

# METRO CUBE



ADDING NEW DIMENSIONS

A MUMBAI METRO RAIL CORPORATION NEWSLETTER

## MD Speaks

Ms. Ashwini Bhide, IAS

MMRC, committed to development of environmentally sustainable public transport, celebrated June 5, World Environment Day with all teams at construction sites engaging in different activities and initiatives towards this goal. These steps intended to contribute towards creating and maintenance of sustainable urban environment around project influence zone. The activities spread awareness about ill effects of plastic use, distribution of cotton bags for daily use, awareness about use of bicycles, implement noise & dust control and awareness camp, quiz session to promote environment conservation, tree plantation at MMRDA R&R (SRA) colonies, casting yard Wadala, free PUC test for vehicles etc.

Monsoon preparatory works in consultation with MCGM were implemented including making all construction sites to monsoon safe condition, establishing connectivity of Storm Water Drains, installation of adequate number of pumps. MMRC also established a Disaster Management cell within MMRDA facility which is manned round the clock. Emergency response units have also been constituted to attend and address any eventuality if arises. The sites and surrounding areas are being regularly monitored to facilitate safe and easy movement of road traffic & commuters during heavy rains. These are in addition to regular traffic diversion and coordination.

On the TBM front, Surya-1 TBM of Package 01 and Tansa-1 TBM of Package 03 were lowered at Cuffe Parade launching shaft and Science Museum Station shaft respectively, ready to start tunneling. Krishna-3 TBM of package 04 is being lowered at Siddhivinayak station launching shaft, to tunnel 1290 meters length towards Worli. Surya-2 TBM completed its FAT and is on way to Mumbai soon. Together the total tunneling is expected to reach 5000 meters by 1st week of July.

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MMRC team welcomes Indian Ambassadors and High Commissioners at Azad Maidan

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# Tidal Influence and Floods: Mumbai

*Mumbai, the financial capital of India and the capital of Maharashtra is located on the coast of Arabian Sea. The low lying areas of the city get flooded very often during monsoon. The highest rainfall in Mumbai recorded so far was 944 mm on 26<sup>th</sup> July 2005, causing flooding. Floods in Mumbai are said to be caused by various reasons, one of them is heavy rains accompanied with high/low tides. We bring some interesting facts about the high & low tides and how it leads to flooding, through a Monsoon Special series of three articles in forthcoming issues, which will also include the forecast of Mumbai's high tide and low tide during monsoon period in order to avoid water logging woes and the risk of accidents.*

The influence of moon on earth is best felt in the coastal areas by rise and fall of sea level, called as the 'tides'. The tides are caused mainly by the gravitational pulls exerted by the moon and sun on the earth and the centrifugal force generated by the earth's rotation. Tides at any coastal location vary during a lunar day depending upon relative position of the moon and the earth.

It is important to understand few terms related to tides in order to follow the tidal influence on the coastal areas where tides are felt the most. Tidal effect is not felt deep inside the sea away from the coast line.

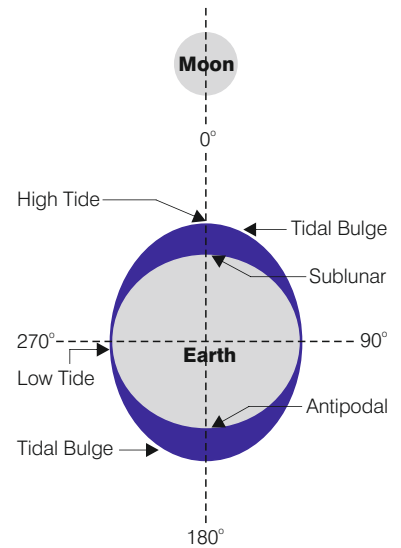
**Moon Phases:** - Mainly the moon passes through two phases during a lunar month.

