

# ECC COLCORO

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A large white rocket with yellow and black accents is launching from a construction site at night. The rocket is angled upwards, with a bright orange and yellow flame and smoke plume at its base. The construction site below is illuminated with various colored lights (blue, green, red, yellow) and shows a complex steel framework. The background is a dark blue sky with a network of glowing blue lines and dots, suggesting a digital or data-driven environment.

PROGRESS FUELLED  
BY DIGITALIZATION

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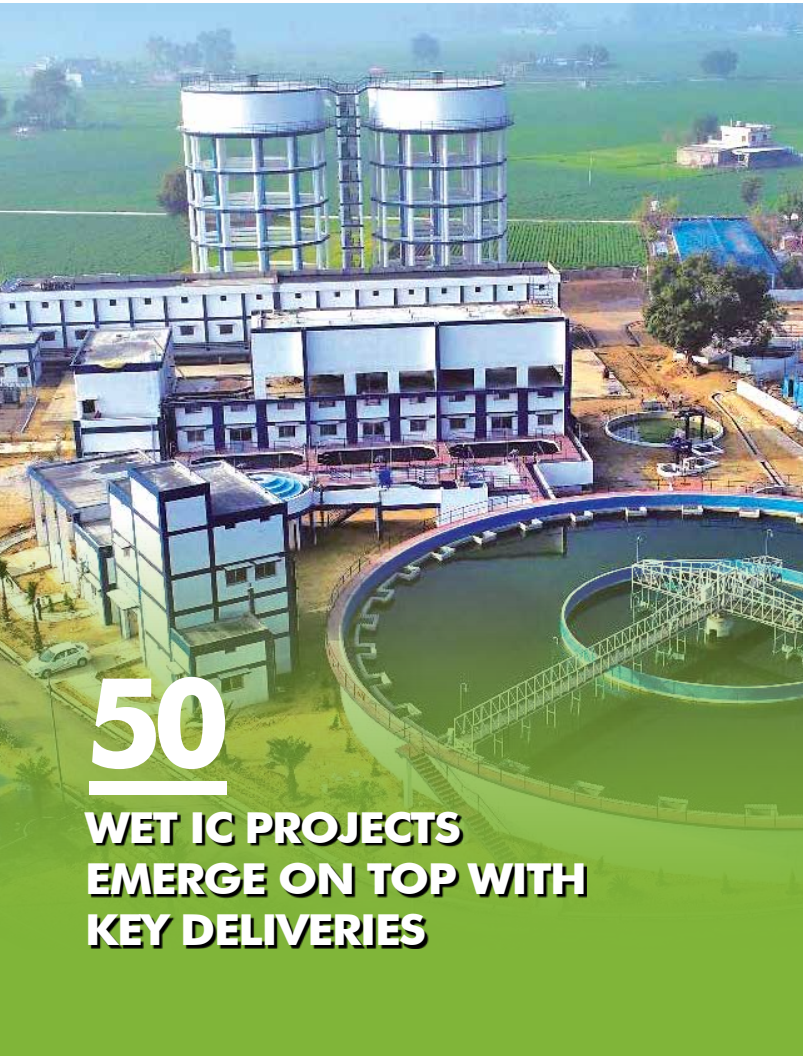
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**Acknowledgements**

This issue of ECC Concord celebrates progress in the face of overwhelming odds. Even as the pandemic raged, our employees and workmen across offices and project sites have taken the challenges in their stride to drive progress and, at the same time, keep everyone healthy and safe. We are still not on safe shores, but we are getting there and with that confidence, let us move forward. Our thanks to all our colleagues – the Executive Assistants – from across businesses, who have been our able allies to put this issue together. Here they are in no particular order: Hema Chandrasekharan, Asha James, A L Nachiappan, Anirudh Bharadwaj, Kini Madhav Anant, P T Selvam, Akshara Asok, Anila Manoharan, Murugan Paramguru, Moinudeen Akbar, Vineet, G Srinivas, Rajshekhar Pingala, Ram Kishore, Sushrut Thakre and several others! This issue is yet another triumph of our teamwork!

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## KEEP THE GOOD WORK GOING!

**WE HAVE DELIVERED QUITE HANDSOMELY ENDING FY 2020-21 WITH OUR REVENUE AND SALES NUMBERS ALMOST ON PAR WITH THOSE OF THE PREVIOUS YEAR, AND, PERHAPS, MOST SIGNIFICANTLY, OUR ORDER BOOK LOOKING VERY ROBUST AT OVER INR 3.5 LAKH CRORES.**

Dear Colleagues,

Once again, we have shown what we are made of and reiterated what makes this wonderful organization so very different for all others. Yet again, as a huge team of 30,000-plus, we have shown that when the going gets tough, when the chips are down, you can always rely on L&T to deliver. Undoubtedly, we have delivered quite handsomely ending FY 2020-21 with our revenue and sales numbers almost on par with those of the previous year, and, perhaps, most significantly, our order book looking very robust at over INR 3.5 lakh crores. All this could only have been possible with your contribution, commitment, drive, and passion to convert adversity into opportunity and perform like true L&T-ites.

It is true that the pandemic has been both a learning and unlearning experience for all of us but in the final analysis, it has made us stronger, sharper, and more focused to succeed. The kind of challenges we faced

across projects, offices, locations, and geographies were novel, without precedent and sudden. There were no easy, off-the-shelf solutions or mitigation plans; each had to be dealt with on its own merit. The way that all of you faced the overwhelming challenges of shortages of men, machine, and material and the loss of almost 4-5 months due to

the various lockdowns, stood together as one and overcame them is extraordinary. The management recognizes that each project site, each office had to evolve their own unique brand of solutions considering the local conditions and circumstances and that we have come through with flying colours is commendable.

**“ BY KEEPING OUR TENDERING PROCESS PRECISE, OUR COSTS, COMPETITIVE AND RAPIDLY MOBILIZING ONCE WE WIN ORDERS, WE WILL CREATE AND SUSTAIN A VIRTUOUS CIRCLE THAT WILL HELP US SAFEGUARD OUR PROFITS. ”**

**“ All the good work we have done in Digitalization came in extremely handy to sharpen our project planning, improve our project management and monitoring, raise our quality and safety standards, and manage our workforce more efficiently. ”**

### Leadership To The Fore

It is in times of crisis that the true mettle of leadership reveals itself and during these tough and testing days, it is heartening that several of you have taken on the mantle to lead your various sites and offices. The organization has gained immeasurably for the pandemic gave us a situation and opportunity to identify leaders. The flow and clarity of communication, both up and down, the quick appraisal of situations and even quicker and positive action on ground have been noteworthy. This is perhaps the most significant reason why we have been able to achieve so much progress since the lockdowns.

We have started to look at things differently, think innovatively and evolve clever ways to do our business that have found expression in several new solutions in automation, mechanization, and digitalization that are driving our efficiencies. Despite the on-ground challenges of limited resources, we have found fresh ways to improve productivity, cut costs and wastage, reduce execution time to speed up delivery to quality and safety. Lessons well learnt during tough times will hold us in great stead when normalcy returns. We are uniquely positioned to add immense value for our clients which if they realize, they will be more than willing to pay us a premium for the difference we bring to our delivery.

All the good work we have done in Digitalization came in extremely handy to sharpen our project planning, improve our project management and monitoring, raise our quality and safety standards, and

manage our workforce more efficiently. It is great that several sites were able to convince their clients and customers for digital approvals, online payments, remote inspections & Factory Acceptance Tests, and such like. Technology is our enabler that is not only saving us cost and time but improving our bottom line. These should be the norm going forward. Our vendors and subcontractors too have been towers of strength, willing to go many an extra mile for us, once again proving that it is teamwork that really succeeds.

### New Wins, New Reasons To Celebrate

While we held our own at our several on-going projects, we did not lose sight of aggressively seeking new business. Winning the largest EPC order ever awarded in India for the High Speed Rail

**“ THE WAY THAT ALL OF YOU FACED THE OVERWHELMING CHALLENGES OF SHORTAGES OF MEN, MACHINE, AND MATERIAL AND THE LOSS OF ALMOST 4-5 MONTHS DUE TO THE VARIOUS LOCKDOWNS, STOOD TOGETHER AS ONE AND OVERCAME THEM IS EXTRAORDINARY. ”**

corridor, the mandate to build the country's longest river bridge from Dhubri in Assam to Phulbari in Meghalaya over the Brahmaputra and the extremely challenging Rishikesh to Karnaprayag railway project that involves considerable tunnelling in the Himalayas are all reasons to celebrate as also is the huge EPC contract that our renewables arm has recently won in Saudi Arabia to build the world's largest solar plant of 1.5 GW capacity. This puts us in the big league as the country's largest EPC player to build hydel, nuclear, and solar power plants. By keeping our tendering process precise, our costs, competitive and rapidly mobilizing once we win orders, we will create and sustain a Virtuous Circle that will help us safeguard our profits. With more opportunities on the anvil in the water, power, metros, and railways sectors, the future holds great promise.

### An External Helping Hand

While we were busy doing what we do best of building infrastructure, the government has been playing its part to create a climate to spur growth and opportunity to revive the economy. We have already seen a concerted strategy to kickstart infrastructure development and several other initiatives to ease liquidity in the market, help resolve working capital issues and redress pending disputes. Though the private sector still lacks confidence to commit investments, robust government and laterally funded projects are keeping things rolling that all augur well for the country at large.

The pandemic is still in our midst, though the good news is that we have learnt to live with it and helped along by the availability of multiple vaccines and the speed with which the population is being vaccinated, we should gradually bring the virus under control. Till such time, let us keep ourselves and our people safe and continue to move forward with focus and purpose.

All the best!

# RIDING ON DIGITAL SOLUTIONS, B&F PROJECTS RACE AGAINST TIME TO MAKE UP FOR LOST GROUND

**A**cross segments and geographies, B&F projects are racing against time to make up for lost time and ground caused by the pandemic. A measure of this feverish action can be seen at the Hyderabad International Airport expansion project where Project Director, C H Anil Kumar, and his team have been focusing all their energies to commission a crucial taxiway. “The 2.3 km long Taxiway – B (Parallel) bisects the terminal and the runway, and its commissioning was critical considering the operational difficulties of constructing in a fully functioning airport.” The junctions of this parallel taxiway were significant considering the operation of stands and ICAO norms. The team had to execute each junction in 10 days as per the stringent NOTAM period along with operational realignment.

*Work in Progress for Arrival Part  
of the Terminal Building at DIAL,  
T2 Project*





“The 2.3 km long Taxiway – B (Parallel) bisects the terminal and the runway, and its commissioning was critical considering the operational difficulties of constructing in a fully functioning airport.”

**C H Anil Kumar**  
Project Director,  
HIAL Expansion Project

“We meticulously planned the operation like shutdown works with hourly schedules including flight movements and GSE access,” informs Deputy Project Director, P Venugopal Kurup. “We carefully estimated our resource requirements and mobilized them appropriately before taking up the critical works. Very significantly,” he adds, “the taxiway was commissioned along with the Taxiway Centerline Light which is perhaps accomplished for the first time in a fully operational airport.”

Other significant milestones accomplished by the Airside team at HIAL led by Airsides Head, Rajesh Shukla supported by Airsides In-charge, Pankaj Rai amid constraints within the operational airport were to commission the West Apron (6 Stands) including taxiways, South Remote Apron (24 Stands) including taxiways and the fuel



“We carefully estimated our resource requirements and mobilized them appropriately before taking up the critical works. Very significantly the taxiway was commissioned along with the Taxiway Centerline Light which is perhaps for the first time in a fully operational airport.”

**P Venugopal Kurup**  
Deputy Project Director,  
HIAL Expansion Project



Runway at HIAL Expansion Project



Hyderabad International Airport Expansion Project

hydrant systems. The project involves expansion of the terminal building, Airside works, 1.7 lakhs sqm of rigid pavement, 3.7 lakhs sqm of flexible pavements and increasing the number of stands from 39 to 98 to meet the forecasted needs of 34 MPPA.

### DIAL lands a major milestone

Since the commencement of the Delhi International Airport project in March 2019, it has been a saga of start, stop, fly, halt, restart and take off for Project Director-DIAL, B&F, Jitender Aggarwal and team. Seven months of design development and setting up of infrastructure was followed by three months of aggressive procurement only for work to be halted in its tracks by the NGT ban. Thereafter, pace was just picking up when the pandemic struck. “We, L&T-ites, are known for taking



“We, L&T-ites, are known for taking setbacks in our stride so with some smart thinking, strategizing, adopting digitalization and advanced monitoring techniques, we have started to catch up on lost time.”

