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MMRC
ADDING NEW DIMENSIONS

METRO CUBE

A MUMBAI METRO RAIL CORPORATION NEWSLETTER

Content

MD Speaks

Ms. Ashwini Bhide, IAS

Urban Mobility India (UMI) Conference & Expo at Nagpur held in 1st week of November, provided the stakeholders an excellent platform to come together and deliberate on how to evolve sustainable and green urban transport. MMRC, represented by senior management actively participated in this conference, showcased the achievements on Metro-3 and had opportunity to interact with several urban transport sector specialists. Hon. Union Ministers; Shri Nitin Gadkari ji and Shri Hardeepsingh Puri ji along with Shri Devendra Fadanvisji, Hon. Chief Minister of Maharashtra & Shri D.S.Mishra, Sec. MoHUA visited Mumbai Metro-3 stall and appreciated the work done so far. Hon. Chief Minister Maharashtra reiterated the need of green public transport. In his message to the conference, he said that the State believes in successful urban development through transport planning that focuses on movement of people rather than vehicles.

Continued on Page 2

Rolling Stock

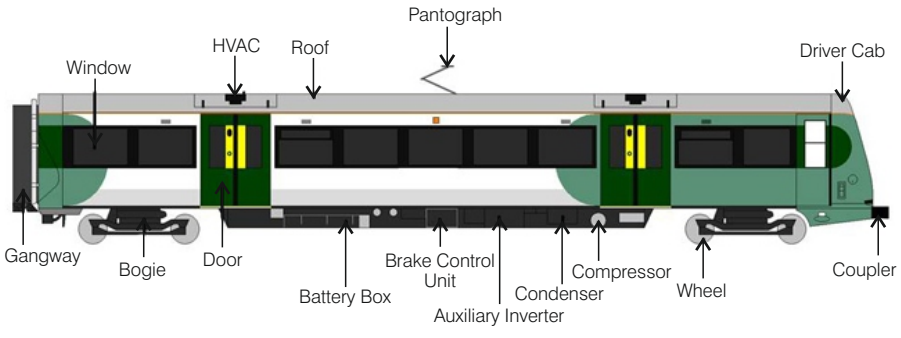
MMRC has signed the contract agreement with consortium of Alstom Transport India Ltd. and Alstom Transport S.A, France for the supply of 248 Metro Rail Cars (31 trains, set of 8 metro rail cars each). To ensure a healthy competition and to promote “Make in India”, initiative of Government of India, all the metro rail cars will be manufactured in India.

Modern lightweight integrally structured rail passenger cars made of stainless steel with design safe speed of 95 km/h and maximum operating speed of 85 km/h will be used for Metro-3. These trains will be powered with 25 kV single phase 50 Hz AC supply with 75% motorization. The trains will be using regenerative electric braking thereby converting the momentum into electrical energy and feeding back to power supply system while braking. This will reduce the energy requirement for running the trains.

Salient Features of Metro-3 Rolling Stock:

- Air-conditioned saloon (passenger area) with better temperature and humidity control, suitable to the environmental conditions of Mumbai
- Longitudinal seating arrangement with stainless steel seats and space reserved for differently abled persons
- Secondary air-suspension for better riding comfort
- Four automatic operated doors provided on each side of metro rail car for commuters and front-end Central Emergency Door for emergency evacuation of the passengers
- Energy efficient power LED based interior lighting arrangement
- Inter-car gangway has been design in order to ease the passengers’ movement.
- Smoke and heat detection system in saloon area.
- Public announcement system (Automatic and manual voice announcement system).
- Passenger Emergency Alarm to communicate with train driver/train controller, OCC in case of emergency
- Passenger Saloon Surveillance System using CCTV
- Passenger Information System namely, Electronic Information Displays, Internal Electronic Destination Displays, Programmable Digital Route Maps etc.
- Wayside Condition based monitoring System

The maximum capacity per eight car train will be approximately 2350 passengers (6 passengers/m^2), including longitudinal seating arrangements.



