



ADDING NEW DIMENSIONS

METRO CUBE

A MUMBAI METRO RAIL CORPORATION NEWSLETTER

MD Speaks

Ms. Ashwini Bhide, IAS

The year 2017 has come to a positive culmination with some milestone accomplishments for the project. Although Metro-3 has a long journey to go, every accomplishment is valuable to cover the entire journey and due credit to the entire team is what is needed to keep the team motivated.

We intend to move ahead with full velocity in 2018 as most of the Environmental Clearance process, Land Acquisition Process is completed. With the strong backing from the Hon. High Court and MMRC's commitment to honour legal procedures and directives, we have been able to make a positive presence in the city. We have received some encouraging feedback with participation from various groups in the society and such constructive suggestions and feedback will help us for future progress. Our recent interactions with the Indian Heritage Society, members of Asiatic Society of Mumbai, eminent Scientist Dr. Anil Kakodkar, participation in Archeology Exhibition organized by Mumbai University have been helpful to generate a healthy dialogue and show our committed efforts to people of Mumbai.

Continued on page 2



Team MMRC welcome 2018

Content

MD Speaks	1
Face Pressure and Surface Stability	2
Security Systems in Metro-3	3
Know Your Station	4-5
Tunnelling Update NOC Process for Regulated Development along Metro-3	6
Experts Speak	7
News @ MMRC	8

Face Pressure and Surface Stability

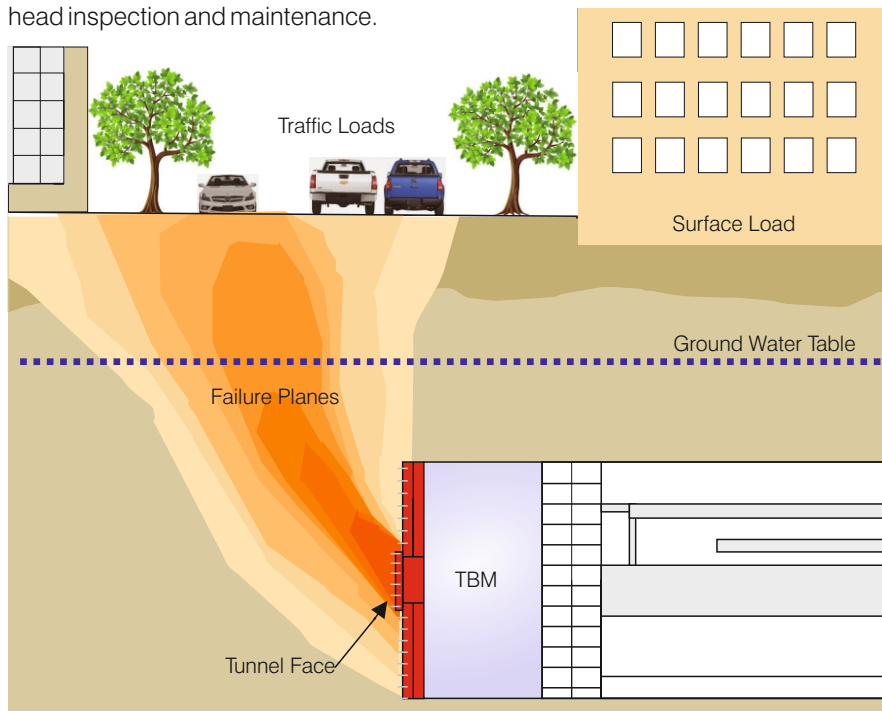
What is Face Pressure?

During tunnel construction, while soil is removed from the tunnel face, the soil layer in front and above the tunnel face exerts active earth pressure. The presence of utility infrastructures and other structures also contributes as additional earth pressure. Water pressure is another significant component of pressure acting at the tunnel face, for the tunnel alignment below the groundwater table.

Support Pressure and Surface Stability

For stability of surface, the layers of soil should have sufficient shear strength to balance the stresses caused due to external forces. In many projects, depending on the soil conditions, tunnels encounter several layers of loose soil or weathered rock. The face may not be strong enough to bear such pressures or may be unstable. As a result, the soil mass in front of the cutter-head can collapse, leading to excessive settlement at the surface. Pressure needs to be generated at the face of tunnel, to counterbalance the pressure generated by the soil, water and overlying infrastructures. This pressure is known as support pressure. At times even if the geological conditions are stable, face support pressure needs to be built up in order to stop the inflow of water into the tunnel.

