



## MD's Corner

Dear Colleagues,

November 2020 turned out to be a month of great satisfaction not only for team Maha-Metro but it also proved defining moment for urban mobility in the country. In the "13th Urban Mobility India Conference, 2020" held on 9th November, the "Standard Specifications of Metro-Neo" (the innovative cost-effective mobility solution for tier-2/3 cities) were unveiled for general adoption in the country by Hon. Shri Hardeep Singh Puri, Minister of State (Independent Charge), Ministry of Housing and Urban Affairs (MoHUA), Government of India. Earlier, these specifications were approved by the Ministry of Railways (Railway Board) and MoHUA.

The above is testament to the pursuit of excellence and innovation of Maha-Metro because the Metro-Neo system was conceived by it as an apt mobility solution for Nashik after studying global best practices operational systems. I am confident that soon we will receive the central government's sanction for the Nashik project.

The month was also special for Nagpur Metro project as the 3.14 km double-decker portion of unique nation's first multi-layered transport system was inaugurated on 13th November by Hon. Shri Nitin Gadkari, the Minister for Road Transport & Highways and the Minister of Micro, Small and Medium Enterprises. Also, significant is the fact that now 12 out of 16 operational Nagpur Metro stations and Metro Bhawan have received the highest green "Platinum Rating" from Indian Green Building Council. Other stations too are designed and being constructed to the same exacting standards to receive the highest green rating once they are commissioned.

I am happy to find in this edition, a very special article by Shri S. Sivamathan, our Director (Finance), titled "Financial Engineering of Nagpur Metro" in the Innovation Corner, elaborating story of how Nagpur Metro has embarked upon the path of achieving all-time financial sustainability.

The good news continues to flow from Pune Project where on 7th November in the project underground section second breakthrough of 1.6 km tunnel was achieved at the North end of Civil Court station. This marked completion of tunnelling work of 1.6 km each in both UP and Down line in the Range Hill-Shivajinagar-Civil Court stretch. The TBMs are now getting ready to start excavation towards the Budhwarpeth station duly passing under river Mutha.

Lastly, I take the opportunity to reiterate that the threat of COVID-19 persists both at Nagpur and Pune. I request all Maha-Metro family members to take mandated precautions at work and at home.



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# INDIA'S TRYST WITH METRO-NEO

A Red Letter Day in the history of Urban Mobility in India!



9th November 2020

On this day, "Standard Specifications" of Metro-Neo, an innovative cost-effective mobility solution for Tier 2/3 cities, was unveiled by Hon. Shri Hardeep Singh Puri, Minister of State (Independent Charge) Ministry of Housing and Urban Affairs (MoHUA) for general adoption in the country. Earlier these Standard Specifications were approved by the Ministry of Railways (Railway Board) and MoHUA. Metro-Neo will be constructed and operated under the Metro Rail Construction Act, 1978 and Metro Railway Operations and Maintenance Act, 2002. While inaugurating the "Standard Specifications", Shri Puri emphasized that by 2030, 600 million people i.e. 40% of the Indian population will be staying in cities. More than seventy-five of these cities will have over one million population, a large number of which will

will be tier 2/3 cities.

Metro-Neo will be the ideal mobility solution for cities having projected Peak Hour Peak Direction Traffic (PHPDT) upto 10,000. Being cost-effective, it is expected to soon catch the imagination of a large number of cities which may like to get Metro-Neo developed for their urban areas as a convenient city transit system. Metro-Neo can also act as a feeder to Metro-Rail network in bigger cities. These "Standard Specifications" were framed based on the recommendation of a committee nominated by MoHUA to suggest a suitable system for tier 2/3 cities after studying the various urban transit systems, operational globally. The committee comprised officials of MoHUA and Metro Railway Corporations and was headed by Dr. Brijesh Dixit, MD Maha-Metro.