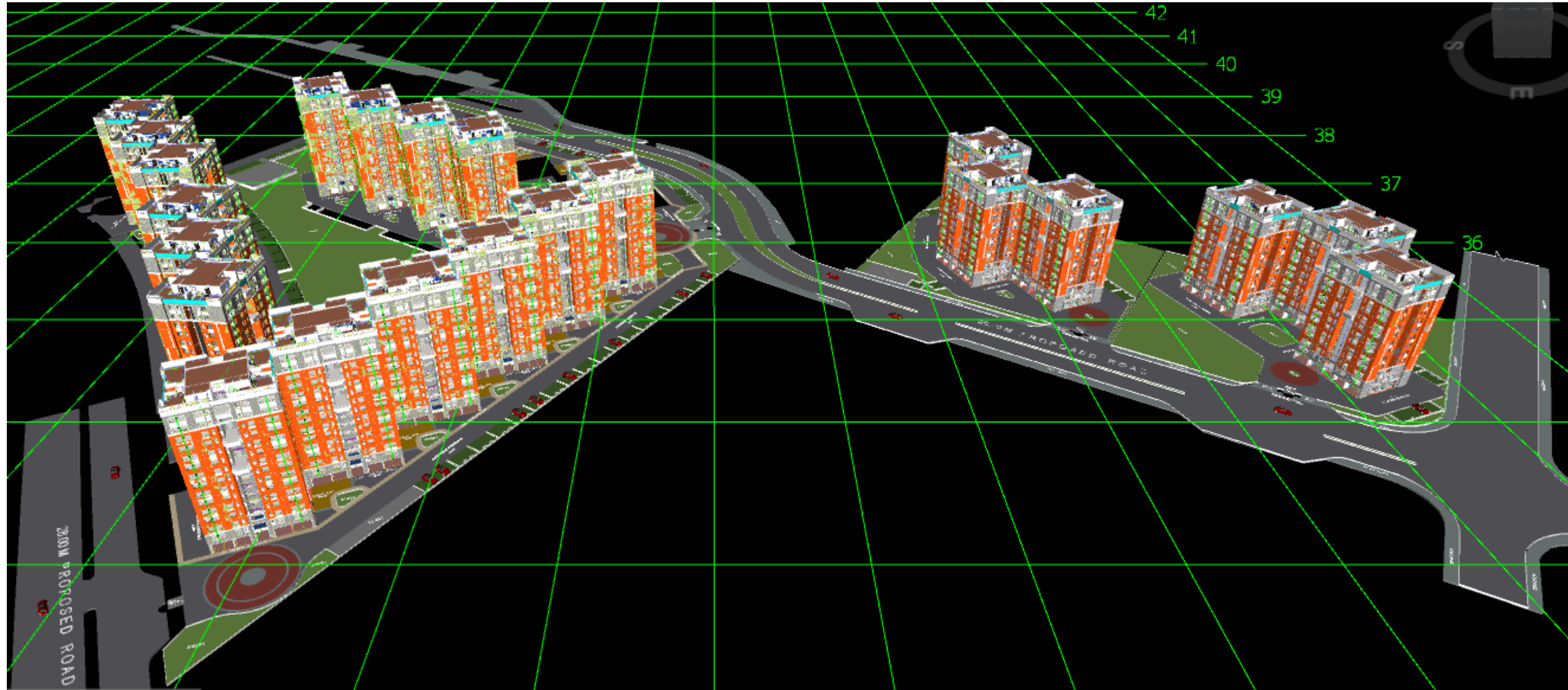
**Jitender Aggarwal**  
Project Director – DIAL, B&F

setbacks in our stride,” says Jitender with a shake of his head, “so with some smart thinking, strategizing, adopting digitalization and advanced monitoring techniques, we have started to catch up on lost time.” The most critical task before them was to complete the high



“Our success is thanks to our excellent planning of interfacing, sequencing, categorizing activities, mobilizing adequate workmen with the required skill level with all the necessary tools, plants and machinery prepared and tracked.”

**Ravi Kadam**  
Head – Construction,  
Delhi International Airport



BIM Model – CIDCO Package IV, Bamandongri, Navi Mumbai

resources cost effectively to assess the asking and achieved rates and asset-wise & vendor-wise productivity.” 4D BIM is proving extremely useful for the execution team to understand workflow processes to reduce rework and improve productivity. The adoption of precast construction for the curved column shutters and the service tunnel, a critical deliverable for Phase 1 as the tunnel links the Utility Building with the Terminal Building through a Node, helped ensure that civil, finishes and MEP works could be executed parallelly.

BIM is proving to be a huge boost to fast-forward progress at the residential CIDCO project in New Mumbai with the mandate to construct some 23,000 units in a record 42 months. Considering the enormity of the project and its demanding schedule, Project Director, O V Divakar had little option but to adopt digital tools that have, as he says, with a chuckle “become a way of life during execution.”

The EDRC and BIM teams took up the challenge of building the tower models that include architectural, structural and MEP detailing. “Early adoption of BIM strengthened the site team’s arm to plan, monitor progress and eventually invoice on time, based on automated quantity take-offs of the completed work,” says K Senou, Head – Technical Services. Presently, they interact daily with more than 500 drawings and 80 models on various RFIs with the latest versions of drawings with 3D models instantly available on the BIM 360 platform. Not only major quantities such as concrete and shuttering but also the generally time-consuming quantity take-offs for finishes such as doors, jambs, conduits, tile skirtings are measured on models. Project progress is tracked on Navisworks 4D models with Planned versus Actual status while the Forge platform allows for automated comparison of actual progress to planned progress and flag deviations.



Electrical Room – DIAL T2

side MEP installation works along with the remaining civil works to clear the front for services.

“We quickly achieved our objective of ordering all the major high side equipment within just four months from July to October 2020 with the help of Primavera supported by Procube,” shares a satisfied Head – Construction, Ravi Kadam. The equipment started arriving and getting installed at site by November and the team commenced standalone testing of the equipment by February 21. “Our success is thanks to our excellent planning of interfacing, sequencing, categorizing activities, mobilizing adequate workmen with the required skill level with all the necessary tools, plants and machinery prepared and tracked,” sums up Ravi.

The construction process is notorious for its unpredictability, construction



“Early adoption of BIM strengthened the site team’s arm to plan, monitor progress and eventually invoice on time, based on automated quantity take-offs of the completed work.”

**K Senou**  
Head – Technical Services

managers must be adept to manage several variables, many at the same time, just as Anuj Chauhan, Head – Mechanical Works and his team were facing. “Apart from the stringent pandemic restrictions, there were stage checking and inspections in between installations with interlinked installations involving various services.” Maintaining their workmen was another tough task but the team succeeded in creating back-up manpower that came in handy when the farmer agitation in Delhi threatened to disrupt progress yet again.

### Digitalization makes a huge difference

“Tracking with IoT showed us our actual rate of progress against the asking rate,” says Ravi, “while Power BI helped to align resources and monitor



“ DigiCast tracks project progress in terms of daily production, ‘live’ asking rates with customized dashboards for quick snapshots on tower wise progress as well as overall material consumption. ”

**Amit Barde**  
 Head – Initiatives (Precast),  
 CIDCO Project, Mumbai



Precast Yard – CIDCO, Navi Mumbai

## Precast DigiCast App is making life easier at CIDCO

Head – Initiatives (Precast), Amit Barde, has a lot to deliver: about 7,400 units, 1.15 lakh elements translating to 35 floors a month and about 10 flats a day. “It is almost impossible to deliver such a massive element count with conventional tools, so we opted for the Precast DigiCast App,” he says, “that provides mould to element mapping, yard storage configuration, trailer master to track each element right from mould preparation to site installation through its lifecycle with digital checklists and Bill of Materials extracted by BIM.” The Tekla Precast BIM, the backbone of the DigiCast App, developed by EDRC, models typical towers with even reinforcement, connection detailing along with all MEP conduit routings such that 2D production drawings can be generated directly through the 3D model at a click. Tekla tracks production of

precast elements in interlinked stages with timely notifications on pending activities for efficient production, based on QR code scans. The despatch team that struggles with about 150 elements to ship a day at peak, has found life easier as each produced element, stored in a predetermined yard location, can be easily looked up on the portal.

Amit is grateful to Sudheer Bommi, the SPOC from EDRC and his team, for DigiCast. “It tracks project progress in terms of daily production, ‘live’ asking rates with customized dashboards for quick snapshots on tower wise progress as well as overall material consumption,” shares Amit. “It even tracks consumables and material consumption making procurement much easier.”



“ We have implemented BIM 4D at the State Cancer Institute, Guwahati which is the largest in terms of both value and built-up area that integrates the construction schedule with the 3D model. ”

**Anjan Mohapatro**  
 Project Director,  
 Assam Cancer Care Foundation  
 Hospitals



Assam Cancer Care Foundation Hospitals, Barpeta

## BIM works just as well with hospitals as with an educational institution

The Assam Cancer Care Foundation Hospitals (ACCF) is a landmark project of 18 hospitals spread across the state of Assam of which work is proceeding at 10 locations presently. “We have implemented BIM 4D at the State Cancer Institute, Guwahati which is the largest in terms of both value and built-up area,” informs Project Director, Anjan Mohapatro, “that integrates the construction schedule with the 3D model.” In their effort to overcome the retarding impact of the pandemic, the team has incorporated both the original baseline schedule as well as the catch-up one in BIM 4D to gauge and monitor progress across structural, architectural and MEP disciplines. “To ensure that maximum people have access to the latest to monitor project progress, we have taken the 4D model ‘live’ to our in-house

FORGE VIP platform, which runs on the cloud on any web browser,” informs Biplab Bhattacharjee, (Assistant Manager - Civil).

The advantages of 4D BIM to the ACCF team are many: they can plan for an extra pour to cast the slab in the hospital portion that was evident only from the visual model due to the peculiar shape of a small portion of the slab. It visually and accurately depicts delays in construction, element-wise and floor-wise quantification of concrete helps to plan pour schedules, it reveals potential clashes and gives the team a comprehensive grasp of actual deliverables.

Project Manager, Rajesh Shukla is happy with the progress that his team is making at his IIT, Bhilai project for progress monitoring is easy for him and his team with BIM. “BIM is helping us across functions like document



IIT Bhilai



“BIM is helping us across functions like document management, quantity take-off for client invoicing & billing, procurement and shuttering models, BBS generation & shop drawings for reinforcement models, develop shop drawings and identify constructability issues.”

Rajesh Shukla  
Project Manager,  
IIT, Bhilai Project

management, quantity take-off for client invoicing & billing, procurement and shuttering models, BBS generation & shop drawings for reinforcement models, develop shop drawings and identify constructability issues.”



RAMCO Kolimigundla

## Digitalization drives efficiencies at RAMCO

“Initially, erecting, lifting and stabilizing a single truss of 74 MT and 60 m long in the circular lime storage shed would take us 11 days,” explains Project Manager, Girish Kumar P at his RAMCO site in Kolimigundla, “but we have optimised it to a cycle time of just 3 days using a 500 MT crane achieved for the first time in a cement plant!” With the Last Planner System (LPS), they identified that using the same manpower for both assembly and erection was delaying the subsequent process of lifting the truss. “We arranged for separate teams for non-truss assembly and erection,” informs Fayaz Ahmed, Manager – Mechanical, “and we were immediately able to reduce cycle time by about 3 times!” Similarly, in Clinker Silo 1, to construct a 40 m



“Initially, erecting, lifting and stabilizing a single truss of 74 MT and 60 m long in the circular lime storage shed would take us 11 days but we have optimised it to a cycle time of just 3 days using a 500 MT crane.”

Girish Kumar P  
Project Manager,  
RAMCO, Kolimigundla

high silo wall, the cycle time for a 3.6 M lift was 15 days. “With LPS, we studied the cycle time for two lifts,” shares Jagadeeswaran, Senior Engineer – Civil, “and then changed the fitter-to-helper ratio for Jumpform installation. We also reviewed our subcontractors cycle time

for their PT works and by establishing better protocols for better monitoring and coordination, we gradually reduced the cycle time from 15 to 10 days.”

LPS came in handy again for the team to complete a concrete slab of 2,000 cum in a matter of three and half days, 172 MT of reinforcements and 30 MT of insert plate works in the Clinker Silo 2, in July 2020 with just 40 workmen. “We minutely monitored daily progress on a daily track sheet, extending working hours as per the schedule to complete the entire exercise in just 25 days,” says a pleased Reegan Paul Singh, Construction Manager – Civil.

Although the return to normalcy has been an uphill struggle, project leaders and their teams at B&F are doing their best to come to terms with the new normal and maintain progress. We wish them the very best! ■



# MEGA HEAVY CIVIL PROJECTS MAKE SIGNIFICANT HEADWAY IN A CHALLENGING SCENARIO

Ever since, the Mumbai Coastal Road Project (MCRP) took off in late 2018, it has been in the news on the merit of being one of the most ambitious infrastructure projects to tackle Mumbai's traffic menace. The public has been awed by its magnitude of scope & scale, the challenge to dig various tunnels in one of the world's most congested cities including a kilometre-long one under the sea for the first time in India and reclaiming land from the Arabian Sea to build the road in an almost entirely marine environment. The project continued to function almost without a break during the lockdown and the two Project Directors, Rakesh Singh Sisodia and Sandeep Singh, for Packages 1 & 4 respectively are focused to keep the ball rolling, and with 25% of the work completed, they are well on track to meet their 2023 deadline.





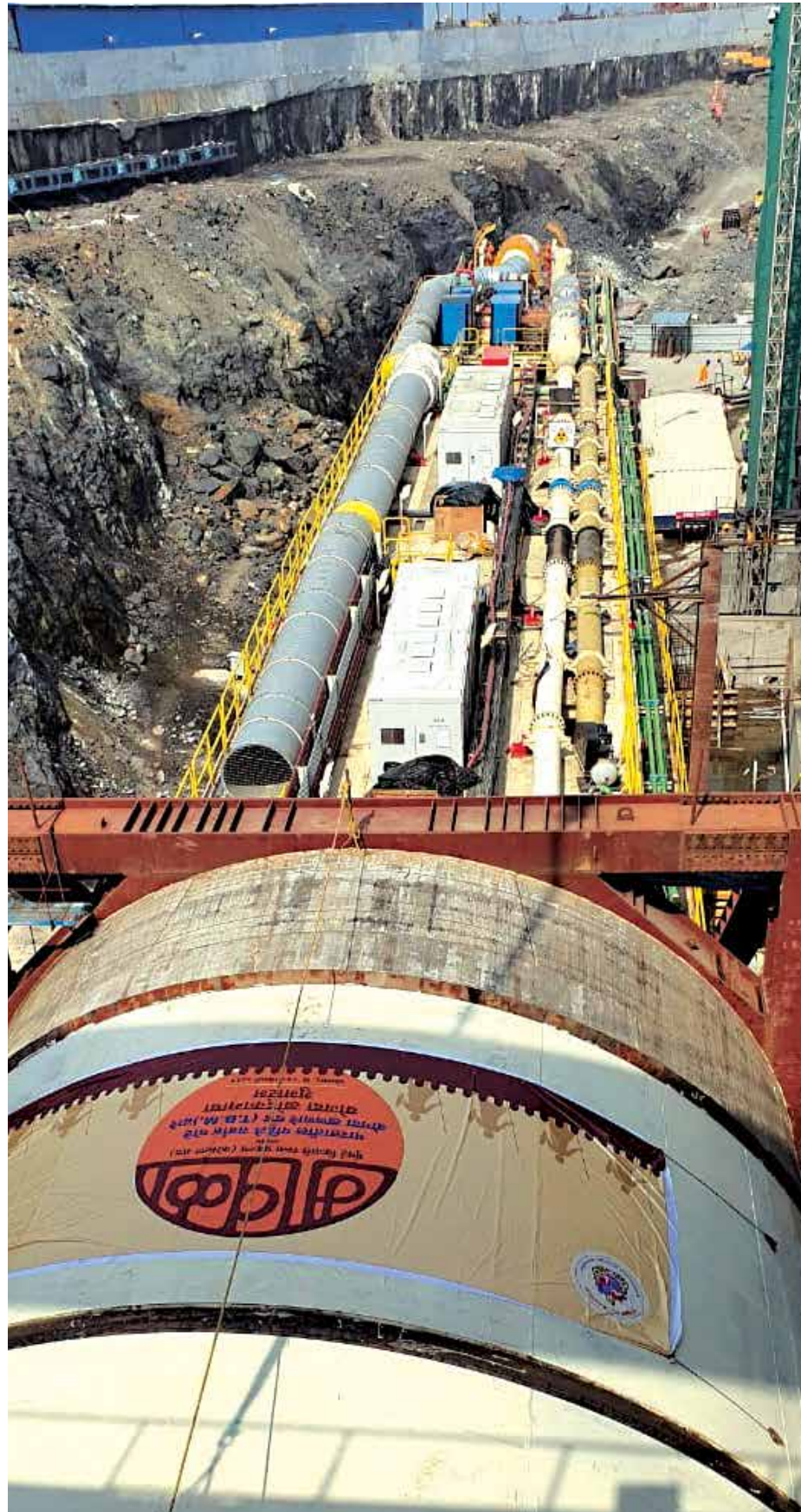
“From October 1<sup>st</sup>, we have been at full strength with all resources, strictly following all the required safety protocols.”

