









IIPA: The Late Shri B G Deshmukh Memorial Lecture 2025-26

27th November, 2025 at 3.00 pm

Parishad Sabhagruha
6th floor, Mantralaya (Annexe)

The Public Transport With Special Reference to Metro

Building Metro Line-3 & Mumbai Coastal Road Project (South)

Ashwini Bhide, IAS

Additional Chief Secretary to CM, GoM &
MD, MMRCL

Mumbai

- The **world's sixth-largest metropolitan region**
- The main **financial hub** of India
- Represents 6.16% of India's GDP and over 33% of the country's income tax revenue
- Mumbai's ports manage one-third of India’s international trade
- Accounts for 38% of international air traffic and 28% of domestic air traffic in India
- Contributes to 25% of the Nation’s industrial output

Mumbai City

- Employment magnet
- Densely populated

- Linear and peninsular
- Limited landmass with little scope for expansion
- Overcrowded public transport system bursting at seams.

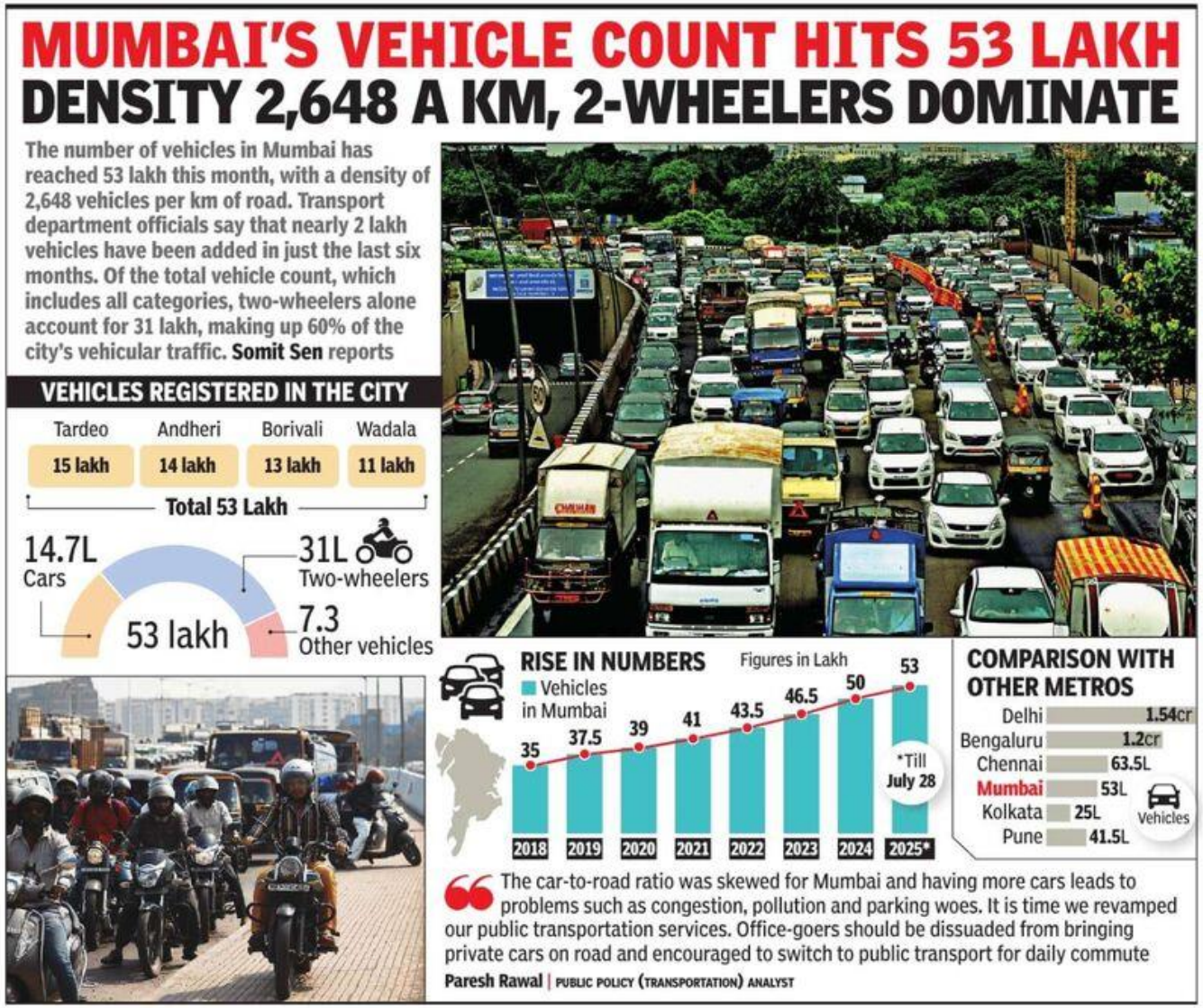
- 7.5 mn passengers/day.
- Compromised safety, comfort and reliability.
- Limited road network, extreme congestion and traffic snarls. Bus transport rendered inefficient.

- Unlocking of new areas, new CBDs without public transport connectivity

Ease of Travel Initiatives : 1990-2010

1. Capacity expansion of existing suburban rail network: MUTP (WB funded)
2. Expansion and improvement of existing road network: MUIP (road widening, flyovers, elevated roads, missing links for East West connectivity) :
    - **Road widening and Improvement**
    - **Flyovers and Elevated Roads**
    - **Eastern Freeway**
    - **Eastern and Western Expressways**
    - **Rail over bridges**
    - **Sahar Elevated Road**
    - **Andheri Ghatkopar Link Road**

Congestion , Vehicular growth continued



- In Mumbai, an average of 193 cars and 460 new bikes were registered each day in 2024.
- The BEST, which boasted of 4,300 buses on road a few years back, **has a fleet of less than 2,591** buses for its daily ridership of 26 L.
- Rise in vehicles, at **2,648 vehicles per km** of road, totaling **53 lakh** could lead to parking woes.
- Mumbai ranks **among the world's most congested cities in 2025** at 12th globally with a Traffic Index of 257.4,
- It takes an average of **54.8 minutes to travel 10 km** during peak hours.

Source: Times of India

Ease of Travel Initiatives : 2010 Onwards

- Developing a new rail-based mass transit system: Execution of the Mumbai Metro Master Plan created in 2004.
- The first Metro line, built through PPP, was commissioned in 2014.
- Commencement of other significant metro lines from 2015 onwards.
- Construction of Monorail

Master Plan for Rail Based Transit System in MMR

Operational Lines (100 km)

1. Line 1 : Versova Andheri Ghatkopar (11.4 km)
2. Line 2A : Dahisar - D.N. Nagar (18.65 km)
3. Line 3 : Colaba - Bandra – SEEPZ (33.5 km UG Line)
4. Line 7 : Andheri (E) - Dahisar (E) (16.5 km)
5. Monorail: Chembur-Wadala- Gadge Maharaj Chowk (20 km)

Under Construction Metro Lines (132.2 km)

1. Line 2B : D.N. Nagar - Bandra – Mandale (23.6 km)
2. Lione 4 : Wadala - Ghatkopar - Mulund Thane-Kasarvadvali (32.3 km)
3. Line 4A Kasarvadvali - Gaimukh (2.7 km)
4. Line 5 : Thane (Kapurbawadi) - Bhiwandi – Kalyan (24.9 km)
5. Line 6: Swami Samarth Nagar- Jogeshwari -Kanjurmarg–Vikhroli (15.31 km)
6. Line 9 & 7A : Dahisar E - Mira Bhyandar (10.58 km) & Andheri - CSIA (3 km)
7. Line 12 : Kalyan – Taloja (20.7 km)

Under Tendering Metro Lines (9.2 km)

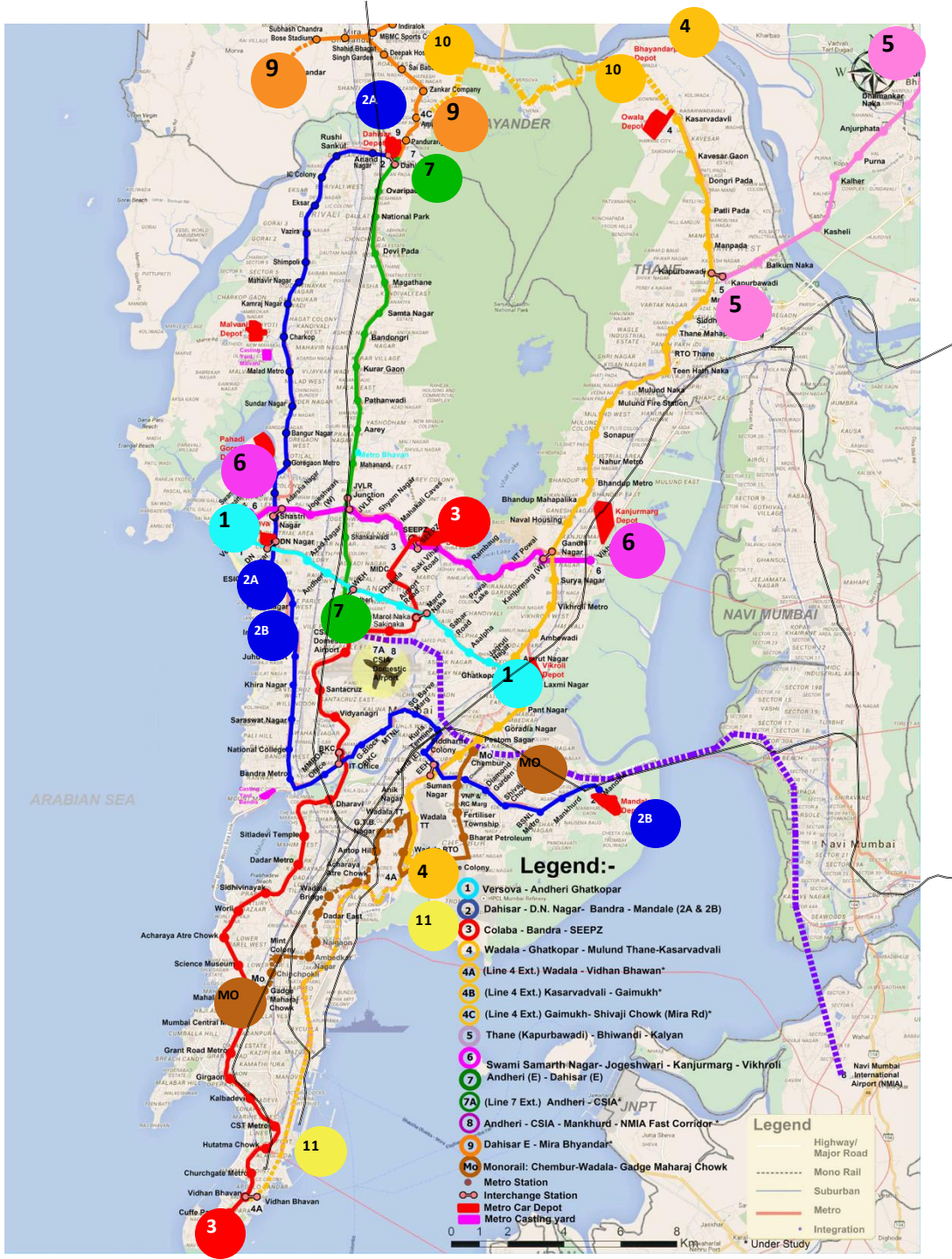
1. Gaimukh- Shivaji Chowk (Mira Rd) (9.2 km)

DPR Under Preparation (115.7 km)

1. Line 8 : Andheri - CSIA - Mankhurd - NMIA Fast Corridor (35 km)
2. Line 11 : CSMT to Wadala (12.77 km)
3. Line 13 : Shivaji Chowk (Mira Road) to Virar (23 km)
4. Line 14: Kanjurmarg – Badalapur (45 km)

Planned Network: 357.1 km ; Operational: ~100 km

Under execution: 141.4 km ; Under Planning: 115.7 km



Future Transport: Modal Share

- Rail Based Mass Rapid Transport System: Suburban Rail + Metro: Predominant mode of transport
- Modal Share of Public transport expected to increase **from 65% to 71.3% by 2031 and 74.8% by 2041**

Sr No.	Mode of Transport	2017		2031		2041	
		in Lakhs	% of Total	in Lakhs	% of Total	in Lakhs	% of Total
1	Sub-urban	81.1	43.2%	69.4	29.3%	67.7	25.1%
2	Metro & Mono	4.1	2.2%	83.6	35.3%	111.7	41.4%
3	Bus	37.5	20.0%	17.1	7.2%	22.5	8.3%
4	Motorised Transport	65.1	34.7%	66.7	28.2%	68.2	25.2%
	Total (in Crs)	**1.88**		**2.37**		**2.70**	

*Source: CTS for Mumbai Metropolitan Region (MMR)- 2022, MMRDA

Mega infra projects

Recently commissioned

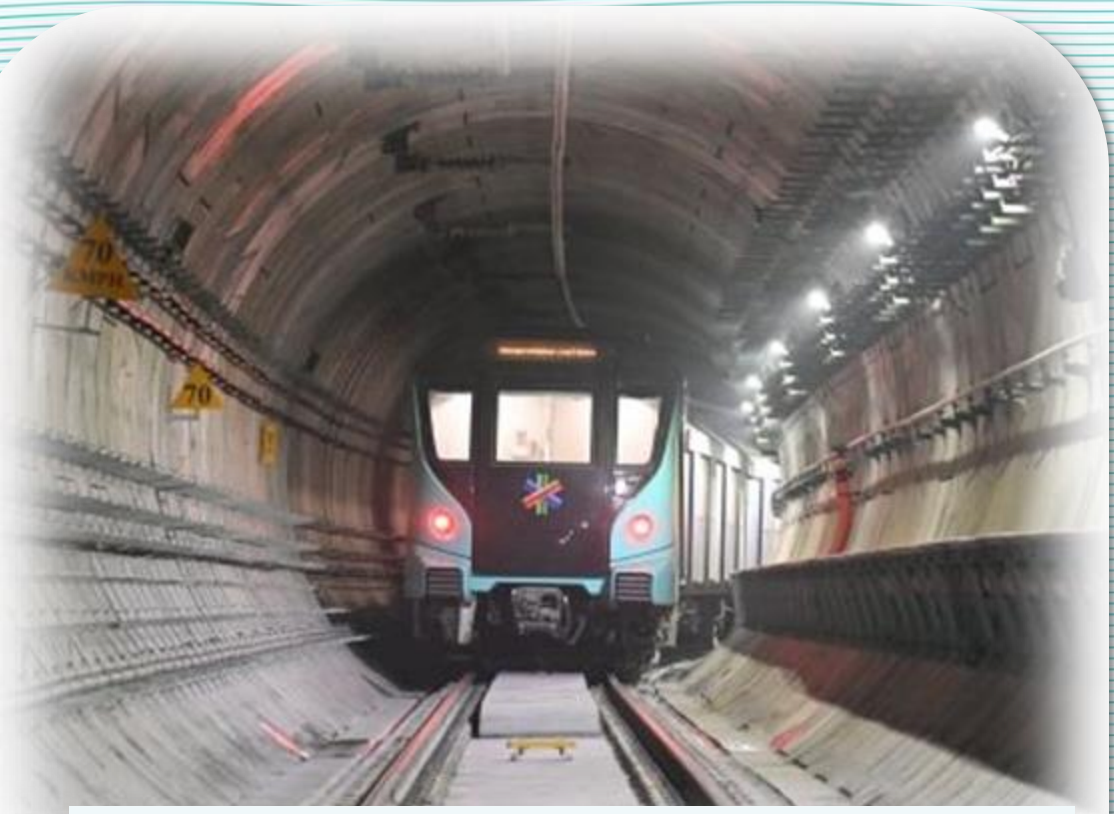
1. Atal Setu
2. Coastal road: Marine drive to BWSL
3. New Mumbai airport

Under Construction

1. **Coastal ring road:**
    1) Bandra-Versova
    2) Versova-Dahisar-Bhayander
    3) Uttan- Virar
2. Worli-Sewri connector
3. Elevated connectivity on EEH to Samruddhi corridor
4. **Tunnel Roads**
    1) Borivali-Thane tunnel
    2) Goregaon-Mulund Link Road
    3) Orange gate to Marine drive

Upcoming Projects

1. Virar- Alibaug Multimodal Corridor
2. Vadhvan port



Colaba-Bandra-SEEPZ (Mumbai Metro Line-3)

Connecting The Unconnected

Mumbai Coastal Road Project (South)

Building Mumbai Metro Line-3 & Mumbai Coastal Road Project (South)

Mumbai Metro Line 3: Salient Features

Salient Features:

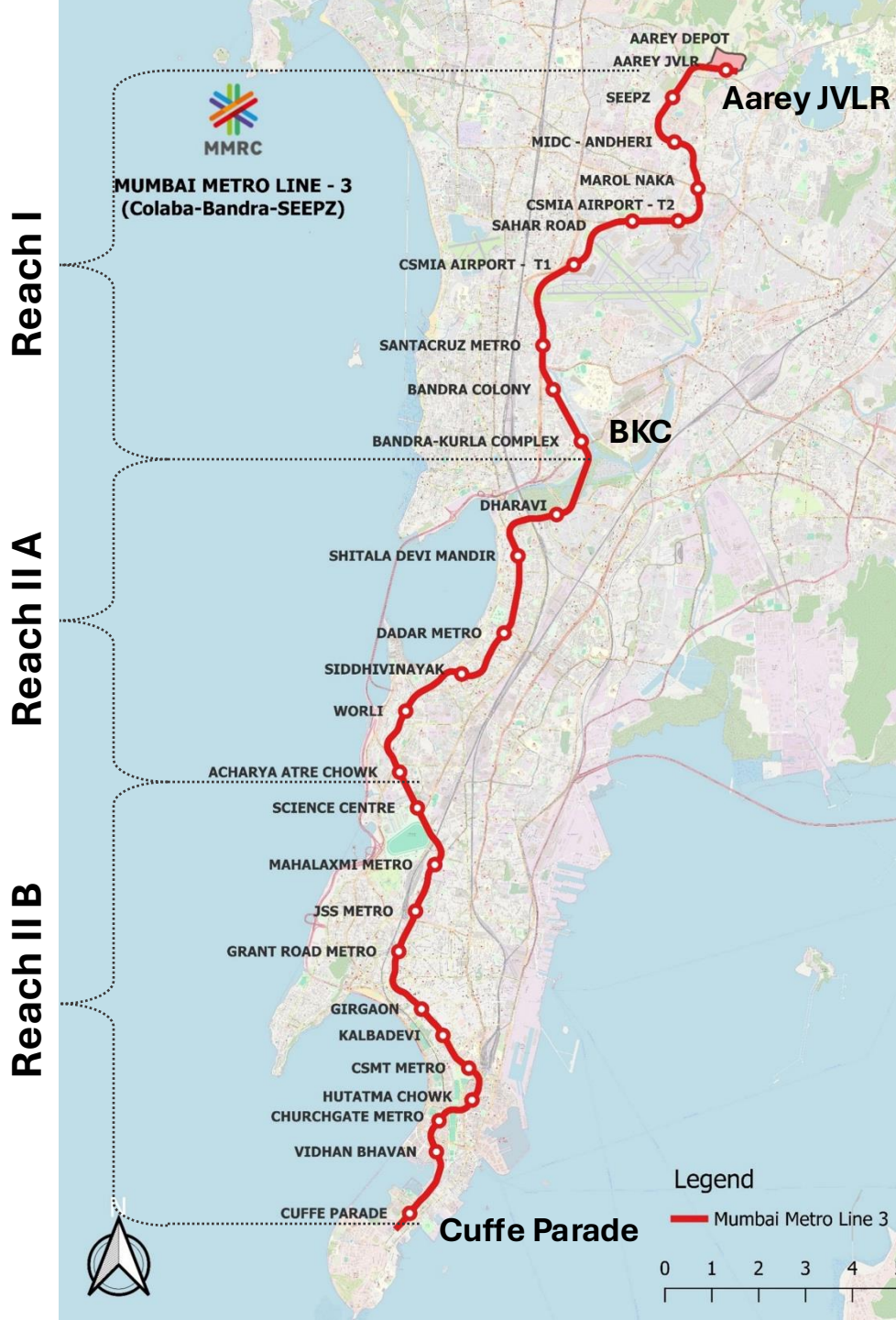
- Fully underground Metro Line from Cuffe Parade to Aarey JVLR
- Completion cost : Rs 37,276 Cr.
- Total length : 33.5 km
- Total no. of stations : 27

  Underground stations : 26 (Cuffe Parade to SEEPZ)

  At grade station :1 (Aarey JVLR)

Operationalization :

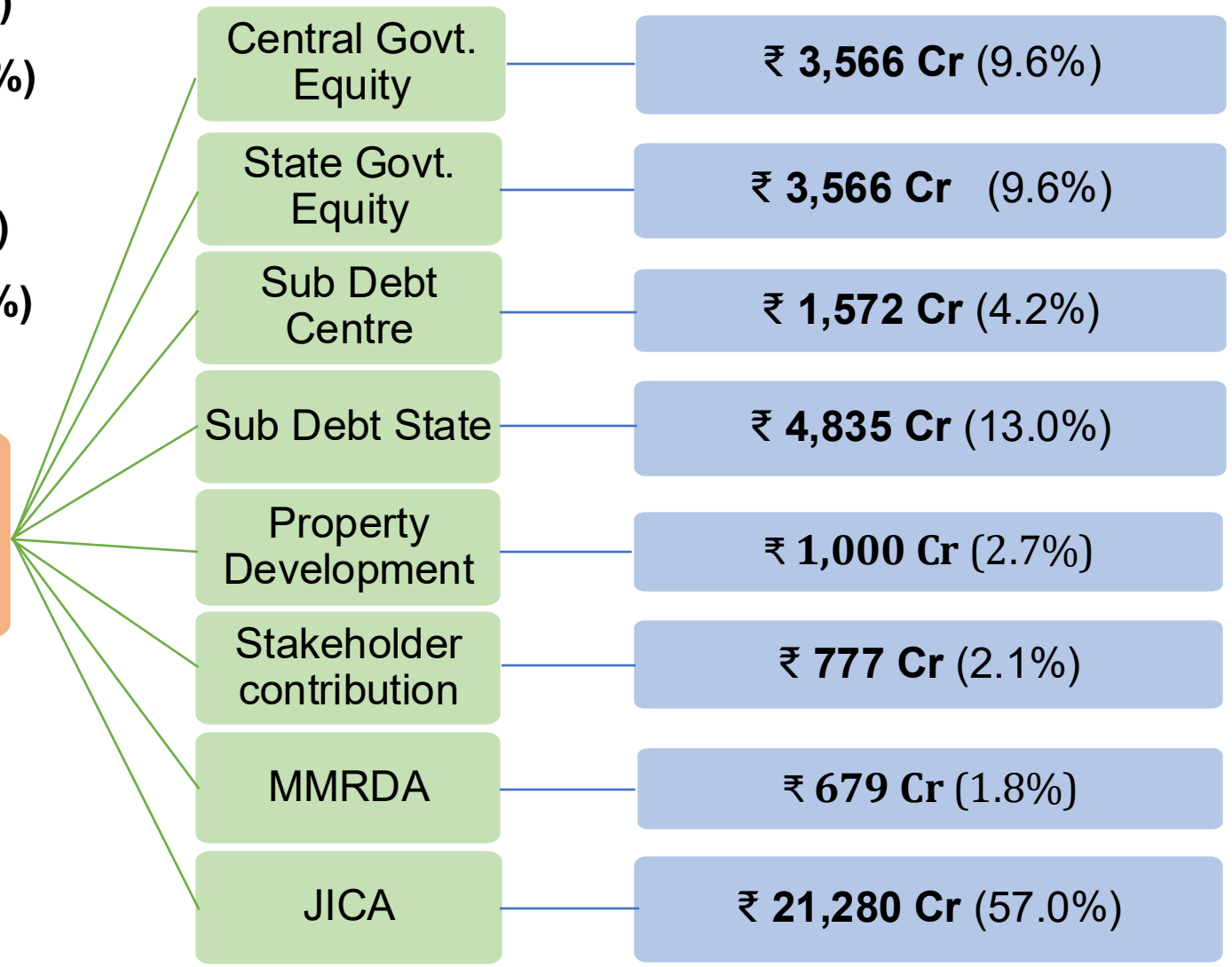
- Reach I : 5th Oct 2024
- Reach II A : 9th May 2025
- Reach II B : 9th Oct 2025



Funding

- **GoI Share** (Equity+SD) **:** ₹ 5,138 Cr. **(13.8%)**
- **GoM Share** **:** ₹ 10,080 Cr. **(27.1%)**
  (Equity+SD+PD+MMRDA)
- **Stakeholder Contribution:** ₹ 777 Cr. **(2.1%)**
- **JICA Loan Share** **:** ₹ 21,280 Cr. **(57.0%)**

Completion Cost:
₹ 37,276 Cr



- **Sub Debt GoI : 50% of Central Taxes**
- **Sub Debt GoM :** ₹ 4,835 Cr.