# METRO-NEO: DISTINCTIVE FEATURES

## - The Need

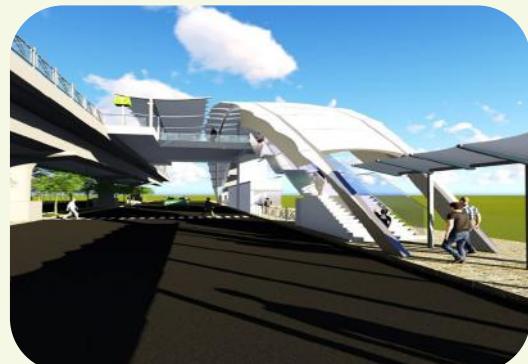
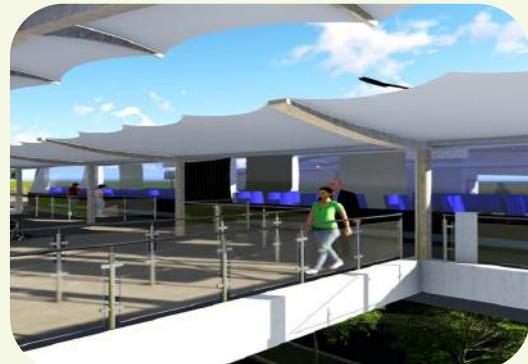
Currently 18 cities in the country have around 700 km operational Metro Rail network and construction work is underway in another 900+ route-length in 27 cities. However, Metro Rails are highly capital intensive and high capacity suitable for cities with high projection of ridership. The success of these systems has led to several cities including those with lesser ridership planning to develop metro rail. These systems due to high capital cost will find difficult to meet required 14% Economic Internal Rate of Return (EIRR) hurdle required for the project sanction. Also, due to lower ridership and high O & M cost, viability of these systems shall have a question mark.

## - It Provides the Best of Both the Worlds

Metro-Neo has arrived as apt solution for tier 2/3 cities requiring lesser ridership upto 10000 PHPDT. It provides quality of travel at par with conventional metro rail (e.g. safe, comfortable, reliable, accessible, eco-friendly and affordable) while being substantially cost effective.

## - Distinctive Features Simplified

Metro-Neo will be rubbered tyred articulated coach-based system, having electric traction, running on a road slab on an elevated/at-grade dedicated Right of Way (RoW). Depending upon the PHPDT needs its rolling stock will be single coach of 12-meter length or two articulated coaches of 18-meter length or three articulated coaches of 24-meter length. The traction system will be 750 Volt DC with overhead twin positive and negative wires placed in parallel and embedded with SCADA to control and monitor the traction power supply.



The simplified signalling shall have suitable Automatic Train Protection (ATP) and anti-collision features. The communication system will be radio and optic-fibre based. The cost-effectiveness of Metro-Neo is owing to substantially reduced 10-axle load of coaches, no need to have tracks or steel wheels, no-frill two-tiered stations with all the basic amenities and optimization of the size of platform roof to one third of the platform length.

## SPECIAL FEATURE

### Nagpur's Date with Multilayered Transport System

The double-decker portion of country's first multilayered transport system, a joint undertaking of Maha-Metro and NHAI at Nagpur was inaugurated on 13<sup>th</sup> November by Hon. Shri Nitin Gadkari, Minister for Road Transport & Highways and the Minister of Micro, Small and Medium Enterprises in the august presence of Hon. Shri Anil Deshmukh - Maharashtra Home Minister, Hon. Shri Nitin Raut - Nagpur District Guardian Minister, Leader of Opposition in Maharashtra Legislative Assembly Shri Devendra Fadnavis and other distinguished dignitaries.

This cost-effective operationally superior system constructed by Maha-Metro on Wardha road eliminated the need of a separate 3.5 km road flyover that NHAI had planned earlier. It includes the double-decker elevated flyover and metro on a single pier. The completion in record time stands testimonial to innovative ability and excellence of Maha-Metro in project execution.

The construction work was preceeded by

the demolition of the then-existing Chhatrapati flyover within record seven days with full public cooperation to make way for the Double-decker integrated structure. Its construction was done with utmost safety without causing inconvenience to the traffic on both sides of Wardha road. Additionally, Maha-Metro in parallel completed the construction of flyover and underpass to enable citizens staying in Manish Nagar area on Wardha road across the railway track in seamless coordination with railway and local authorities.