Indicative Metro Car

MD Speaks

Continued from Page 1

As an attempt to locate the Metro-3 project on International Mobility Canvas, and to advocate the agenda of 'Accessibility for All', Shri R. Ramana, Executive Director (Planning), MMRC, presented a research paper at International Conference on Mobility and Transport for Elderly and Disabled persons - TRANSED 2018, Taipei. He spoke about "safe & sustainable mobility for elderly and persons with disabilities". The paper and presentation covered specific concerns and issues in India in reference to accessibility for elderly and specially abled people, and approaches adopted in Metro-3 project to address these concerns.

I had an opportunity to share the status of the project to Mumbaikars through Akashwani, about underground Metro construction technology and how we are overcoming several challenges. We could interact with sustainability leaders across Asia Pacific Region at the Greenbuild India International Conference on capacity building, mentoring and leadership development through our Metro-3 journey.

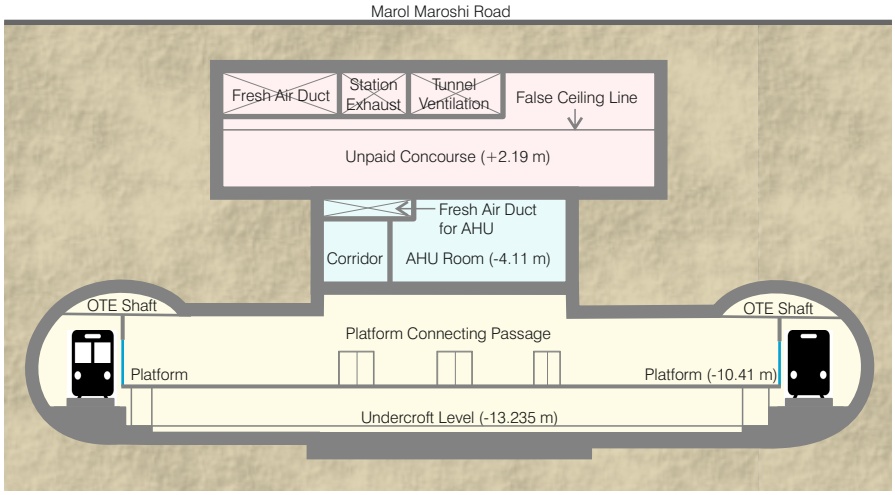
On the project front, with all 17 TBMs now working in full action, the total tunneling distance has crossed 13.0 km length. It is expected that 80% tunneling will be completed by December 2019 and few more break throughs are expected by end of the year 2018. With the Hon.'ble High Court verdict out on the Parsi Temple - *Athash Behram* matter, the 2nd TBM in Package 2 will restart working after more than 4 months' stay. Package 4 achieved completion of 5015 m of tunnel work as on end of November. The three TBMs Krishna 1, Krishna 2 and Krishna 3 respectively completed 2451.26 m, 2137.76 m and 426.92 m tunneling.

The systems’ contracts awarded are now in mobilization and design stages, significant developments are expected soon. With an overall progress of 30%, Metro-3 Team is trying to go full throttle in coming months on all fronts.

What Lies Beneath The Earth

In last article, we had seen the alignment of Construction Package 6. This month we will see Construction Package 7. The alignment of Metro-3 in package 7 starts from the end of CSIA (International) station and ends at the start of Metro-3 Car Shed Depot. The alignment comes out of tunnel at the end part. This package includes three stations (Marol Naka, MIDC and SEEPZ).

The alignment passes below some multistoried buildings, Sahar elevated road, Mumbai Metro Line 1 bridge and SEEPZ flyover on Jogeshwari Vikroli Link Road in this package. At Marol Naka, an interchange is planned at the station.