Mumbai Metro Line 3 as seen by Wall Street Journal (2021)

'You have to actually cut open Mumbai's belly' — Inside one of the world's most audacious transit projects

More than 8,000 workers keep construction going 24 hours a day to finish the line that will speed 1.6 million riders beneath one of the world's most crowded cities

Mumbaikars endure a crowded rail system that is so packed that it endangers lives. At least 680 passengers died last year falling from trains on the suburban network

- Mumbai will become worlds most crowded metropolis.
- More than 600 people a year are killed on existing at grade suburban rail network.
- Crossing the worlds largest slums.
- 8,000 workers working 24/7.
- Fleet of 17 TBMs.
- Contending multicultural and multi religious identities.
- Parsi temples are sacred and feed by fire energy emanating from the center of the earth.

Creating Connectivity

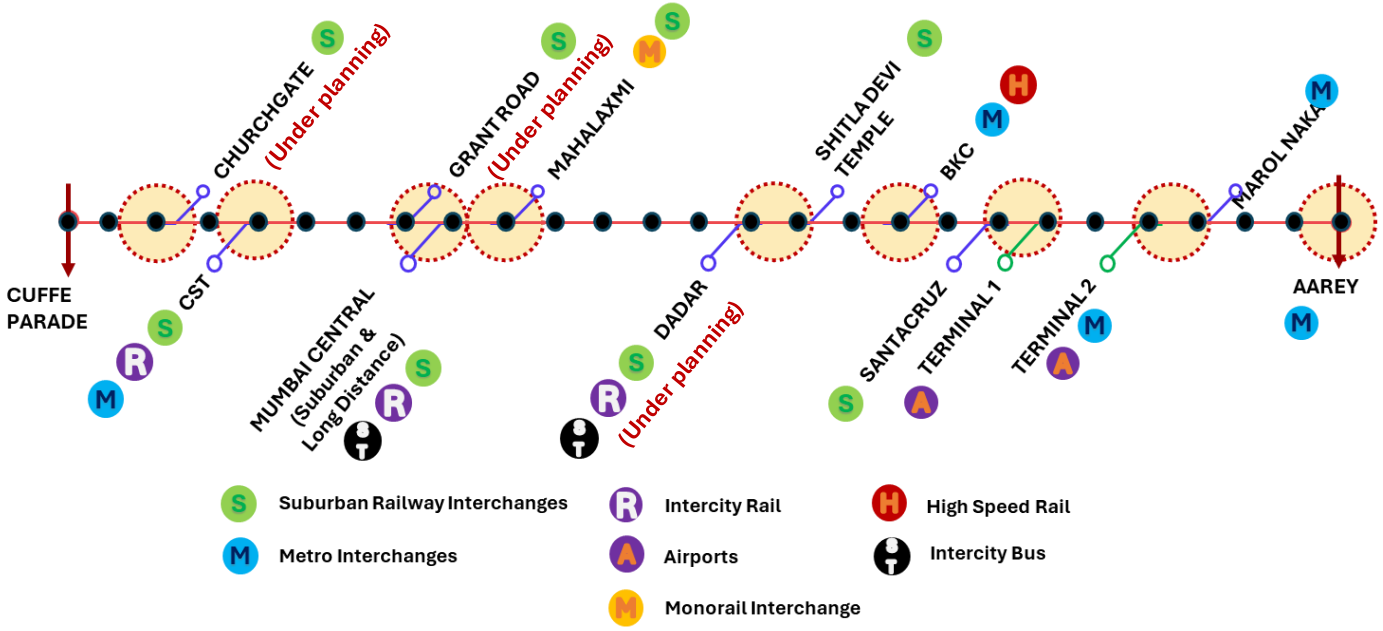
- Serves six CBDs
  - Nariman Point , Cuffe Parade (WTC), Fort, Worli/ Lower Parel, BKC & SEEPZ / MIDC
- Connects areas not served by suburban rail
  - Nariman Point, Cuffe Parade, Kalbadevi, Worli, BKC, Airport & SEEPZ/ MIDC
- Interchange with existing public transport
  - CST (CR), Churchgate, Bombay Central (WR), Marol Naka (Line 1), Mahalaxmi (Monorail), Mumbai Central (ST)
- Airport connectivity
  - Domestic Terminal(T1), International Terminal(T2)

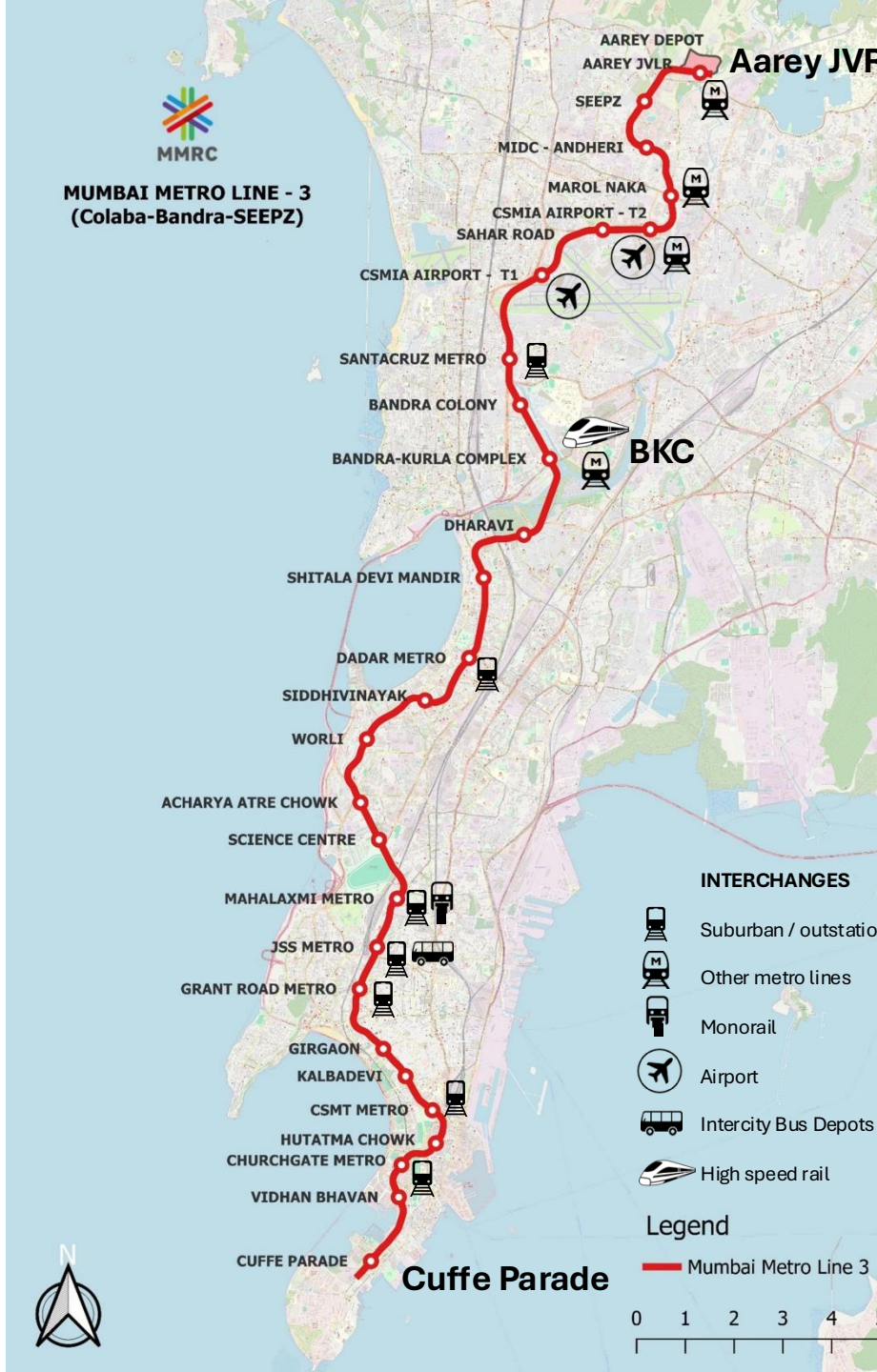
- **~ 30 Employment clusters/Govt/Pvt. Offices**
- **~ 12 Education Institutions**
- **~ 11 Major Hospitals**
- **~ 10 Major Transportation Hub**
- **~ 25 Religious & recreations centres**
- **~ 3 million Population in influence zone**
- **In Emergencies on Suburban Provide Evacuation**

Multi Modal Integration& Transit Oriented Development

Line 3 Interchanges with Metro/MRTS and Suburban

- **Other Metro Lines**: 4 lines at Aarey JVLR, Marol Naka, CSMIA T2 and BKC
- **Airport Terminals**- T1 (Domestic) and T2 (International)
- **High Speed Rail**: at BKC (planned)
- **Railway Stations**- CSMT, Mumbai Central (JSS), Churchgate, Dadar- for long distance and suburban rail junctions and Santacruz
- **Monorail** at Mahalaxmi station (connecting through skywalks) executed by MMRDA
- **Buses** at Mumbai Central (JSS)





Mumbai Metro Line 3: Project Timeline

Concept & Planning

- **1969:** Metro concept proposed in Mumbai's Development Plan
- **1991:** Feasibility study by MMPG; Mumbai Master Plan (9 corridors, 3 phases, 149 km) by DMRC

Project Milestones :

- **2011:** Project included in JICA Rolling plan, DPR for MML-3 was prepared by RITES
- **2013:** GoI approval & Loan Agreement signed by JICA
- **2014:** GoM approval, MMRC JV-SPV was formed (as per guidelines in GoI approval)
- **2015:** GC Appointed
- **2016:** LoA Issued to all Civil Bidders
- **2019 (Nov.) :** GoM Stopped Aarey car depot work
- **2022 (July) :** GoM revoked Stop Work order for Aarey Car Depot

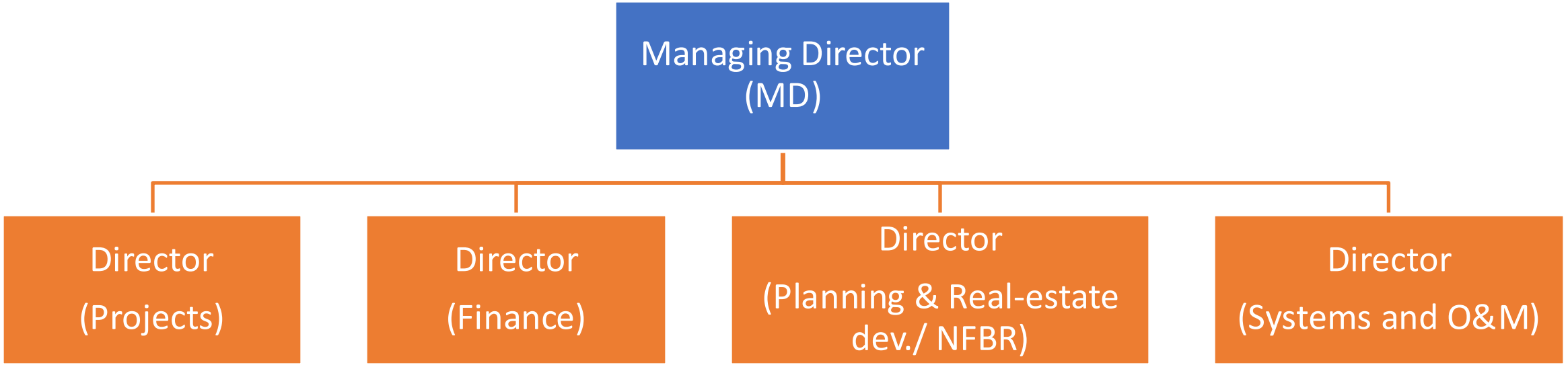
Project Commissioning :

- **2024 (Oct):** Phase 1 Aarey → BKC (10 stations)
- **2025 (May):** Phase IIA BKC → Acharya Atre Chowk (Worli) (7 stations)
- **2025 (Oct):** Phase IIB Acharya Atre Chowk → Cuffe Parade (10 stations)

Mumbai Metro Rail Corporation Limited (MMRCL)

Mumbai Metro Rail Corporation Limited (MMRCL) is a 50-50 JV between GoI & GoM

- **Chairman :** Secretary, Ministry of Housing & Urban Affairs, GOI
- **Four Nominee Directors** each from State Govt & Centre Govt



Scope of Work and Project management

❖ **General Consultants on board : Consortium of**

- Aecom Hong Kong
- Padeco Japan
- LB USA
- Egis Rail France

❖ **Civil contracts:**

- 8 Civil Packages including car depot package
- **Car depot at Aarey**

❖ **System contracts: (Total 32)**

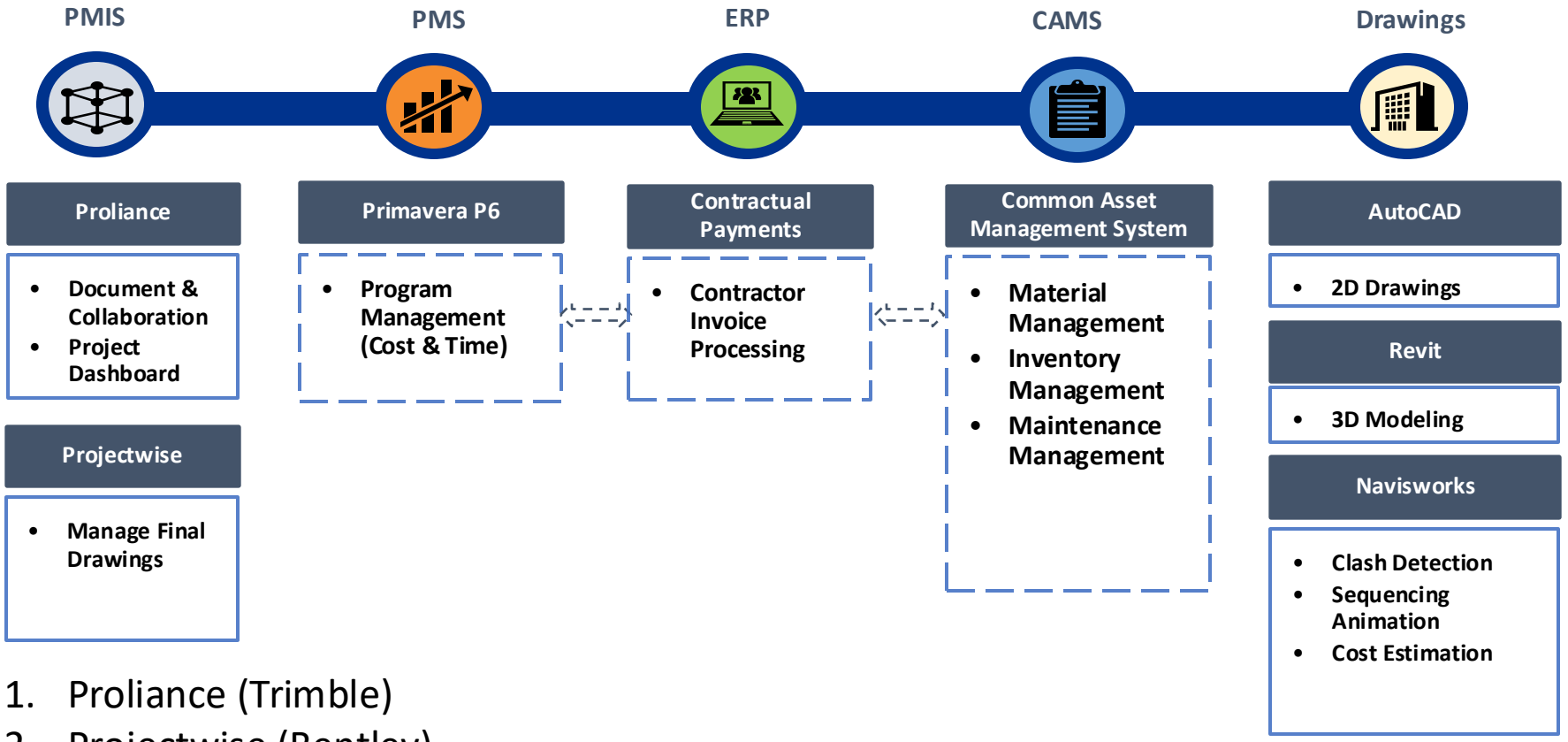
MMRC's in-house team

- ❖ Consortia of Indian and International bidders
- ❖ Selection through international competitive bidding

Project tendering & bidding methodology adopted by MMRCL

- JICA Standard Bidding Document based on FIDIC Yellow book.
- GoI Consultancy Procurement Guidelines and evaluated using QCBS
- GoI Works Procurement Guidelines.

Innovative Digital Project Management



1. Proliance (Trimble)
2. Projectwise (Bentley)
3. Primavera P6 (Enterprise Project Portfolio Management) (EPPM) (Oracle)
4. Enterprise Resource Planning (ERP) (Oracle)
5. Common Asset Management System (CAMS) (MAXIMO) (IBM)
6. 3D BIM (Building Information Modelling) (Revit & Navisworks)

CM War room Support

CM war room mechanism for mega infrastructure projects and its effective use by MMRCL for faster decision making and resolution of inter departmental issues.

