Turnkey Solutions for Rail Infrastructure
Transforming Nation's Rail Infrastructure

Railways, serves as the most sustainable and environment friendly means to transport people and freight. As India’s largest engineering, technology, construction and manufacturing organization, Larsen & Toubro (L&T) has established itself as a unique service provider delivering turnkey solutions for all types of projects in the rail and urban transit sector. L&T has the capability and the commitment to address national as well as global rail sector requirements.

L&T has been in the forefront in building railway infrastructure for mainline and dedicated freight corridors that meet the demands of the country by applying project management competencies, new technologies and mechanised construction methods.

With a proven track record and more than three decades of experience, L&T has taken the lead in rail construction by introducing pioneering techniques, resulting in execution of projects with innovation, quality and speed. It offers total infrastructure solutions for urban mass transport systems including system integration and dedicated rail connectivity projects for core sector developers.

Integrated Solutions for Railway Construction

As a leader in rail construction, L&T offers turnkey Engineering, Procurement and Construction (EPC) solutions encompassing design, engineering, supply, project planning, quality control and field execution.

L&T provides timely delivery of the project with a single point responsibility for varied requirements of complex and integrated railway projects covering the entire gamut of activities from project conceptualisation, planning to design engineering, project execution, statutory approvals, testing and commissioning.

Proven Track Record

- 7500 tkm of Railway Electrification
- 700 tkm of Track Construction (New lines, Doubling, Gauge conversion)
- State-of-the-art Signalling and Telecom systems in more than 85 stations
- Commissioning of more than 30 traction substations including India’s first 2x25 kV AC railway traction substation and 220 switching stations

India’s Highest Altitude (88 m high, 308 m long) Jajjar Khad Steel Bridge on Jammu-Udampur Rail Link

2 x 25 kV AC traction substation, Annupur

India’s first Monorail Transit System at Mumbai
Complete Civil and Track Works

L&T has the expertise to take up construction of rail bed and permanent way works involving construction of embankment, bridges, associated civil works comprising station buildings, passenger amenities and staff quarters. L&T has established mechanized method for track linking resulting in high quality, speedy execution and improved accuracy.

L&T, along with consortium partner, Sojitz Corporation of Japan is executing India’s Largest Design & Build Railway Project for a section of the Western Dedicated Freight Corridor with a route length of 626 km including 110 major bridges, 1188 minor bridges and culverts. The project envisages mechanised track laying using state-of-the-art fully automated New Track Construction Machines at the rate of 2 km per day, which is considered many times higher than the conventional methods.
Power of Speed
Progress through Railway Electrification

L&T holds the unique distinction of energising major trunk routes in the Indian Railway Network in record time since 1981. The turnkey capabilities in the overhead catenary system include design, supply, erection, testing and commissioning of:

- 25 kV, single phase 50 Hz, traction overhead equipment
- Traction substations, switching stations including 25 kV gas insulated switchgear
- Modification of overhead catenary system
- Rigid overhead conductor system for electrification of underground tunnels with rigid overhead equipment

Signalling and Telecommunication

L&T has the experience and expertise to handle major turnkey projects for railway signalling and telecommunication services. L&T has strategic alliances with leading signalling manufacturers for providing state-of-the-art system engineering for automatic train control system comprising automatic train supervision, protection and operation including electronic interlocking.

The range of services offered includes design and commissioning of:

- Panel / Route interlocking
- Solid state interlocking of stations
- Interlocking of level crossings
- Block Working and Control Communication
- Fiber Optic Transmission System (FOTS)
- Radio System (GSM-R / TETRA / VHF)
- Public Address System (PAS)
- Passenger Information Display System (PIDS)
- Master Clocks
- Data Networking System (DNS)
- CCTV Surveillance System
- NP-SCADA System

Over 50 stations with relay and solid state interlocking have been commissioned by L&T.
Energising the Core Sector

Dedicated Rail links and Merry-Go-Round Systems

L&T offers end-to-end rail connectivity solutions for core sector developers viz; Power, Steel, Aluminium, Cement Plants including manufacturing of associated bulk material handling equipment.