In cases of mechanized tunneling, common support mediums such as bentonite slurry, earth paste, and compressed air are used to build the required face support pressure. Applying excessive support pressure as it may lead to surface heave and ground distortion. Inadequate support pressure may cause ground settlement. Therefore, an adequate range of face support pressure is needed to stabilize the face, which in turn will minimize settlement, avoid ground collapse, prevent ground heaving and allow for reliable advance of the TBM. It also allows for safe hyperbaric interventions for cutter-head inspection and maintenance.



Failure mechanism at tunnel face - Source: <http://www.facesupport.org/wiki>

MMRC participated in the 'Exhibition of Rocks, Minerals and Archeological Antiquities' organized by Centre for Extra Mural Studies, University of Mumbai and India Study Centre (INSTUCEN) Trust, Mumbai, where Geological samples of five Metro station locations (Cuffe Parade, CST, Science Museum, BKC and ramp at SEEPZ station) were displayed.

MD Speaks

Continued from page 1

To keep the momentum on, 2nd Tranche JICA loan process has been initiated. During last two months, JICA Fact Finding and Appraisal Missions reviewed the project and expressed their satisfaction on implementation progress. 2nd Tranche loan process for JPY 100 Billion is expected to be completed by March 2018. MMRC has reviewed and updated the Social and Environmental Impact Assessment and updated documents will be available on JICA/MMRC website. State Govt. has recently transferred Sandeep Patil Cricket Academy land at Vidyanagari station. Two TBMs at Azad Maidan and Vidyanagari each were lowered during this month to initiate tunnelling work at UGC 02 and UGC 05.

On the evening of December 20th, the entire MMRC team and General Consultants got together to acknowledge the achievements of 2017 and welcome 2018 and celebrate peace and harmony for the Christmas and New year season. One can realize that the Metro-3 project is not only meant to serve the interest of the city as an urban infrastructure but also has opened up new opportunities for engineers from various faculties, architects, contract and legal experts, planners, environmentalists, administrators, managers and people from HR, media, IT background. Its needless to say that everyone's joint efforts can only realize the dream called Metro-3 and my best wishes to the entire project team. With this, I also wish a very Happy Prosperous New year 2018 to all our readers.

Security Systems in Metro-3

MMRC has been doing extensive study while planning security system. Best practices across the globe, including India, have been studied and a judicious mix of international practices relevant to Indian context have been considered while designing the security plan.

Metro systems are the second most vulnerable entities after aviation industry, therefore these systems require high level of security measures. The extensive use of metro systems by many sections of the society makes them highly attractive targets for antisocial entities wanting to maximize chaos and destruction. In its latest communication, The Ministry of Housing and Urban Affairs (MoUHA) has placed Metro-3 in category 'A' under vital/critical installations/projects, which is highest category for vital installations based on threat perception to the Project. The susceptibility of metro systems lie in the fact that they are very open and accessible, with fixed, expected routes and access points. Their openness and conspicuousness makes it easy for potential terrorists to blend in crowds without creating suspicion. The volume of passengers makes it challenging for metro operators to employ multiple security procedures, which are used in aviation security. Preventive security measures on metro, such as the screening of passengers and luggage with X-ray scanners and metal detectors, hand searches, passenger profiling, sniffing dogs and armed guards etc. have been successful in preventing any kind of attacks on metros and have been widely used in metros in India.



Security Screening at station entrance



Security Installations on station platforms

Implementation of CPTED

The role of Crime Prevention Through Environmental Design (CPTED) in security planning is growing. CPTED considers the fact that the physical design of spaces can affect both, the likelihood and impact of criminal/terrorist activity. Metro-3 planners have been proactive in implementing this system as a long-term strategy to address crime and terrorism. Therefore it is critical that requirements of security systems are taken into account during design of metro station and other structures. Metro-3 has appointed experienced security experts in the planning and designing stage of the project and they have been critical in designing the station layouts keeping in view the various security requirements such as locations of various security equipments, CCTV cameras, evacuation ways, appropriate signage, clear line of sight, adequate lighting, clear spatial configuration, clear pathways/walkways etc.

Know Your Station - Worli Station



High-rise Development along Dr. Annie Besant Road



SASMIRA



Mahindra Towers



people's Mobile Hospital



Doordarshan Sahyadri



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

- | | |
|--|--|
| 1. Doordarshan Sahyadri | 12. Regional Passport Office, Mumbai |
| 2. Sasmira Institute of Management Studies | 13. Worli Hospital For Women |
| 3. Lion Garden | 14. Worli Fire Station |
| 4. Worli Police Camp Ground | 15. Watumull Institute Of Electronic Engineering And Computer Technology |
| 5. Adya Shankaracharya Garden | 16. Podar Medical College and Hospital |
| 6. Bhagwan Gautam Budha Udhyan | 17. Aditya Birla Center |
| 7. People's Mobile Hospital | 18. Mumbai Traffic Police H.Q. |
| 8. Worli Police Station | 19. Maharashtra State Police Housing & Welfare Corporation Ltd. |
| 9. MCGM Office | 20. Mahindra Tower |
| 10. Nipponzan Myohoji Budha Temple | 21. Maharashtra Rifle Association |
| 11. Glaxo Smith Kline | |