1. Waxing phase - from New Moon to Full Moon
2. Waning phase - from Full Moon to New Moon

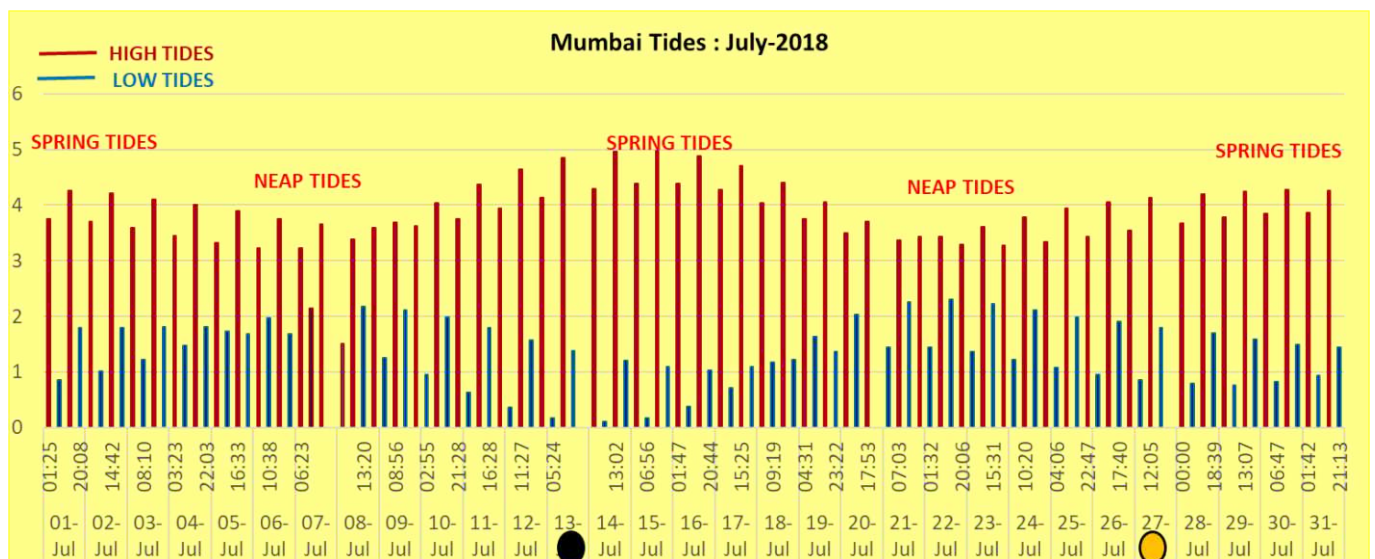
**Tides:** - Variation in sea water level at a given point and time on the coast line is called as a 'tide'.

1. High Tide - during a lunar day when the sea level rises to its maximum height is known as 'High Tide'. It occurs twice a day when the moon is right above and diagonally opposite.
2. Low Tide - A low tide occurs half way between two high tides, when the sea levels fall at the same place where it was high some time back.

**Flooding (Rising Water):** - As the sea levels keep varying regularly, the rise of sea level from low tide to high is called as 'flooding'. During flooding, water flows from sea towards the shore/land. The ships anchored in open waters always face towards the sea during the rising tide.



Tides are influenced by the shape of coastline, the flow of currents, weather, bathymetry, etc. The variations in tide level happen according to the position of the moon in relation to a given point on the surface of the earth. When the moon is directly above or opposite to a given coastal area on the earth, we witness high tides causing the waters to bulge from the surface of the planet. Conversely, low tides occur at that same point when the moon is at right angles.



**Tidal Graph: July-2018**

Observations: -

- There are possibilities of water logging in Mumbai from 4 Jul to 7 July if there is heavy precipitation during this period.
- Similarly, the city could experience floods from 21 July to 23 July if there is continuous precipitation during this period.

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# What Lies Beneath The Earth

In last month, we have seen the alignment of Construction Package 2. This month we will see Construction Package 3. The alignment of Metro-3 in Package 3 starts with Mumbai Central Metro station and ends at Worli Station. This package includes five stations (Mumbai Central Metro, Mahalaxmi Metro, Science Museum Metro, Acharya Atre Chowk, and Worli Station).