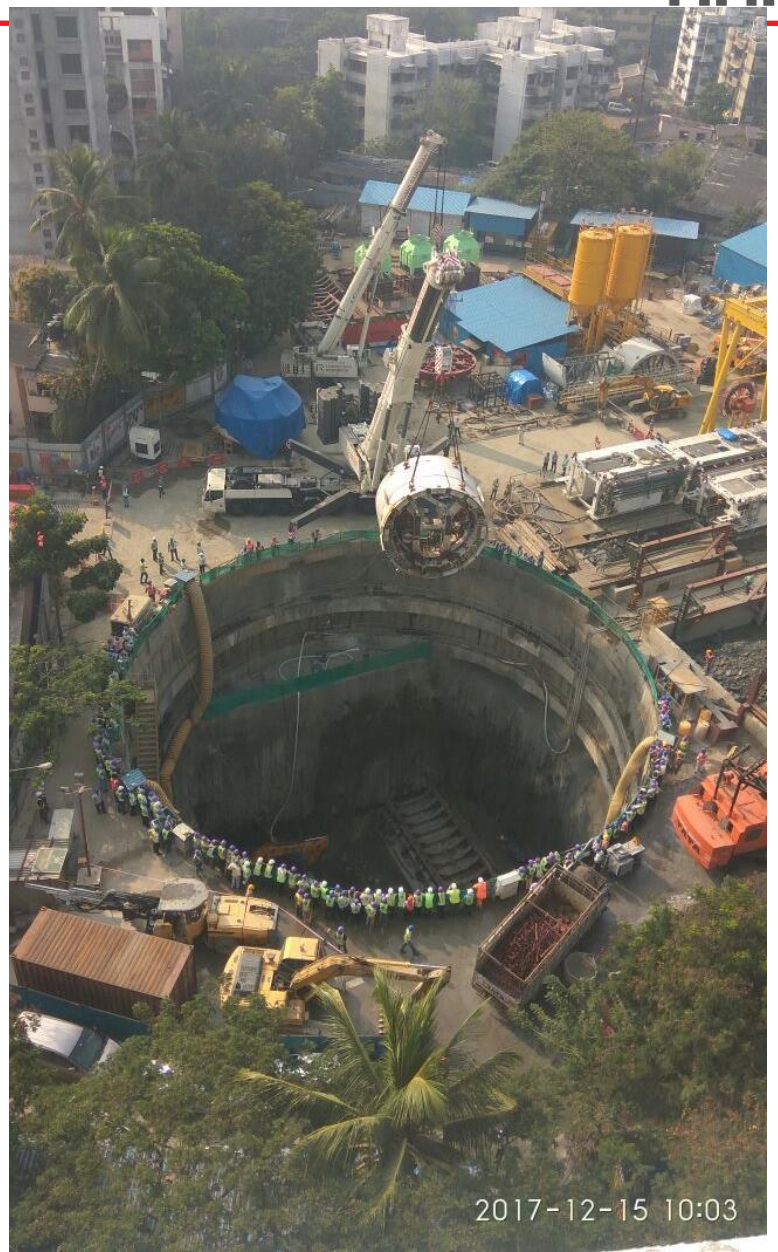
Construction Sequence and Methodology

Civil construction: techniques adopted:

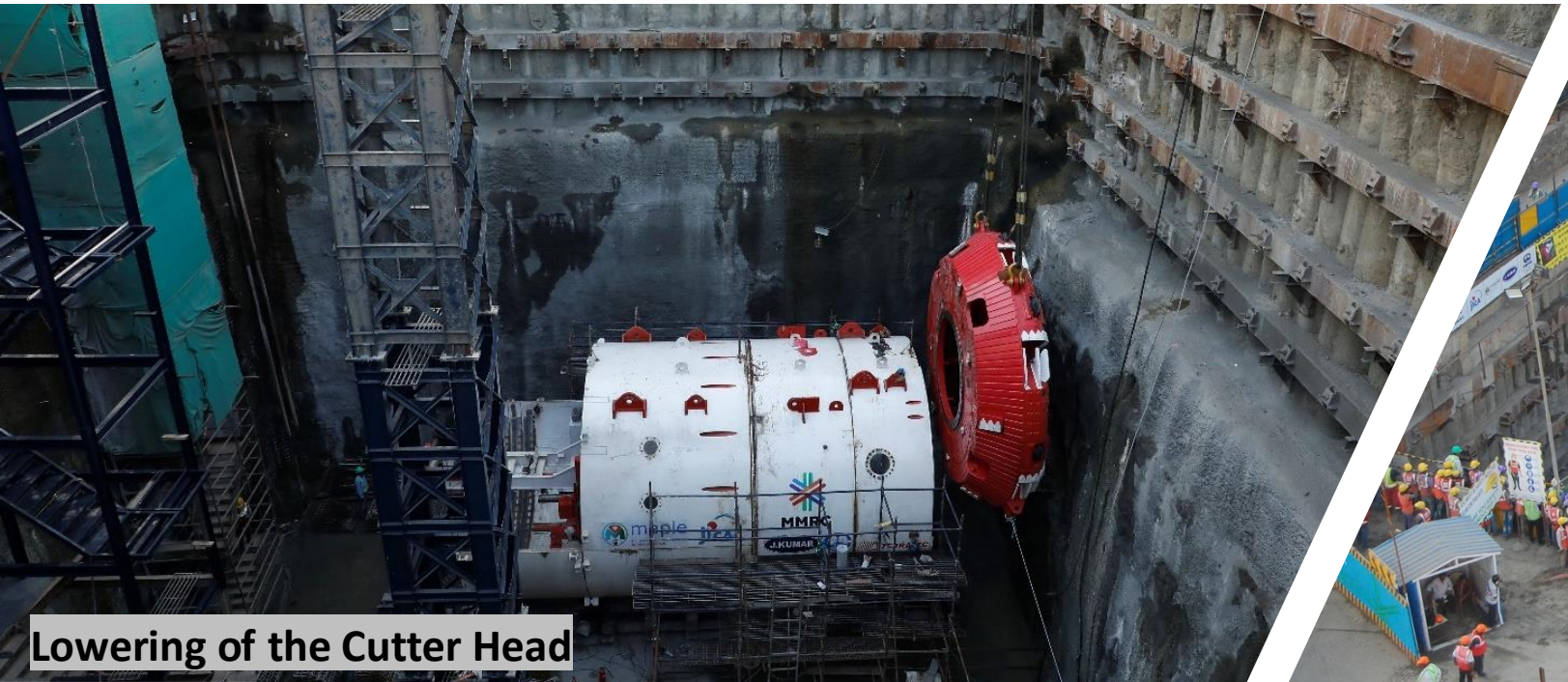
- **Tunnelling** with 17 TBMs with precast RCC segmental rings.
- Bottom-Up construction in stations
- NATM tunnels in stations and sidings
- TBM tunnels widened by NATM to create platforms and crossovers

MMRC

Construction Sequence and Methodology: Tunneling



TBM Launching Shaft & Lowering of TBM

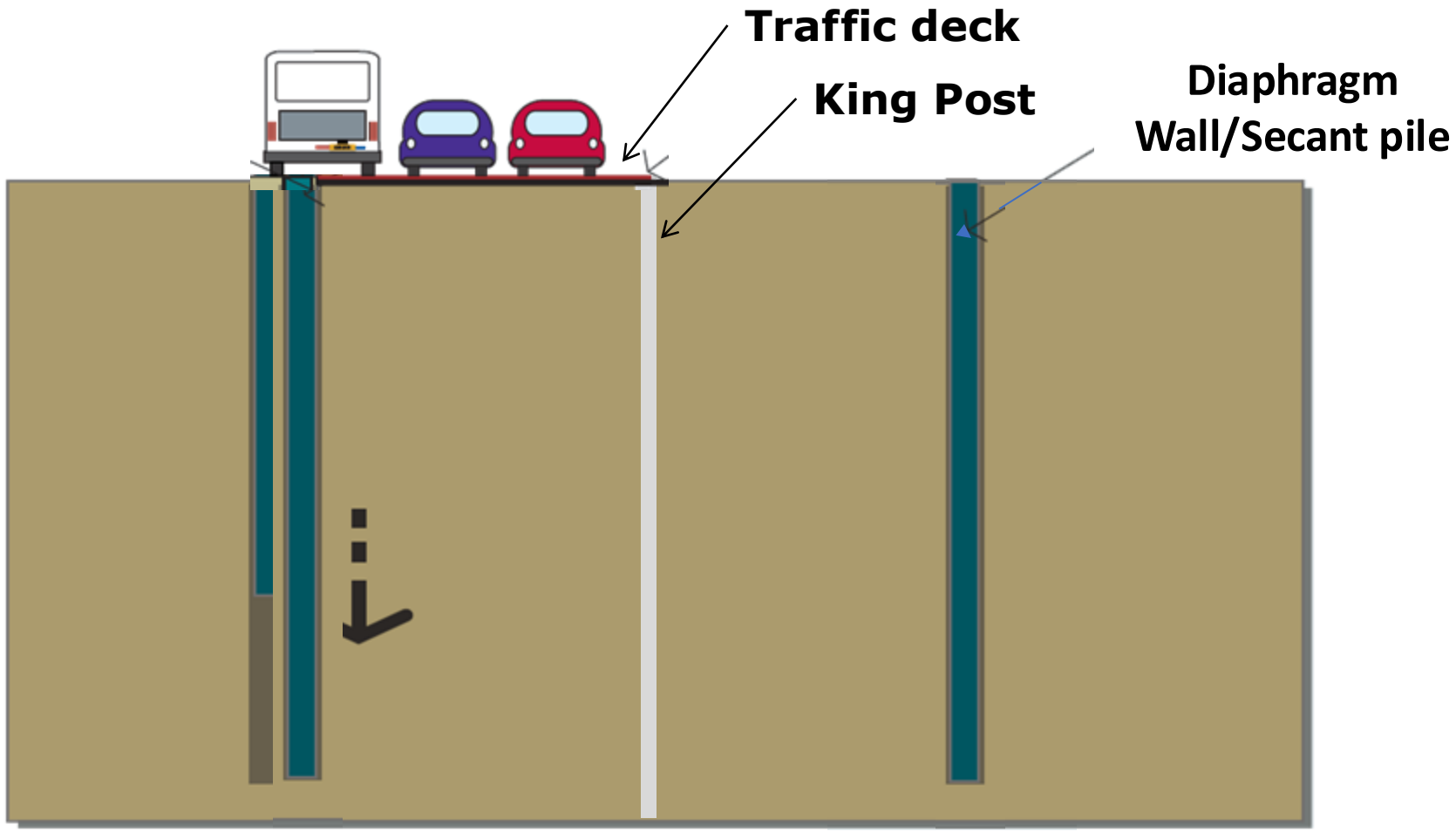


Lowering of the Cutter Head

Underground Station Construction

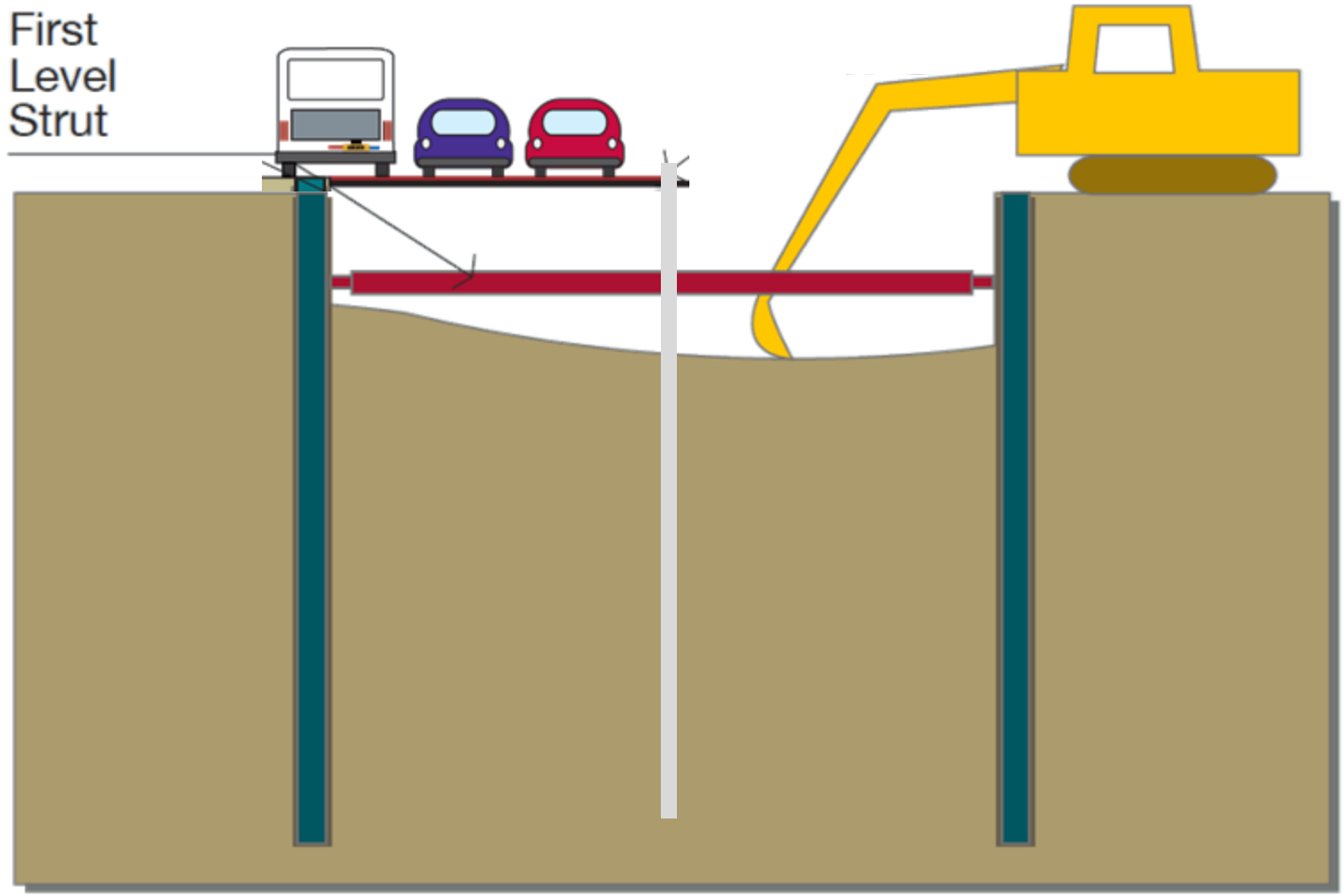
- **Metro Line 3 has 19 Cut & Cover Stations**
- **7 station in Type A & 11 in Type B (Structural Form)**
- **Method of Construction**
  - **Bottom up construction Method**

Construction Sequence and Methodology



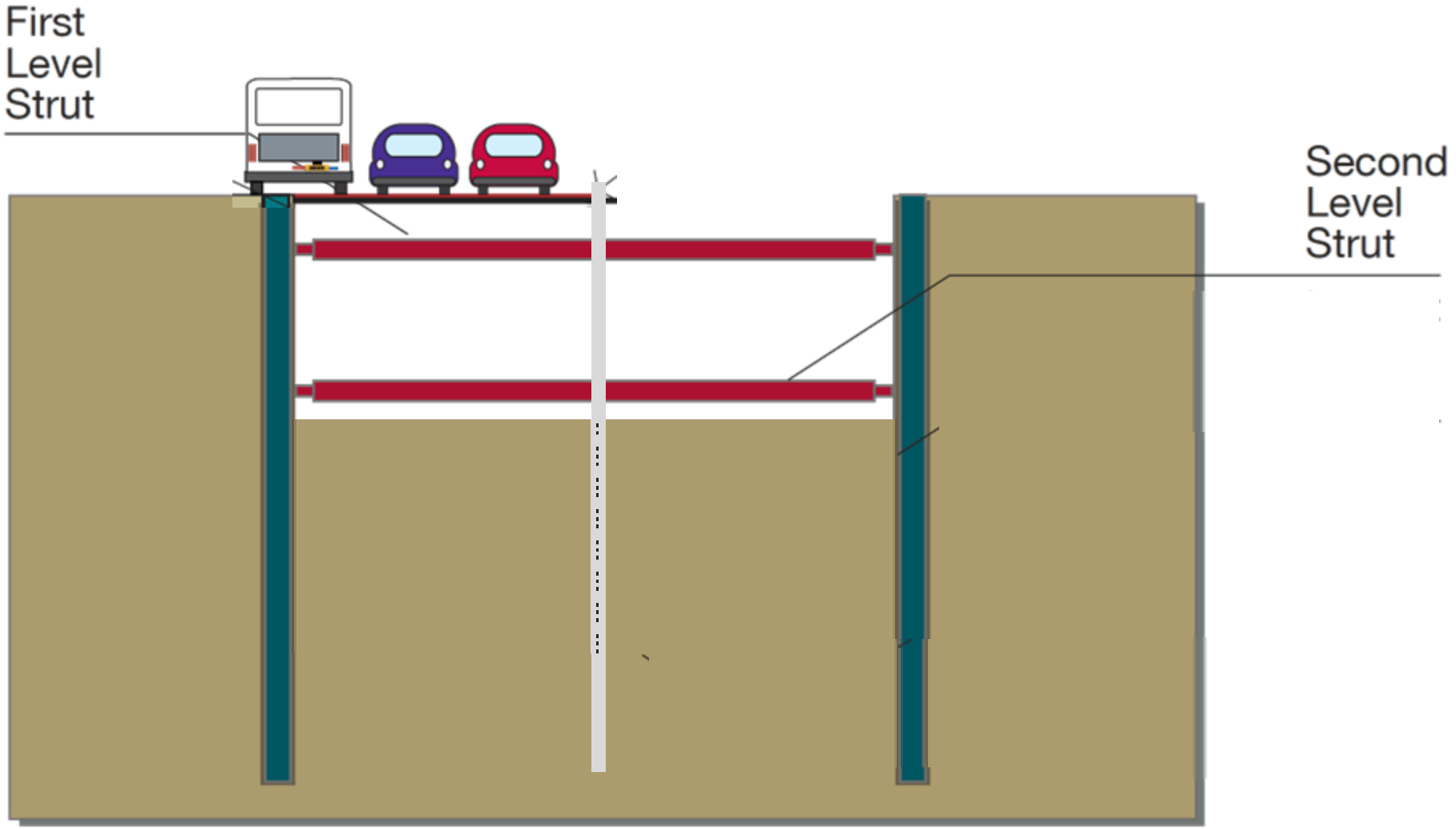
Complete installation of traffic deck
Complete installation of king post
Complete installation of retaining wall

Construction Sequence and Methodology



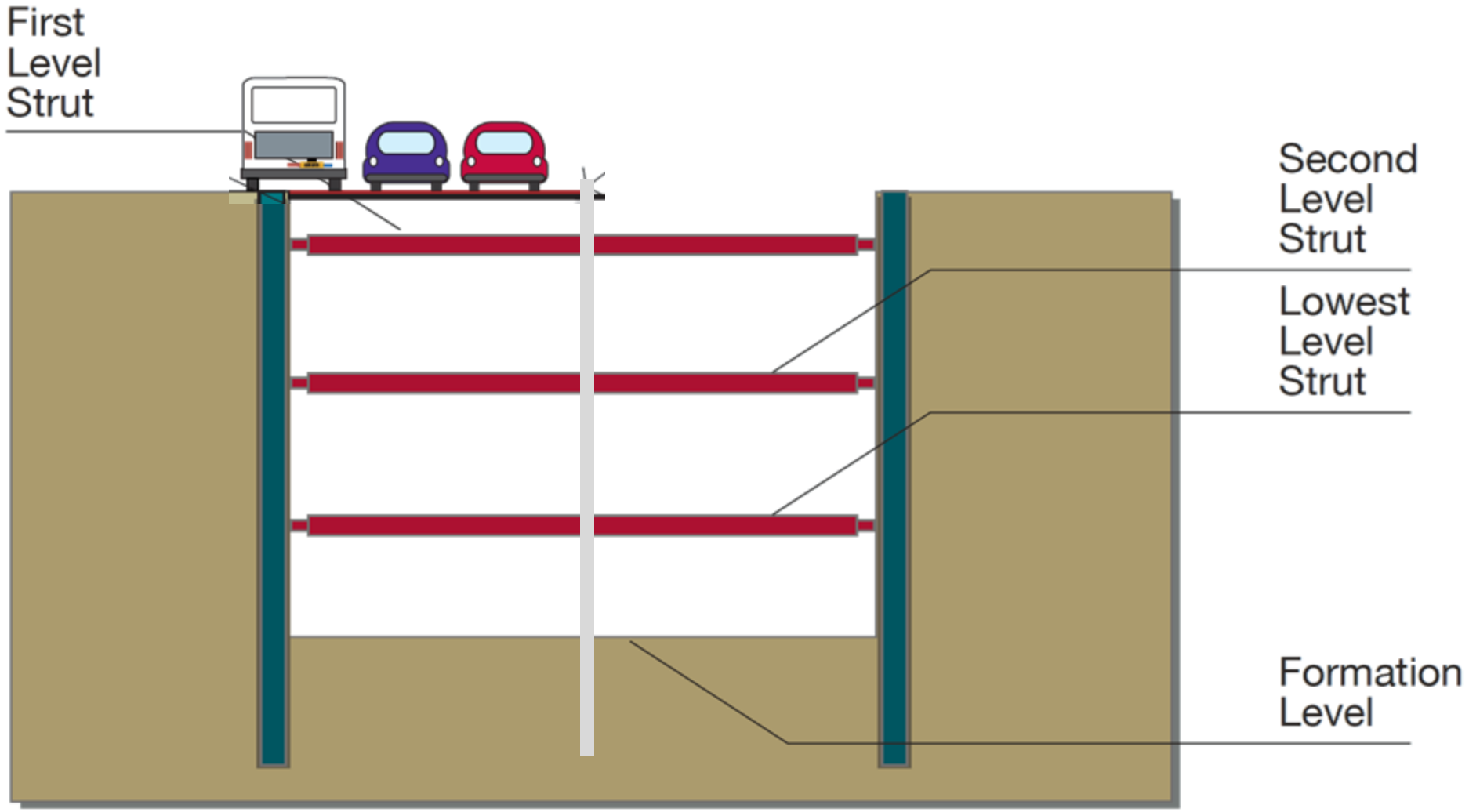
Excavation from ground level & installation of 1st level strut

Construction Sequence and Methodology



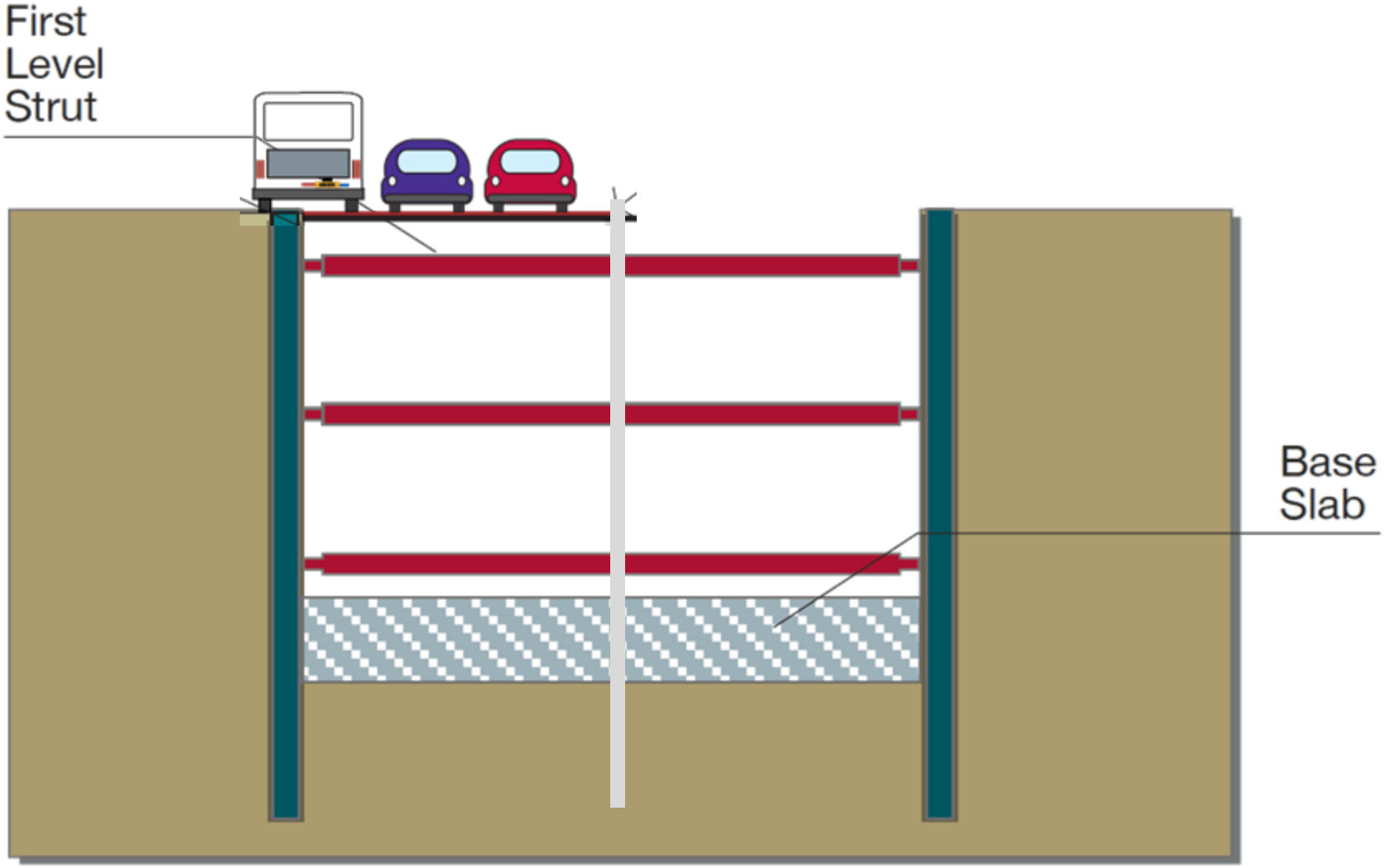
Excavation continues & installation of 2nd level strut