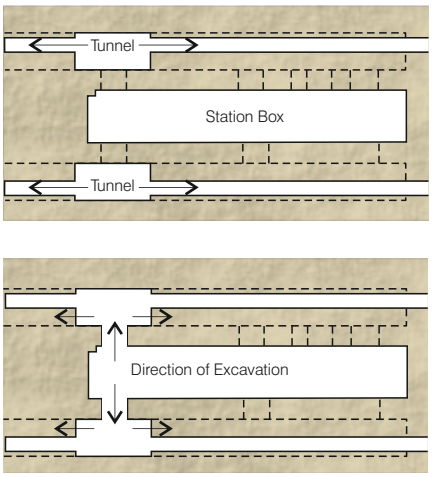


Section - Marol Naka Station

The challenges while working in this area: -

1. **Rocky Strata:** It is variable and different type of rock e.g. Basalt and Breccia encountered. Any weak rock layer shall be identified during construction and necessary precautionary measures to be taken as necessary.
2. **Strength of Rock:** Strength of rock varies in similar grade of rock at different locations.
3. **Ground Water:** Earth-retaining system should be water tight in upper soil and highly fractured rock mass layers.
4. **Upper Soil and Completely Weathered Rock Mass:** During the station construction, top soil and weathered rock will be supported by secant piles (earth retaining system), which will be constructed before start of the excavation.
5. **Tunnel Boring Machine (TBM):** The tunnel crown may be in weathered rock resulting seepage and loss of volume. To cater this tunneling in this stretch will be executed by Dual Mode Tunnel Boring Machine (TBM). The TBM will operate in closed mode by Earth Pressure Balancing Technology in weak rock stretches.
6. **Alignment:** TBM has to negotiate locations near existing flyover at Airport, SEEPZ and Metro Line 1 at Marol Naka. The NATM portion in Marol Naka Station is in good quality of Breccia Rock. The tunnel opens out after SEEPZ Station for connection to Depot.

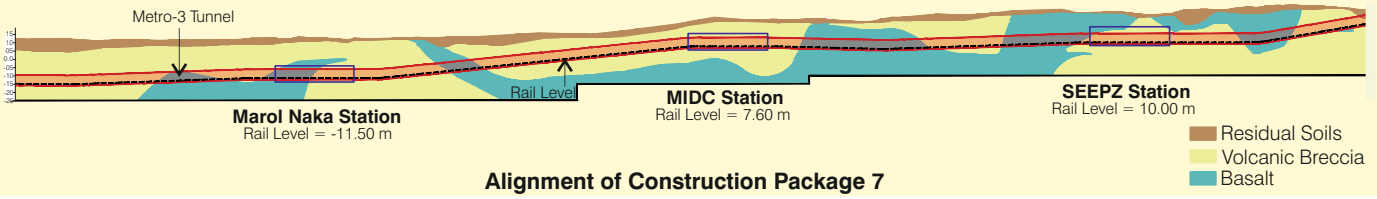
The geology is residual soil underlain by completely weathered rock and then hard rock. The predominant rock types found in this stretch are Basalt & Breccia of grade of weathering III or higher. Basalt is harder and stronger variety of rock and the Breccia is weaker than Basalt. Tunnels are with nominal soil/ rock cover of about 18m.



Indicative Plan - Integration of Tunnel and Station Box

Marol Naka Station work is in progress

Cut-and-Cover method has been adopted for construction of stations in this package. NATM method of construction will be for construction of a platform portion of Marol Naka Station.