Some of the key projects executed include:
- 66 km link from Mainline to Port including Centralised Traffic Control and associated Bulk Material Handling for Dhamra Port at Odisha
- 45 km coal link for 4 x 600 MW Thermal Power Plant for Sterlite Energy at Odisha
- 21 km coal link for 2 x 525 MW Thermal Power Plant for Marthon Power at Jharkhand
- 7.1 km link to 10 MTPA Iron Ore Processing Unit for Tata Steel at Joda Iron Ore Mines
- 25 km link to 0.5 MTPA Cement Plant for Lafarge Cement at Chattisgarh
- 45 km link to 2 x 700 MW Thermal Power Plant for Nabha Power at Punjab
- 28 km link to Bauxite mines for Bharat Aluminium (BALCO) at Chattisgarh

Bridging Ideas

All types of Steel / Concrete Bridges and Tunnels

L&T has executed over 220 km of bridges and viaducts of various kinds and has pioneered the construction of major steel and concrete bridges for rail infrastructure. It has extensive experience in executing a wide range of bridges and viaducts of different span lengths using ingenious construction techniques such as:
- Incremental launching
- Segmental construction
- Cable-stay
- Precast, pre-stressed concrete
- Steel, concrete composite construction

Some of the landmark railway bridges built by L&T include:
- Panvel Nadi viaduct in the hilly tracts of Western Ghats for Konkan Railway
- Halladi bridge for Konkan Railway
- Bridges across Gambhir Khad and Jhajjar Khad on Jammu-Udhampur rail link (one of the tallest railway bridges in the country) in the Himalayan ranges

Using different technology and overcoming the geological challenges, L&T has built tunnels of over 35 km in various stretches including the toughest sections for Konkan Railways.
Transforming Urban Commute
India’s first Monorail corridor

L&T has an impressive track record of executing major urban mass rail transit systems in the country. It brings to the urban rail sector, a perspective that is firmly set in the future. Leveraging on its domain expertise, L&T has set world-class standards and new benchmarks in the execution of urban mass rail transit systems.

India’s first monorail transit system is currently under execution by L&T on the Jacob Circle-Wadala-Chembur section in Mumbai. The 20 km turnkey design and build project with 17 stations and two maintenance depots, includes testing and commissioning with initial operation and maintenance for a period of 3 years.

L&T’s scope of work includes:
- Construction of Piers and Portals
- State-of-the-art high accuracy Guideway Beam Casting and Erection
- Depots and Stations
- Traction and auxiliary substations
- 750 V DC Third Rail Installation
- Automatic Fare Collection
- Interface Management
Delhi Metro

L&T has been a reliable partner to the successful implementation of Phase 1 and 2 of Delhi Metro project.

Tunnel / Viaduct / Stations
- Underground corridor of 6.6 km between Kashmere Gate to Central Secretariat along with key stations building complexes such as Rajiv Chowk, Chawri Bazar, Mahiya Nagar
- Airport Express Way Link below the T3 Terminal
- 554 m long Metro Rail bridge across river Yamuna

Traction / E&M
Design, Supply, Installation, Testing and Commissioning of
- 25 kV rigid Over Head Electrification (OHE)
- Rigid Overhead Contact System - ROCS (for entire Phase 2 tunnel section)
- Underground Electrification, Fire suppression and Utilities

Depots
Construction, Testing and Commissioning of Najafgarh Depot-cum-Workshop
For phase 3 of Delhi Metro, L&T is currently executing three elevated sections and two underground sections along with two contracts for traction system involving OHE and ROCS.
**Hyderabad Metro**

L&T, through its Special Purpose Vehicle, L&T Metro Rail (Hyderabad) Limited is developing the entire metro network for the city of Hyderabad with a concessionaire period of 35 years. This is considered one of the world’s most prestigious and the biggest contracts on a BOT basis in the metro sector.

L&T is building the entire section of elevated corridor in all the three high density corridors spread over a distance of 71 km along with 66 ultra-modern station buildings, 3 state-of-the-art depots, overhead electric traction system and ballastless track works. This world-class transit system would be operated by Keolis, France using rolling stock from Hyundai Rotem and Signalling & Train Control, Communications from Thales and AFC from Samsung.

**Chennai Metro**

In Chennai, L&T is executing two elevated stretches covering a length of 9.5 km, underground stretch for a length of 3.35 km using TBM, 6 elevated and 3 underground stations, an expansive depot construction involving 22 structures and 110 km of Ballastless Trackwork for the entire operational sections and depots.