From the Science Center Station and Acharya Atre Chowk Station on E Moses Road, the Metro-3 alignment traverses to Worli Metro Station on Dr Annie Besant Road. Worli Metro Station is located right in front of SASMIRA, amidst several corporate office buildings and institutes like Aditya Birla Center, Siemens Ltd., RPG House, Glaxo Smith Kline, Doordarshan Kendra, Industry Manor, Play Boy Club, Century and Kamala Mill Compounds on the eastern side and residential colonies and high end residential apartments along Worli sea face on the Western side.

The station area is witnessing massive redevelopment on the old mill lands and residential colonies (MIG housing, government housing). Although there is a constant daily influx of working class people from the suburbs, Worli is still far off from the direct reach of Western and Central Railway. The nearest stations on Western and Central Railway (Mahalaxmi, Lower Parel, Elphinstone, Dadar, Curry Road, and Parel) are at 2 to 5 km distance from Worli and therefore, efficiency of the intermodal transport like taxi, BEST buses becomes critical. With the three metro stations including Worli Metro Station, Worli-Prabhadevi area is directly connected by the public transport network, further enhancing its accessibility and demand for development. Besides the working class commuters, the metro will facilitate movement of young students within the institutes like Podar Medical College, Watumull Institute of Engineering, various hospitals and temples like Mahalaxmi Mandir, Prabhadevi and Siddhivinayak.

Worli Metro Station is the last station in the Island City before approaching Siddhivinayak Station in Dadar. Dr Annie Besant Road is characterized by several temples and religious structures within the Metro-3 stretch. One of them is the Nipponzan Myohoji Buddha Temple, which reminds us of the age old Indo-Japanese cultural collaborations. As the Metro-3 project is funded by Japan International Cooperation Agency, it is a pleasant coincidence to have a different kind of Japanese presence in the project.

Nipponzan Myohoji Buddha Temple

India and Japan have shared strong relations traditionally, Buddhism being a common thread that initiated this cultural exchange. The bilateral relations between the two countries in the recent times have resulted in a joint strategic partnership leading to several national joint ventures. Japan has funded various infrastructure projects in India including Delhi Metro and now Metro-3.

Among the few places in Mumbai with a strong Japanese Buddhist influence is the Nipponzan Myohoji, a Japanese Buddhist temple, which sits diagonally opposite Poddar Medical College on Dr Annie Besant Road, often gets unnoticed in the changing skyline around Worli Naka. The temple was established in 1956 by Nichidatsu Fujii, a Japanese Buddhist Monk who was also a close associate of Mahatma Gandhi and played active role in India's independence movement.

The temple is dedicated to Japan Buddha Vihar Trust and is run by Seth Raja Baldeo Das Birla's family. Holy precinct of the temple leaves a lasting mark of its serene positive vibes, calling to visit again.



"The aim behind building this temple was to establish peace and bring people of all religions and castes together," says Bhikshu Moitra, who is taking care of this premises since 1976.

Tunnelling Update

The first Tunnel Boring Machine of Metro-3, S-1073 procured from German major Herrenknecht AG has completed 68 meters of tunnelling at launching shaft in Naya Nagar, Mahim. The highly-mechanized Earth Pressure Balance (EPB) arrived at Mumbai Port from China in September 2017 was lowered in presence of Honourable Chief Minister of Maharashtra, Shri. Devendra Fadnavis in October.

The machine started excavation in November 2017 and is expected to complete the construction of 2.5 km long tunnel by October 2018. It will be retrieved at Dadar near Sena Bhavan, after which it will be brought back to Naya Nagar launching shaft to start tunnelling on the other side towards Dharavi. It's neighbouring machine S-1074 has begun the excavation process and has completed 22 meters.

TBM T-58 started the excavation at launching shaft in Azad Maidan in presence of Mr. Ajoy Mehta, Municipal Commissioner of Mumbai, Mr. Anand Kulkarni, Chairman, Maharashtra Electricity Regulatory Commission along with other senior IAS officers. Manufactured by German major Terratec T-58 machine has completed 35 metres out of the 4.5 km long route between Azad Maidan & Grant Road.