Alignment of Construction Package 7

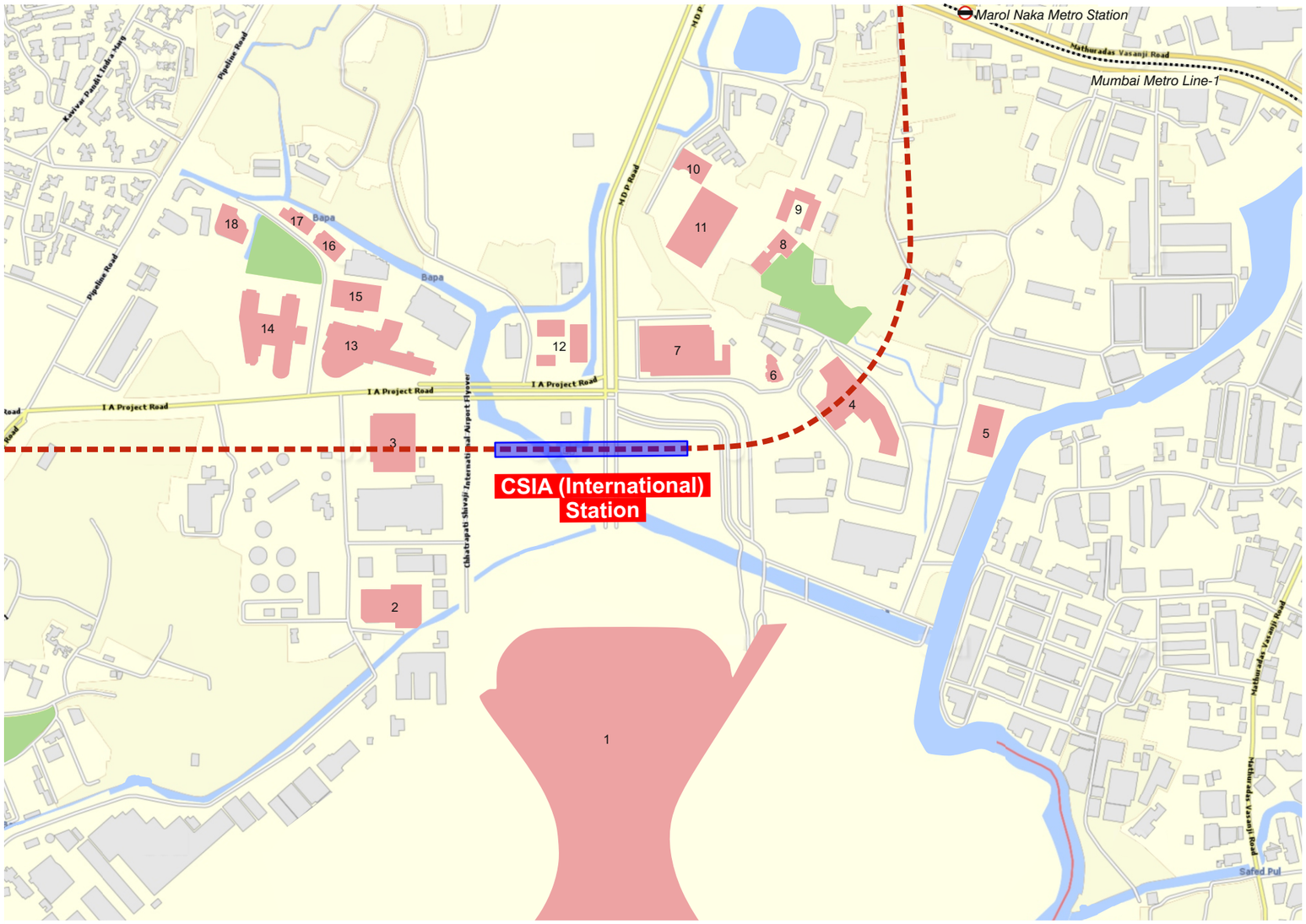
Know Your Station - CSIA (International) Station