The alignment crosses the Western Railway tracks near Mahalaxmi Railway Station. The predominant rock types found in this stretch are Basalt and Breccia. The subsidiary rock types are Shale and Tuff. Basalt is harder and stronger variety of rock and the Breccia is weaker than Basalt. All stations in this package are constructed by Cut-and-Cover method of construction.

### The challenges while working in this area are:-

- Rocky Strata:** It is variable and different types of rock e.g. Basalt and Breccia are encountered. Any weak rock layer shall be identified during construction and necessary precautionary measures to be taken as necessary.
- Strength of Rock:** Strength of rock varies in similar grade of rock at different locations.
- Ground Water:** Existing ground water in this area is about 2.25 m below ground level. Therefore, earth-retaining system should be water tight in upper soil and highly fractured rock mass layers.
- Upper Soil and Completely Weathered Rock Mass:** During the station construction, the top soil and weathered rock will be supported by secant piles (earth retaining system), which will be constructed before start of the excavation.
- Tunnel Boring Machine (TBM):** Tunneling in this stretch will be executed by slurry TBM as the variations in the strata with the rock weathering grades. The TBM will operate in closed mode by Earth Pressure Balancing Technology.
- Railway Tracks:** The alignment crosses the Western Railway Tracks near Mahalaxmi Railway Station. The tunneling below the running tracks is challenging.

Weathering Grade (WG)	Rock/CR (%)	RQD (%)
WG1 - Fresh	95-100	90-100
WG2 - Slightly Weathered	90-95	75-90
WG3 - Moderately Weathered	60-90	40-75
WG4 - Highly Weathered	30-60	10-40
WG5 - Completely Weathered	0-30	0-10
Residual	0	0