**Sanjay Digambar Patil**  
Assistant Project Director,  
Mumbai Trans Harbour Link Project 1

Recently, the successful assembly and commissioning of the largest TBM in the country, named ‘Mavala’ – a term drawn from the soldiers of Shivaji, found the project in the news again. An impressive aspect of the project that is being built to last a hundred years is the use of Mono Pile Foundation systems deployed for the first time in India, inspired by the technology used in Dutch windfarm turbines, involving a single structure that reduces installation time & cost and speeds up progress. Another is the use of ‘geotextiles’ that are fine, permeable fabrics laid over the sea wall bedding layer to prevent the fine matter from the reclamation getting washed out into the sea.

### MTHL streams forward

Another Mumbai project battling with sea-related challenges is the Mumbai Trans Harbour Link project, another ambitious infrastructure which will be India’s longest sea bridge. It features a 4.7 km long viaduct, 1.6 km long interchange and a 2.5 km at grade section. The superstructure is of three types: 53 spans of the precast segment type, 114 spans that will be cast in situ and another 20 steel spans. The steel spans have two major railways crossings and one highway crossing.



India's Largest TBM ready to Drive



MTHL 3 - Span Erection



“We dismantled the underslung system with the pulling system and are using pre-fabricated cages for the portal beams. The inner shutter drive mechanism is another innovation while we are using an improved platform system to stress the underslung system.”

**S R Santhosh Kumar**  
Senior Engineering Manager (Civil),  
Mumbai Trans Harbour Link Project 3

Work stopped on March 23<sup>rd</sup> but after rigorous follow-ups, the site management received the green signal from the Collector’s Office to proceed, sending the team to commence hectic activity starting with earthwork excavation that required less manpower. Gradually, from April onwards, machinery like excavators, dodgers & dumpers have been pressed into service as work progresses to a planned strategy. “From October 1<sup>st</sup>, we have been at full strength,” affirms Assistant Project Director, Sanjay Digambar Patil, “with all resources, strictly following all the required safety protocols.” Highlighting on the progress made, Project Manager MTHL 3, Satya Prakash, reels off a few numbers: 76% of foundation, 63% of pier work, 85% of

earthwork both to be achieved by June 21 and 49% of the segment casting by October 21.

The precast yard has seen significant progress thanks to strategic planning and some smart execution, remarks Roopesh Kumar Dandapat, Senior Manager – Precast. “Knowing that we had to play catch up, we pressed on the pedal and increased our production of segments from 32 to 52 in a month with 75% of our labour strength,” he says with vigour. “By introducing a gear mechanism to move the segment inner trolley we have improved efficiency with less effort,” he smiles. Senior Engineering Manager (Civil), S R Santhosh Kumar adds that several of their innovations have accelerated



“75% of all concrete sourced has been routed through ConEase, fabricated materials are tagged & tracked using E-Tap, we have tracked almost 450 precast segments, the procured material is tracked as well as 100% of our OSD panels.”

**Waseem Akram Mittygar**  
Digital Officer,  
Mumbai Trans Harbour Link Project 1

progress. “We dismantled the underslung system with the pulling system and are using pre-fabricated cages for the portal beams,” he says. “The inner shutter drive mechanism is another innovation while we are using an improved platform system to stress the underslung system.”

Different people have reacted differently to the pandemic. Construction Manager (Civil), Akhilesh Kumar Singh, considers it as a blessing in disguise as “our dependence on workmen decreased and we adopted more mechanization and automation that have improved our efficiencies.” With continuous follow-ups with the subcontractor and by closely monitoring their deliveries, the team has been able to achieve their monthly billing regularly without impacting progress. The normally stressed admin & accounts departments have the added responsibility of maintaining COVID-19 protocols and keeping people safe. With Mumbai remaining a red zone, the onus on Manager – Accounts, Shaikh Javed Mohammad Akil and his team has been immense. “Our life is all about coordination,” says Javed with a strained smile, “we coordinate with the medical staff for overall health,

with JICA for compliance issues, with the government and local bodies of smooth functioning at site, availing of permissions, emergency passes for workmen and a lot more.” Labour strength has been maintained at site according to a pre-planned workman mobilization programme evolved as soon as operations resumed.

Recognised as the Best Digitally Enabled site across L&T Construction, MTHL has adopted every relevant digital solution on offer. Apart from conducting regular drone surveys and updating the GIS portal every 3 months with the results of drone photogrammetry, the team has adopted 3D BIM for design, Procube for project monitoring, Asset Insight for P&M, WISA for workmen management, Cynergy for customer interactions and as Digital Officer, Waseem Akram Mittygar adds, “75% of all concrete sourced has been routed through



RVNL Pkg 2 - Site Camp and Tunnel Portals

ConEase, fabricated materials are tagged & tracked using E-Tap, we have tracked almost 450 precast segments, the procured material is tracked as well as 100% of our OSD panels.”

### On track at the RVNL project

Work at Project RVNL Package 2, part of the new 125-km broad gauge line between Rishikesh & Karanprayag in Uttarakhand, started in January 2020 under a pandemic cloud. Although physical activities were stopped, since the project was in the mobilization stage, Project Manager, Prabhu Kumar and his team were able to tick off several activities that did not require physical presence. Contractual submittals like method statements and work programmes were prepared



Precast elements stacked in the precast yard at MTHL Pkg 3



“We achieved 9,200 cum of concreting (out of total scope of 38,000 cum) for two rail bridges, one road and another minor bridge and RCC retaining wall structures apart from installing & commissioning two 56 Cum/Hr batching plants and one 200 TPH crusher plant.”

**Prabhu Kumar**  
Project Manager,  
RVNL Package 2

and submitted to the client, RFPs for works were prepared and agencies were finalized after online discussions with the HQ team.

“We finalized and procured client approvals for our check lists and formats for execution and quality checks, finalized vendors and mobilized specialized equipment,” Planning Manager, Vishvamohan Srivastava informs. In addition, the team submitted applications, followed up for statutory permissions, identified, finalized, and deployed staff and mobilized workmen from within the state for the initial works as inter-state movement was restricted.

The team hit the tracks as soon as the restrictions were lifted completing the infrastructure facilities and the portals at Byasi and Shivpuri areas and 1,800 m of tunnel excavation by starting ten tunnel faces at four different locations. “We achieved 9,200 cum of concreting (out of total scope of 38,000 cum) for two rail bridges, one road and another minor bridge and RCC retaining wall structures apart from installing & commissioning two 56 Cum/Hr batching plants and one 200 TPH crusher plant,” Prabhu



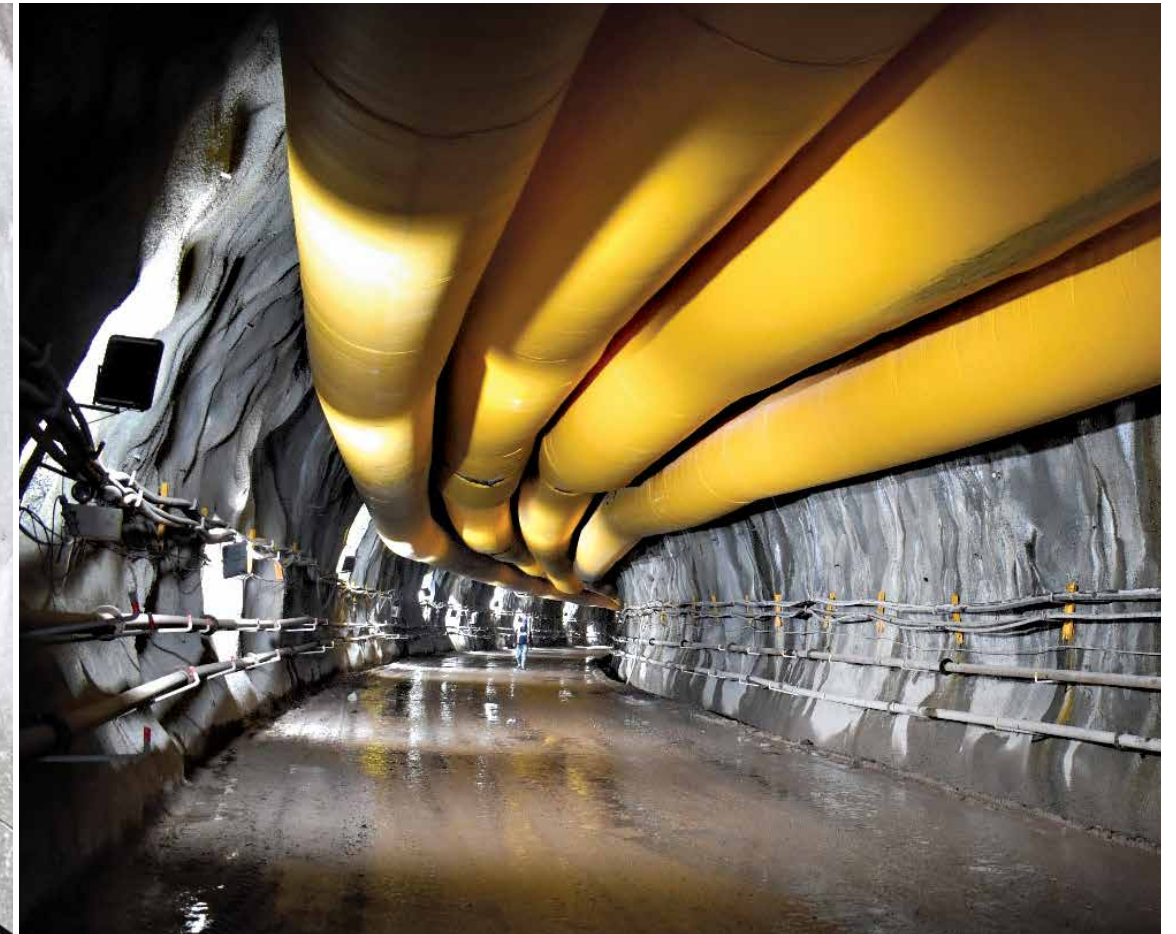
“By closely monitoring productivity and effectively utilizing our resources, we have achieved 60 m of the escape tunnel excavation in a month against targeted progress of 55 m in B3 Class rock which has been appreciated by our Client too.”

**Sunil Kumar Khatri**  
In-charge – Tunnel Construction,  
RVNL Package 2

ticks off. In addition, they have commissioned a Project Information & Management System for project documentation and construction monitoring, installed CCTV cameras across the site, a Video Analytical System to track vehicle and people activity inside the tunnel and an



*Tunnel excavations in progress*



*Tunnel portals*

IP-based Tunnel Communication System for better communication and data transfer within the tunnel.

Led by Sunil Kumar Khatri, In-charge – Tunnel Construction and closely coordinating with other departments, the team commenced tunnel excavation 45 days ahead of the scheduled start date, immediately after completing the portal works. “By closely monitoring productivity and effectively utilizing our resources, we have achieved 60 m of the escape tunnel excavation in a month against targeted progress of 55 m in B3 Class rock,” shares Sunil, “which has been appreciated by our Client too.” For tunnel construction from Adit-2 towards Guller, Shift In-charge, Sujeet Kumar Pandey and team have completed 430 m of tunnel excavation

using the NATM method, with limited resources.

Liaising with the government authorities took precedence post the unlock for work to proceed which is where Admin In-charge, Ajai Pratap Singh’s expertise came in handy. “We procured permissions to install and commission borewells for construction water, for blasting and did our first blast on August 26<sup>th</sup>,” he shares. Other permissions Ajai arranged for included short term permits for mining RBM boulders, CTE and CTO for batching plants at Byasi & Shivpuri (first concrete was poured on July 15<sup>th</sup>), CTE and CTO for 200 TPH crusher, electricity connection from Uttarakhand Electricity Board and permission to operate diesel power generators.



Launching girders at the RRTS project

cross. Travel across the country was still restricted and the client was particular that all COVID-19-related regulations be followed so one person was designated as the pole point to coordinate all movement. Like at other sites, workmen mobilization & retention were challenges with the available local labour too few and raw. Harinarayanan says, "as a team, we formalized and standardized operating procedures, processes, and tools to keep workmen safe, build their confidence through effective, two-way communication and respond to their concerns through flexible adaptation."

Pile Rigs mobilisation was another major challenge. Mobilizing pile rigs from another project was risky owing to transportation issues and spare parts non-availability, hence they decided to have back-to-back agencies for piling works, thereby transferring the risk (pertaining to skilled labour availability & resource) to the subcontractors. The first pile commenced on July 11<sup>th</sup> in the viaduct and August 8<sup>th</sup> in stations against the key milestone target date of

October 4<sup>th</sup> followed by other activities like pile cap & pier works. Developing a customized & operational precast yard in 45 days was another notable achievement as Avik explains. "There was huge demand for fabrication agencies. The moulds had been ordered from HQ at stringent prices & delivery schedules. The drawings & designs were altered that adversely impacted the vendors for timely delivery and quality. To maintain the precasting schedule the team initiated in house modifications, commissioning and started pre-casting of segments to ascertain segment production."