JW Marriott

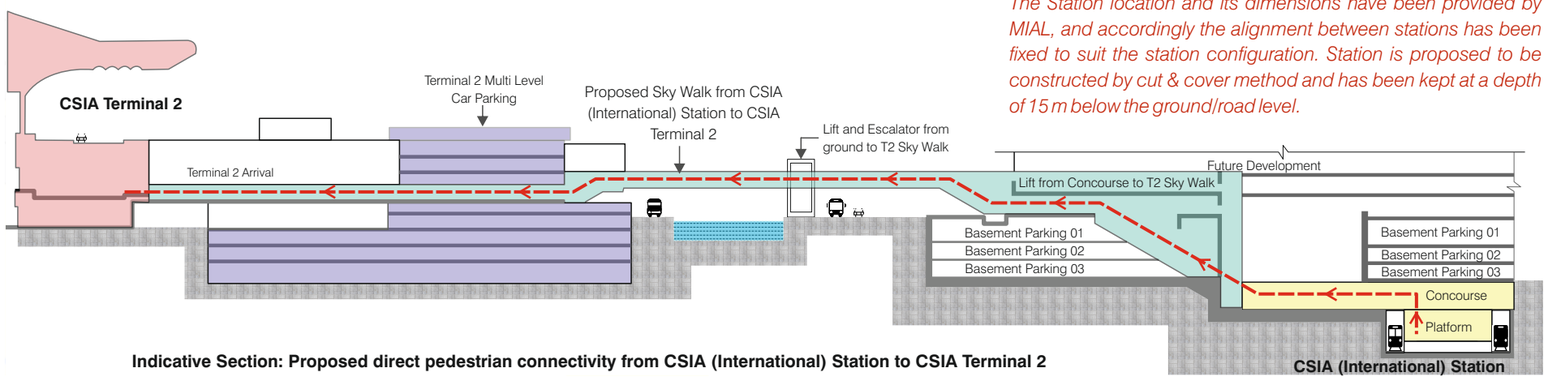
Ambassador's Sky Chef

Airport Health Organization

1. CSIA Terminal 2
2. Air India Air Transport Services Ltd
3. Chefair Catering Service
4. JW Marriott
5. The Cube
6. Airport Health Organization
7. Ambassador's Sky Chef
8. Waterstones Club
9. Waterstones Hotel
10. The Lalit Residency
11. The Lalit Mumbai Hotel
12. Bureau of Civil Aviation Security
13. Hyatt Regency Mumbai
14. ITC Maratha
15. Hilton Mumbai International Airport
16. Jet Airways
17. Blue Dart Centre
18. Prime Corporate Park



Map source : http://www.loginmumbai.org/map.html



Indicative Section: Proposed direct pedestrian connectivity from CSIA (International) Station to CSIA Terminal 2

The Station location and its dimensions have been provided by MIAL, and accordingly the alignment between stations has been fixed to suit the station configuration. Station is proposed to be constructed by cut & cover method and has been kept at a depth of 15 m below the ground/road level.

CSIA (International) Station

CSIA (International) Station is 23rd Metro-3 Station followed by Marol Naka Station from Colaba. It is located in front of the Chhatrapati Shivaji International Airport - Terminal 2 and beneath the existing parking lot, amidst five-star hotels surrounding the airport. The nearest stations on Metro Line 1 are Marol Naka and Airport Road. Andheri and Ville Parle stations on the Western Railway Line are at a distance of about 5 km from CSIA (International) Metro Station. The Central Railway Line, however, is still far off from the direct reach of CSIA Metro.

The most unique feature about the Metro 3 corridor is direct connectivity of South Mumbai to Docmestic and International Airport Terminals, which at present takes about 90 to 120 minutes depending on the road traffic conditions. The Metro-3 route will reduce this commute time between Colaba and Airport to 40 minutes. Terminal 2 on daily basis handles millions of people including commuters and airport/airline company staff. With the introduction of underground metro station at CSIA, these people can move in and out with ease and comfort. Terminal 2 (T2) was opened in January 2014 by replacing the old terminal. T2 operates all international flights as well as some domestic flights, which are operated by Air India, Air India Express, Air India Regional, Jet Airways and Vistara. As there are three underground stations in the airport premises at CSIA (International), Sahar Road and CSIA (Domestic), there will be an ease in commuting between Domestic and International Terminals which so far is undertaken by metered taxi or fixed rate inter-terminal transportation service.

The proposed Metro-3 station will mainly serve the Terminal 2 and hotels like; JW Marriot, The Lalit Residency, Hyatt Regency Mumbai, ITC Maratha, Waterstone Hotel etc.

TRANSED 2018 - Mobility for All

TRANSED 2018 is the 15th International Conference on Mobility and Transport for Elderly and Disabled Persons, was held at the Taipei International Convention Centre from 12th-15th November 2018. The main theme of the conference was 'Mobility for all: Connecting the World with Accessible Transportation'. MMRC participated in the confrerence and presented the paper on 'Safe Mobility for Elderly and Persons with Disabilities'. This artilce includes an introductory part of the paper, foremost details will be discussed in forthcoming issues. TRANSED was created by US Transportation Research Board in 1978 and is held every three years. TRANSED was traditionally held in Europe and North America. Taiwan is the fourth city in Asia to host this event following India.

Mr. R. Ramana, Executive Director (Planning), MMRC speaking at TRANSED 2018

The foremost feature of the passenger movements in Mumbai is dependence of travel on public transport due to which there is a large gap between the demand and supply. All transport facilities are concentrated within three suburban railway corridors. Today's major challenge is to provide an east-west connectivity and promote growth by providing alternate and efficient mass rapid transport system. Metro-3 (Colaba-Bandra-SEEPZ), a 33.5 km fully underground metro corridor is planned for filling this gap.