Construction Sequence and Methodology



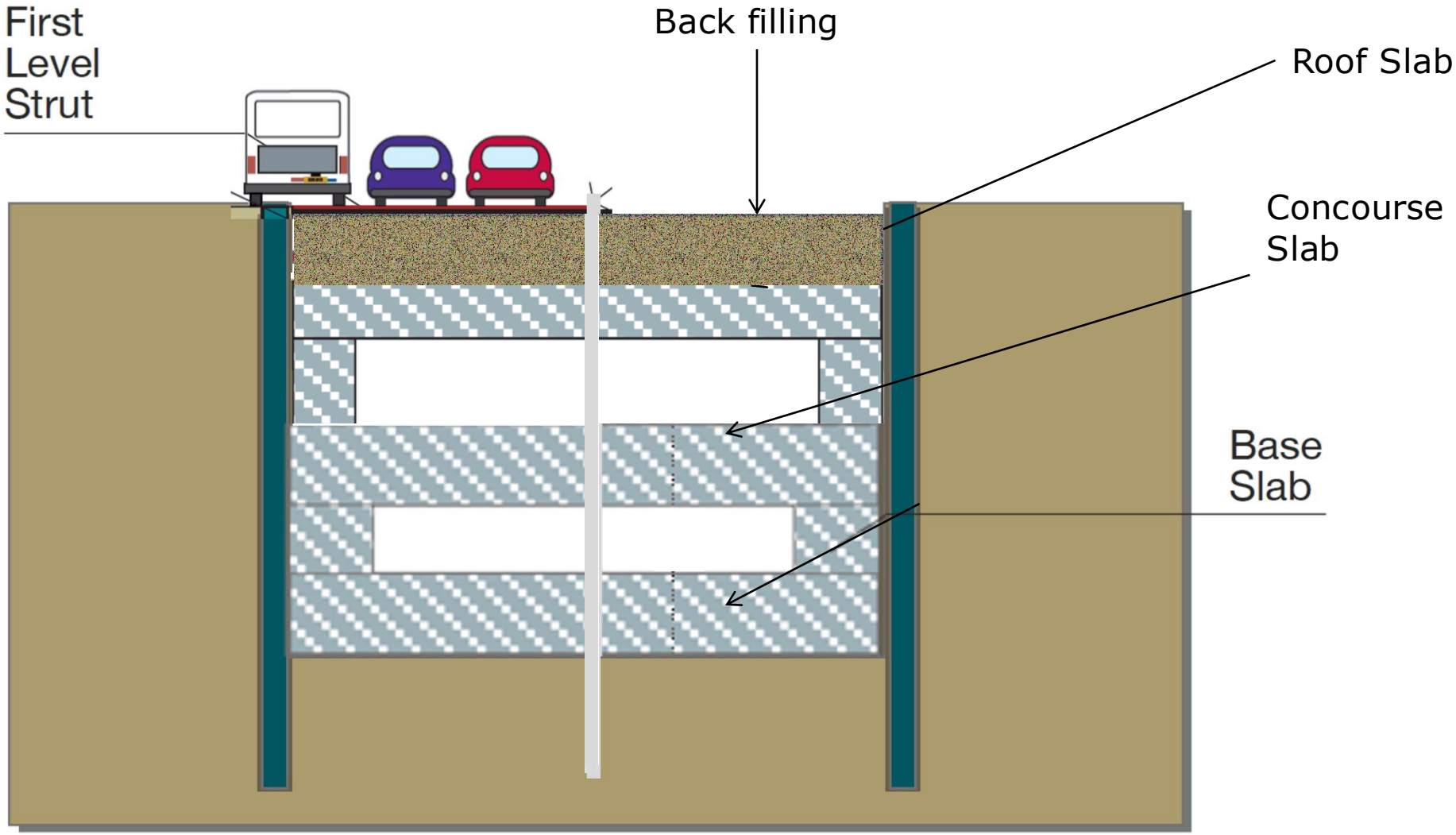
Excavation continues to formation level with installation of struts

Construction Sequence and Methodology



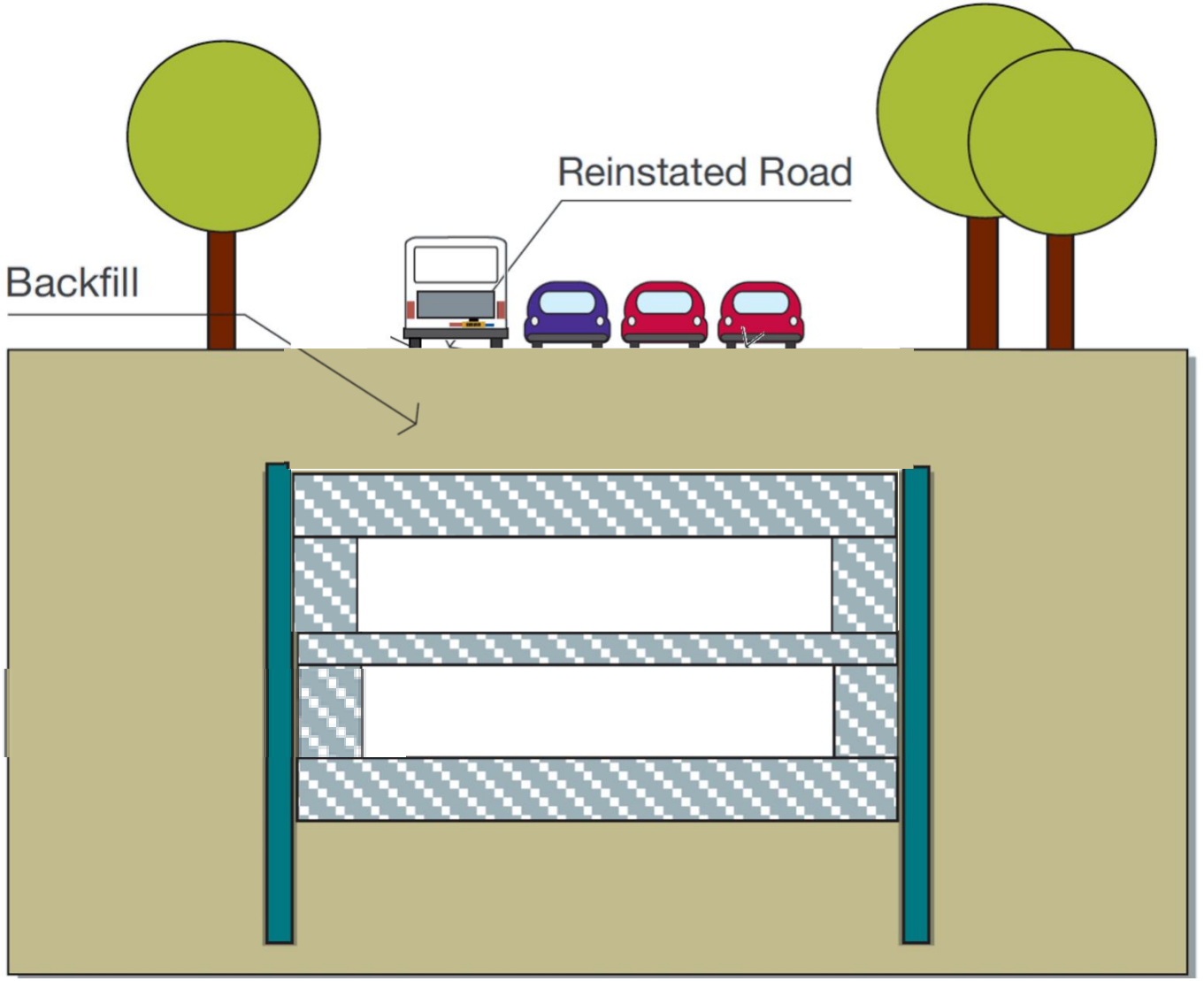
Construction of base slab

Construction Sequence and Methodology



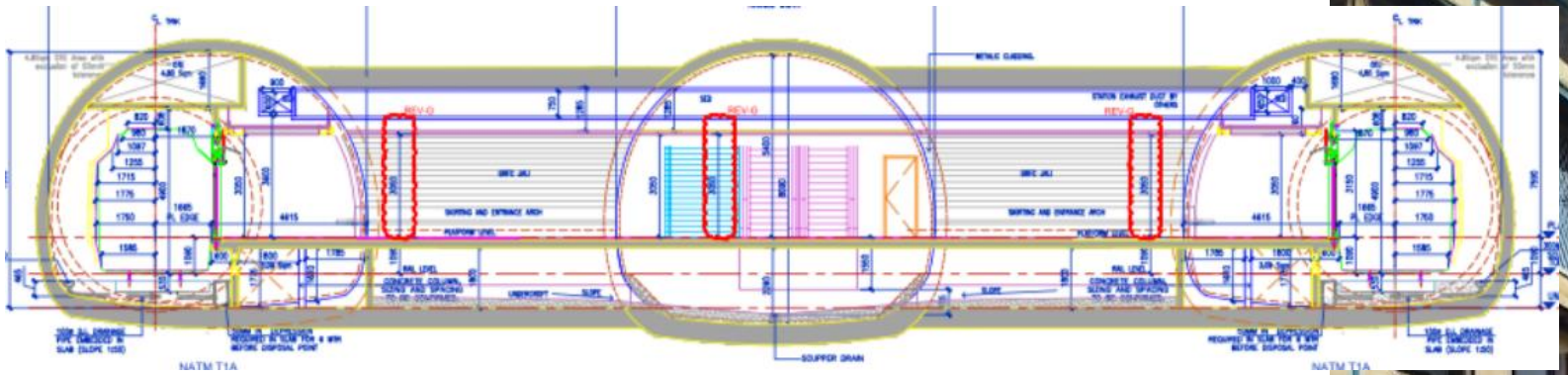
Completion of walls/ columns, concourse & Roof slab
Reinstatement of ground

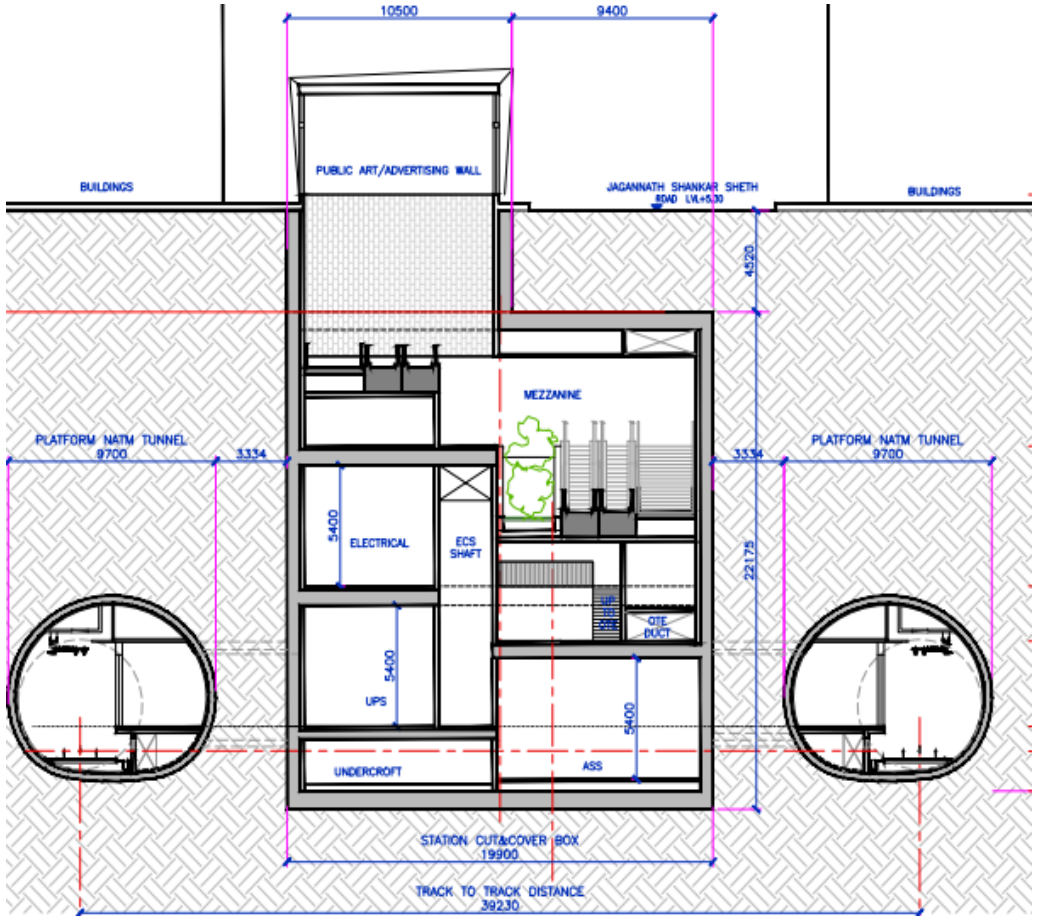
Construction Sequence and Methodology



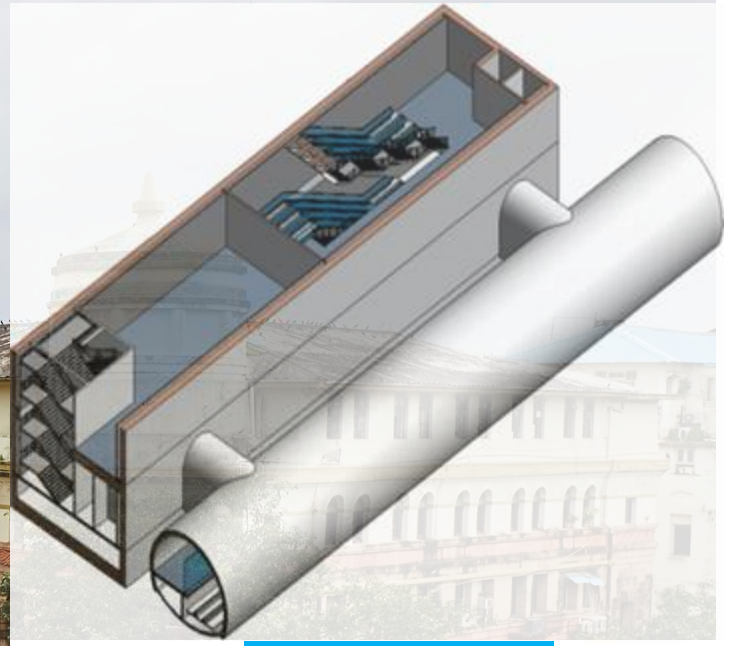
Road Restoration after reinstatement of ground

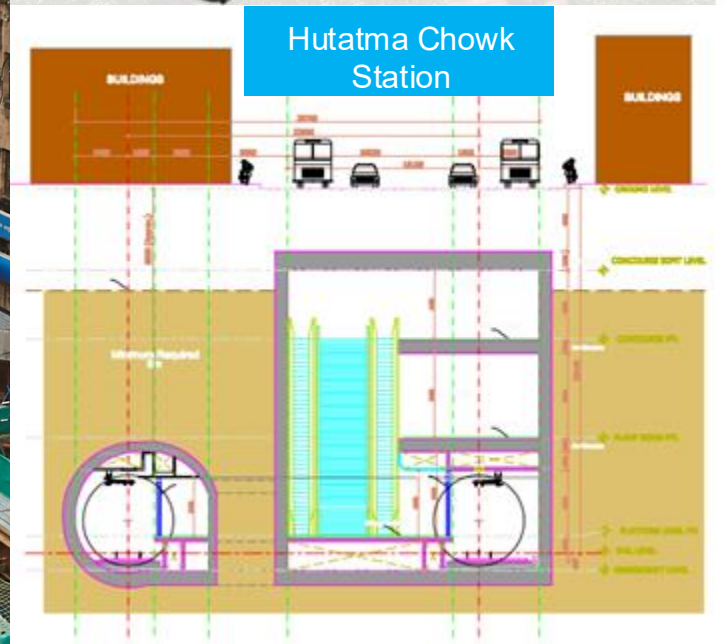
KALBADEVI STATION





HUTATMA CHOWK





Construction Sequence and Methodology: Tunneling

New Austrian Tunnel Method (NATM) of Construction

High Vibration Attenuation Track Structure

Train operation induced noise and vibrations needed to be mitigated by adopting appropriate technological solution for track structure.

High Vibration Attenuation Track Structure is adopted for the first time in India to mitigate vibrations in sensitive areas.

Challenges

Geology	Underground utilities	Traffic management
Land acquisition & rehabilitation of affected families	Approvals and permissions	Congested work areas
Safety: construction sites	Safety: buildings, monuments, infrastructure	Muck disposal and logistics
Environmental challenges	Protests & litigations	Media and public perception

Addressing the challenges

Meticulous planning	Transparent policies and processes	Competent team and robust project management mechanism
Clear roles and responsibilities & delegation of powers	Engagement of experts and specialized agencies	Detailed investigations
Superior quality work site management	International standard safety protocol	Constant engagement with stakeholders, citizens, media, political parties
Information dissemination almost on real time basis	Effective use of social media	Responsive grievance redressal system

