

India's High-Density Rail Corridors: Expansion Plan, Congestion Forecast & Key Upgrades

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High Density Network Rail Corridors Latest News

- The Centre has approved adding a third and fourth rail line on the 32 km **Badlapur-Karjat stretch** in Maharashtra, extending the Mumbai Suburban Corridor and strengthening a key segment of the 1,238-km Mumbai-Chennai **High Density Network (HDN)**.
- This corridor—one of India's most saturated—links Mumbai to Chennai via Pune, Solapur, Guntakal and Arakkonam.
- The decision is part of Indian Railways' broader plan to decongest all seven High Density Network corridors, which make up just 16% of the total network but carry 41% of all rail traffic.
- As passenger and freight demand surges, expanding and improving the HDN has become crucial to ensuring smoother, more efficient railway operations.

About High Density Network (HDN)

- The High Density Network (HDN) comprises passenger-freight corridors where train operations are running beyond optimal capacity, causing congestion, delays, and reduced efficiency.
- Out of 69,181 route-km of Indian Railways, the HDN accounts for 11,051 route-km (15.97%).
- These highly saturated corridors are divided into 237 sections, each with varying levels of utilisation.

HDN Is Overloaded

- A rail network ideally functions at 70–80% capacity for smooth operations.
- The HDN far exceeds this:
 - Only 4.60% of HDN routes operate below 80% capacity
 - 18.89% operate at 80–100%
 - 32.75% at 100–120%
 - 29.53% at 120–150%
 - 14.11% run at over 150% capacity
- This means 95% of the HDN runs above the optimal threshold, many well beyond designed limits.
- A majority of HDN sections operate at **stress levels** where delays and bottlenecks are unavoidable.

An Example: The Overburdened Karjat-Lonavala Section

- On the 28-km Karjat-Lonavala stretch (part of the Mumbai-Chennai HDN):
 - 67 trains run each way per day
 - Maximum capacity: 40 trains
- This results in 167% capacity utilisation — far above ideal levels.

How HDN Compares With the Overall Indian Railways Network

- According to the **National Rail Plan** (2051 vision document):
 - 45% of the entire Indian Railways network operates below 70% utilisation
 - 29% operates at 70–100%
 - 25% runs at 100–150%
 - Only 1% exceeds 150% utilisation
- In contrast, the HDN is severely overloaded, highlighting why expansion and decongestion of these seven corridors is a top priority.

India's Seven High Density Rail Corridors: Nationwide Coverage

- The High Density Network (HDN) spans all four regions of India, consisting of seven highly saturated corridors:
 - **Howrah-Delhi (1,422 km)** – Only 31.34 km (just two sections) operate below 80% capacity. The entire remaining corridor is heavily saturated.
 - **Howrah-Mumbai (2,039 km)** – Only 85.2 km operates below 80% capacity. Most of this Golden Diagonal corridor faces high congestion due to intensive freight and passenger load.

- **Mumbai-Delhi (1,322 km)** – One of the only two HDNs without any section exceeding 150% utilisation. The Western Dedicated Freight Corridor (WDFC) runs parallel, absorbing freight pressure.
- **Delhi-Guwahati (1,876 km)** – A staggering 96% of the corridor operates above 80% utilisation. Faces both heavy passenger movement and significant freight demand.
- **Delhi-Chennai (2,037 km)** – Nearly 52% of the corridor is running at 120–150% capacity, one of the highest saturation ratios in the network.
- **Howrah-Chennai (1,117 km)** – **50%** of this corridor operates at **120–150% utilisation**, indicating tight capacity.
- **Mumbai-Chennai Corridor** – Almost 90% of the corridor sees utilisation in the 80–120% range. This corridor remains extremely busy, with several sections nearing saturation.

Future Congestion Projections

- The National Rail Plan warns that without major upgrades, HDN congestion will rise dramatically:
 - By 2051, no HDN section will operate below 100% capacity utilisation.
 - 92% of the HDN will exceed 150% utilisation, far beyond safe or efficient levels.

Near-Term Outlook: Heavy Overload by 2031

- By 2031, the HDN is projected to be severely overstretched:
 - 50% of HDN will operate above 150% utilisation
 - 39% between 100–150%
 - Only 9% will remain within 70–100% capacity
- This indicates that demand growth is outpacing infrastructure expansion.

Line Expansion: The Core Strategy for Decongestion

- While multiple operational reforms help improve train movement, line expansion—doubling, tripling, quadrupling, and even penta/hexa lining—is the most critical decongestion measure.

Recent Progress in Line Expansion

- Indian Railways has aggressively expanded capacity:
 - 1,983 km completed in 2021–22
 - 3,185.5 km in 2022–23
 - 2,244 km in 2023–24
 - 2,900+ km in 2024–25
- This is helping, but far more expansion is needed given HDN congestion levels.

Role of Dedicated Freight Corridors (DFCs)

- The Eastern DFC (fully operational) and Western DFC (96.4% complete) are expected to divert freight traffic away from HDN, freeing capacity for passenger trains.
- This is one of the most impactful steps in reducing HDN load.

Source: <https://vajiramandravi.com/current-affairs/indias-high-density-rail-corridors-expansion-plan-congestion-forecast-key-upgrades/>

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