L&T STEC JV lowered their first Tunnel Boring Machine named "VAINGANGA 1" at Mid shaft in Pali Ground, Marol for Package UGC07, as part of Metro-3 tunnelling works on 15th Dec 2017. TBM assembly will be completed within a month and initial drive is expected to start by mid-January 2018. The first tunnel drive will be towards CSIA International Airport.

Out of the 17 TBMs' being used for constructing of 33.5 km long tunnel running from Colaba to SEEPZ, 12 machines have already cleared FAT. 7 TBMs are delivered in Mumbai of which 5 machines have been lowered at launching shafts in Naya Nagar (2), Azad Maidan (1), Vidya Nagri (1) and Pali Ground (1).

NOC Process for Regulated Development along Metro-3

It is well known that the development in Mumbai is compact and vertical in nature because of the land scarcity, which is challenge for any infrastructure project. Fully underground Metro-3 passes through various brownfield as well as greenfield developments. To ensure smooth implementation of Metro-3 and structural safety of developments coming along its corridor, it is necessary to regulate these development activities. Metro-3 Influence zone (50 mt. on either side of the center line) and station locations are marked on MCGM Development Plan. For developments falling within the influence zone of Metro-3, it is mandatory to obtain No Objection Certificate (NOC) from MMRC under Section 20 of Metro Railways Act, 1978. Under Section 21, Metro Railways Act, 1978, MMRC has powers to regulate the construction and excavation activities along Metro-3 alignment.

Procedure followed for NOC

1. Application for NOC
2. Scrutiny of mandatory documents and drawings
3. Document deficiency letter sent to applicant (if any)
4. Submission of documents and drawing to MMRC
5. Proposal sent to general consultants (GC) for their remarks
6. Undertaking by applicant (if/as required)
7. NOC is issued to applicant for the said development

As on 22.12.2017, 64 NOCs have been issued by MMRC.



TBM Lowering at Pali Ground



TBM Lowering at Pali Ground



TBM Lowering at Vidyanagri



TBM Lowering at Vidyanagri



TBM Lowering at Azad Maidan

Experts Speak

Walkability and Way Finding through Maps

The intricate weave of the multiple transit systems throughout the city indicate that Mumbai is a city of pedestrians, with 51 per cent of the population choosing to walk to their destination. Despite this, however, little attention is paid to pedestrian safety, so it's hardly surprising that 61 per cent of the fatalities in road accidents are not motorists but pedestrians and cyclists.

Who does not cherish a good walking experience? A good walk is good for body, mind and environment. Walkable neighborhoods are popular hangouts and have higher property values as well. Walking promotes healthy lifestyle and is the most equitable form of exercise available to everyone anytime, anywhere, provided there is the right to walk. The right to walk needs to be recognized as a fundamental right; It includes provisions for pedestrian amenities, protected sidewalks with sufficient width and demarcation from traffic lanes with buffers, well-maintained paved surface, accessibility for the disabled etc. Proper shading and open spaces should complement the pedestrian infrastructure which contributes to better walking environment.

With the introduction of a 172 km Metro network, more than 70 lakh commuters are expected to get benefitted by the project. The figures bring forward the concern of dispersal of the commuters from all the Metro stations to the walkable (within 1km distance) destinations or the nearest alternative modes of transport. The emergence of the new transit stations in an existing city fabric has a great impact on its immediate surroundings with increase in the flow of commuters and overloading the existing physical infrastructure.

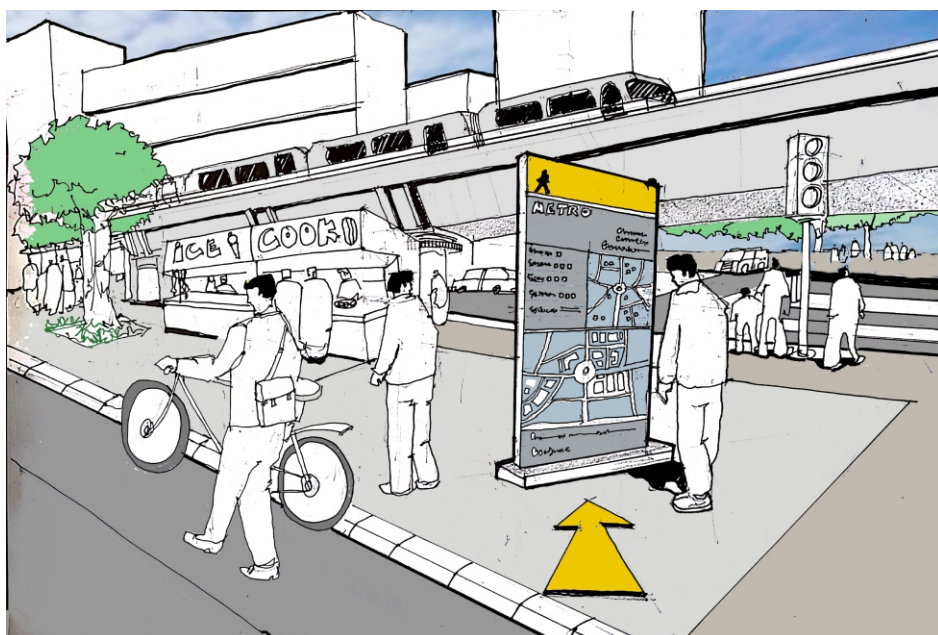
A detailed mapping and survey of these influence areas around each station is crucial to create a comprehensive walkability map to generate strategies for better management of the dispersal of commuters. The comprehensive plan will incorporate better walking conditions, accessibility to other modes of transport, provision of public facilities and resolve traffic conflicts. The installation of way finding maps is just a starting point to direct or channelize the movement of the commuters so that the dispersal is more organized and comfortable. The comprehensive mobility plan encourages walkability and thus the use of public transport which factors to better traffic resolution and environmental conditions of the city.