Challenges

Geology

Underground utilities

Traffic management

Land acquisition and rehabilitation of affected families

Approvals and permissions

Congested work areas

Safety: construction sites

Safety: buildings, monuments, infrastructure

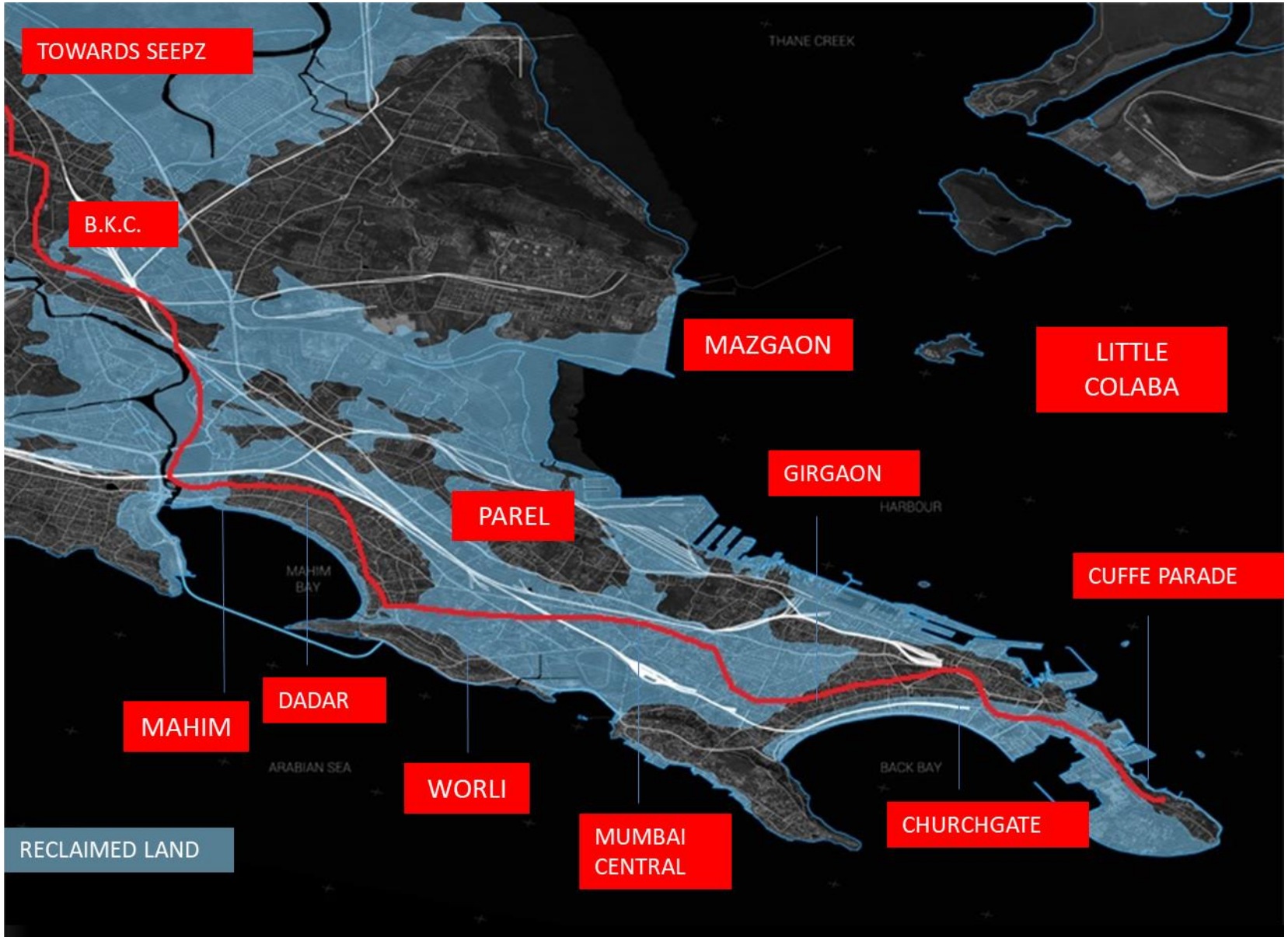
Muck disposal and logistics

Environmental challenges

Protests & litigations

Media and public perception

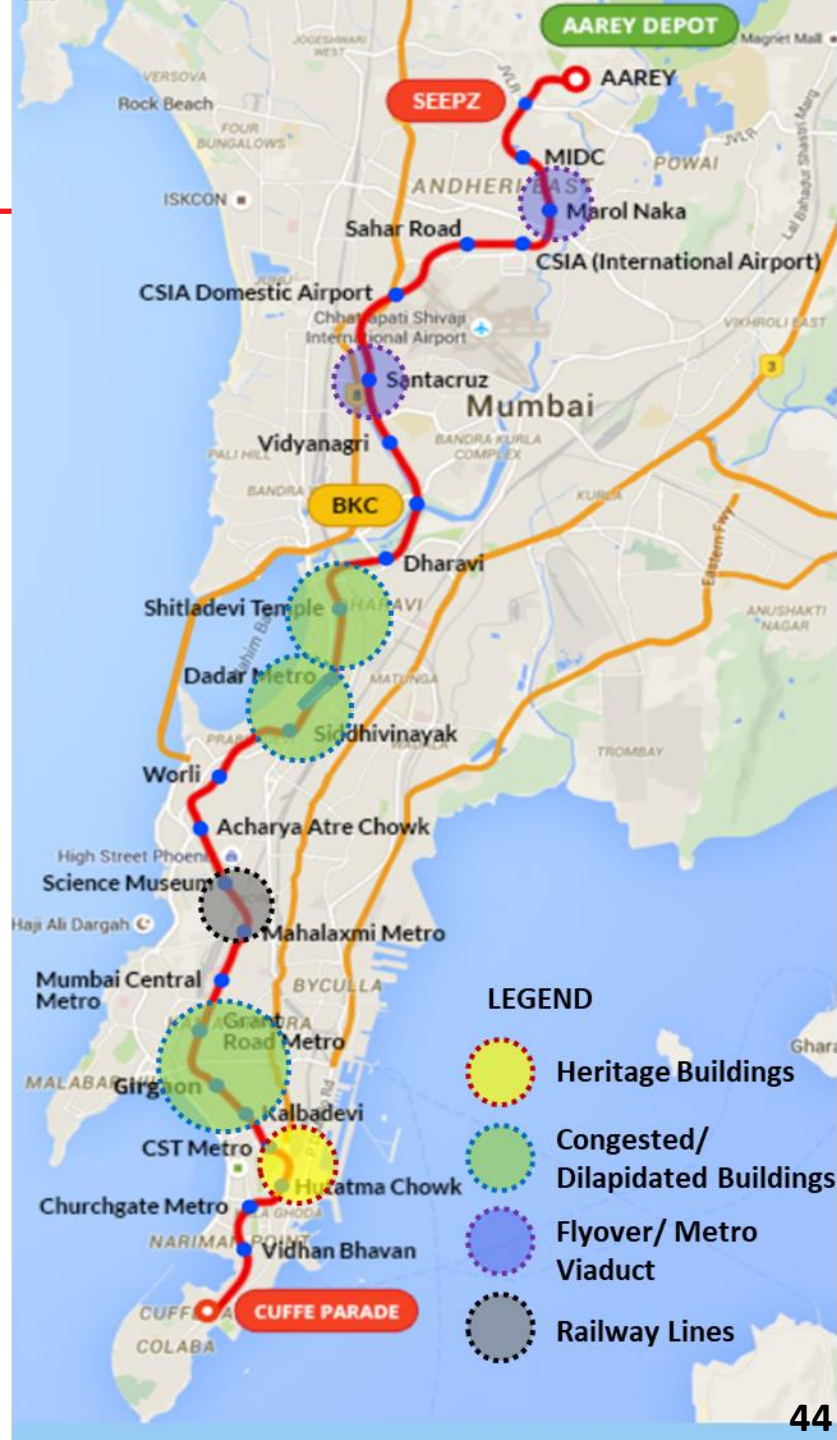
Topography of Mumbai



- Mumbai was once an archipelago of seven islands which were joined by land filling over period of time.
- Mumbai today is a tapered land mass with sea/creek on three sides. It has high population density; and low road space.

Topography of Mumbai

- The corridor passes through densely populated and congested parts.
- It is practically impossible not to have tunnels passing directly underneath or in close proximity of existing buildings and existing infrastructure:
    - Heritage Buildings
    - High Rise Buildings (existing, under construction)
    - Dilapidated Buildings
    - Congested areas with narrow roads
    - Flyovers and Metro Viaduct
    - Railway Lines
- There are administrative and logistical challenges due to deep and old civic utilities, traffic management, muck disposal etc.



Challenges

Geology	**Underground utilities**	Traffic management
Land acquisition and rehabilitation of affected families	Approvals and permissions	Congested work areas
Safety: construction sites	Safety: buildings, monuments, infrastructure	Muck disposal and logistics
Environmental challenges	Protests & litigations	Media and public perception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HIRE & FIRE
TATA HITACHI


L&T-KOMATSU
SHOT ON REDMI NOTE 7
MI DUAL CAMERA

UTILITIES HANGING INSIDE THE STATION BOX

DADAR STATION

SHITLADEVI STATION

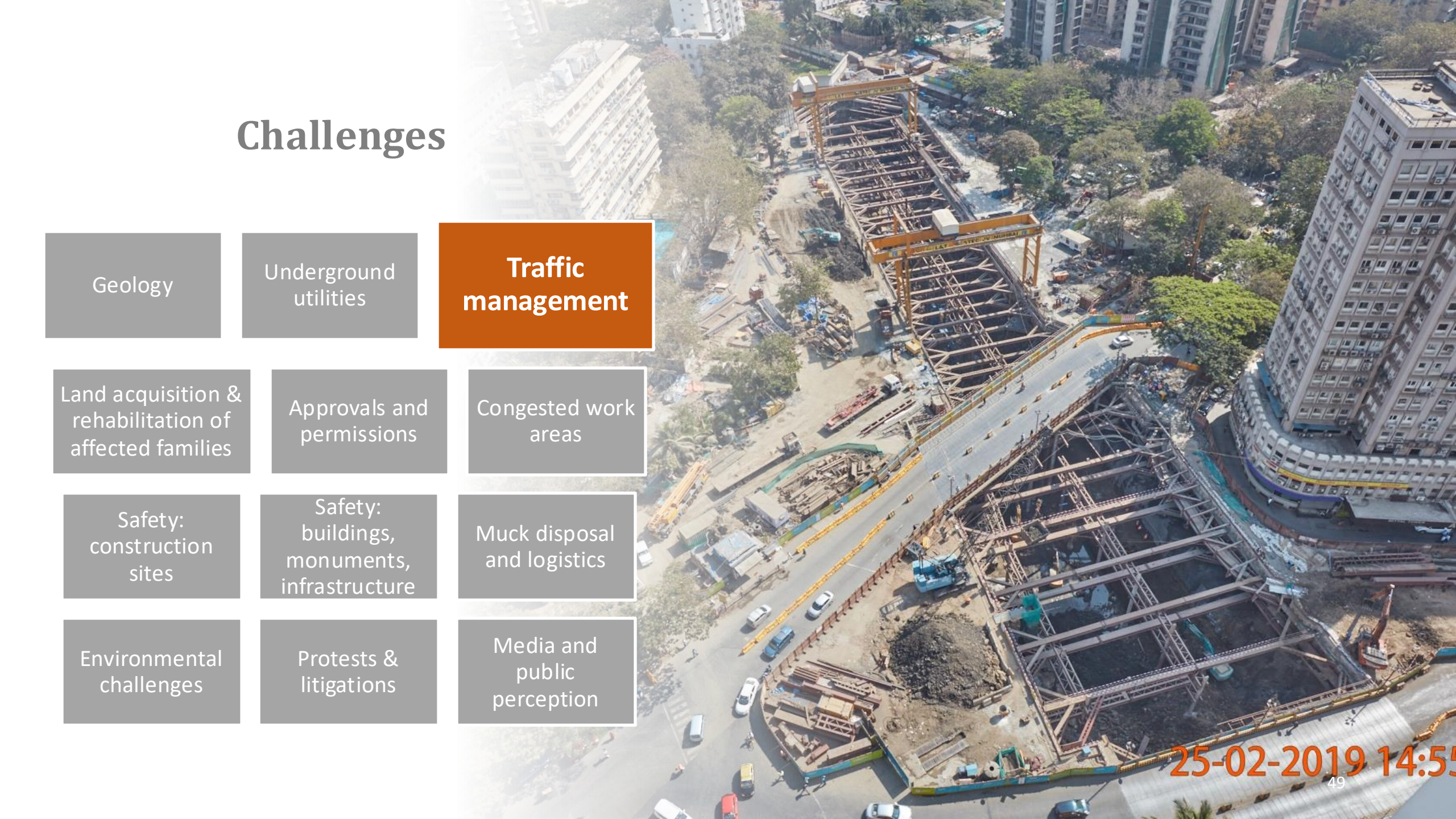
ACHARYA ATREYA CHOWK STATION

WORLI STATION

Challenges : Underground utilities

Challenges

Geology	Underground utilities	**Traffic management**
Land acquisition & rehabilitation of affected families	Approvals and permissions	Congested work areas
Safety: construction sites	Safety: buildings, monuments, infrastructure	Muck disposal and logistics
Environmental challenges	Protests & litigations	Media and public perception



- Traffic Diversion Plan in advance
- Stake holder consultation
- Coordination with Traffic Dept.

- 5200 RM of traffic lanes were laid on steel/concrete decking

Challenges

- Geology
- Underground utilities
- Traffic management
- **Land acquisition & rehabilitation of affected families**
- Approvals and permissions
- Congested work areas
- Safety: construction sites
- Safety: buildings, monuments, infrastructure
- Muck disposal and logistics
- Environmental challenges
- Protests & litigations
- Media and public perception

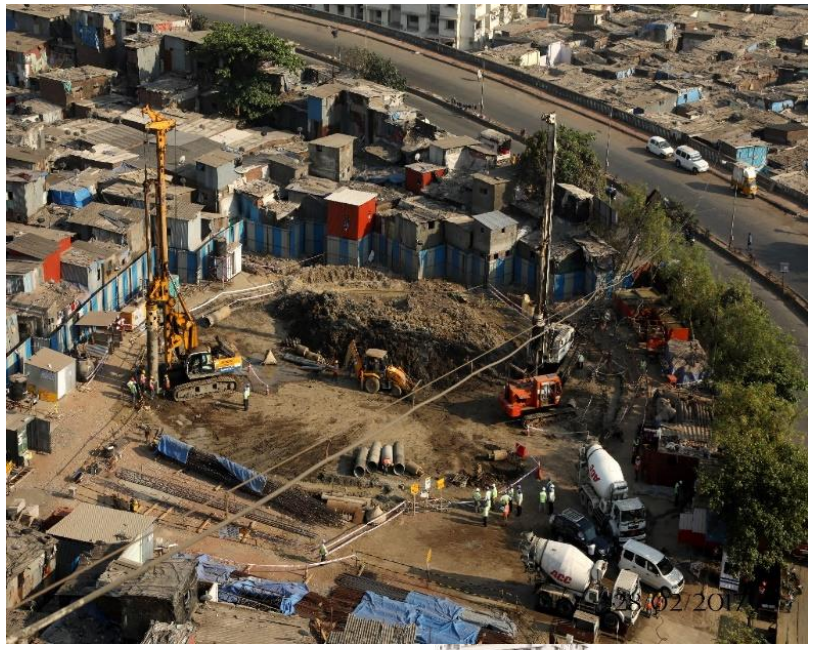
Progress of Land and R&R

Land Acquisition: 100% in possession (73.14 ha Govt. & 2.56 ha Pvt.)

Rehabilitation & Resettlement of PAPs:

- 2125 PAP's Rehabilitated (Formation of society in progress)
- 733 PAPs at Kalbadevi and Girgaon are temporarily rehabilitated. (Rent being paid)
- Permanent rehabilitation plan at Kalbadevi (K2 & K3) and Girgaon (G3) is under execution with following updates:
  - K3: contractor awarded, and work is in progress in site.(37 nos. of floors)
  - G3: contractor awarded, and work is in progress in site.(48 nos. of floors)
  - K2: contractor awarded, and work is in progress in site. (16 nos. of floors)

Naya Nagar Launch Shaft – Site Before demolition

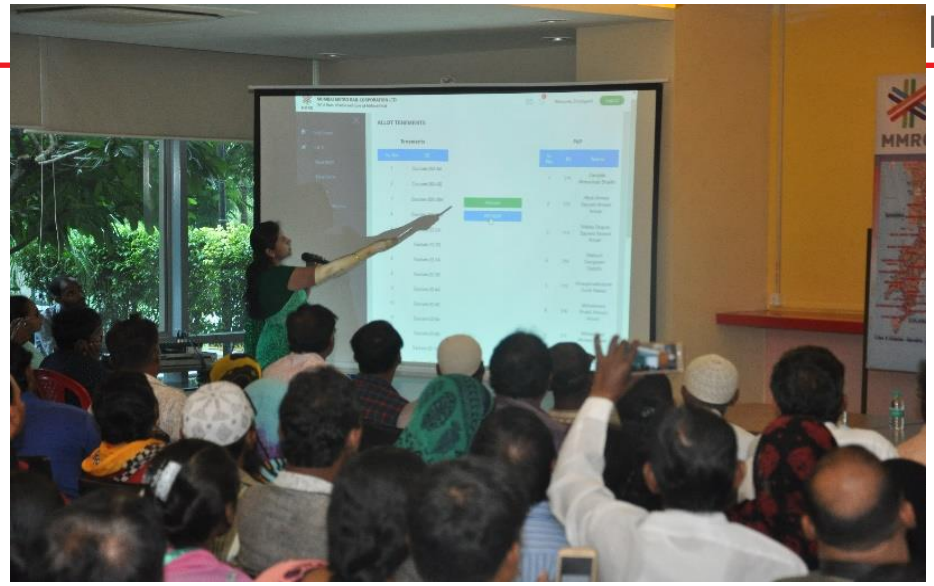


Site After Demolition

Naya Nagar Shaft

Public Consultation with PAPs

Girgaon & Kabadevi

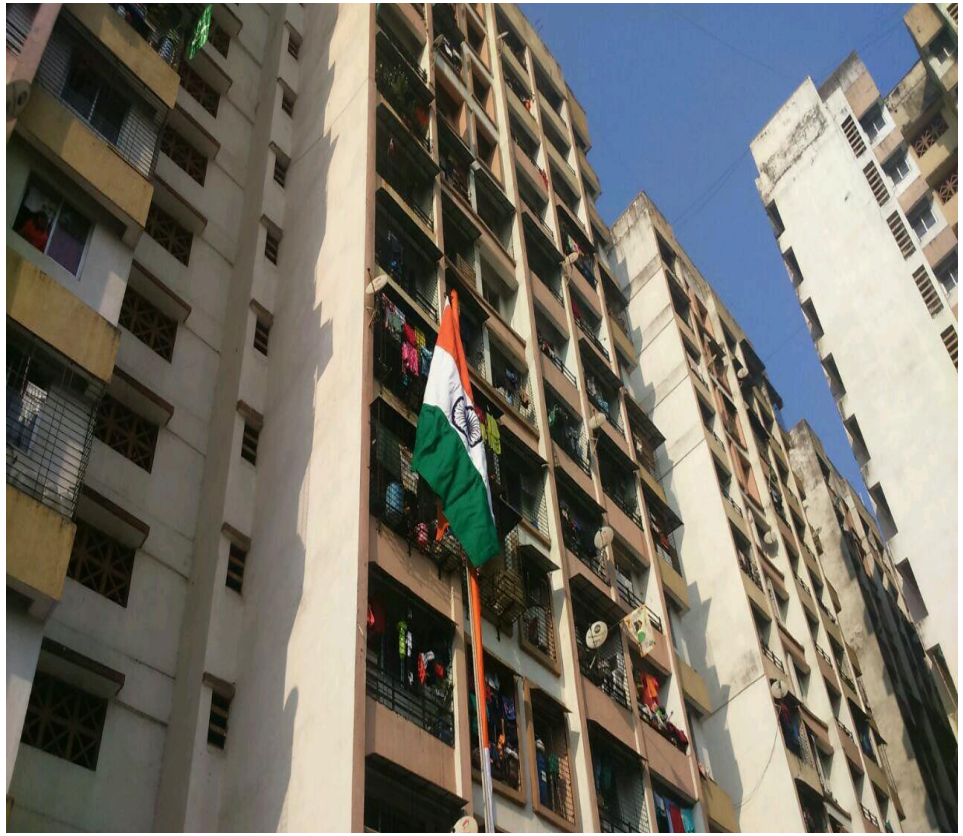


BKC

Nayanagar

Sahar Road

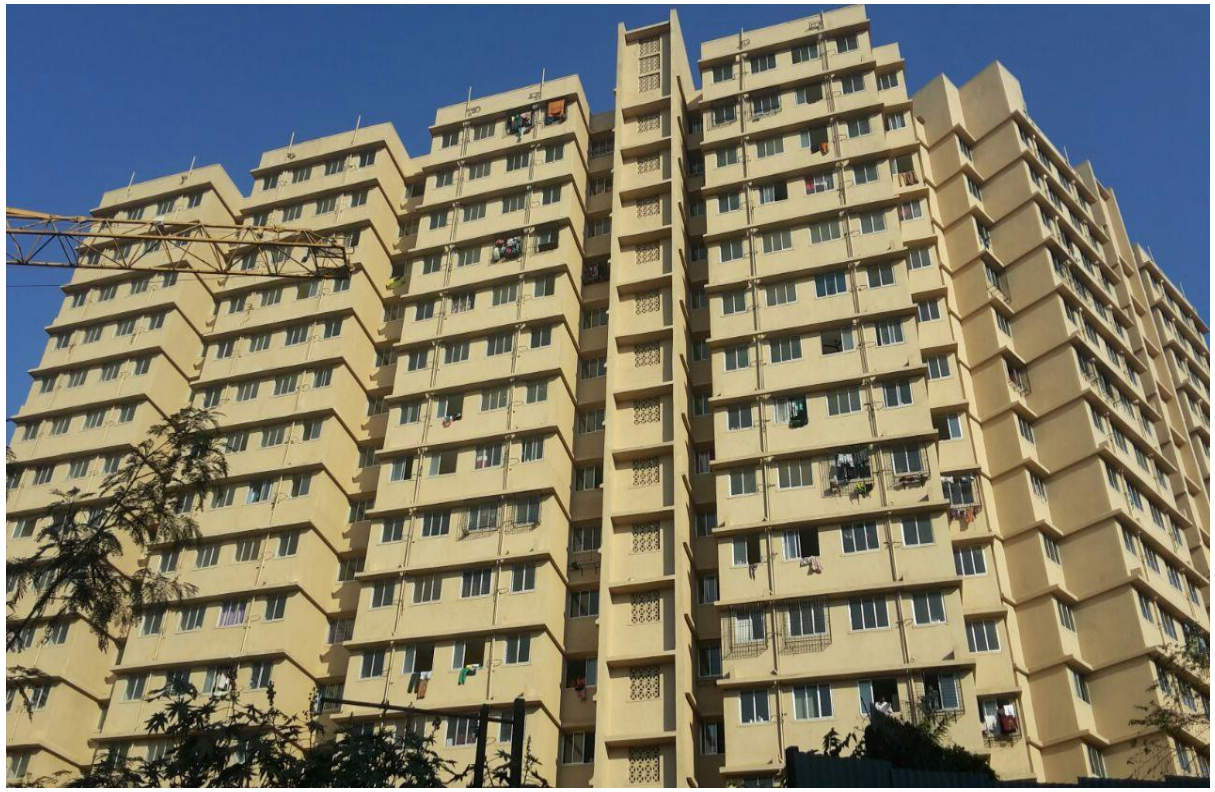
Rehabilitation and Land Acquisition



Land requirement achieved :
75.70 Ha

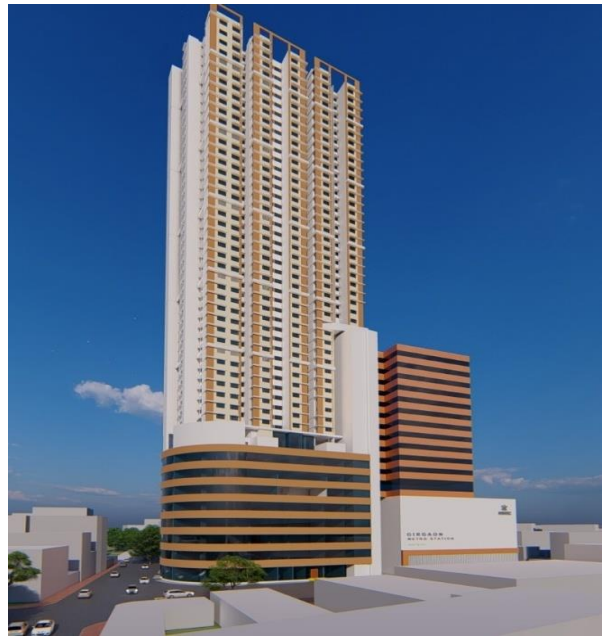
2781 Project Affected Families rehabilitated.

730 families to get benefit of in-situ rehabilitation



Kalbadevi - Girgaon Redevelopment Project Status

733 families to get benefit of in-situ rehabilitation



Project Configurations

Blocks	K2 (Kalbadevi Commercial Complex)	K3 (Kalbadevi Heights)	G3 (Girgaon Heights)
Block Area (in sq.mt.)	1,822.3 sq.mt.	1,643.8 sq.mt.	4,613.6 sq.mt.
Metro Building Configuration	G+4 Structure	Ground Structure	G+3 Structure
Redevelopment Building Configuration	• Fully Commercial Building • Basement (Services) • G+2- Fish market • 5th To 10th (Rehab Commercial) • 10th to 16th Floor (Sale Commercial)	• Composite Residential Building • Basement (Services) • G+1 (Commercial & Amenities) • 2nd & 3rd (Services) • 4th To 37th (Residential)	• Composite Residential - Commercial 3 Basements (Parking. & Services) • Ground to7th (Commercial & Part Services) • 8th & 9th (Services & Amenities), • 10th to 48th (Residential) • Ancillary Building (G+4 Metro Structure, next 10 floors commercial)
Building Height	70.0 mts.	119.7 mts.	155.5 mts.
Proposed completion	**Aug -2027**	**Mar-2026**	**Sep-2027**

MMRC

Challenges

- Geology
- Underground utilities
- Traffic management
- Land acquisition and rehabilitation of affected families
- **Approvals and permissions**
- Congested work areas
- Safety: construction sites
- Safety: buildings, monuments, infrastructure
- Muck disposal and logistics
- Environmental challenges
- Protests & litigations
- Media and public perception

Approvals and Permissions Required

- MML-3 Alignment Notification & Notification under Metro Act
- Central& State cabinet approvals for Project and Funding Pattern
- Tri-Partite Agreement between GoI, GoJ and MMRC
- Mumbai Heritage Conservation Committee Approval
- Tree Cutting Permissions from Local Authorities
- Traffic Diversion NOCs from Local Authorities
- Utilities Shifting Clearances from Local Authorities
- In-situ Rehabilitation with Redevelopment Scheme approval from GoM
- Clearances from MOEF, CRZ, MPCB, Land Authorities including AAI, Defence, State Govt Depts.