### Heroes leading the charge

N N Munireddy (Deputy General Manager - Mechanical) heads the erection activities for the 15.2 km viaduct that involves 479 spans in 18 months with five launching girders. The first LG was launched on February 23<sup>rd</sup> and Munireddy is playing a key role to tailor the precast yard to produce 11,000 segments. M Jaya Prakash, Construction Manager (Civil) has the onus for the sub-structure & superstructure works for 5 km of the viaduct and has already executed 25% of his scope including 18,000 m of piling & 133 pile caps, pier & pier caps along with road & media restoration. It is Senior Construction Manager, Sachin Pansare's responsibility to build the two stations at Murad Nagar and Modi Sagar North. Sachin and his team have already been demonstrating exceptional skill and remarkable progress, focusing on handing over the station to the E&M contractor by January 2022.

The projects of Heavy Civil are huge in size and scope but so are the fortitude and skill of our colleagues to chase progress even in these difficult and unprecedented times. Kudos to all of them! ■



Precast yard set up

### RRTS P3L1 takes root in the pandemic

RRTS P3L1 is India's first Regional Rapid Transit System involving 15.84 km of elevated corridors of a total stretch of 90 kms connecting Delhi & Uttar Pradesh. Project Manager, Subramanyam Itta, received the LOA on March 19<sup>th</sup> during the lockdown and the NTP (Notice to Proceed) on June 8<sup>th</sup> when the country was just unlocking posing huge challenges to mobilize men, material, and machinery.

Staff and workmen mobilization were the first hurdles for Itta, Planning Manager, Avik Datta and Admin & Accounts Head, K Harinarayanan to



Pier works at RRTS



## RREC PROJECTS GAIN GROUND OVERCOMING TOUGH ROADBLOCKS

**P**art of the New NH No 52 programme, the strategically important Karodi-Aurangabad Road Project (KARP) is being executed by RREC in EPC mode that involves constructing a 56.77 km 4-lane alignment with 28.25 km of service roads, 144 structures including 81 culverts, 19 minor bridges, 14 over & underpasses, two flyovers, a major bridge and host of other ancillary works. Work at site for Project Manager, Radhi Surya Rao and team started in full swing as soon as the NTP was received on February 12<sup>th</sup>, 2019.

## On a roll ...

Almost immediately, they ran into their first roadblock: much of the alignment ran through a forest area that required nearly 1,82,000 MT of hard rock excavation. "Normally, working through forest areas in a road project is time consuming as clearances and approvals are often delayed," points out Surya Rao. Aware of these dangers, the team led by Pankaj Kale and Bharat Singh, Structural In-charges for Sections 1 & 2, resolutely followed up with the forest authorities to obtain the requisite clearances in double quick time boosting the execution team to complete the total area in record time. "This gave us a huge head start," Surya's satisfaction is evident. "Our momentum took us through the monsoon without any slackening of pace and in the process achieved all our milestones well ahead of schedule." In fact, the project achieved new heights during the monsoon delivering a record production of 10,000 cum concrete every month along with other ancillary activities.

With this massive 'push', the KARP project team achieved their first milestone 173 days ahead of schedule and their second, a good 219 days before schedule. Talk of being on the fast track!



4 lanes completed from CH 304+000 to CH 305+000 in the middle of a forest area

The result of their focused approach was that KARP did not record a single positive COVID-19 case. An achievement that won them praise from the government authorities, the local public and even featured in the local newspapers.

## Overcoming disruptions

At site, even after the restrictions were relaxed, the team struggled to get rolling without adequate labour force and the necessary bulk materials. Working with their subcontractors, the team put in their best efforts to motivate and bring back the labour as well as other resources bearing all the consequential expenses despite restrictions on inter-state train and other vehicular movement.

Apart from Men & Material, Head – P&M, Mangude Dhanaji Hariba won accolades for keeping his machinery running, turning in a zero-accident report, and setting new records in the process. "We mobilized various critical machineries like cranes ensuring that the subsequent process of construction (girder erection) went off smoothly and efficiently," he says. Under his leadership, KARP has successfully

**WITH THIS MASSIVE 'PUSH', THE KARP PROJECT TEAM ACHIEVED THEIR FIRST MILESTONE 173 DAYS AHEAD OF SCHEDULE AND THEIR SECOND, A GOOD 219 DAYS BEFORE SCHEDULE.**

## Stopped in their tracks

The pandemic put the brakes on this rapidly progressing project and though site activities were suspended, the team turned their focus to manage their workforce to keep them engaged and safe. "It was like fighting a war," remarks Planning Manager, Ketan Wakankar, in the thick of action. "The entire KARP team of 89 employees came together to address the situation effectively with a strategic approach. To micro-monitor activities, we divided our

210 departmental workmen and 545 workmen into small groups of 25 each with a mentor (respective engineer) appointed for each group who took care of his group and kept informing the Project Manager of developments on a regular basis."

The entire exercise was driven by the dedicated and goal-oriented, Uma Sankar Mahapatra, Head – Accounts, who coordinated to keep the site safe from infections and played a key role helping several workmen return to their native places after the unlock.



**“ It was like fighting a war. The entire KARP team of 89 employees came together to address the situation effectively with a strategic approach. ”**

**Ketan Wakankar**  
Planning Manager,  
Karodi-Aurangabad Road Project



Another completed 4-lane stretch with a median opening

implemented the 5P concept at site. The project's Hot Mix Plant, well regarded for its housekeeping, has set a record within RREC of 25,642 MT asphalt production from a single 120 TPH plant in a month. He took up the additional responsibility of site safety and has played a lead role in KARP clocking 7.5 million safe manhours and counting.

"Even as we were getting our act in place, we were hit by one of the fiercest monsoons in recent times," shares Surya, running his hand through his hair in exasperation. "The compounding effect of these two setbacks could have easily pushed the date of completion of the project beyond our contractual completion date but we took these setbacks in our stride, using every single opportunity to make up for the precious lost time by ensuring that the right person was at right place with the right resources." Surya Rao, Ketan and the team have every reason to smile for they achieved their 3<sup>rd</sup> milestone 174 days ahead of schedule!

Surya Rao agrees that they succeeded because they did several things right like quickly mobilising workmen from other



“Obtaining the statutory permissions from the Government authorities, maintaining goodwill with the authorities and consultant while adhering to our professional commitments really stood us in good stead, as also our judicious use of resources at site.”

**Radhi Surya Rao**  
Project Manager,  
Karodi-Aurangabad Road Project

States even during the lockdown, closely following up for the maintenance of equipment, procurement of materials through telephonic discussions and conducting all meetings regularly and virtually. "Obtaining the statutory permissions from the Government authorities, maintaining goodwill with the authorities and consultant while adhering to our professional commitments really stood us in good stead," he says, "as also our judicious use of resources at site." A case in point: their crusher site office has been constructed entirely using only scrap materials.

### CTP 14 project ploughs ahead towards target

Work at the CTP 14 project, a greenfield project of the Western Dedicated Freight Corridor with a proposed 128-km



“We kept ourselves busy quantifying our work as per design, reconciling material, preparing catch-up plans to overcome hurdles and push critical activities and preparing method statements for approvals.”

**Shashank Pachhade**  
Project Director,  
CTP 14 Project

alignment from Rewari to Dadri, was flagged off on February 1<sup>st</sup>, 2017. An integrated package, the project involves the design and construction of civil, buildings, Track Works, electrical &



mechanical works, and Signalling & Telecommunication for double line electrified track with 2x25 kV AC, 50 Hz., formation and bridge structures to be provided for 32.5 Tonne axle load and the track structure for 25 Tonne axles.

Challenges emerged for Project Director, Shashank Pachhade and his team almost from word "go" as being situated in the Capital region, issues relating to statutory compliances and availability of borrow earth cropped up that were expeditiously overcome under the leadership of Project Manager of the Formation Team, Pachipulusu Murthy. The team were at peak activity having completed 58% of the earthwork when the pandemic brought progress to a halt. While on one hand, they immediately took steps to keep the employees and workmen safe, Shashank could not lose sight of his project deliverables. "We kept ourselves busy quantifying our work as per

design, reconciling material, preparing catch-up plans to overcome hurdles and push critical activities and prepare method statements for approvals." The period of relative inactivity was also used to train some of the staff online on quality, crushers and management subjects by the Project Department heads.

The team made quick progress as soon as operations resumed in mid-April by completing the earthworks and blanket track laying from the Asawati Link Line (IR) to the Prithla Yard and full height embankment of 30 m from CH 68+300 to 68+600. "We have completed 80% of earthwork, 43 km of blanket top and 3300 MT of blanket production from CH 58 Pugmill," elaborates Planning Manager, Priyang Panchal, adding proudly, "we set a record of sorts with a continuous pour of 500 cum in a single day at the Dadri location for ERS work."

Along with his team, Pachipulusu Murthy's drive and supervision has a lot to show for their effort. "We have completed 2.23 crore cum of earthwork, 30 LMT of rock excavation, 70 km of embankment and 66 K cum of concrete," he energetically reels off his numbers.



“We have completed 80% of earthwork, 43 km of blanket top and 3300 MT of blanket production from CH 58 Pugmill. We set a record of sorts with a continuous pour of 500 cum in a single day at the Dadri location for ERS work.”

**Priyang Panchal**  
Planning Manager,  
CTP 14 Project



While Priyang has streamlined planning meeting all requirements promptly and adequately, he has additionally responsibility as Section In-charge for the critical rock excavation at the portal and blanketing works for the Asawati Link line connection. "Having completed the excavation well on time, we have already handed over the portal to Heavy Civil IC for tunnel excavation," he says, with an air of achievement. In addition, Priyang and team completed the blanketing works for the Asawati connection by September and have handed them over for track laying. Prior to the lockdown, the blanketing works had stalled due to certain transportation statutory issues in Delhi NCR and the non-performance of the subcontractors. Senior Manager (Civil), Krunal Shah, who dons the additional hat of Quality Manager, had stepped in to resolve the logistics issues of movement from crusher to stock and Pugmill to site, helping to complete the blanketing works from 12 km to 40 km.

Construction Manager, Sanjay Dadhe has also been doing his bit completing a major part of the earthwork, excavation, blanketing and slope protection for the stretch from CH 29+000 to CH 55+117. Presently he is deployed at the Prithla Yard section due to his considerable experience in structural works. "There are major ERS works pending," he observes. "I am now in charge from CH 82+000 to CH 97+093 for the earthwork, blanketing, ERS, RE Wall and handover of the Prithla Yard and need to complete them all by August 2021," with a look that says that he is ready for the challenge.

Even as his team is manfully pushing ahead, Shashank feels that they have made remarkable headway thanks to their quick mobilization

of workmen, cleverly opening new fronts at the Faridabad, Prithala, Dadri and Dharudera sections and closely monitoring the mobilization of equipment and material. "Apart from close follow ups with the government authorities for clearances, we also moved our staff around, putting some of them in charge of priority stretches. They succeeded and therefore we succeeded too," he laughs, though knowing full well that he still has a long way to go.

## EDFC CP 303 project delivers despite the pandemic

Over at the 225 km long EDFC CP 303 railway project involving the construction of bridges and formation works across six districts of Uttar Pradesh that is part of the 1839 km long Eastern Dedicated Freight Corridor from Ludhiana in Punjab to Dankuni in West Bengal, the team delivered the Gulaothi Yard Depot, the first of its kind, in the entire corridor that can receive directly through rail racks. "We did it in true L&T style," shares an excited Vikram Kohli, Project Manager, "and unloaded 7,000 MT of rails right in the middle of the pandemic."



**"We did it in true L&T style, and unloaded 7,000 MT of rails right in the middle of the pandemic."**

**Vikram Kohli**  
Project Manager,  
EDFC CP 303 Railway Project

Chasing cash, the team adopted safe methods of working to keep the project on track with a Quick Response Team involving the Project Director and other top site leadership assigned with clear roles and responsibilities to direct the course of action. Starting operations on May 6<sup>th</sup> post the unlock, the team focused on strengthening their workforce that increased from 250 to 750 and the earthwork teams from 23 to 43 by mid-June.

"As most of our works are machine-oriented, we handed them over to subcontractors on a back-to-back basis," informs Vikram. Ensuring continuous supply of bulk material was a challenge that they overcame by obtaining special permissions from the government and the Railways for



**"We have to handle and control a huge quantum of aggregates from larger leads. A separate earthwork team has been mobilized in the smaller sections with end-to-end responsibility of work including maintaining the approach roads during the monsoon."**

**Mayank Varshney**  
Construction Manager - Planning,  
EDFC CP 303 Railway Project

movement of men and material. "We had all our bases covered that enabled us to achieve 90% peak progress in May and 110% in June as compared to the previous year," Vikram's smile is obvious. "Better physical progress resulted in better invoicing and thereby better collections." Quite a win-win situation for the project team.