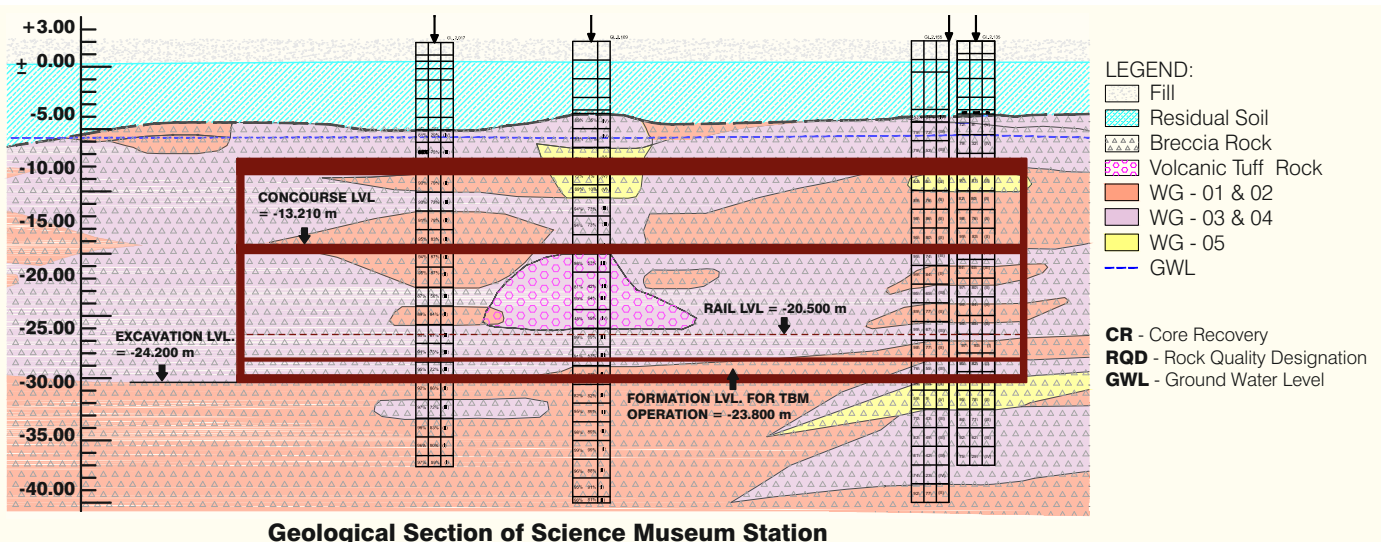
# MD Speaks

*Continued from page 1*

As part of our social rehabilitation program, training was organized for Metro-3 Project Affected Persons shifted at rehabilitation colony office bearers at Chakala on how to establish and manage Co-operative Housing Societies. Ex. Assistant Manager, MHADA Mr. C. S. Kekane imparted the training for about 150 members and guided them on legal and safety issues.

We had privilege to welcome Indian Ambassadors and High Commissioners to our work at Azad Maidan to get a first-hand site experience of this Mega project. We are truly honored and inspired by the encouraging views expressed by our guests. Among other important delegates were Indian Railway officials visiting our construction sites to understand advance technicalities being used in civil construction and tunneling. They appreciated the progress, safety protocol & international quality standards being followed in Metro-3 works despite the challenging site constructions and several litigations in courts.

We continue our journey in full swing despite the challenges and our eyes on what we wish to accomplish!!



**Geological Section of Science Museum Station**





# Know Your Station - Vidyanagari Station



University of Mumbai



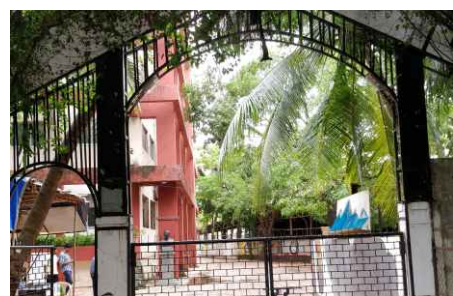
Cardinal Gracias High School



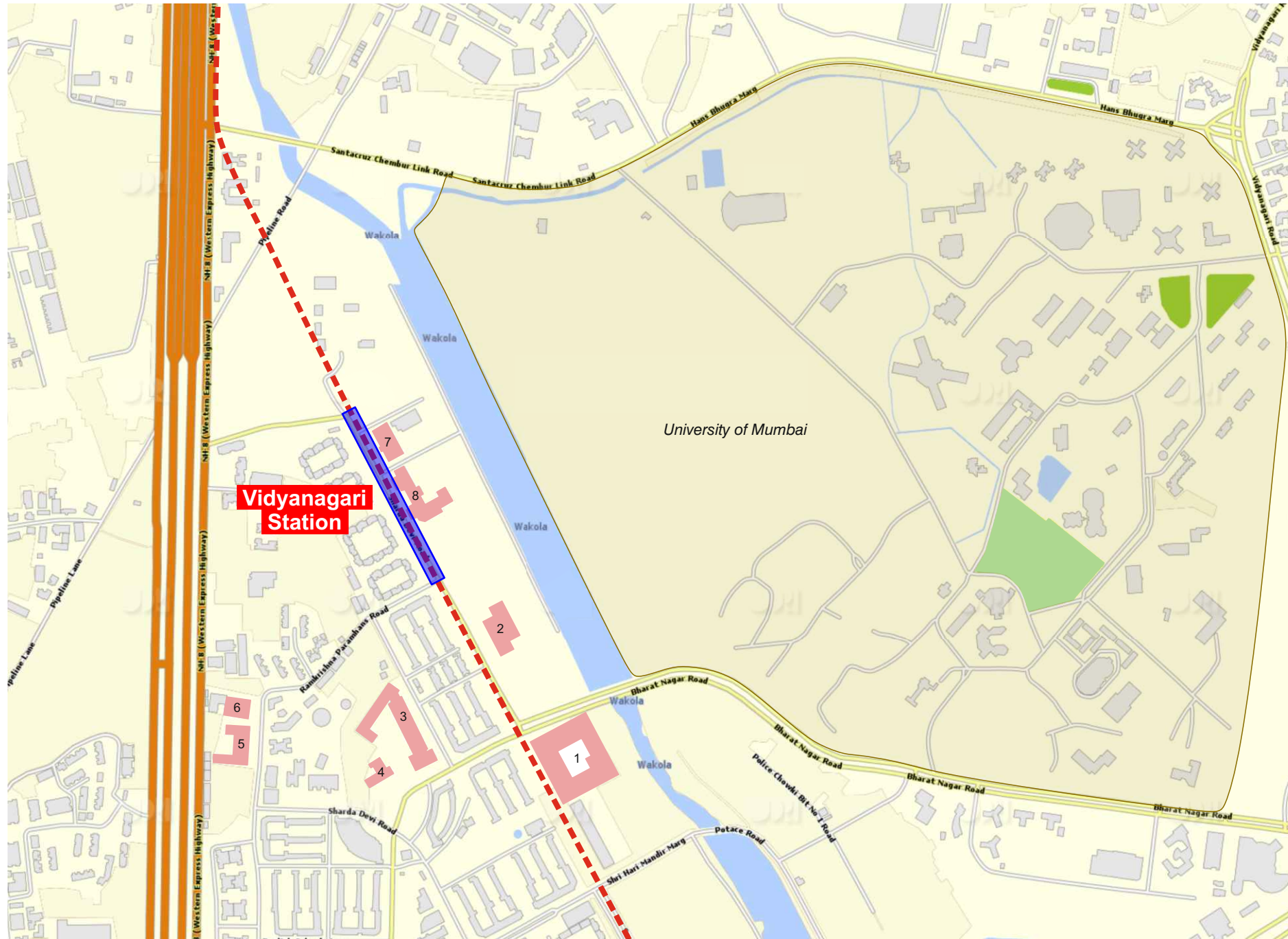
Centre for the Study of Social Change (CSSC)