Challenges

- Geology
- Underground utilities
- Traffic management
- Land acquisition and rehabilitation of affected families
- Approvals and permissions
- **Congested work areas**
- Safety: construction sites
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- Environmental challenges
- Protests & litigations
- Media and public perception

HUTATMA CHOWK

KALBADEVI STATION

KALBADEVI – K2 BLOCK

KALBADEVI METRO STATION – OPENING TO CENTRAL CAVERN FROM K2 BLOCK

Challenges

Geology	Underground utilities	Traffic management	Land acquisition and rehabilitation of affected families
Approvals and permissions	Congested work areas	**Safety: construction sites**	Safety: buildings, monuments, infrastructure
Muck disposal and logistics	Environmental challenges	Protests & litigations	Media and public perception

Safety practices followed

Strict Adherence to health safety and Environmental Norms of International standards

Regular Audit & safety Score

Talley Token for tunnel entry

Gas monitoring results at tunnel entry

Emergency contacts and site notices

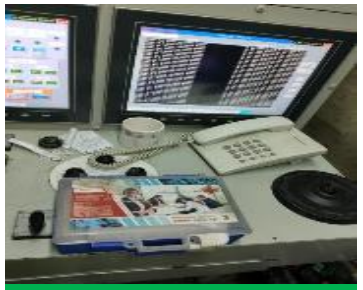
Communication telephone

Rescue stretcher in TBM

Eye wash points in TBM

Rope lights along the barricading

Self rescuer used in Tunnel



First aid box in TBM

Emergency equipment base for station

Emergency control room

Emergency alarm along tunnel

Demo scaffold for training

4 Hour capacity CCBA for ERT

Challenges

Geology	Underground utilities	Traffic management
Land acquisition and rehabilitation of affected families	Approvals and permissions	Congested work areas
Safety: construction sites	**Safety: buildings, monuments, infrastructure**	Muck disposal and logistics
Environmental challenges	Protests & litigations	Media and public perception

Safety Challenge: Protocol Adopted by MMRC

- **Building Condition survey** (BCS) of all buildings in **influence zone of 50 metres** on either side of the alignment before commencement of work
- **Existing** creeks and **weaknesses are mapped** and recorded by experts
- Designers then evaluate the strength of these buildings to **assign allowable impact or serviceability limits.**
- Design of the stations and tunnel, excavation methods are decided keeping the allowable impact limits of existing adjacent buildings.
- **Protection and mitigation** to be applied in buildings where considered necessary

Building Conditions before commencement of work

Floor/Location/Area	Ground floor/ Room-1, Shop-5, Passage-2, Room

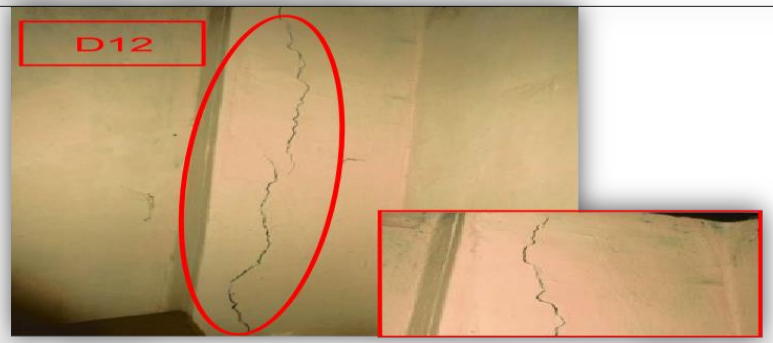
Specific Location : Room-1, Ceiling
Wall: N/A
Crack Size: Major spalled concrete (Exposed rebar)
Photo ID: 16W 008-53, 16W 008-54

Specific Location : Shop-5
Wall: North
Crack Size: Minor crack (~2.0 mm, ~0.3 m long)
Photo ID: 16W 008-66, 16W 008-67

Specific Location : Passage-2, Ceiling
Wall: N/A
Crack Size: Major spalled concrete (Exposed rebar)
Photo ID: 16W 008-99

Specific Location : Passage-2
Wall: SW
Crack Size: Moderate damage
Photo ID: 16W 008-100, 16W 008-101

Specific Location : Passage-2
Wall: SW
Crack Size: Moderate crack (~3.0 mm, ~0.5 m long)
Photo ID: 16W 008-102, 16W 008-103



Specific Location : Room
Wall: East
Crack Size: Minor crack (~2.4 mm, ~1.5 m long)
Photo ID: 16W 008-135, 16W 008-136

Building Condition along alignment and Monitoring Instruments

Sn	Description of item	Total In Nos.
1	**Buildings Investigated**	2416
2	**Heritage Structures**	103
3	**Dilapidated Buildings**	2266
	Very Severe	**48**
	Severe	**436**
	Moderate	**883**
	Very Slight/ Minor	**739**
	Negligible	**160**
4	**Instrumentation & Monitoring @ buildings**	1723
5	**Building Supported**	124

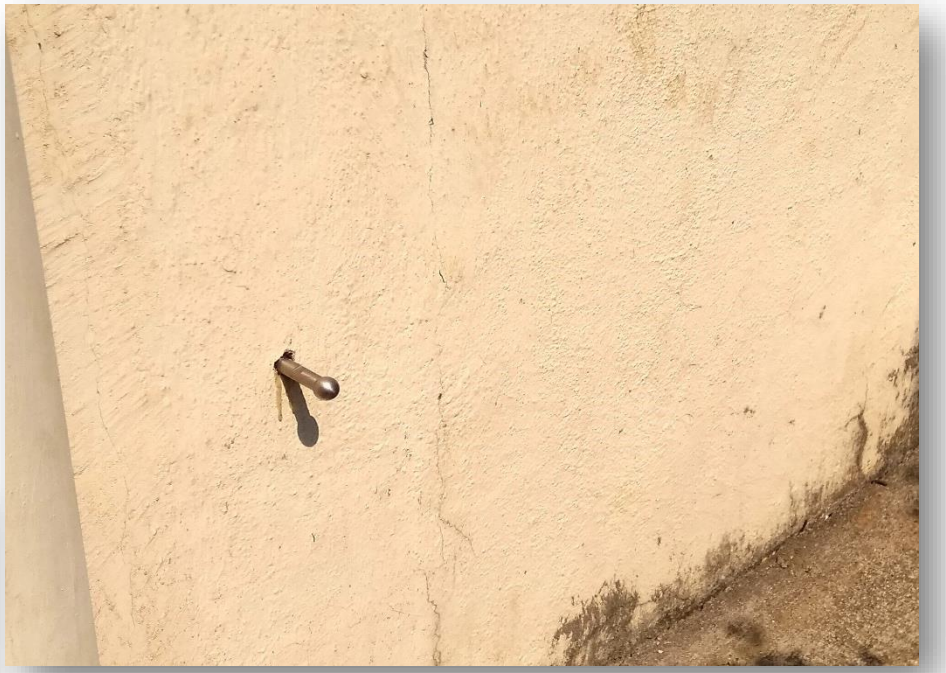
Monitoring Instruments

- Building Settlement Marker
- Soil Settlement Marker
- Pavement Settlement Marker
- Crack Meter, Inclinometer
- Rod Extensometer, Piezometers
- Vibrating Wire, Tiltmeter
- Vibration & Noise Monitor/ Seismographer
- Total Stations & Targets, Load Cell & Strain Gauge
- Shotcrete Creep Test Equipment
- Water Stand Pipe
- Frequency of measurement would depend on the nature of the work.
- For heritage and weak buildings 24X7 Online monitoring will also be undertaken when considered necessary.

Instrumentation & Monitoring

Building Settlement point

To check the settlement of the structure during station construction



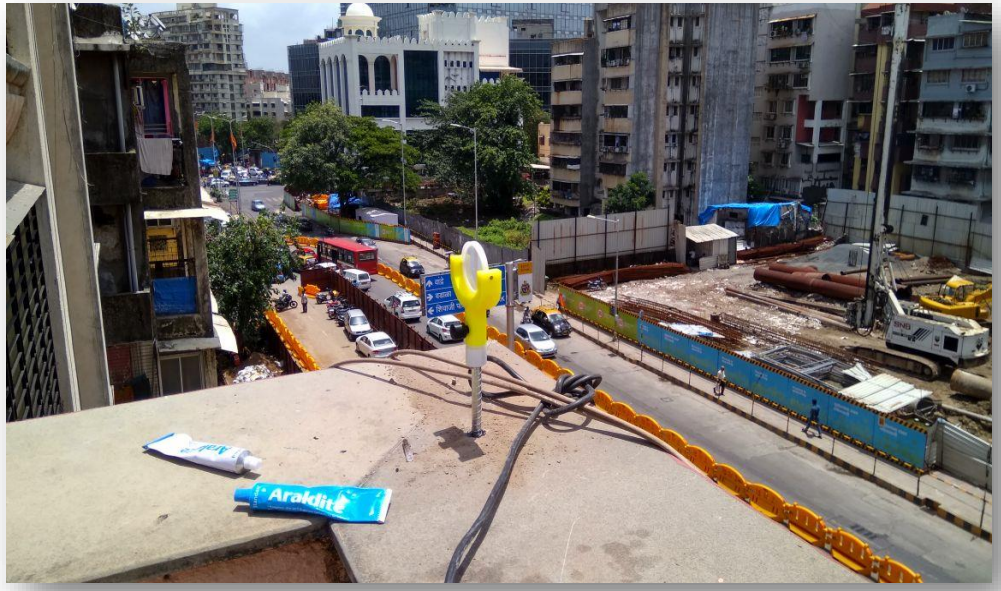
Crack meter

To measure the crack of the building structure

Instrumentation & Monitoring

Tilt Plate

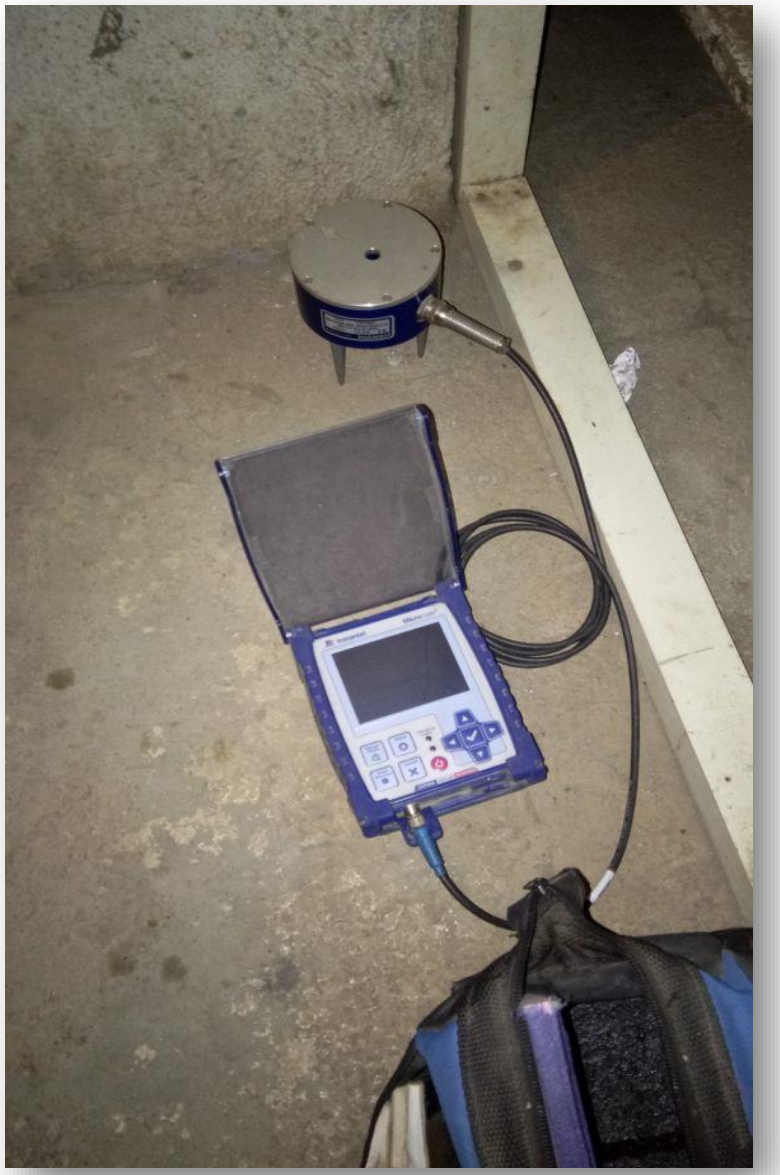
To measure the tilt of the building structure



Optical target

It measure the deviation of the building structure in three directions

Instrumentation & Monitoring

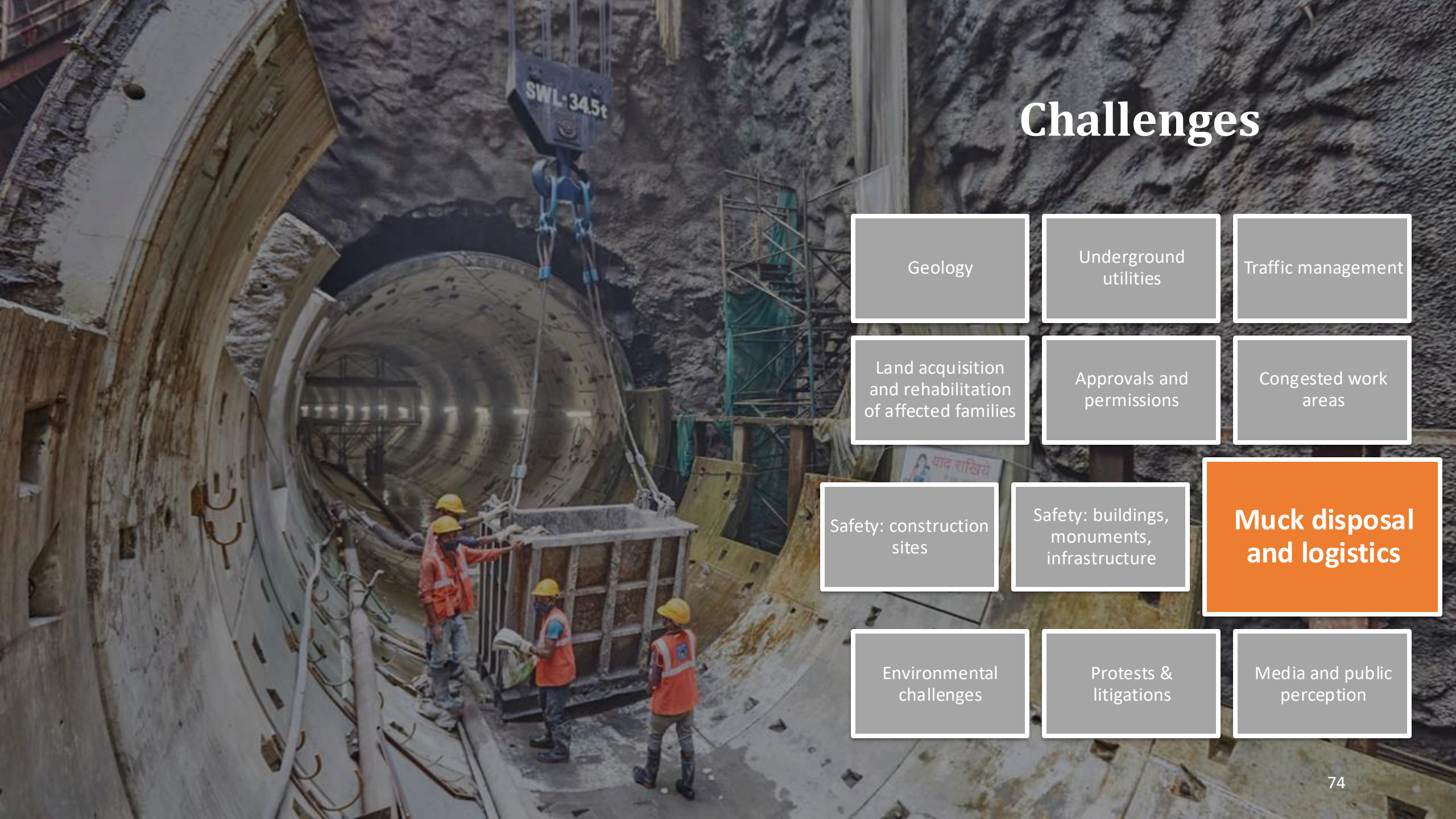


Vibration monitor

To measure the vibration at nearest building structure during construction activity

Propping and supporting arrangement for building

Propping arrangement for safety of building



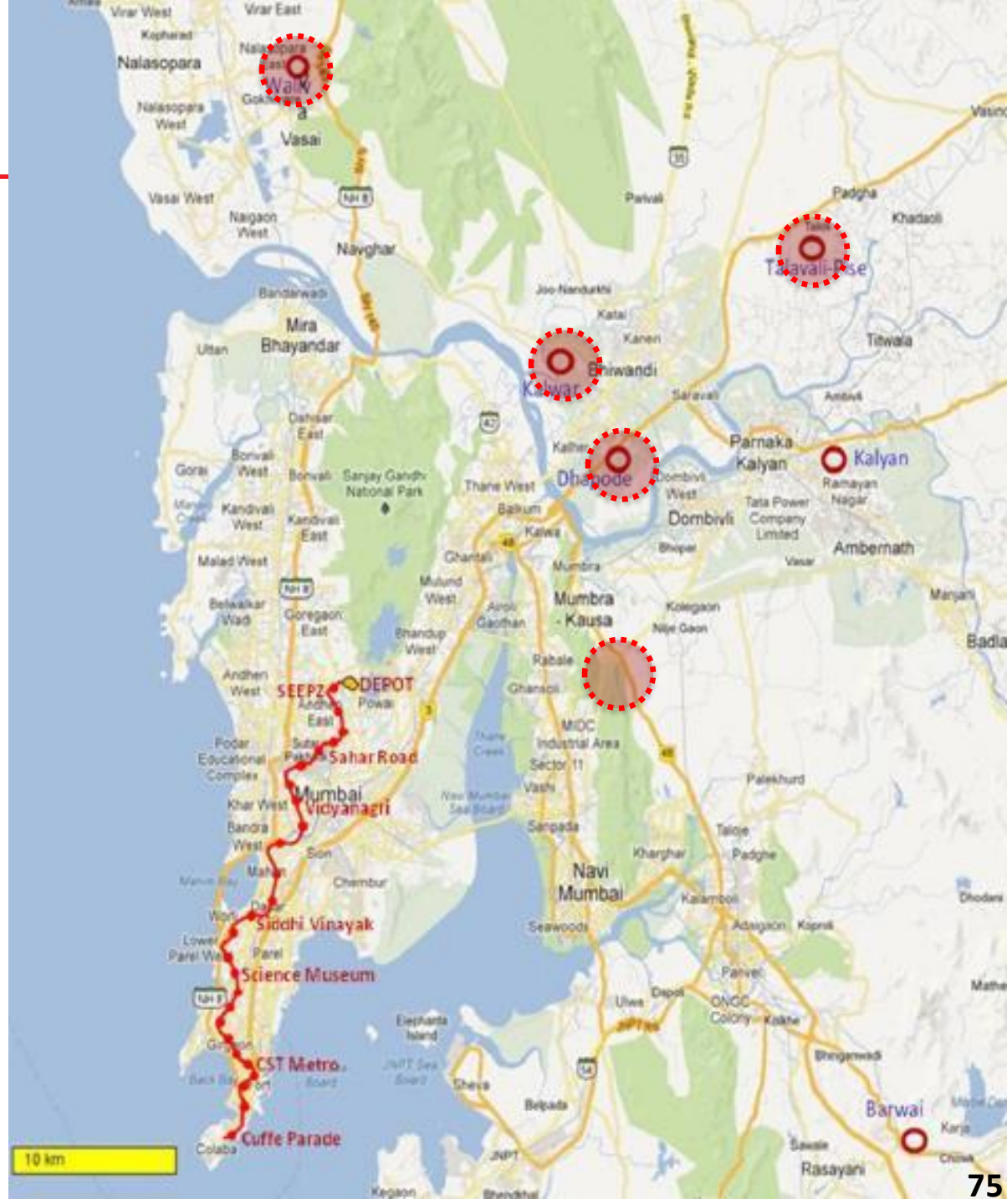
Challenges

- Geology
- Underground utilities
- Traffic management
- Land acquisition and rehabilitation of affected families
- Approvals and permissions
- Congested work areas
- Safety: construction sites
- Safety: buildings, monuments, infrastructure
- **Muck disposal and logistics**
- Environmental challenges
- Protests & litigations
- Media and public perception

Muck Disposal at farther distances

Project generated 8.5Million Cum muck during construction of Stations and Tunnels.

Abandoned quarries (Govt. owned) were identified for muck disposal. These quarries were approx. **16 to 74 Kms away from sites**



Challenges

Geology	Underground utilities	Traffic management
Land acquisition and rehabilitation of affected families	Approvals and permissions	Congested work areas
Safety: construction sites	Safety: buildings, monuments, infrastructure	Muck disposal and logistics
Environmental challenges	Protests & litigations	Media and public perception

Environmental Impacts and response

Removal of Trees (Cut + Transplant) (3093 for stations and allied activities and 2574 at Depot & allied activities)

Mitigation Actions:

- Compensatory plantation + Plantation through CSR + Miyawaki Plantation= 33,023.
- 2931 number of grown-up trees at respective station sites after completion of works
  - MMRCL submitted undertaking dated 9th May 2017 in WP 814 of 2017 to plant equivalent number of trees that would be affected at station sites / allied activities and green cover to extent of 95% of area would be restored after complication of station construction work.
  - Total Trees- 2931; 26 u/g stations; Total Tree species– 29
  - Trees Growing period at nurseries – 4 years; Maintenance – 3 Years at Station sites.
  - **Total Trees In-situ planted -1319 at station sites and 20 trees planted under public appeal till 20 November 2025 .**
- Transplantation : 1,952 .