---

Artist’s impression of Hyderabad Metro Station Building

Perspective view of elevated section

Part of the completed viaduct

Launching of girders in progress

Ballastless Track for Chennai Metro

Underground section of Chennai Metro

Bird’s eye view of the long elevated section showing the complex alignment.
Riyadh Metro
L&T is part of ArRiyadh New Mobility Consortium, which along with Ansaldo STS - Italy, Bombardier Transportation Ltd-UK, Impregilo S.P.A- Italy, Nesma & Partners- Saudi Arabia is executing Line 3 (41 km) of Riyadh Metro.

The design and build contract includes construction of bridges, tunnels, elevated & underground stations and depots.

Bangalore Metro
At the IT Capital of India - Bangalore, L&T has constructed 4.8 km of elevated viaduct structures and three elevated metro stations (Outer Ring Road, Penney Industrial Area and Penney Village) at quick time using innovative construction technology.
Powerhouse in Modern Day Transport Systems

Innovations in Tunnelling Technology

L&T has executed 120 km of tunnel in varying ground conditions for metro rail systems. This involves all types of underground construction methods such as TBM, NATM and cut & cover construction.

Rajiv Chowk - the largest underground Delhi Metro railway station in the CBD area of Connaught Place involving 3 level interchange station complex was constructed by L&T. In addition, L&T executed Chawri Bazar station using complex NATM technology under very adverse site conditions.

Swanky Stations with Complete Amenities

L&T provides comprehensive design and build solutions from concept to commissioning for station building and depots, comprising MEP works, vertical and horizontal transportations, building automation systems, IT systems, system integration etc.

L&T has the capability to deliver structures for mass transit systems including complete E&M installations and services like automated fare collection, passenger information display system and fire-fighting systems for railways and metro operations on a turnkey basis. L&T has constructed 115 stations across the country and has completed more than 17.5 million sq.m of building spaces in the last 3 years.
Ballastless Track

Key to a Pleasant Ride Quality

L&T has pioneered the construction of Direct Fixation Resilient Track System (Plinth type) which is a cast in-situ, top down method of construction that offers excellent advantages on elevated corridors owing to lesser dead loads on the viaduct, less material handling and accurate construction.

Leaders in Precast technology

To enable faster completion of projects, L&T employs state-of-the-art precast technology for various railway and urban transit projects. Concrete elements such as viaduct segments, full span ‘U’ girder, tunnel lining rings, armour units, deck elements, guideway beams for monorail are prefabricated in state-of-the-art casting yards.

Structural Fabrication yards

L&T’s ISO and OHSAS certified facilities for rolling mill structure fabrication and galvanizing at Puducherry and Pithampur are capable of handling custom-made structures required for railway projects. All the fabrication workshops of L&T are equipped with sophisticated, heavy duty facilities to take up intricate fabrication for electrification of masts, bridge decks, structural components, conveyor galleries and transfer towers.

Geotechnical Engineering

L&T's geotechnical arm, L&T GeoStructure offers engineering solutions and caters to the entire gamut of geotechnical and foundation engineering design and construction. L&T was the first to introduce trench cutter equipment in India for underground stations involving rock socketed permanent diaphragm wall. L&T GeoStructure has also installed India’s first secant pile wall for Delhi Metro Rail project at Hauz Khas.

Perspective close-up view of the viaduct cross-section for Riyadh Metro

Precast yard showing the elevated segments in the foreground
Competency Development Centre
Comprehensive Training for Excellence in Rail Infrastructure
Towards fulfilling the demands in rail construction, L&T has established the Competency Development Centre (CDC), a first-of-its-kind exclusive training centre for rail construction at Kanchipuram, near Chennai for different activities based on the requirements of an integrated rail construction project.

Equipped with excellent infrastructure for practical and classroom sessions, CDC has the facility to impart on-site training to 300 technicians and 180 middle-level managers/engineers in a year. Specialised training is provided in Permanent Way Works, Overhead Electrification, Signalling & Telecommunication and complete civil construction works.

Delivering World-Class Design
A well-equipped design facility Engineering Design and Research Centre (EDRC) at Chennai and at Faridabad provides a broad spectrum of design and consultancy services ranging from concept to commissioning for all types of projects in the rail and urban transit sector.

EDRC provides construction engineering services for:
- Bridges
- Viaducts
- Guideway beams
- Permanent way works
- Overhead equipment including traction substations
- Ballastless track work
- Signalling and telecommunications
- Special infrastructure requirements
- Tunnels and underground structures
- Building services
- Hydraulic engineering
- Electrical and instrumentation system engineering
- Geo-technical engineering