Ascend International School



Dr. Baliram Hiray College of Architecture



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



Church of St. Joseph The Worker



Kanakia Paris

1. Kanakia Paris
2. Ascend International School
3. Indian Education Society New English School
4. Dr. Baliram Hiray College of Architecture
5. Cardinal Gracias High School
6. Church of St. Joseph The Worker
7. MPSP Singh College
8. Centre for the Study of Social Change (CSSC)

This month, we cover the 19<sup>th</sup> underground station northwards from Colaba - Vidyanagari on Metro-3, located beneath the Sharada Devi Road at Bandra East, very close to BKC. The nearest stations on the Central and Western Railway are Kurla, Santacruz, Khar Road and Bandra at 2.5 to 5.0 km distances from proposed Vidyanagari Metro Station. So far, this area has been depending on the BEST bus, taxi, auto rickshaw services for connectivity from nearby stations.

Vidyanagari area is bordered by Khar East, BKC and Kalina. It is home to a number of schools and colleges besides the Kalina Campus of the University of Mumbai and the Govt. College of Pharmacy. The University of Mumbai is one of the oldest and premier Universities in India, established in 1857. It is housed in two campuses of areas 243 acres and 14 acres at Vidyanagari and Fort respectively, sub-campuses at Ratnagiri (20 acres), Thane (6.50 acres) and Kalyan (6.26 acres) with 60 University Departments, Institutes and 749 affiliated colleges. It has established its name in industrial & international collaborations, sports, cultural and out-reach activities.

Kalina-Vidyanagari area has an advantage of the proximity to BKC and Airport. These factors have stimulated residential development and redevelopment in this area. Large land parcels under Teachers' Colony, Government Colony are potential redevelopment areas in future. Kalina is also an emerging hub for commercial real estate and private companies.

Station will mainly serve the important institutes like, University of Mumbai, Ascend International School, Dr. Baliram Hiray College of Architecture, Centre for the Study of Social Change (CSSC), MPSP Singh College etc. It's prudent location with many educational institute nearby would enhance and ease the movement of young students. Metro-3 will boost the area as presently there is no direct connectivity by railways.

