

NAVI MUMBAI COASTAL ROAD, INDIA

Enhancing embankment stability on soft soil



Industry:	Transportation
Application:	Roadways
Location:	India
Product:	MIRAFI® PET800

Overview

To improve traffic flow and establish a direct connection with Jawaharlal Nehru Port (JNPT), Navi Mumbai Special Economic Zone, and Nodal areas, a 6-lane coastal road stretching 8.3 km (5.2 miles) from NH4B near Navghar to Sector-63 at Dronagiri, Navi Mumbai was proposed. The initial land acquisition covered 5.4 km (3.4 miles) of the road, followed by the construction of a 52 m (170.6 ft) embankment reaching a height of approximately 4.5 m (14.8 ft).

The road alignment traversed soft soils with limited load-bearing capacity and high compressibility, posing significant concerns for the embankment's stability and performance.

Solution

The proposed road alignment crossed areas with very soft to soft clays, reaching a depth of 9 m (29.5 feet). It was estimated that a settlement of around 1.7 m (5.6 feet) would occur, with 90% consolidation expected within 20 years.

To expedite the consolidation process during the 9-month construction phase, prefabricated vertical drains (PVDs) were implemented. These drains were driven into the soft soil at 1 m (3.3 feet) intervals in a staggered pattern. The PVDs facilitated vertical drainage, redirecting water from the foundation soil upward to a 300 mm (11.8 inches) thick horizontal granular drainage blanket placed above ground level.

High strength geotextiles were then positioned over the drainage blanket. These geotextiles provided reinforcement to support the embankment soil, preventing rotational failure during consolidation. The design required geosynthetics with a tensile strength of 400kN/m (22.7 lb/ft) within a 5% strain to meet serviceability requirements.

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CASE STUDY

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Installation

MIRAFI® PET800/50, a high strength polyester woven geotextile with a tensile strength of 800kN/m (45.4 lb/ft), was employed to ensure embankment stability within the specified criteria. The geotextiles were placed across the entire width of the embankment, with no sewing permitted in this direction. Adjacent geotextiles were laid in a similar manner and stitched together using a portable stitching machine, creating joints every 5 m (16.4 feet) along the length of the embankment.

Granular soil readily available in the area was incrementally placed over the high strength geotextile reinforcement until the desired embankment height was achieved.



Performance

The foundation soil underwent consolidation within the designated timeframe, thanks to the implementation of prefabricated vertical drains. The utilization of **MIRAFI®** PET800/50 high strength geotextiles enabled the rapid construction of the embankment over the foundation soil, exhibiting no signs of distress. Furthermore, these geotextiles successfully achieved the required design settlement.



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