Oct 11, 2025, 16:41


Oct 11, 2025, 16:41






Photographs of Tree Package 19, 20 and 21 at Holding Nurseries




Tree Transplantation

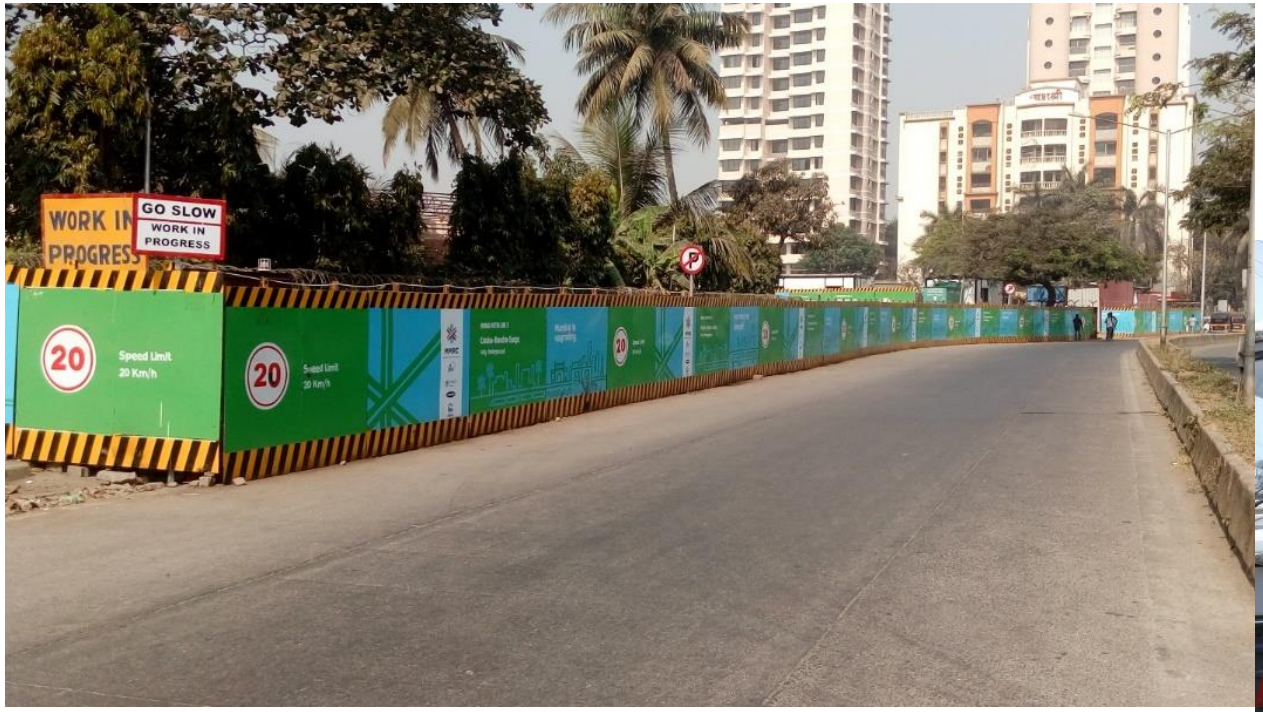
Environmental Impacts and response

Air, Water, Noise Pollution during Construction

Mitigation Actions:

- High Standard Housekeeping
- Benchmark survey
- Realtime monitoring

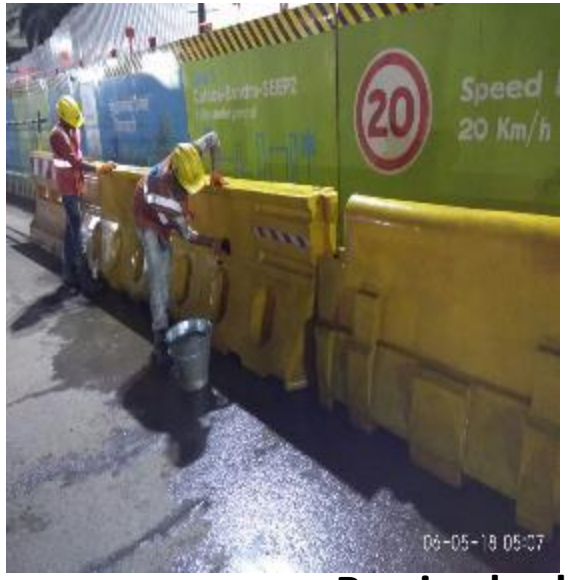
Environmental Measures during Construction



Enclosed work areas

Wheel Washing Plant

Environmental mitigation Initiatives: House keeping

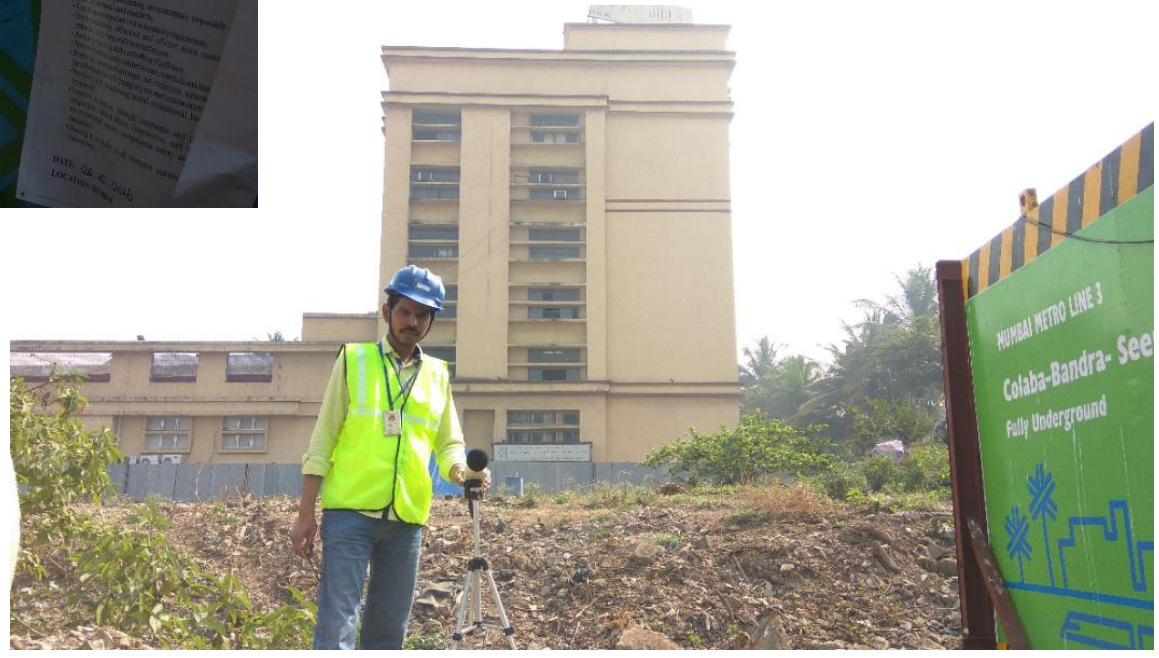


Barricade cleaning at all station / RMC locations

House keeping at Mid shaft Pali ground

Environmental Measures during Construction

Air Quality Monitoring



Challenges

Geology	Underground utilities	Traffic management
Land acquisition and rehabilitation of affected families	Approvals and permissions	Congested work areas
Safety: construction sites	Safety: buildings, monuments, infrastructure	Muck disposal and logistics
Environmental challenges	**Protests & litigations**	Media and public perception

Protests & litigations

- Protest by Project Affected People (PAPs)
- Protest by elite groups with NIMBY attitude
- Opposition by environmentalists, activists & certain citizen groups.
- Opposition by political parties/ leaders

Litigations

Number of cases -168

(Supreme Court -09 , Bombay High Court -109, City Civil Court -28, other courts -22)

Number of cases where stay order was passed – 16

(High Court 14, NGT -1, Supreme Court -1 (group matters))

MUMBAI METRO LINE 3 COMMISSIONING

Phase-1: Inauguration
by Hon'ble PM on 05/10/24

Phase - 2A: Inauguration
by Hon'ble CM & DCM on 09/05/25

Phase-2B: Inauguration
by Hon'ble PM & CM on 08/10/25

Ridership Details

Total Passengers travelled (7^{th} Oct 2024 to 26^{th} Nov 2025)	2,00,43,752
Average Passengers per day (9^{th} October 2025- 26^{th} Nov 2025)	1,47,495
Maximum daily ridership achieved	1,82,461 (on 16.10.25)

Project Progress


03.06.2024 12:04


ESTABLISHED BY BHARAT RATNA
DR. B. R. AMBEDKAR
In 1953


J.N. PETIT INSTITUTE

CROSS OVER AT SAHAR

SAHAR CROSSOVER

AAREY DEPOT WORKSHOP

TERMINAL -2

CONCOURSE LEVEL


SAHAR
गंतव्य / Destination
प्लेटफॉर्म / Platform
ट्रेन/समय / Time
आरे जेव्हीएलआर
2
14:03
आरे जेव्हीएलआर
2
14:03
Welcome to SAHAR
Station
Customer Care
CONCOURSE LEVEL


TERMINAL -1
लिफ्ट
Lift
बाहेर
Exit
Chhatrapati Shivaji Maharaj
International Airport - T1
PLATFORM LEVEL

MAROL NAKA

NATM - PLATFORM

BANDRA COLONY

PLATFORM LEVEL


BKC
MMRC
KOTAK - Bandra -
Kurla Complex
सावधान
ESCALATOR PLATFORM VIEW


SHITLADEVI

GIRGAON

STAIR CASE

KALBADEVI

CST METRO

ENTRY STRUCTURE


बाहेर
Exit
बाहेर
Exit
बाहेर
Exit
बाहेर
Exit
लिफ्ट
Lift


2
आरे जे.वी.एल.आर.
Aarey JVLR
LIC
8976862090


Remix


FIRE EXIT
ग्राहक सेवा
Customer Care
MMRC
LIC
Ticket Office
THIS SIDE UP
SWISS MILITARY


माहिती
Information
MMRC


बाहेर
Exit
2025 10 09 17:54

MUMBAI METRO 3 NCMC CARD

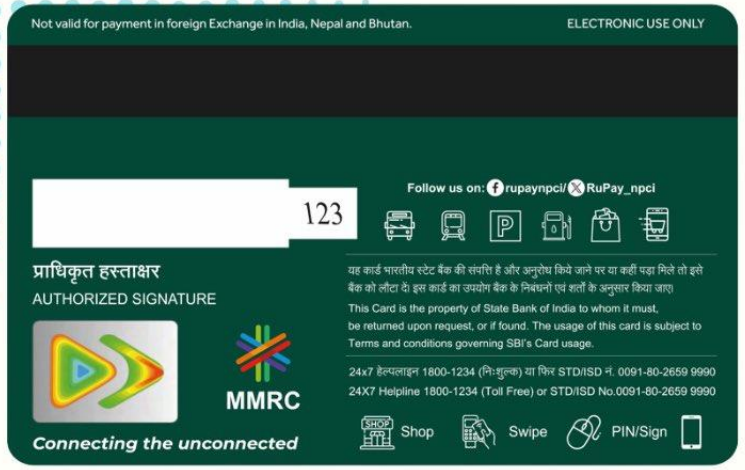
FEATURES

Enables contactless entry at Metro Line 3 stations

Same card can be used on Metro Lines 1, 2A & 7, buses and metro networks in other cities

NCMC cards issued by Metro Lines 1, 2A & 7 and other transport operators are compatible and rechargeable at Metro Line 3 stations

MUMBAI METRO 3 NCMC CARD



FARE STRUCTURE

Fares on Line-3 will be charged as per the regular fare slab

Fare will range from ₹ 10 to ₹ 60 between Aarey JVLR and Acharya Atre Chowk station

Free Wi-Fi on MetroConnect3

MMRC

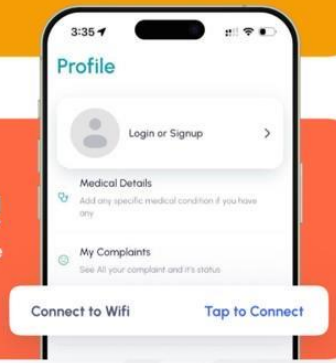
Stay Connected Underground!

01 Install & Login

Download & install the MetroConnect3 app and login before entering the station.

02 Connect to Wi-Fi

Go to your phone's Wi-Fi settings and select MetroConnect3 Public Wi-Fi.



03 Free Wi-Fi Inside!

Open the MetroConnect3 app, goto profile & tap Connect to Wi-Fi, and you're done!

Fast, Reliable, Secure

24X7 Customer Support 180 022 0221

contact@mmrcl.com www.mmrcl.com

GET THE APP NOW

MMRC

Mumbai Metro Rail Corporation Limited

Mumbai Metro Line 3

To buy MMRCL QR tickets on WhatsApp,
Scan this QR code

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Send 'Hi' message

Buy MMRCL Line 3 Tickets Hassle Free!!

Scan this QR code to purchase QR Tickets on WhatsApp

PeLocal
Fintech Private Limited







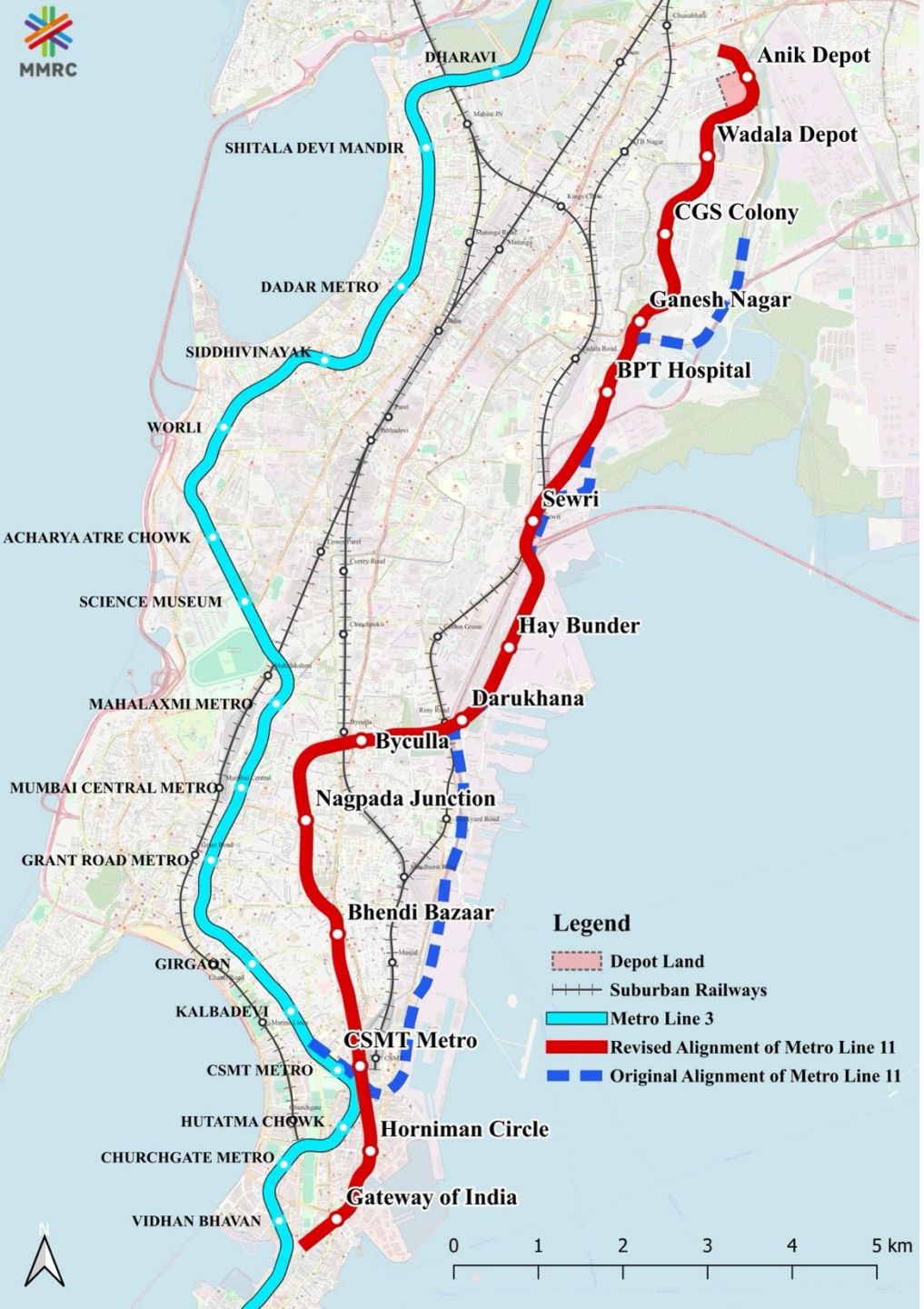
Robbins
MMRC


MUMBAI METRO LINE - 3
INSPECTION MOTOR TROLLEY
MMRC
MMRC


गिरगाव
Girgaon
MMRC

Mumbai Metro Line-11
(Anik Depot to Gateway of India)

Line 11
(Anik Depot- Gateway of India)



- **Alignment Length** : 17.51 km

  (U/g 16.833km and At-grade 0.667km)

- **Total Stations (Nos.)** : 14 stations

  (1 At-Grade and 13 U/g)

  (8 cut & cover, 5 NATM)

- **U/g Average Depth** : 20.0m to 22.0m

- **Depot Location** : Anik Depot (16 Ha)

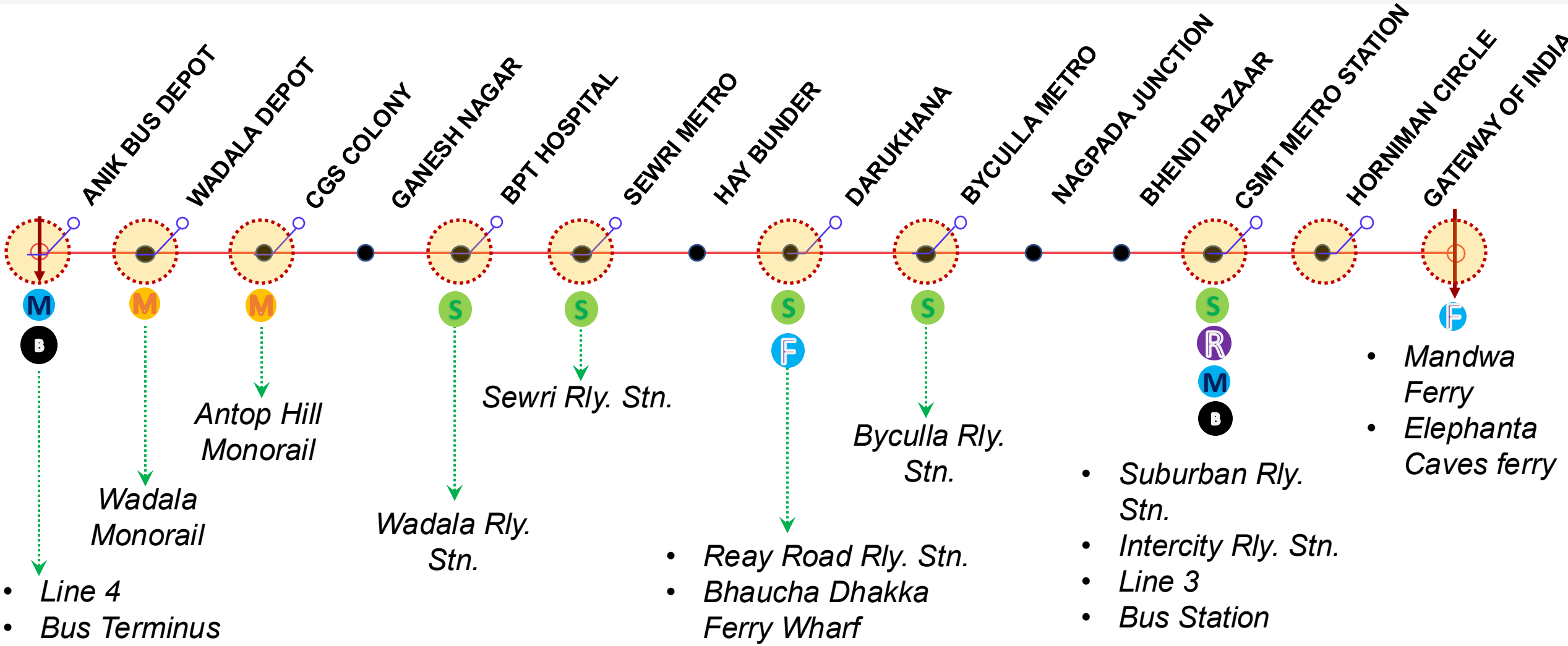
- **Land Requirements** : Permanent- 22.72ha

  (Govt.- 20.35 ha, Private- 2.37 ha)

  Temporary- 19.55ha

  (Govt.- 17.08 ha, Private- 2.47 ha)