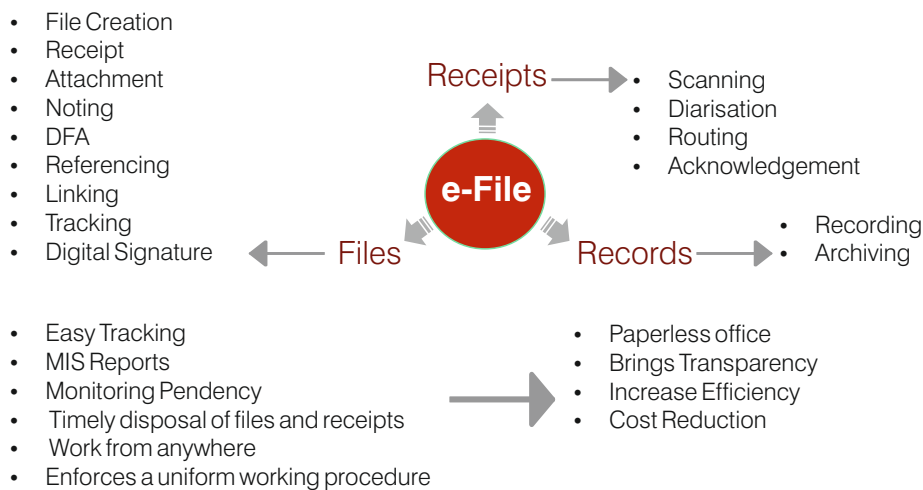


# e-Office Implementation at MMRC

e-Office is a Mission Mode Project (MMP) under the National e-Governance Program of the Government. The product is developed by National Informatics Centre (NIC) and aims to usher in more efficient, effective and transparent inter-government and intra-government transactions and processes. e-Office Solution enables core operation of the government organization at all levels to be performed in a virtual paper less environment.

With a vision to adopt paper less operations, increase transparency, efficiency and accountability regarding file movement, MMRC has implemented e-Office Solution in assistance with NIC System Administration and Support Team. e-Office application is live at MMRC since 15.12.2016. Working of e-Office application is demonstrated as follows.

## Electronic File Processing System



Printing Eliminated



Proper Compliance

### Savings

Reduced Storage



Reduced Labour

## Key benefits to be achieved by using e-Office System:-

1. Enhance transparency regarding movement of files
2. Increase accountability
3. Assure data security and data integrity
4. Reduce time for unproductive procedures
5. Promote innovation by releasing staff energy and time from unproductive procedures
6. Transform the government work culture and ethics

## Tidal Influence and Floods: Mumbai

*Continued from page 2*

**Ebbing (Falling Water):** - Opposite to flooding when the sea water starts to flow towards the sea and the sea level starts to reduce, is called as the 'Ebb'. The ships anchored in the stream face towards the land during the ebbing. The speed of water during ebbing is higher than flooding and it carries everything loose/floating into the sea and does not allow it to come back because of strong currents. It is a very dangerous situation and it is not safe to swim in sea during ebbing. Most of the cases of drowning at 'Aksha Beach' in Mumbai take place during the ebbing tides.

**Slack Water:** - After reaching the highest level of the tide during the flooding, sea water does not start to return to sea immediately. It stays in place for some time till equalisation of pressure of incoming and outgoing water. There is no movement of water during this period. It is called as 'Slack Water' and occurs after every high and low tide during a lunar day.

**Spring Tides:** - As seen from the phases of moon during a lunar month; the Moon, Earth and Sun are aligned in the same plane on full and new moon days. The resultant pull on the earth is higher that causes the increase in the tidal bulge and increase in water level of the high tides. Due to increase in the bulge height, it pulls more water towards it, the level of low tide reduces perpendicular to it. The high and low tides tend to reach the extreme end around new and full moon and are called as 'Spring Tides'.

