application and provided us technical services during the period for above works as per specifications requirement.

After a period of eleven months, i.e. performance after one monsoon is very good as compared to adjoining length & the geogrid retrieved from its embedded location was found to be intact and in good condition.

Their commitment in timely delivery and excellent technical services enabled us to complete our scheduled activity on time and the projects at a whole.

We wish them all the very best and intend to continue working with them and assure that the product will be used in such locations in future also.

Stamp & sign

Deputy Engineer
Works Division (PMGSY)
Zilla Parishad Thane

Nodal Executive Engineer
Works Division (PMGSY)
Zilla Parishad Thane
# PMGSY R & D Project List Under TechFab Solution for 2011-12 & 2012-13

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Project</th>
<th>Region</th>
<th>Block</th>
<th>Head</th>
<th>Product</th>
<th>Qty</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Special Repair of MDR-36 to Pangari-Borane Road VR-5 Km 0/000 to 2/600 (L-104) Length 2.6Km Package MH-3058</td>
<td>Pune</td>
<td>Satara</td>
<td>Special Repair</td>
<td>Gabion PR-20</td>
<td>50 m wall Retaining Wall</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NH-8 to Bhatiwalli-Bhatani-Adani-Bhinar-Medhe-Vadghar-Kalbhone-Nimbawali Road, Tal-Vasai, Dist-Thane Km 0/000 to 1/000</td>
<td>Konkan</td>
<td>Thane</td>
<td>R &amp; D</td>
<td>TFI-5300 TGB-40</td>
<td>5500 Sqm Subgrade Stabilization</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Gidhade-Bande-Jatwade-Chanpuri to Arthe Road VR-17 Tal-Shirpur, Dist-Dhule Km 0/000 to 9/900 Package MH-0982</td>
<td>Nashik</td>
<td>Dhule</td>
<td>R &amp; D</td>
<td>TFI-5300 TGB-40</td>
<td>49500 Sqm Subgrade Stabilization</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Improvement to Amdure-Shikhachi Wadi-Rohi Pimpalgaon-Vasantwadi Road MDR-24 Tal-Mudkhed, Dist-Nanded Km 0/500 to 0/800, Km 1/800 to 2/700 &amp; Km 3/000 to 3/500 Tal-Mudkhed, Dist-Nanded Package MH-1839</td>
<td>A'bad</td>
<td>Nanded</td>
<td>R &amp; D</td>
<td>TFI-5300 TGB-40</td>
<td>6600 Sqm Subgrade Stabilization</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SR of SH-217 to Rohila Pimpari-Kasar Road Km 4/600 to 5/380 Tal-Jintur, Dist-Parbhani Package MH-005 under maintainance</td>
<td>A'bad</td>
<td>Parbhani</td>
<td>Special Repair</td>
<td>Gabion PR-20</td>
<td>60 m wall Retaining Wall</td>
<td></td>
</tr>
</tbody>
</table>
End users of our products and services

- Cochin International Airport
- Jaipur Airport, AAI
- National Highways Authority of India
- Public Works Departments of Punjab, Haryana, Maharashtra, Gujarat, Dadra & Nagar Haveli, Andaman
- Road Infrastructure Development Company of Rajasthan
- Tamilnadu Road Development Corporation
- Northeast Frontier Railway
- Northern Railway
- Irrigation Department, Govt. of Gujarat
- Irrigation Department, Govt. of Uttar Pradesh
- Uttar Pradesh Jal Nigam
- Water Resources Department, Govt. of Bihar
- Water Resources Department, Govt. of Assam
- Irrigation Department, Government of Kerala
- Irrigation Department, Govt. of Meghalaya
- Farrakha Barrage Project (Central Water Commission)
- Tehri Hydro Development Corporation
- Surat Municipal Corporation
- Pimpri Chinchwad Municipal Corporation
- Haldia Dock Complex (Kolkata Port Trust)
- Adani Ports
- Meghalaya State Electricity Board
- Oil and Natural Gas Corporation
- Reliance Industries Ltd.
- Indian Petrochemicals Ltd.
Conclusion

• Geosynthetics are widely used for various application with proven technology.

• Economical and relatively simple to design and construct.

• However, as in the case of any structure we have to give proper attention to the materials, design and construction.

• Techfab India has the resources, expertise and experience and offers a wide range of products and services.
THANK YOU