Multimodal Interchanges



S Suburban Railway Interchanges

M Metro Interchanges

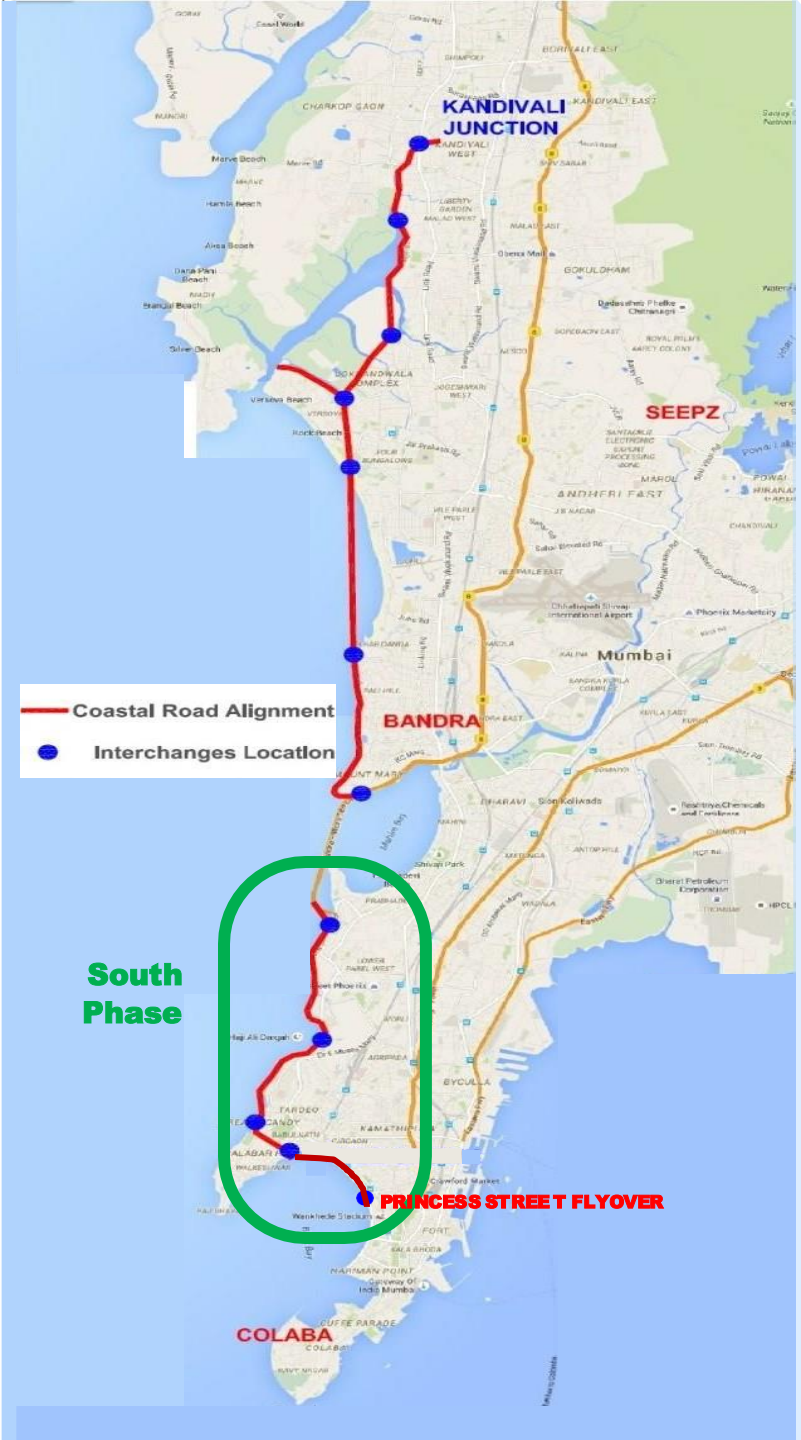
M Monorail Interchange

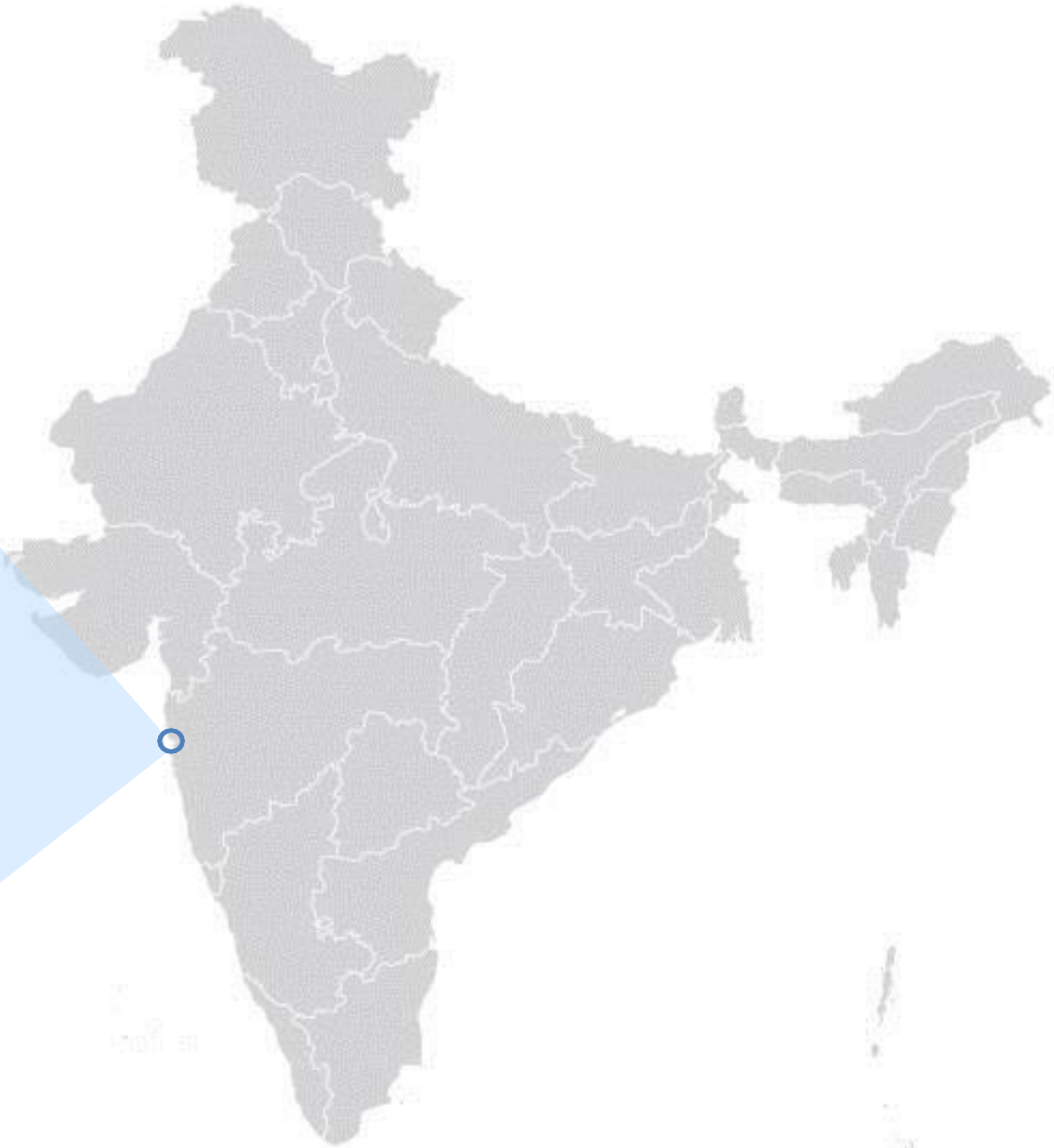
R Intercity Rail

B Intracity Bus Station

F Ferry Wharf/ Ferry

Coastal Road (South)


KANDIVALI JUNCTION
SEEPZ
BANDRA
Mumbai
COLABA
Coastal Road Alignment
Interchanges Location
South Phase
PRINCESS STREET FLYOVER



Highlights of the project

India's largest diameter 12.19 m Tunnel Boring Machine (TBM) is being used to bore the tunnels

Diameter is equivalent to 4 storey building

First time in India, Saccardo Ventilation System will be installed in road transport tunnels.

Saccardo Ventilation system in which Saccardo Nozzles introduce air jet into a tunnel at a high velocity. This air jet imparts most of its momentum to the Tunnel air & hence helps to drive the tunnel air in desired direction

First time in India, the bridge will be constructed on the Monopile foundation

Monopile is large diameter single pile instead of group of piles in foundation of bridge – this technology reduces time & cost of construction, is eco friendly owing to less disturbance to sea bed, and is noise free working).

Multiple complexities and variety in a single project

There is a road on reclamation, bridges, interchanges, tunnels undersea as well as hills, the creation of green open spaces, etc.

Projected traffic of Avg 45,000 PCU* per day, in each direction

60,000 PCU at Bandra - Worli Sea Link end.

30,000 PCU from Priyadarshani Park at Napean Sea Road to Princess Street Flyover end at Marine Drive

Traffic reduces towards Priyadarshani Park through Interchanges

*PCU means Passenger Car Unit is metric used in Transportation Engineering, to asses traffic flow on road or highway and is a traffic variable compared to a single car

Project Timeline

Concept & Planning

- **1967 :** Costal Road was shown in Sanctioned Regional Development Plan of Mumbai as West Island Freeway
- **2008 :** CTS for MMR region recommended a Highway Corridors on the Western Coast
- **2016 :** GC appointed
- **2017 :** Receipt of All State & Central Statutory Permissions

Project Milestones :

- **2018 (Aug) :** Administrative approval by Standing Committee ,BMC
- **2018 (Oct) :** LOA issued to all Civil Contractors as Design & Build Project
- **2019 (July) :** High Court stopped Coastal Road Project
- **2019 (Dec) :** Supreme Court revoked the order of High Court
- **2020 (Mar) :** Work Commenced

Project Commissioning :

- **2024 (March) :** South bound traffic commenced from Worli upto Marine Drive
- **2024 (June) :** North bound traffic commenced from Marine Drive upto Haji Ali
- **2024 (July) :** North bound traffic commenced from Haji Ali upto Worli Sea face
- **2024 (Sept) :** North Bound Worli Sea Face to Bandra Worli Sea Link (BWSL) via Bow String Arch Bridge
- **2025 (Jan) :** South bound traffic commenced from BWSL to Worli Sea Face via Bow String Arch Bridge
- **2025(May) :** Remaining arms of Worli & Hai Ali Interchange

Reclamation

Sea Walls

Promenade

Casting Yards

Cut & Cover

Tunnel Boring Machine

Tunnels

Utility Boxes

Pedestrian Underpasses

Ramps

Monopiles

Launching Girders

Bridges

Interchanges

Green Spaces Concepts

Rigorous studies and efforts

1. Studies undertaken before project initiation
2. Studies undertaken during the on-going works
3. Approvals and No Objection Certificates from concerned authorities
4. Conservation of aquatic ecosystem

   Translocation of Corals
5. Storm Water Drains Management
6. Environmental measures and compliances
7. Inclusive steps towards those affected by the project

   Compensation Policy

Studies undertaken before project initiation

1. Inception Report
2. Feasibility Report
3. Detailed Project Report (DPR)
    1. Executive Summary
    2. Main Report
    3. Economic & Financial Analysis Report
    4. Engineering Report
        1. Topography Survey Report
        2. Geotechnical Report
        3. Traffic Studies Report
    5. Design Report
        1. Alignment & Pavement Design Report Part 1
        2. Bridge & Tunnel Design Report Part 2
        3. Reclamation & Urban Design Report Part 3
        4. BRTS & Construction Methodology report Part 4
    6. Drainage Design Report
    7. Material Investigation Report
    8. Social Impact Assessment Report
    9. Tunnel Safety & Services Report
    10. Environmental Impact Assessment Report
    11. Risk Assessment & Disaster Management Plan
4. Studies on extreme waves, extreme water levels, storm surge, tsunami height and Coastal morphology for Coastal Road project by National Institute of Oceanography, Goa.

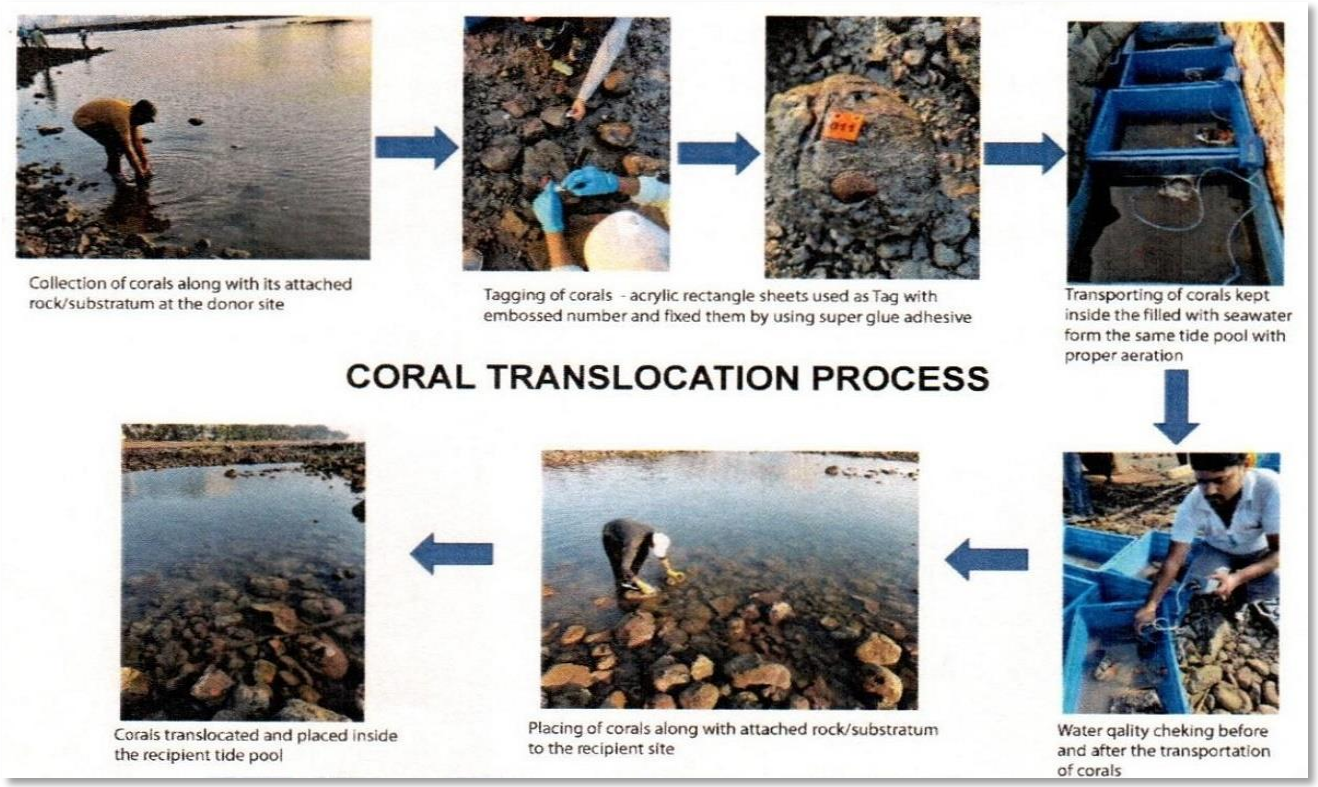
Approvals & No Objection Certificates

**In order to process the Request For Proposal (Tenders),
BMC project team obtained NOCs from the following 19 authorities**

1. Ministry of Environment & Forest, Climate Change, Government of India
2. Maharashtra Coastal Zone Management Authority
3. Maharashtra Maritime Board
4. Public Works Department
5. Maharashtra State Road Development Corporation
6. Joint Commissioner of Police (Traffic)
7. Commissioner of Fisheries
8. Indian Navy
9. Coast Guard
10. Tree Authority
11. Mumbai Heritage Conservation Committee
12. Mumbai Port Trust
13. High Power Committee – Girgaon Chowpatty
14. Coastal Port Engineer
15. Tri-member Committee – Marine Drive
16. Revenue Dept. Govt. of Maharashtra
17. Collector, Mumbai City
18. Coastal Police Mumbai
19. Fire Brigade, Mumbai

Translocation of Corals

- Total 18 colonies of corals covering area of 0.251 sq.m. were found in Worli region. They were successfully translocated to Worli distance about 130m from the Project activity area
- The area coverage of Corals in Haji Ali were 0.11 sq.m. which was translocated successfully at an intertidal region of Navy Nagar Colaba, Mumbai.
- The translocation of corals have been executed by experts from NIO in the presence of representatives from Additional Principal Chief Conservator of Forests, Mangrove Cell.



Social inclusion

Impact on fishermen community at Worli and Haji Ali

Assessment of impact on their livelihood with the help of TISS

Calculation of compensation using SDG framework

Direct Transfer of compensation to bank accounts of affected families

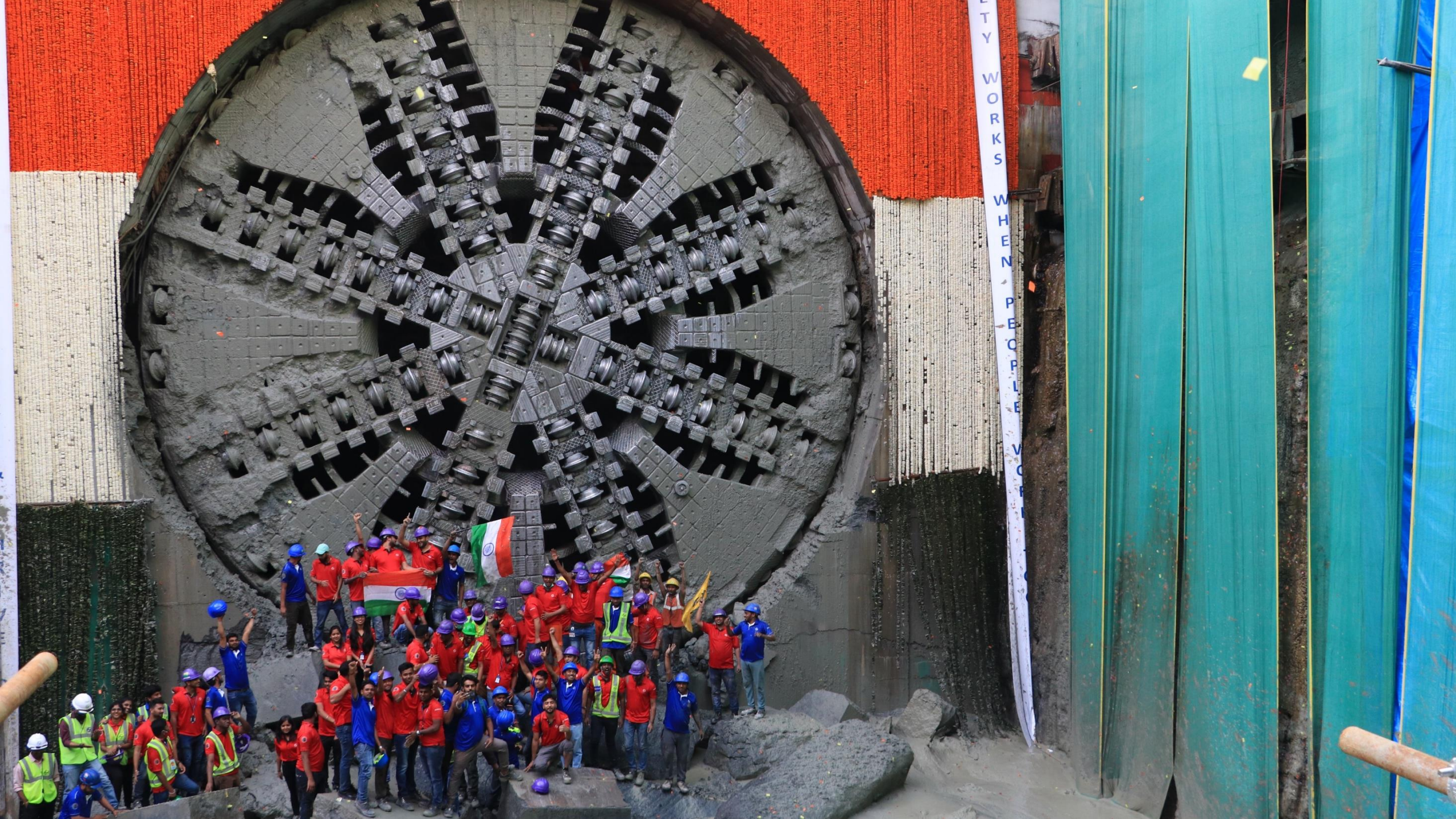
Change in bridge design and enhanced span to mitigate the concerns related to movement of their boats


POLICE
POLICE
MH 01 AN 1333
किनारे रस्ता मार्ग
/ Bandra / Airport
Via. Coastal Road
5.5m


KEEP


भुलाभाई देसाई मार्ग
Bhulabhai Desai
Road
5.5m

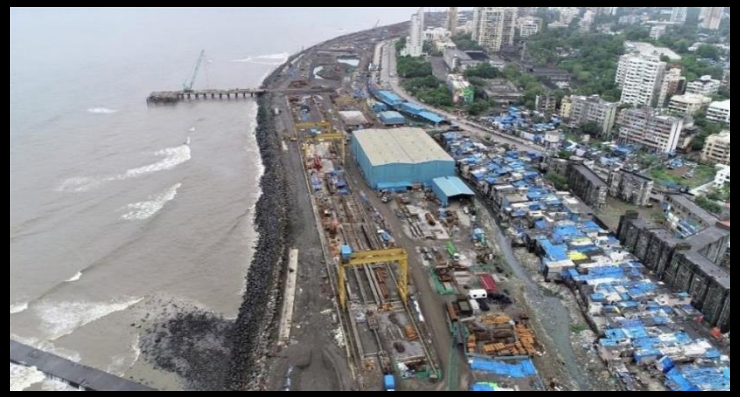

Freight Wings
Freight Wings
Freight Wings
Freight Wings


TY WORKS WHEN PEOPLE

The recipe for the successful project delivery

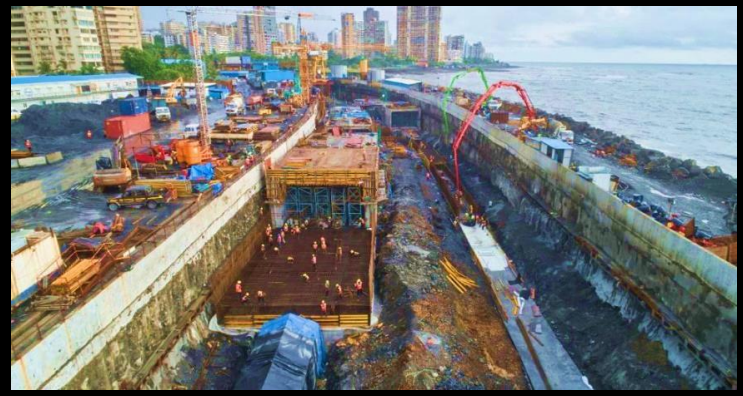
- Adequately empowered leadership team
- Dedicated and skilled work force
- Team building and empowering the team through systematic power delegation
- Quick decision making avoiding unnecessary delays and ambiguity
- Regular and rigorous reviews and site visits at all levels
- Transparency, commitment and professionalism
- Pre project preparation
- Use of technology and professional project management tools
- Constant engagement with stakeholders
- Problem solving approach
- Effective use of social media and engagement with citizens
- Strong Political Will and Vision









Thank You