**Neap Tides:** - Contrary to aligning of Earth and Moon with the Sun on new and full moon days, the moon positions itself perpendicular to the plane of Sun in the middle of waxing and waning phases resulting in lower gravitational pull. The height of the tidal bulge on these days is lower than spring tides. Similarly, the low tides also do not go so low during this period as that in spring tides. Consequently, the difference between high and low tide is not as much and certain amount of water column is seen during low tides as well. This phase of tides is called as 'Neap Tides'.

# War Room

*Our author for 'Expert Speaks' section for this month is Mr. Kaustubh Dhavse, Officer of Special Duty (OSD) to the Chief Minister at Government of Maharashtra. Mr. Dhavse has been the CEO & Founder at Network People Services. He has also served as a Deputy Director of Consulting at Frost & Sullivan.*

## Objective and Structure

The War Room is an initiative driven by the Chief Minister's Office primarily to de-bottleneck critical infrastructure and other important projects in the State. The Hon. CM Shri Devendra Fadnavis put this process in place very early in 2015 to overcome policy paralysis and bring speed and focus on project execution in the State of Maharashtra. The mandate of the War Room is to monitor and accelerate projects by simplifying approval process and bringing all stakeholders together to hasten decision making. This is done through daily interventions by the team and by convening regular meetings chaired by the Hon. CM.



The War Room is headed by the Hon. CM Shri Devendra Fadnavis and operations are headed by Shri Praveen Pardeshi (ACS to CM) and Kaustubh Dhavse (OSD to CM). They lead a team of young Chief Minister's Fellows of the War Room – Janak Shah, Varun Sanghavi, Shalaka Wate, Saurabh Kanade and Yash Kirkire, each of whom have been given a portfolio of projects to handle.

## Monitoring Process (Metro-3)

One of the responsibilities of the War Room is to monitor and expedite Metro projects in Mumbai, Pune and Nagpur. The War Room engages with multiple agencies responsible for construction of the Metros on a daily basis to resolve any project related administrative bottlenecks. Tracking and expediting permissions and files, smoothening inter-departmental coordination, thorough follow-ups and clear escalation mechanisms are some of the ways in which the team functions effectively. Members of the War Room also undertake multiple field visits to the Metro sites to monitor construction time lines.

## Hon. Chief Minister's Guidance

The Hon. Chief Minister plays an active role in the War Room and chairs bi-monthly meetings focused solely on resolving the issues slowing down approvals and construction of these projects. Major decisions related to policy interventions, funding issues, land transfer, relief & rehabilitation and others are taken by the Hon. CM in the War Room meeting and different departments are asked to resolve the issues either immediately or within tight deadlines.

The personal involvement of the Hon. CM in the functioning of the War Room along with the support of top-most bureaucracy has resulted in unlocking Maharashtra's growth potential with ongoing construction of +30 projects worth over \$40 Bn., some of which have been planned more than 2 decades ago but have existed only on paper.

## How does the War Room benefit?

War Room meetings bring together heads of the different departments and agencies and decisions are taken on the spot for project acceleration. This laser-like focus and well-oiled mechanism has enabled a massive acceleration in delivery of big-ticket Infrastructure projects.

From delivering 11 km of Metro lines in the previous decade to the sanctioning and initiating construction of 345 km of Metros in the last three years of the existence of the War Room is a testament to the success of this team. Due to the sharp focus of the government machinery on public infrastructure, investment led growth. The vast metro network in Maharashtra is expected to be completed by 2023.



War Room Team in Action



## News @ MMRC



MMRC initiates its first tree plantation drive at MMRDA R&R colonies in Slum Rehabilitation Authority sites, Mankhurd.



International Yoga Day 2018 has been celebrated by different packages.



Safety signages have been installed at construction sites in Marathi, Hindi and English languages for easement.

## Project Progress Update

As on 29<sup>th</sup> June, 2018



Two TBMs have been lowered and are getting assembled for tunneling.

Legend  
█ Planned  
█ Completed

### MMRC Control Room

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



Website Link

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