Statistics for India: Census 2011

Many countries including India are undergoing a demographic transition. Statistics for elderly & Persons with Disabilities (PwDs) revealed in the Census 2011 of India is both alarming and disconcerting. Out of the total 1210.80 million population of India, about 26.8 million persons are 'disabled' which is 2.21% of the total population. Accessibility is one of the best known tools to achieve inclusion in our built and social environments for PwDs and many others. 'Inclusive' here refers to Right to Access and participation in all pursuits of life. The meaning of accessibility in India has evolved today much beyond its inception through "The Persons with Disabilities (Equal Opportunities, Protection of Rights & Full Participation) Act, 1995".

The Persons with Disabilities (Equal Opportunities, Protection of Rights & Full Participation) Act, 1995

The act was enacted in 1995 to give effect to the proclamation on the full participation and equality of the people with disability in the Asian & Pacific Region (Beijing 1992). It requires that equal opportunities are offered to differently abled people, including non-discrimination in transport, on the roads and in built environment. Persons with Disabilities means persons who have minimum of 40% disability as certified by medical authorities. Provisions are also applicable to elderly, pregnant women and mothers with small children on prams. Act identifies seven categories of disabilities; Blindness, Low vision, Leprosy-cured, Hearing impairment, Loco motor disability, Mental retardation, and Mental illness.

Existing Regulations in India

1) The Persons With Disabilities (Equal Opportunities, Protection of Rights & Full Participation) Act, 1995
2) United Nation Convention on Rights of Persons with Disabilities (UNCRPD), 2008
3) Accessible India Campaign (Sugamya Bharat Abhiyan), 2015
4) Harmonised Guidelines & Space Standards on Barrier Free Built Environment for PwD & Elderly Persons, 2016

Mumbai has following challenges for provisioning accessibilities to the Elderly and Persons with Disabilities:

- The wedge-shaped city has no space left for public uses
- High density pedestrian traffic
- Fallout of linear development, as interchanges are busier in the peak hours
- Being a reclaimed land, certain areas are prone to flooding, which enhance ramp lengths

Existing Regulations in Mumbai

Mumbai DP 2034 provides separate section (Sec. 39) dealing with 'Special Regulations of Differently Abled People' for customized public buildings, public roads & public spaces by incorporating design guidelines for ensuring barrier free environment for differently abled.

Distribution of Disabled Population by Types of Disabilities, Census 2011

1) In Seeing - **19%**
2) In Hearing - **19%**
3) In Speech - **7%**
4) In Movement - **20%**
5) Mental Retardation - **6%**
6) Mental Illness - **3%**
7) Multiple Disability - **8%**
8) Any other - **18%**

Metro-3

Five general forms of disabilities are considered while provisioning the facilities viz. mobility, visual, hearing, speech, cognitive impairments. The paper will discuss in depth how the design interventions and technological advancements can be better utilized in terms of the provisions made on each level of the stations; street level, concourse level, platform level, inside the rolling stock and signages. Project of such a scale will not only be a benchmark in the country, but also will trigger the necessity of ensuring barrier free designs and technologies for making all public transportation projects (existing as well as proposed) more inclusive.

Expert Speaks

The journey of Metro-3 began in 2016 and the city of Mumbai seems to be shaken up with the thought of this 33 km long underground intervention day in and day out. As the journey continues with its highs and lows …. accomplishments and challenges, breakthroughs and dynamics, Mumbaikars are undoubtedly believing in a dream coming into a new reality, never imagined before. This new reality is shaped up by aspirations and perceptions of Mumbaikars.

Our expert author this month is a diehard Mumbaikar, an Urban Designer, Architect, Writer, Academician and Creative Learner. Mr. Bhatia has witnessed the ever evolving city since more than five decades and expresses here, in his article "Metrobhoomi", his perceptive thoughts on the gestation of Metro-3.