The 3.14 km long flyover has a carriage width of about 19.6 meters, including a median of 3 meters, except for a length of 500 meters, where carriage width is 26.36 meters. Either end of the flyover is provided with a 300-meter-long ramp and has a gradient between 3.3% to 4%. A crash barrier of 1.1 meters height with LED illumination posts has been provided at the extreme end of the carriageway. Adequate signages and road reflector boards have also been provided.



## INNOVATION CORNER

S. Sivamathan  
Director (Finance), Maha Metro

### Financial Engineering of Nagpur Metro

Metro Rail projects face humongous challenge of being capital intensive with low rate of return as fares need to be affordable. Nagpur Metro has adopted a multi-pronged strategy to achieve long-term financial sustainability amid the above challenge. The strategy hinges around the completion of project within time and cost; optimizing life-cycle O&M cost and giving primacy to non-fare box revenue.

- **Project Cost Reduction:** The project cost has been reduced to 10% lower than the DPR cost. The specific cost reduction measures include but are not limited to:
  - **Land Acquisition** within record time at lower cost
  - **In Civil Engineering** viaduct, stations and p-way cost-optimized through reduction in segment length by 1.8 m, per span weight reduction by 15-ton, design optimization, integration of parapet casting with segment costing eliminating the need of separate casting etc. Station platform length has been reduced by half to 75 meters. P-way cost has been reduced over the life cycle by using 25 m length 1080 grade for the first time in the country to reduce joints welding
  - **Rolling Stock Acquisition** done at the lowest cost in the country through innovative tendering. Coach maintenance depot cost reduction by bringing depot size to the half of DPR, bay lines and repair bay lines reduced by half to 80 meters and 20 % reduction in depot track to 8 km, no roof over stabling lines and train stabling at stations apart from depots
  - Reducing Traction Cost** by reduction of sub-station numbers to half, reduction of transformer rating and elimination of neutral section, etc. Signalling & Telecom cost reduction through innovative tendering, elimination of master - clocks &

servers from stations, elimination of signal rooms, virtualization of telecom subsystem servers etc.

- **Innovative PPP** in provisioning of AFC by SBI led consortium apart from saving INR 250 crore of capital cost, has saved 10 years maintenance cost while during the same period the project will receive a royalty of INR 30 crore.

- **Life-time O&M Cost Saving** Construction cost saving has been matched with life-time O&M cost saving. At the manning level, Nagpur Metro has bettered the global best practices with 27 staff per km including outsourced staff. Similarly, with 65% of total energy needs to be met by low-cost solar energy generated on station rooftop panels the project will have substantial lifetime energy cost saving. Maintenance cost is kept low by adopting global best-practices, creating local next-practices & following the mantra of condition-based maintenance to optimize cost.

- **Maximizing Revenues:** Apart from maximizing farebox revenues through innovative partnerships for providing first-mile and last-mile connectivity, Nagpur metro has taken pioneering measures to have 60% of its total revenues from non-fare-box revenues. It was the first project to get TOD approval and approval of 1% additional cess on stamp duty well before project execution the later enabled it to have INR 200 Crore revenue even before the start of the commercial operations. The Maha-Metro strategy to maximize non-operational revenue is built around elaborate plans to maximize revenues from airspace & real-estate at and around stations in a manner that Nagpur Metro stations become new vibrant city centres.

The winner, in the end; Nagpur & its citizens!

# PUNE UNDERGROUND

## Second Tunnel Breakthrough

On 28th September underground section of Pune Metro with meticulous planning and adept quality execution achieved the key milestone of the first tunnel breakthrough of 1.6 km at the North end of the Civil Court underground station.