Vikram attributes his team's success to a combination of proper comprehension of the jobs, teamwork, prompt decision making, envisaging unforeseen risks and the preparedness to manage them. "I am always open to new ideas and believe in leading from the front," he says. "I understand the capabilities of individuals and look to channelize their strengths

**"Our strategy has been very simple: understanding our employer's requirement and the expectations of the Client and Management, evolve strategies according to them and execute."**

**Vikram Kohli**  
Project Manager,  
EDFC CP 303 Railway Project



A view of the Gulaothi Yard receiving directly through rail racks

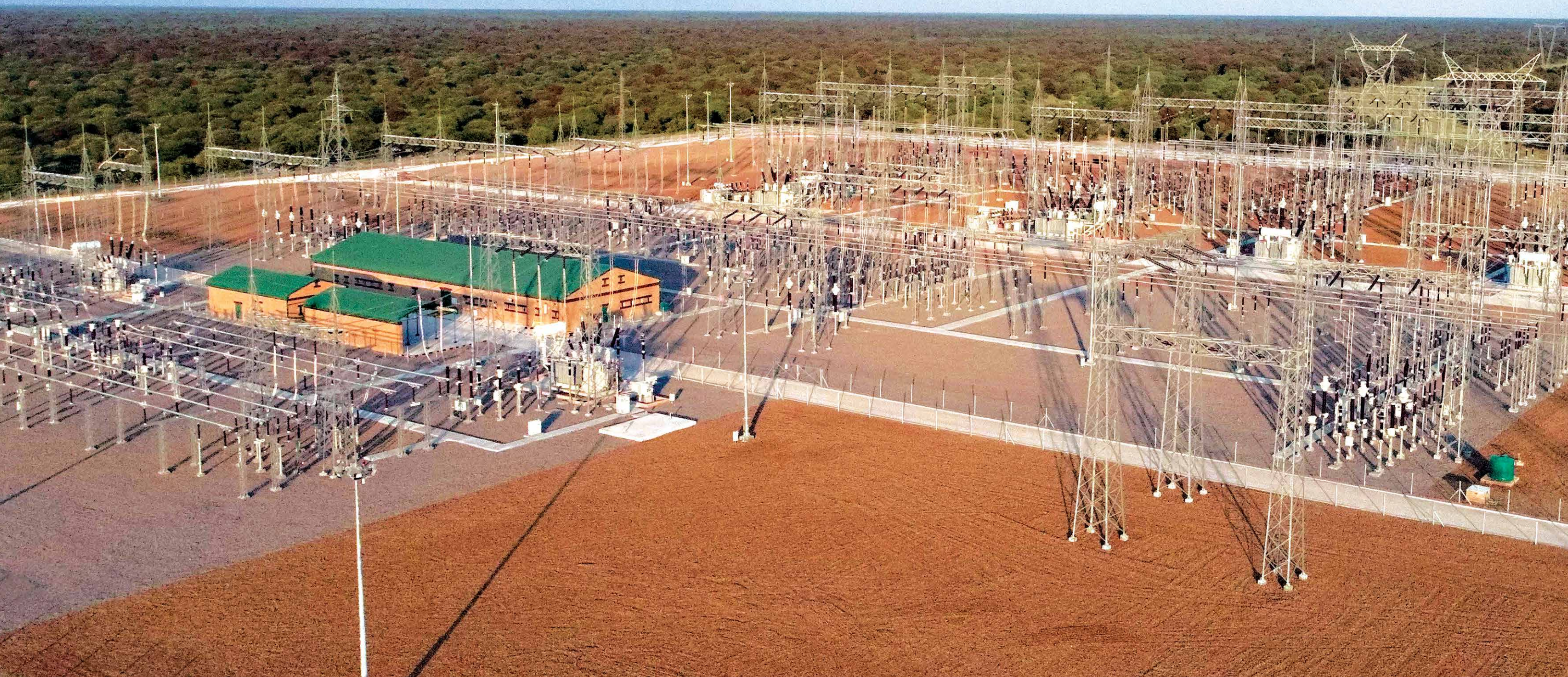
to contribute to the successful implementation of the project."

The project team has a hefty scope that includes constructing 283 TKM of tracks, 37 major bridges, 38 major RUBs, 588 minor bridges, handling 36,000 MT of rails and building 21 station buildings and yards apart from a huge amount of ancillary works. "We have to handle and control a huge quantum of aggregates from larger leads," mentions Mayank Varshney, Construction Manager - Planning. "A separate earthwork team has been mobilized in the smaller sections with end-to-end responsibility of work including maintaining the approach roads during the monsoon."

"Our strategy has been very simple," concludes Vikram, "understanding our employer's requirement and the expectations of the Client and Management, evolve strategies according to them and execute." It is working thus far for Vikram and we wish him and his team all the very best! ■

# PT&D PROJECTS EVOLVE NEW STRATEGIES TO SURGE AHEAD IN CHALLENGING TIMES

Over the last few months, project sites across L&T have scripted their own success stories to mitigate several work challenges caused by the pandemic. For some, it has been about achieving milestones in a confined zone while most PT&D projects have been keen to close in on large span jobs across districts, some even cross-country. What is interesting is that each site has evolved multi-pronged approaches considering the local challenges to implement new ways of working, deploying technology tools and redefining job protocols to progress.



## Finding direction with Bhodhi

Project Manager, S. Ganesh Kumar, at the 400 kV Kamudhi-Ottapidaram Transmission Line project, traces his progress. "When operations resumed, we had a lot of ground to cover with the alignment spread across 139 km covering 3 districts in Tamil Nadu involving the construction of two transmission lines with more than 400 tower locations. Our immediate task was to prioritise the work zones considering the variations in terrain and the logistics restrictions."

For Planning Engineer, SS Naresh it was about lining up schedules considering a range of external issues, several beyond his control. "Thankfully, we made a breakthrough when our project was chosen as one of the pilot jobs to implement the digital planning tool – Bhodhi that came at the right time," he exclaims. "It gave us the much-needed insight about variances across zones, listing out the activities to target for acceleration with the add-on cost factors. We were able to predict productivity, timelines and resourcing upfront. It was like having a forward vision," exults Ganesh Kumar. Being equipped to anticipate physical lags well in advance helped the team to accordingly realign resources like preponing the supply of critical items to facilitate zone wise delivery. "All this helped us achieve our committed sales irrespective of the delay in physical progress especially during the initial days of the project," reveals a pleased Ganesh.

With 'Bhodhi' charting the way forward, it was time to hit the road with the ground works. Ganesh mentions further on-field improvisations like the use of mobile cranes to create M/C towers for critical sections while the 5S methodology ensured maintenance of

quality and safety standards. Labour management was still an issue, but the team diligently addressed it with specific teams, monitoring manpower requirement and sourcing. "We even went to the extent of sourcing workmen from Jharkhand and Bihar through separate buses that helped us to quickly scale up to 700 workmen and fast forward progress." Today, Ganesh is a happy man having steered the course with almost 280 towers raised and well on track to achieve final delivery.

## A two-in-one project

"We had a unique task to dismantle 71 existing towers, destring conductors and earth wire to make way to raise new towers," Project Manager,



**"The digital planning tool – Bhodhi gave us the much-needed insight about variances across zones, listing out the activities to target for acceleration with the add-on cost factors. We were able to predict productivity, timelines and resourcing upfront."**

**S. Ganesh Kumar**  
Project Manager,  
400 kV Kamudhi-Ottapidaram  
Transmission Line



400 kV Kamudhi-Ottapidaram Transmission Line

Pothuraju Daviri describes his task at the 220/110 kV Thrissivaperur Transmission Line project that also involved enhancing a 66 kV transmission line to 220 kV. "It was like doing two jobs and the overall progress depended on how fast we could prepare the ground."

A straightforward approach was not the answer for Pothuraju and team to regain momentum and make up for lost time. "Our smart ploy was to keep both ends going," he points out, "taking up the dismantling of towers along with the new scope of stringing works by using HTLS – ACCC, drake conductor." A range of digital applications such as QIR, EHS Shield, WISA strengthened the team's effort





220/33 kV Gas Insulated Substation (GIS), Ranchi

to steer ahead in the right direction and rapidly, with a workforce of just 145. “We stuck to the fundamentals, put our best men in challenging tasks especially when executing the narrow base towers, planned meticulously, and roped in the client whenever necessary for approvals. The result is that we completed 59 foundations, 51 tower erections and 1.75 km of stringing.” Pothuraju and team have enough reason to celebrate.

## Building a super substation

Dibyakanti Gosh has just delivered India’s tallest substation, a six storied structure within 15 months. “The 220/33 kV Gas Insulated Substation (GIS) at Ranchi for Jharkhand Urja

Sancharan Nigam Limited (JUSNL) is the first GIS contract awarded to L&T by JUSNL,” he shares excitedly,” having to construct six 220 kV GIS bays, nineteen 33 kV GIS bays, 65 MVA, three 220 kV 3 Phase Power Transformers along with a 220 kV Double Circuit EHV Cabling Works across 34.5 Km.

Working in confined spaces is sometimes advantageous as Dibyakanti and his team discovered by taking up considerable tasks even during the restrictions with the client’s support. “When full operations resumed, we went full throttle and achieved one of the single largest pours in PT&D IC of 710 cum RCC for the building raft and deployed a mobile tower crane to fast track construction activities.” Today, they are sitting pretty having delivered



“We stuck to the fundamentals, put our best men in challenging tasks especially when executing the narrow base towers, planned meticulously, and roped in the client whenever necessary for approvals.”

**Pothuraju Daviri**  
Project Manager,  
220/110 kV Thrissivaperur  
Transmission Line



Ground plus 6 floor control building of the GIS at Ranchi

a project well ahead of the schedule with the highest standards of safety and quality that has won their client’s acknowledgement.

## Powering up Cuddalore

In February 2021, Cuddalore, a coastal town in Tamil Nadu, experienced a heavy 16-hour downpour that normally would have hit their power supply for a six. This time however the people continued to enjoy power supply thanks to the Under Ground Cabling (UGC) team headed by Madhan Arjun who delivered a breakthrough project with the help of some timely on-field innovations along the way. “This is a World Bank funded scheme that aims to convert the overhead distribution system to underground cabling around the coastal areas,” explains Madhan, “and our scope involved converting the existing feeders at Pentesia, Alpettai, Suthukulam to six underground feeders of 22 kV voltage with associated LT network and service connections works.”



“We went full throttle and achieved one of the single largest pours in PT&D IC of 710 cum RCC for the building raft and deployed a mobile tower crane to fast track construction activities.”

**Dibyakanti Gosh**  
Project Manager,  
220/33 kV Gas Insulated Substation,  
Ranchi

Despite the large scope of works, he appreciates their Feeder incharges Veerabhadrapa , Vijaykumar, Balaji & Visakh who hit their first milestone by 20<sup>th</sup> March just days before the restrictions were announced by commissioning the HT circuit comprising 306 numbers of RMU, 76 km of cabling contributing to 270 transformers. “Phase 2 was our real



“Phase 2 was our real test we took up the LT trenching for 75 km that involved a 12 km stretch of concrete road that required trenching of up to a depth of 600 mm with concrete pneumatic breakers. By 20<sup>th</sup> December, 90% of the LT cables were commissioned.”

**Madhan Arjun**  
Project Manager,  
Under Ground Cabling, Cuddalore



test,” he grins, “as the scope involved laying 160 km of LT power cables, with 455 km of service cabling, installing 2384 pillar boxes and providing 10840 service connections.”

Being the planning Lead, A Karthick says, From June to September, we only focussed on some of the toughest tasks with limited resources. “We took up the LT trenching for 75 km that involved a 12 km stretch of concrete road that required trenching of up to a depth of 600 mm with concrete pneumatic breakers.” In the meantime, 180 workmen from other states were sourced and accommodated at the respective work locations in marriage halls to ensure their safety. They were provided with basic amenities; all the migrant workmen were RT-PCR tested and gradually the team gained their confidence with the successful motivation drives made by Site accountant Mr. Prasanth Kumar and Site EHS Mr. Chinmaya Brahma.



*A transformer installed at one of the locations in Cuddalore as a part of the Under Ground Cabling Project*

By 20<sup>th</sup> December, 90% of the LT cables were commissioned. For Madhan and team, the last leg was the most visible phase of the project, having to directly interact with the end consumers to provide 10,840 house service connections. “Not an easy task as we had to deal with the locals and convince them to take the cables inside their houses up to the meter box,” shares Madhan. “We increased our manpower with Tamil speaking members in each team to address any unlikely issues.” For Balaji, on the other hand, maintaining goodwill for L&T was critical too. “Every house had a perfect concrete finish and to lay the cables we had to excavate,” he mentions. “Once the job was over, we ensured that the finishing was as good as it was earlier.

Overall, we have taken around 2500-line clearances and completed 99% of works.” Thanks to their efforts power shortages are a thing of the past for the people of Cuddalore.

## On a digital drive in the ASEAN Region

Having been associated with Sarawak Energy to deliver two substations earlier, Nitesh Kumar, Project Manager, Matang Substation, is on a familiar ground steering the third consecutive substation. “When the pandemic hit, we were already in a digitalized working environment, so we just continued operating, leveraging our expertise,” he states confidently.