YESTERDAY

The headline of a noted newspaper stated "Heavy rains flood Mumbai" with the sub title 'Trains run late, flights delayed, bus routes changed'. It's of June 11, 2013, a fortnight thereafter the Union Cabinet granted clearance to Mumbai Metro Line 3 (Metro-3) as an additional public transit mode with a distinct north south route from SEEPZ to Colaba. Following this nod, the MMRC, now identified as a JVC of the Central and State Governments started in house work on making it happen. The construction of Metro-3 line began sometime in October 2016. Available segments along the 33.5 km route, which is to be completely underground, were barricaded for safety to indicate that things have started moving on the actual work at site. The seed was planted. As the first step, the noting of environmental conditions for its germination was to be done. Soil, geology, temperature, other existing conditions and surroundings were studied to enable its growth.

TOMORROW

It's the year 2025, four years since the Metro-3 opened for my working day commute from Worli station to MIDC up North. Till the time the Metro-3 did not exist, I travelled by car as there were too many rides to be made in different public transport modes and spend over an hour and half each way between these places. The Metro-3 is also comfortable and safer as there are controls about passenger load (numbers) and air conditioning for the commuter. However, I wish it would allow more baggage space and load too. In terms of time, the journey avoids undue delays as it's track mounted, technologically computerised to meet schedules and does not cross other modes at any point in the underground route. When I started using the Metro-3, it was a novelty. After a few days then I felt that it was monotonous as there was nothing to look at outside the windows, and people seemed too preoccupied in their smart devices or just kept looking at others. After that, I carry a fiction novel, not in soft copy, to allow me read and with self-discipline I prefer to keep my digital devices off and that enables me time.

TODAY

Having seen what was (YESTERDAY) and what lies ahead (TOMORROW), let me come back to where I belong. It's the here and now. As I write this piece for the METROCUBE, it makes me wonder how long will this 'now' last. If the past was long enough to be understood through historical noting, the future seems longer for it remains unknown, then this present is just a speck in between. Which is the reason that I see it as being vital for the Metro-3. It is the making period of this Metro line, and a line that runs underground remains unseen, almost analogous to the prenatal stage of human life.

With this understanding I note that it's in the gestation period of Metro-3 that we exist today. The life that is growing in the seed planted yesterday needs nurturing. There will be effects on other organs and systems lying within. There may be visible changes in the outer appearance of the physical body. Some ailments are consequential and temporary, others need preventive measures and some physiological effects will remain. And transformation is inevitable once birth happens. But for those of us who are around here and now, it's that moment in time when one can experience life in the womb - albeit of a major transport related infrastructure, and a first time tunnel bore construction project. As timelines state, the birth is due in 2021. Let's wait patiently for the delivery of a healthy baby Metro-3 and good life for the mother Mumbai.

Achievement

Dr. Vishwas G. Ajnalkar has been working as a Senior Deputy General Manager (Electrical) in MMRC since February 2016. Being an Electrical Engineer, Dr. Vishwas is having a 26 years of experience in power sector. In July 2018, he was awarded the Ph.D. degree by 'Savitribai Phule Pune University' for his research work on the topic "A Study of Impact of Reforms in Indian Power Sector, on Organizational Efficiency with Special Reference to Maharashtra State Electricity Distribution Company Limited". Now, he has received the Best Researcher Award from IOSRD (International Organization Of Scientific Research And Development) for his Ph.D. research work in the 72nd International Research Awards ceremony , held at Chennai on 28-29 September 2018.

News @ MMRC

Mr. S.K.Gupta, Director Projects, MMRC was invited by Rotary Club Of Downtown Sealand for sharing an in-depth information and having an interactive session with its members about Metro-3 and it's impact on Mumbai's transportation system.

The MMRC stall at Urban Mobility 2018 was visited by Mr. Pankaj Bansal, MD Chennai Metro and Mr. I. P. Gautam, MD Ahmedabed Metro.

COMFED Production Pvt. Ltd. has been appointed for complete video documentation of Metro-3 activities which would cover different aspects of construction and related challenges in the form of a bimonthly series. Other activities like; Environmental Initiatives, Bid Management Process, Public Outreach etc. would be covered in this documentation. In the 1st episode, traffic conditions of Mumbai will be highlighted that would give enough reasons for the erection of Metro-3 with different benefits other than easing out traffic woes of Mumbaikars.

Project Progress Update

As on 1st December, 2018

Churchgate Metro Station work is in progress

MMRC Control Room

Contact us @ +91 9136805065 to report monsoon related grievances pertaining to Metro-3 construction work.

Website Link

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