Not resting at the above laurel, Pune underground on 7th November achieved second important milestone with breakthrough of another 1.6 km tunnel at the North end of Civil Court station thereby completing the tunnelling work of both Up and Down line of 1.6 km each in the

Range Hill-Shivajinagar-Civil Court stretch. Like the first breakthrough, the second breakthrough too happened 150 meters below the NATM section of the Civil Court underground station in record time.

All existing service set up from Agriculture College site surface will be shifted now for TBM relaunch at Civil Court station. After re-arrangement of set up, both TBMs will be reassembled and start excavation towards the Budhwarpeth station duly passing under river Mutha.

### North end of the Civil Court - 1.6km



# HIGHEST GREEN ACCREDITATION

## IGBC's Platinum Rating for Twelve Nagpur Metro Stations and Metro Bhavan

Eco-sensitivity, integral to core values of Maha-Metro is best exemplified in green initiatives like massive afforestation, meeting 65% of energy needs from its own solar energy, adopting bio-digesters at stations, 100% water recycling and rain-water harvesting and constructing stations and other buildings to meet the exacting criterion of IGBC's Platinum Rating. The efforts have resulted in 12 of 16 operational Nagpur Metro stations along with Metro Bhawan being awarded Platinum Rating of Indian Green Building Council's Green MRTS Rating system. Other stations are also being constructed ensuring they receive this rating on completion.

Stations awarded Platinum Rating are Khapri, New Airport, Airport South, Airport, Jai Prakash Nagar, Rahate Colony Metro Stations on Orange Line and Lokmanya Nagar, Bansi Nagar, Wasudev Nagar, Subhash Nagar, Institute of Engineers, Jhansi Rani Square Metro Stations on Aqua line. ICBC's vision is, "To enable a sustainable



built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025". Platinum Rating of Nagpur stations and Metro Bhawan is on account of excellence in following parameters:

Design Category	Achieved Efficiency/sustainability measure for the project
<b>Energy Efficiency</b>	<ul style="list-style-type: none"> <li>○ More than 30% efficient in traction power requirements</li> <li>○ More than 15% efficient in non-traction power requirements</li> </ul>
<b>Water Efficiency</b>	<ul style="list-style-type: none"> <li>○ More than 15% efficient in end use water requirement</li> <li>○ More than 30% efficient through water re-use</li> <li>○ RWH provision for more than 90% run-off generated for roof and non-roof areas of metro stations</li> </ul>
<b>Indoor Environmental Comfort</b>	<ul style="list-style-type: none"> <li>○ Better experience for commuters;</li> <li>○ Better outdoor views and ventilation</li> <li>○ No impact on public infrastructure due to maintenance</li> </ul>
<b>Material Conservation</b>	<ul style="list-style-type: none"> <li>○ More than 90% of construction waste re-used at site, no additional burden on landfill sites.</li> <li>○ 100% disposal domestic &amp; hazardous waste with authorized agencies</li> <li>○ In station construction: less use of virgin material, more use of recycled content material</li> </ul>
<b>Sustainable Sites</b>	<ul style="list-style-type: none"> <li>○ More comfortable &amp; safe for passengers. Convenient for women &amp; differently abled passengers</li> <li>○ 100% transportation of excavated soil in more controlled manner</li> <li>○ Worksite monitoring for Air, Noise, GW and Soil Quality</li> <li>○ Minimal impact on nocturnal environment</li> <li>○ Provision for alternative fuel based transport facility for commuters</li> <li>○ Comprehensive multimodal integration plan</li> <li>○ Effective integration with other modes of transport such as Airport, Railway Station, Bus Stand, etc.</li> </ul>

# METRO-NEO GLIMPSE

## Illustrative Metro-Neo Coaches & Stations



## Social Media Engagement

Citizens Love  
Maha Metro!

Social media engagement of Pune & Nagpur Metro far exceeds its other counterparts in the country. Pure testimony of 'Maazi Metro'



### NAGPUR METRO

Average acquisition of FB followers per month

**10,249**

589,747   11,689  
 5,58,900   13,374



### PUNE METRO

Average acquisition of FB followers per month

**8,900**

5,74,394   12,200  
 1,211,438   21,395