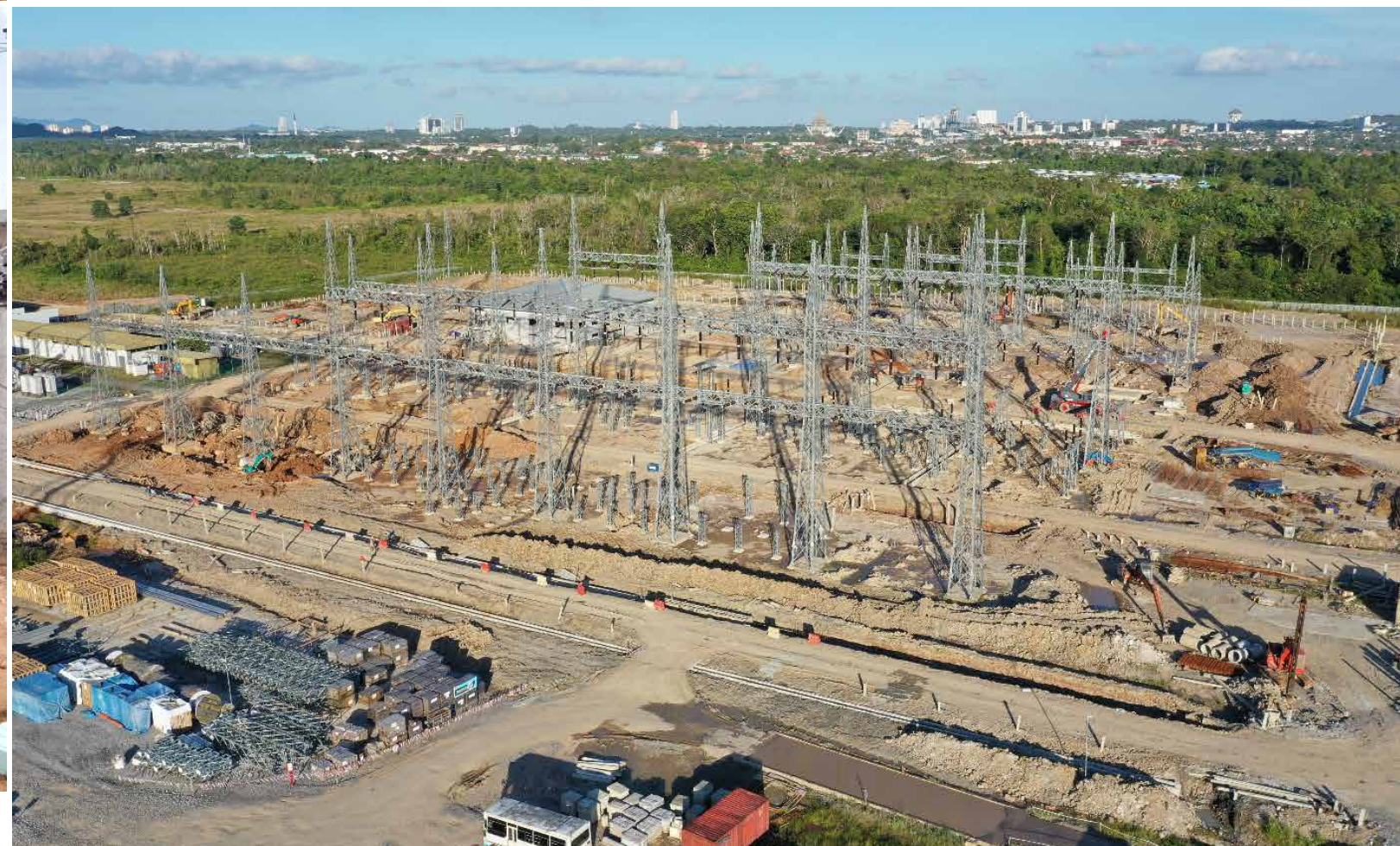
L&T’s scope involved design, procurement, installation, testing & commissioning of the AIS substation with 275 kV & 132 kV outdoor air insulated switchgear units with double busbar arrangement, 2X240 MVA auto transformers, 275 kV cabling works, 33 kV cabling works, 33 kV GIS, complete 275 kV, 132 kV & 33 kV protection, control and communication system along with AC & DC system, retrofitting works related with 2X120 MVA power transformer & reactors and other accessories to undertake emerging load capacity in addition to the existing load of the old substation.

What tilted the scales in favour of the project team was the client opting for remote inspection. “Factory Acceptance



“When the pandemic hit, we were already in a digitalized working environment, so we just continued operating, leveraging our expertise.”

**Nitesh Kumar**  
Project Manager,  
Matang Substation



*Matang 275/132/33kV Substation under construction*

Test (FAT) through MS Teams is one good thing that has emerged post the pandemic,” Nitesh says with a smile, “a feasible option and a win-win option for the client. Today, all our quality inspections are routed through digital platforms, saving time and cost.” The 33 kV GIS material at the Selangor factory in Malaysia was tested in a day while the 275 kV and 132 kV Circuit Breakers were remote tested at the OEM’s premise in Suzhou, China, saving the team 5 precious days.

The team pressed forward on the back of a range of digital tools such as BIM for virtual interface design check, Align to monitor online and in real time, Primavera P6, drone to monitor daily progress, time lapse camera to record weekly progress, Shield App for safety, QIR App for quality, Bluetooth communication for work at heights and GPS-enabled transportation. With around 68% of works achieved involving essential priority area civil foundations, control building structural works, structure along with conductor and earth wire installation,

the project team is surging ahead with the right momentum. "Apart from the civils works, equipment installation comprising the main & reserve busbar, post insulators, indoor cable trays and grid earthing installation are nearing completion, shares Nitesh, adding proudly, "Our client has acknowledged the timely completion of key milestones with a letter of appreciation."

Another breakthrough project in the ASEAN region on a digital drive is the 550/230 kV GIS, a highest voltage system involving the installation of twenty 500 kV and twelve 230 kV GIS feeders, three 333.33 MVA power transformers (single phase) associated with reactors for power compensation. "We are at an advanced stage of completion," informs B. Santhanam, Senior DGM, Projects, "with the outdoor electrical equipment installed and the 500 kV and 230kV GIS building clean room access given, GIS and GIB

installations are completed, while the 230 kV building control and relay panel testing/commissioning works are in progress and the entire system will be ready for energization in couple of months."

Installing the 500 kV GIS was a critical milestone for the Surat Thani 2 Substation, which when commissioned, will be the largest transmission system in Thailand's southern province and a key power hub in the national electricity grid. It is a norm worldwide that GIS installation is always undertaken in the physical presence of an OEM supervisor. However, as the Korea-based OEM could not make it due to the travel restrictions, the team formulated SOPs that included setting up a virtual room with CCTV cameras, laptops and other essentials that could broadcast the feed to multiple locations. "Remote Supervision of 500 kV GIS installation by the OEM has never been done in L&T but now with the



**“Remote supervision of 500 kV GIS installation by the OEM has never been done in L&T but now with the SOPs defined, up to 30% of the works has been completed through remote supervision.”**

**B. Santhanam**  
Senior DGM,  
550/230 kV GIS Projects, Thailand

SOPs defined, up to 30% of the works has been completed through remote supervision," shares Santhanam. Further, drones are being extensively used for project monitoring and was instrumental to convince the client on critical matters that impacted progress.



500/230 kV Surat Thani-2 GIS under construction



220 kV Single Circuit Transmission Line, Tanzania



**“We relied primarily on digital interventions for tasks such as surveying, quality inspections and project monitoring with 15 foundations teams, 18 erection teams and two stringing teams in charge of the work zones.”**

**Anil Kumar Giri**  
Construction Manager,  
220 kV single circuit Transmission Line,  
Tanzania

Krishana Panga (HKP), has a lot to share on how the team overcame multiple issues apart from the challenges posed by the pandemic. "Threat from wild animals especially elephants was frequent and after weighing all the pros and cons we decided to go for IP65-make floodlights as our elephant deterrent system. We also focused on skills training for our 586 local workmen, hired in line with the citizen economic empowerment policy."

Their biggest challenge, however, was the unavailability of the OEM teams for testing and commissioning the circuit breakers, disconnectors, and transformers. Very soon it was clear that they would have to make do with the available local resources to take up the critical works. "We formed workmen teams based on their skill sets, deployed skilled workmen under one of our technical managers to do the disconnector and circuit breaker jobs while rest of the team members took up the transformer works," HKP shares his strategy. "Beginning with one disconnector, the complete report as well as the video shots of the works was shared online with the OEMs. Upon

## Making the most of African safaris

The Standard Gauge Railway project in Tanzania is a landmark project involving the construction of a 220 kV single circuit transmission line on lattice towers, along with single conductor and 48 fiber OPGW earth wire across 161 km. "It is a first-of-its-kind dedicated transmission line project which will provide un-interrupted power supply to the high-speed Standard Gauge Railway line," shares Anil Kumar Giri, Construction Manager.

Considering the span, the team has broken down the alignment into small zones with designated teams addressing specific tasks. "We relied primarily on

digital interventions for tasks such as surveying, quality inspections and project monitoring with 15 foundations teams, 18 erection teams and two stringing teams in charge of the work zones," says Anil. "From March to July 2020, we achieved around 23% of progress and upped the ante thereafter." Client appreciation has not been long in coming especially for the team's digital initiatives. "They have endorsed the online FAT programs which has ensured timely delivery of inspected material at site and fast tracking of the project," Anil smiles contentedly.

Having successfully delivered the Mawana 400/220/132/33/11kV substation, the largest in Botswana in December 2020, Project Manager, Hari



Overview of one of the 22 substations built and commissioned for Public Authority Housing Welfare, Kuwait

Speaking on behalf of the team, Thiruchelvam says, “We began with the end in mind as the scope of work was largely the same. Our priorities were to capitalize on the buy in time by finalizing our vendors at the earliest and build a cross-functional team with a single goal to seamlessly align with the implementation plan.” To streamline work front operations, the delivery schedule was planned in a staggered manner based on the construction progress, highlights P. Senthil Raja, Project Manager, 1362 Package. Some of the quick deliverables achieved by the project team include completion of RAFT for the 22 stations within 150 days of the contract being awarded, completion of electrical equipment installation, testing & commissioning within 90 to 120 days for each station.

Although Kuwait did not totally lockdown, certain areas where the workmen stayed were restricted for which the teams established small



“We prioritized work in a sequential manner as they were only two supervisors so that the Taking Over Acceptance Certificate for the substations could be delivered on a weekly basis to the customer.”

**P. Senthil Raja**  
Project Manager,  
PAHW - Qatar Substation

shelters near site locations mobilizing a few subcontractors with limited manpower to focus only on the critical activities and later when fronts opened, they took up stage wise re-mobilization based on substation priority working in shifts. For OEM supervision, they had to think out of the box as most of their coordinates were unable to return as fresh Visas were not issued, informs Senthil. “For a few items like transformer installation, we managed with video calls. For other equipment like the GIS and switchgear, we prioritized work in a sequential manner as they were only two supervisors so that the Taking Over Acceptance Certificate for the substations could be delivered on a weekly basis to the customer. However, for the 132 kV terminations we managed to bring the OEM supervisors through special Visas obtained with the help of our client.”

Summing up PT&D’s achievement, one PAHW representative rightly puts it, “Many will start fast but few will finish strong,” which is an apt testimony for such a special project delivered during challenging times.

However vast the span, PT&D always knows how to steer ahead, deliver projects across geographies, making them a truly global EPC player. Being a step ahead is the PT&D way of playing the power game. ■



“We formed workmen teams based on their skill sets, deployed skilled workmen under one of our technical managers to do the disconnecter and circuit breaker jobs, It was a milestone moment as we were able to hand over the equipment to the client without a single snag.”

**Hari Krishana Panga**  
Project Manager,  
Mawana 400/220/132/33/11kV  
Substation

their confirmation, we proceeded with the other critical tasks and completed the OEM’s scope in 57 days. It was a milestone moment as we were able to hand over the equipment to the client without a single snag.”

### Speedy completion of 22 substations

The duo of P. Senthil Raja and M. Thiruchelvam worked in tandem to deliver 22 substations for the Public Authority Housing Welfare, Kuwait, within a short period. Awarded as three separate contracts comprising 9 substations in each package, the job was collectively handled as a single package with the respective project managers pushing hard for the individual milestones that ultimately enabled overall delivery.



## SIGNED, SEALED, AND DELIVERED ON TIME!

### C-UPD-UG cabling project wins Timely Delivery award



Work began on PT&D IC's C-UPD-UG cabling project in Bengaluru for BESCOM (Bangalore Electricity Supply Company) right on cue on February 24<sup>th</sup>, 2018. The project involved underground cabling works under the Model subdivision scheme in the E8 subdivision of Shivaji Nagar division, East Circle, BMAZ North area on a total turnkey basis under rate contract for 2 years. Project Manager, K Dhandapani and his team delivered the project right on time on February 23<sup>rd</sup>, 2020, not a day earlier, not a day late. This outstanding achievement won the team the Timely Delivery Award for L&T Construction and although they



have enough reason to celebrate, they agree that it was a hard-fought victory.

The Government of Karnataka and BESCOM envisions to convert Bengaluru's entire overhead distribution network into an underground system to reduce T&D losses, power interruptions, ensure reliable quality power supply and avoid electrical accidents. To convert their vision into reality, 4 of the 54 subdivisions were chosen for a pilot project, out of which the E-8 subdivision was awarded to L&T. "After completing and delivering the project on time, we have been awarded six more similar projects by BESCOM in Bengaluru city for a total value in excess of INR 1,000 Crores," says Dhandapani. Timely execution and delivery certainly have their rewards.

### "How can there be projects without challenges?"

Dhandapani had to contend with several imponderables even as they started work. Since the project had been awarded on a rate contract basis, the total amount of work was only a guesstimate. Shivaji Nagar, like any place in Bengaluru, has high population density, narrow roads, and heavy traffic. "Several statutory approvals had to be taken prior to the commencement of work as we were going to execute in an urban location," points out Planning Manager, Mrs. Swati M Rajapure, who played a dual role of Quality Head too. "Since high value materials scope was involved, it was essential to get the right materials at the right time." In addition, since majority of their work was underground using the HDD method, the team had to deal with a lot of underground utilities like the GAIL pipeline, power cables, communication cables, traffic signal cables, water &



Several statutory approvals had to be taken prior to the commencement of work as we were going to execute in an urban location. Since high value materials scope was involved, it was essential to get the right materials at the right time.

**Swati M Rajapure**  
Planning Manager,  
C-UPD-UG Cabling Project

sewage pipelines, all of which required close coordination.

Dealing with government agencies is difficult in normal circumstances but having to obtain permissions from the Multi Agency Coordination Committee (MARCS) headed by BBMP involving several Government departments like BMP, BWSSB, BDA, BMRCL, KPTCL, BSNL, GAIL, HAL and the city police including traffic police and BESCOM was a tall order. "We deputed dedicated resources to vigorously follow up with all the departmental officials for permissions to commence road cutting," says Dhandapani. As open trenches would disrupt traffic and endanger pedestrians, the LT UG scope had to be converted to LT ABC works to get started that interestingly reduced the scope by 23%. Overhead activities like installing DTCs, GOS, stringing LT AB cables and dismantling the existing 11kV line works all required everyday line clearances and hence execution was so planned so as not to be disrupted by shutdowns for better productivity and zero LTIs.

"As the prefabricated structure was proposed as an additional item in place of the plinth, the approval process took considerable time," remarks Dhandapani, "so, we focused on the feeders that did not involve these activities and since the transformer mounting arrangement was with a prefabricated structure, we executed with less manpower but better productivity," he smiles. Right of Way was another roadblock for which the team held several meetings with different stakeholders to clear the way to move ahead.

### On the fast track

As soon as the DWA was received, the team got cracking and the next six months went into planning, engineering, and procurement, starting with a detailed survey to finalize quantities. An unforeseen hitch was the assembly elections and the election code of conduct due to which no construction was possible for six months. "We, however, utilized this period to micro level plan and finalize activities for each feeder,"



After completing and delivering the project on time, we have been awarded six more similar projects by BESCOM in Bengaluru city for a total value in excess of INR 1,000 Crores.