*Further to our previous articles on Metro and Walkability, here we have some more views from **Jai and Ketaki Bhadgaonkar**, Principal Urban Designers, Planners and Co-founders of **Bombay61 Studio** based in Mumbai.*

*They, along with **MESN (Mumbai Environmental Social network)** were instrumental in developing way finding maps for the Metro Stations in Mumbai along Metro Line 1 and have been actively presenting their design innovations on urban issues through various competitions, workshops and writings.*

The Way finder maps for Metro Station areas are beyond signage, much integral to the transit integration system and are popular within the travellers in the western countries. Generally these maps installed at the station entrances and key locations, are neighbourhood maps which consist of locations of important institutions, landmarks, transit stations, etc. within walkable distance of 1km. These maps are graphically represented with clarity, legibility and are attractive for commuters, visitors and tourists. The locations for installation of these maps are also selected carefully on the basis of the movement pattern the commuters followed. The initiative promotes walkability and helps first time visitors with quick orientation and ease of dispersal.



Achievements Green Apple Award

Mr C.Kannan, Chief Safety Specialist, General Consultant for Metro-3 was awarded Gold Trophy Green Apple Award for the Built Environment & Architectural Heritage 2017 in the International Campaign to find the greenest companies, councils and communities. He competed against more than 500 other nominations in the Green Apple Awards, which was presented at the Houses of Parliament, London on 6th November 2017. Now he has been invited to publish winning paper in The Green Book , the leading international work of reference on the Built Environment , so that others around the world can follow their example and learn from his achievement.

The Green Organisation has been established since 1994 as an international, independent, non-profit, non-political, non-activist environment group, dedicated to recognising, rewarding and promoting environmental best practice around the world.



Mr C.Kannan receiving the Green Apple Awards from Mr Roger Wolens ,Managing Director of the Green



Mr R Ramana , Executive Director (Planning) MMRC interacted with Dr Anil Kakodkar , Former Chairman , Atomic Energy Commission recently on December 14th , 2017 at Bhabha Atomic Research Centre , Anushakti Nagar , Mumbai. Mr Ramana updated Dr Kakodkar about the constitution and role of MMRC and progress of Metro-3 project. Dr Kakodkar was impressed with the project detailing and bequeathed best wishes to Metro-3 project team members.



MD MMRC, Ms Ashwini Bhide along with Mr. S K Gupta, Director Projects and Mr. Ramana, ED Planning made presentation to the members and invitees of Indian Heritage Society to appraise them on the Metro-3 works in the heritage areas of South Mumbai. Through this interaction, MMRC conveyed their commitment to deliver this project without disturbing the heritage environment with due attention to safety and stability of old heritage buildings.



Ms Ashwini Bhide delivered a lecture in the prestigious Prof. L. B. Kenny Endowment Lecture at the Asiatic Society of Mumbai. The lecture series is focused around urbanization issues in India. In her topic, 'Revamping Urban Infrastructure, Challenges and Opportunities', Ms Bhide shared an insightful picture of the challenges involved in Urban Infrastructure projects particular in Mumbai's transport infrastructure including Metro-3.



Metro-3 project team comprising MMRC and General Consultants participated in a Cultural Evening to Celebrate Christmas and Welcome Year 2018. With this the entire project team came together to showcase its creative talent, oneness and team spirit, share some informal moments with fun and music.

MMRC Control Room

Contact us @ 8291751545 to report monsoon related grievances pertaining to Metro-3 construction work.



Website Link

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