**K Dhandapani**  
Project Manager,  
C-UPD-UG Cabling Project



adopted various methodologies and initiatives to reduce the involvement of labour, bring uniformity and quality to the work, save time, reduce cost, and push progress. "During the survey, the scope of bulk items like RMU and HT UG Cable increased by 6% and 21% respectively that required special permissions from BESCOM," reveals Section In-charge, Amit Bhat.

Dhandapani flags off a couple of other innovative steps to improve their productivity and save time. "Considering the involvement of more manpower and civil masonry works in the awarded scope of DTC plinth type foundation, we proposed a specially designed prefabricated structure platform to mount the transformer that worked very well for us," he says. Workmen were trained on mock-ups in the store yard before engaging

shares Swati, apart from proactively obtaining permissions from various third parties such as the PWD, NHAI, Railways and the like.

Once the elections were over, construction began in earnest that lasted for 18 months, including a monsoon during which the team



During the survey, the scope of bulk items like RMU and HT UG Cable increased by 6% and 21% respectively that required special permissions from BESCOM.

**Amit Bhat**  
Section In-charge,  
C-UPD-UG Cabling Project



objective. "Training, delegation, rewards, constructive feedback and motivational events and sessions kept the team engaged and, on their toes," smiles Dhandapani.

### Digitalization leads the way

Swati reels off a slew of digital solutions that the team adopted. "We had Empower to monitor project progress and materials in real time and the Quality App to ensure product quality and work methodologies," she shares. A digital display board showed DPRs, a fleet card system was used for fuel purchase and CCTV cameras provided surveillance at the store yard. Workmen were screened through WISA while VR modules came in handy for their training. EHS Head, Biman Roy adds how useful the Safety App was to maintain safe operating procedures, proud of the RoSPA Gold the site won.

them at site and RMU foundations were implemented with pre-casting concrete.

### Precise project management, monitoring, control

"Our project monitoring and control were spot on with daily progress updates and regular reviews with the Cluster and Segment that resolved issues and

speeded up progress," informs Sahukar Mohan Rao, another Section In-charge. Prompt sourcing of material was critical to their success. "All the required 3M resources of Men, Material and Machine were mobilized at the right time for optimum utilization because of our rigorous follow up with our client and vendors," he adds.

On the peoples' front, every team member was empowered to take decisions to achieve a common



Our project monitoring and control were spot on with daily progress updates and regular reviews with the Cluster and Segment that resolved issues and speeded up progress.

**Sahukar Mohan Rao**  
Section In-charge,  
C-UPD-UG Cabling Project

**TRAINING, DELEGATION, REWARDS, CONSTRUCTIVE FEEDBACK AND MOTIVATIONAL EVENTS AND SESSIONS KEPT THE TEAM ENGAGED AND, ON THEIR TOES.**

**K Dhandapani**  
Project Manager,  
C-UPD-UG Cabling Project

"In essence, it was the triumph of wonderful teamwork," concludes Dhandapani, clearly thrilled with his team's achievement. ■

# WET IC PROJECTS EMERGE ON TOP WITH KEY DELIVERIES

**S**trategically placed as the lockdown began, several WET IC projects quickly got off the blocks when operations resumed. Though challenges were many and varied, some significant project teams across regions rose to the occasion, rapidly adapted to the new paradigm and with some strategic decision making and innovative operational methods achieved significant progress.



## Water lifeline for 200 villages

Having done the hard work before the lockdown, Project Manager, Dinesh Kumar, Banswara-Pratapgarh WSS, successfully commissioned the network across some 200 villages by June 2020. "It was a milestone moment as we moved into the defect liability period," he remarks with gusto. "It has been a huge effort by the team as our scope of design, construction, and commissioning of water infrastructure across 334 villages in three zones was vast."

Laying 2419 Km of pipeline was the team's most challenging part as most of the alignment was across the Aravalli



**“ All along our focus was to accelerate safely wherever possible as the construction, testing and commissioning of civil structures of intake works and pipeline started to complement the final delivery. ”**

**Dinesh Kumar**  
Project Manager,  
Banswara-Pratapgarh WSS



1150 KL Overhead Service Reservoir at Banswara-Pratapgarh WSS



Public stand post for remote location water distribution



Overview of the 18.6 MLD Water Treatment Plant

hills that called for secure and deep trenching methods. "To execute larger structures like the intake well, approach channel, raw water reservoir and water treatment plant, our approach varied depending on their criticality," Dinesh informs. Faced with a largely hard rock strata, the process of breaking down was done with utmost safety while specialized execution methodologies were adopted for the 42 m deep intake well with 12 m wide and 200 m long approach channel inside the Mahi dam. "All along our focus was to accelerate safely wherever possible," he adds, "as the construction, testing and commissioning of civil structures of intake works and pipeline started to complement the final delivery."

In-house digital solutions helped enhance the quality processes while the online SCADA system ensured that the output was as per accepted value limits. Inspection calls were raised in the Cognisite App for different site locations and virtual inspections

conducted through MS Teams. "We received the completion certificate on 15<sup>th</sup> June 2020 and the villagers are now reaping the benefits of regular water supply," says Dinesh with a smile of a job well done.

## Building Punjab's first Central Water Treatment Plant

The Moga Water Supply Scheme, Punjab's first Central Water Treatment Plant to feed potable water to around 85 villages is another landmark project completed in quick time. L&T's scope of work comprised WTP foundation, construction of a 50 MLD WTP, 5400 KL CWR and two MBRs of 1140 KL capacity each, along with 330 Km of DI pipelaying, involving around 8000 cum of concreting. "It is a huge plant spread across 4 acres and key structures had to be raised on an uneven terrain," Project Manager, Navdeep Kumar Sharma, describes his



An aerial view of the Moga Water Treatment Plant in Punjab

challenges which the team overcame by resorting to some transformational technologies. “We were the first in the Water Supply BU to implement BIM as an integrator that enabled us to seamlessly close the gaps between the civil, mechanical and electrical drawings. Interfaces were missing in 4 key areas and to reconcile them physically would have taken a lot of rework,” shares Navdeep.

Most of the reviews with the HQ management were done over Smart Glass, another transformational tool, through which the actual work from any location could be viewed. All site engineers were equipped with tablets. For Navdeep it meant huge savings in cost and time and accelerated progress.

Feet on ground makes all the difference and the team networked with the local governing bodies to source additional



“We were the first in the Water Supply BU to implement BIM as an integrator that enabled us to seamlessly close the gaps between the civil, mechanical and electrical drawings.”

**Navdeep Kumar Sharma**  
Project Manager,  
Moga Water Supply Scheme



40 MLD Sewerage Treatment Plant at Rourkela

manpower, especially skilled, train the unskilled workmen and carefully formed crews for critical works. Their diligence reaped rewards as they successfully completed erecting a 65-meter structural steel canal crossing bridge carrying twin pipelines mains over the Abhoar canal, a strategic section of the project much to the client’s delight.

Although a model project, the satisfaction for Navdeep and team is greater as they have blessed 68,000 households and 3,63,714 people in rural India with potable water.

## Engineering a composite sewerage system for Rourkela

The steel city of Rourkela will soon receive a vital sustainable infrastructure



“A clear picture of the various interfaces gave us direction to shift gears and focus on the underground works, working out a combination of approaches like the open-cut method, micro tunnelling and precast to complete the work fronts.”

**C Rajavel**  
Project Manager,  
Rourkela

as L&T’s Wastewater BU team is putting finishing touches to a composite sewerage system that will benefit some 2.5 lakh people and, at the same time, purify the Brahmani river off its pollutants.

The imposing scope of work for Project Manager, C Rajavel and team spread across 5 sewerage catchment areas is to lay a pipeline network across 185 Km, 728 m of RCC gravity sewer by trenchless method, 10611 manhole chambers, 210 Km of house sewer, 5,665 Km of DI rising main, three intermediate sewerage pumping stations, one terminal sewage pumping station and a 40 MLD treatment plant.

Constructing the pipeline network and associated works is critical as the alignment runs through the heart of the town with hardly any space for approaches. BIM came in handy for Kamal Kumar Jindal, Asst. Construction Manager as he matched the integrated design with on-ground conditions to finalize his execution plan. “BIM helped to optimise our execution methods and firm up concrete quantities for critical structures such as the trapezoidal wall.” View EHS, WISA, EIP Pragati and QIR app were other digital tools that strengthened the team’s arm. “A clear picture of the various interfaces gave us direction to shift gears and focus on the underground works.” informs Rajavel, “working out a combination of approaches like the open-cut method, micro tunnelling and precast to complete the work fronts.”

With 96% of the work completed, Rajavel and team are very close to handing over the 40 MLD plant and the main pumping station by June 2021 and he smiles at the thought of 2000 Rourkela households singing L&T’s praises.



**“We turned the pandemic situation into opportunity by engaging more machinery at lower costs, organized factory acceptance tests for the client and engaged our limited manpower for the most critical tasks that have helped us achieve progress despite several setbacks.”**

**Amit Kar**  
Project Manager,  
Barrackpore Integrated Sewerage Project

## On a clean Ganga mission at Barrackpore

A part of the humongous task of cleaning river Ganga rests on the shoulders of Project Manager,

Amit Kar, and his team, at the Barrackpore Integrated Sewerage System project. “We are mandated to lay 247 Km of sewer lines of varying dia (150-900 mm diameter DWC and RCC pipe), 12 pumping stations and 2 STPs of 6 & 18 MLD.”

It is a typical city job with nagging issues waiting around every corner for the team that includes poor soil condition with a high-water table, constrained approach roads and a forest of underground utilities. Technology tools cleared the ground for Tamal Saha, Construction Manager. “We deployed GPR survey and the utility detector to identify the underground utilities while the risky trenching works were fast tracked safely with horizontal drilling machines and trenchless pipe laying methods.”

For other significant structures like the STPs, the project team relied



Horizontal drilling machine deployed at Barrackpore Integrated Sewerage System Project

on Lean Management techniques to maximize efficiencies and productivity. “We turned the pandemic situation into opportunity by engaging more machinery at lower costs, organized factory acceptance tests for the client and engaged our limited manpower for the most critical tasks that won accolades from our client,” informs a happy Amit Kar. “They have appreciated our efforts especially the safety and quality standards that have helped us achieve progress despite several setbacks.” With 93% of works completed, the team has their goal in sight.

## Ringing in a green future for farmers

Across different regions in the North and South of the country, WET IC is executing large water systems for irrigation which when commissioned will be game changers for farmers. It

is a tall order for Parthiban Mohan, Project Manager, at Narmada Kshipra LWS1 Project, that is designed to totally discharge 15 cumec of water, of which 10 cumec will be used to irrigate 30,000 hectares while the remaining water will meet the domestic and industrial needs across villages in 5 districts of Madhya Pradesh.

“Our main scope involved laying 409 Km of pipes, constructing pump houses and allied structures,” informs Surya Kant Dubey, Assistant Manager, Mechanical. “Well before the lockdown, we had prepared a detailed micro plan based on which we set up fabrication shops at different locations to facilitate the efficient flow of finished MS pipes.” As Guniting was a major activity, 5 automatic plants were established across strategic locations. “Around 32 km of the pipeline was in a hilly forest area,” points out Parthiban, “and to ensure that work continued uninterrupted without resources idling, we deployed a secure and feasible work approach, blasting wherever it was safe, taking the help of the construction method planning cell to devise a winch arrangement for shifting and laying pipes, and engaging cranes at approachable locations.”

Keeping tab of operations was easy despite the span for Soumitra Mukhopadhyay, Senior Construction Manager, Civil thanks to digital tools. “We had 1326 workmen on the WISA platform whom we could pin point at any given point of time while we tracked the entire pipeline alignment with the LMNOP App. Almost 80% of our quality inspection was carried out in the virtual mode with the support of the Quality Incident Reporting App and ViewEHS App helped improve the Safety quotient.”

The team successfully solved their labour issues by sourcing workmen



18 MLD Sewerage Treatment Plant at Barrackpore





“A mixed group of workmen helped us to maintain our strength. In addition, we rotated the existing labour gang across work zones to familiarize different crews with most of the tasks to reduce dependency on any specialised gang.”

**Parthiban Mohan**  
Project Manager,  
Narmada Kshipra LWS1 Project

from all parts of the country “A mixed group of workmen helped us to maintain our strength,” remarks Parthiban. “In addition, we rotated the existing labour gang across work zones to familiarize different crews with most tasks to reduce dependency on any specialised gang.”



Pump House 1, near Kalingarayan Anaicut, Bhavani



Pipe laying

Parthiban and team still have a long way to go but are on track and with 60% of the works completed, they confidently foresee completion by January 2022.

Kundalia Right Bank Canal is another significant lift irrigation project that made good progress overcoming some initial setbacks and although there is a fair distance to cover, Project Manager, Dinesh Kharbanda, has things under control. “We have surveyed 82328 Ha of gross consolidated area, constructed three distribution chambers and a residential building for the client, achieved around 90% of RCC Works, laid 200 Km of pipeline and completed the main structural works.”

Working from his base at Zirapur, a remote hamlet, Planning Manager,

Kirtish Mahajan, had to deal with the labour issue as almost 80% of the workforce returned to their villages when operations resumed. “We were able to convince them to return thanks to a series of workmen motivation drives organized by the EHS and IR departments highlighting the secure arrangements made at camps. We commenced with rotational shifts before gradually moving ahead as the numbers rose to 605.” To resolve some issues, they faced on the ground, the team roped in the Sarpanch and other leaders to convince the villagers about how they stood to gain from the project that opened fronts for work resumption. Having almost crossed the half-way stage, Dinesh is targeting to deliver the project by June 2022.



“We have surveyed 82328 Ha of gross consolidated area, constructed three distribution chambers and a residential building for the client, achieved around 90% of RCC Works, laid 200 Km of pipeline and completed the main structural works.”

**Dinesh Kharbanda**  
Project Manager,  
Kundalia Right Bank Canal

Work is proceeding at a feverish pace at the Athikadu Avinashi Project near Coimbatore in Tamil Nadu with

Project Director, Ravi Kumar Padnavis, steering critical tasks, “We have to lay over 250 km of MS pipeline, 805 km of HDPE pipeline, construct six pump houses, install 46 VT pumps along with associated civil, electrical and instrumentation works. Once commissioned, the scheme will draw 1.5 TMC of surplus water from river Bhavani downstream of the Kalinganarayan anicut to fill 32 public work department tanks, 42 union tanks and 971 ponds in three districts while irrigating 24, 468 acres.”

Digital interventions are proving to be the difference for Project Manager Venkateswaran Thirupathi as most of his documentation for work processes and approvals have been secured online during the lockdown apart from sourcing around 400 T of f surplus

formwork materials from other projects to complete critical works. “Just to give an example,” adds Ravi Kumar, “we surveyed a 30 Km stretch along the national highway in a day with Real Time Kinematic drone which in the conventional mode would have taken us at least 8 days. From planning to execution, safety, quality, and even administrative tasks, the digital route has made our job easier, more precise, avoiding rework.” The digitalization drive has won one more disciple!

Amid crisis lies great opportunity mentions Ravi Kumar highlighting on how the team successfully addressed labour issues. “A special taskforce team spearheaded by the Project Director himself reached out to numerous workmen gangs across the length and breadth of the country to augment the workforce once the lockdown was lifted. Apart from bolstering the

workmen confidence that it was safe to work at site, the team spent around INR 95 lakhs on their travel arrangements. The team’s concerted efforts have translated into 1754 workmen presently engaged across work fronts. The client was delighted at the pace with which the project was progressing as the pump house structures – I, II & III were raised within three months. The good work was commended with a slew of appreciation certificates as well.”

With 76% of invoicing completed, the team is gunning to hand over their project by December 2021.

### An all-in-one package

There is something in this package for everyone, says Mukesh Singh, Project Manager, Infrastructure Works at Bidkin. “The very fact that two ICs, WET and TI, are executing significant



“From planning to execution, safety, quality, and even administrative tasks, the digital route has made our job easier, more precise, avoiding rework.”

**Ravi Kumar Padnavis**  
Project Director,  
Athikadu Avinashi Project

portions of the job makes this both a competitive and a complementary job,” he grins knowingly.

WET IC is responsible for design, construction, testing, operation, and maintenance of infrastructure works for road drains, culverts, bridges,



Zonal substation at Bidkin



“We resumed by engaging the available workmen from our local contractors on a trial basis and found it to be productive, at least temporarily. Soon, we increased our numbers and worked out two and three shifts to accelerate progress across fronts.”

**Mukesh Singh**  
Project Manager,  
Infrastructure Works at Bidkin

water supply, power system including sewerage and common effluent treatment plant for sector A Phase III in the AURIC Bidkin Industrial Area, Aurangabad.

Sequencing and scheduling of works was vital as this is a new industrial city developed in line with the country’s Smart City vision. The team led by experienced managers ensured that clashes in design were aligned through BIM before execution began. Apart from core water infrastructure works, deliverables include electrical, instrumentation and some portion of mechanical works with the onus on intra-department handing and taking over.

To overcome the setback of the labour exodus, “we resumed by engaging the available workmen from our local

contractors on a trial basis,” points out Mukesh, “and found it to be productive, at least temporarily, while parallelly we continued to diligently source workmen from other states. Soon, we increased our numbers and worked out two and three shifts to accelerate progress across fronts.”

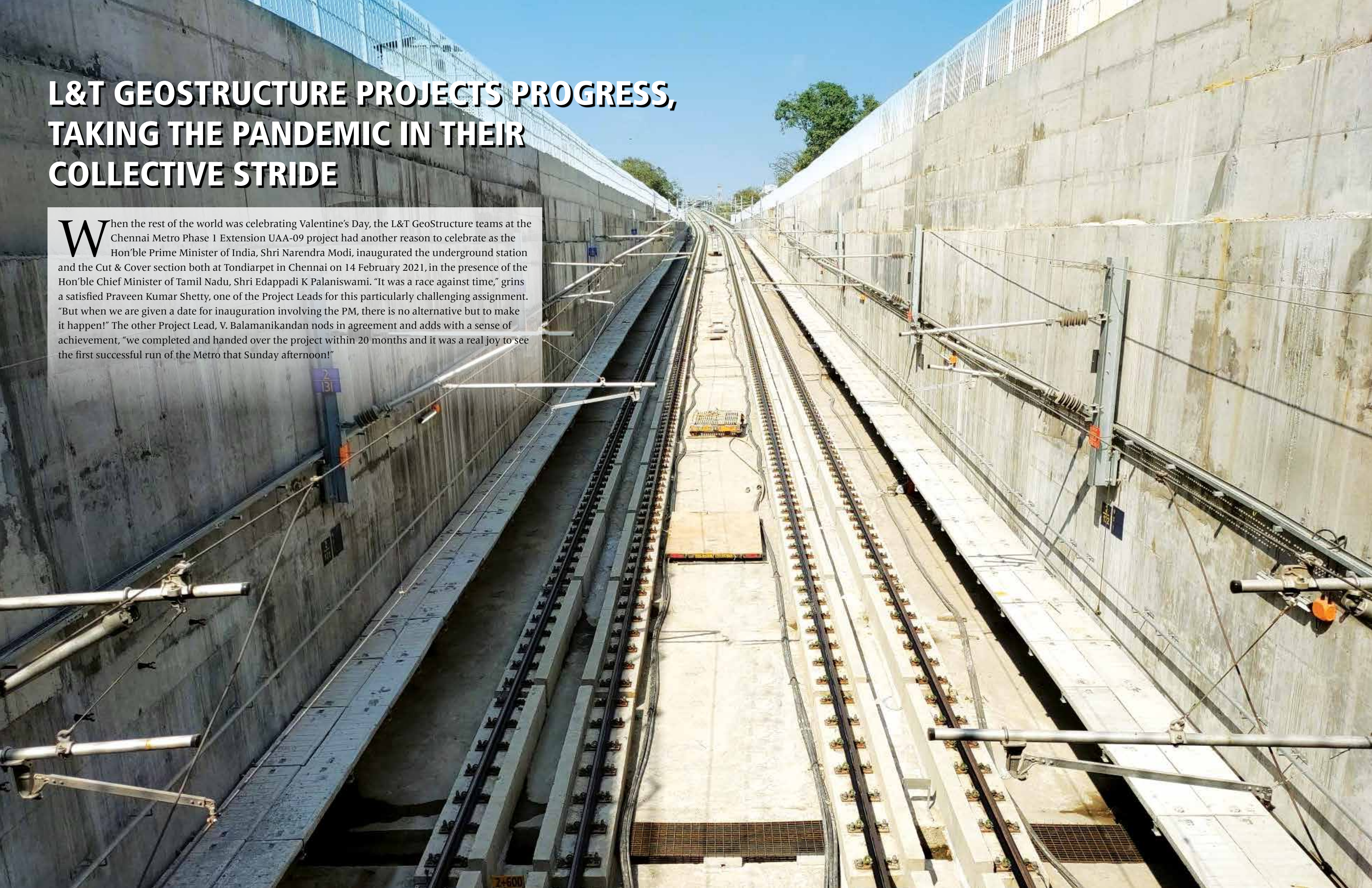
Along with a range of digital tools, Mukesh and his team have banked on L&T’s EPC prowess by implementing a slew of value engineering methods such as setting up vertical shaft dry precast factories for RCC pipes, ducts, paver blocks, manholes and kerb stones, extrusion welding for HDPE liner and spot welding for reinforcement that have propelled them to complete almost 99% of the works. They now await the client’s directives on power and water supply to commission the project. ■



Diversion Weir, near Kalingarayan Anaicut, Bhavani

# L&T GEOSTRUCTURE PROJECTS PROGRESS, TAKING THE PANDEMIC IN THEIR COLLECTIVE STRIDE

When the rest of the world was celebrating Valentine's Day, the L&T GeoStructure teams at the Chennai Metro Phase 1 Extension UAA-09 project had another reason to celebrate as the Hon'ble Prime Minister of India, Shri Narendra Modi, inaugurated the underground station and the Cut & Cover section both at Tondiarpet in Chennai on 14 February 2021, in the presence of the Hon'ble Chief Minister of Tamil Nadu, Shri Edappadi K Palaniswami. "It was a race against time," grins a satisfied Praveen Kumar Shetty, one of the Project Leads for this particularly challenging assignment. "But when we are given a date for inauguration involving the PM, there is no alternative but to make it happen!" The other Project Lead, V. Balamaniandan nods in agreement and adds with a sense of achievement, "we completed and handed over the project within 20 months and it was a real joy to see the first successful run of the Metro that Sunday afternoon!"







“Completing the project was a race against time, but when we are given a date for inauguration involving the PM, there is no alternative but to make it happen!”

**Praveen Kumar Shetty**  
Project Lead,  
Chennai Metro Phase 1

The scope of work comprised the 200 m underground metro station with four major entry structures, three vent shafts and an ancillary building. The 650-metre-long Cut & Cover section involved a 400-metre roof slab, a base slab of 650 metres, a 900-metre side and mid wall. Significantly, this section of the Metro connects North Chennai to the rest of the city while the underground section connects to the elevated section via a ramp.



Cut and cover at Tondiarpet, CMRL

## Overcoming issues of soil & space

It is obvious that both project teams stretched muscle and sinew to achieve their stiff targets, having to overcome two major hurdles in the process. “We had to construct in a very challenging soil stratum and in an extremely congested and narrow urban space,” shares Planning Engineer, Soham Roy with a grimace, “and yet meet our high safety and quality standards.” While the task would have been challenging even in normal times, these were the times



“We had to construct in a very challenging soil stratum and in an extremely congested and narrow urban space and yet meet our high safety and quality standards.”

**Soham Roy**  
Planning Engineer,  
Chennai Metro Phase 1



View of the cut and cover tunnel at Tondiarpet, CMRL

of the pandemic with the team having to face huge restrictions and stringently adhere to the severe COVID-19 SOPs and protocols to ensure that people remained safe, and at the same time, progress was rapid and sustained.

Fully prepared and working seamlessly, one team completed the balance 25,000 cu.m. of excavation and 40,000 cu.m. of backfilling for the Cut & Cover portion of the Ramp. “We successfully poured 15000 cu.m. concrete in 8 months despite the pandemic,” says a proud Praveen Shetty, highlighting the completion of the 600 m long and 6 m high partition wall that separates the up and down lines of the tunnel. For his Planning Engineer, Aditya Gaikwad, an already complex task was made even more complex, having to deal with other contractors who were laying the rails simultaneously on both the lines. “We planned the whole process meticulously, our coordination with all the other agencies was spot on and we completed the task within just two-and-a-half months.” Another notable achievement by the station team was to complete the vent shaft building involving a 14 m tall RCC structure that was completed within two months meeting high quality and safety standards.

Both Praveen Shetty & Balamanikandan agree that the project has been “an example of showcasing the merits of project coordination, planning and execution while tackling all the unseen variables and finding appropriate solutions.”

## Desperately seeking more hands, skilled and otherwise

The now-famous migrant labour migration dealt telling blows to all sites across the organization, leaving it to each project to evolve their own strategies to identify, induct and quickly train new labour. “We had to literally reconstruct our workforce and we mobilized about 600 workmen from across the country,” shares Balamanikandan. “The Workmen Connect & WISA apps helped us to coordinate the movement of workmen and to induct new workmen at site. The team did a fabulous job of keeping a steady balance despite Chennai remaining a COVID-19 hotspot.” All the health care and protection SOPs issued by the government and the internal EHS protocols were practised at site, with the team not only following the local regulations, but remaining in constant contact with the client and partners to achieve productivity and complete the project milestones on time.

Elsewhere in Madhya Pradesh, the project team constructing a composite medium irrigation dam across the river Runj in Panna district was faced with a similar situation. “As soon as the lockdown was lifted, we swung into action to bring workmen back to site and successfully mobilized about 150 of them,” informs Project Director, Sarasindu Datta, with a sense of



Navigational lock at Farakka, WB



“We planned the whole process meticulously, our coordination with all the other agencies was spot on and we completed the task within just two-and-a-half months.”

**Aditya Gaikwad**  
Planning Engineer,  
Chennai Metro Phase 1

purpose. The WISA app went a long way to efficiently enrol new workmen.

At the Navigational Lock project at Farakka, the unique ‘Workmen Connect’ App came in handy for the team to track, monitor movement and remobilize workmen from across the country. “We mobilized 217 workmen to attain the required strength of 272,” says a satisfied Rajaneesh Kumar Rai, Project Director, for whom at his distant site, completion of critical milestones



“We had to literally reconstruct our workforce and we mobilized about 600 workmen from across the country. The Workmen Connect & WISA apps helped us to coordinate for the movement of workmen and to induct new workmen at site.”

**V. Balamanikandan**  
Project Lead,  
Chennai Metro Phase 1

was so dependent on remobilizing workmen with the required skillsets and orientation. His pain point, however, was that the fresh labour being inducted required continuous and rigorous training to equip them sufficiently to start delivering. Planning Manager, Sachin Thakkar, points out that, “the WISA app was used to screen new workmen online and regularise staff attendance.”



Stone pitching works at Runj dam, M.P.



## Overcoming the hurdles of isolation and the monsoons

If the Chennai Metro teams had to face the perils of congestion and lack of space, Sarasindu and his team at Runj had to contend with the issue of isolation that became even more severe due to the pandemic. Not ones to be deterred, they carried on, finding every possible opportunity in these times of crisis, though even as they restarted operations, a particularly severe monsoon badly hampered their efforts. With a focused approach and proper planning, the team took up concreting works and achieved about 52,000 cu.m. of concrete in a seven-month period.

“Post the monsoon, we have achieved yet another feat, achieving 80,000 cu.m. of excavation and 70,000 cu.m. of backfilling for the Cut off Trench.”

**Sarasindu Datta**  
Project Director,  
Design and Construction Runj Dam



“Through Procube, we were able to quickly escalate constraints and bottlenecks and work out mitigation measures. In fact, progress speeded up thanks to quick decision-making.”

**Vivek Iyer**  
Planning Manager,  
Design and Construction Runj Dam

“Post the monsoon, we have achieved yet another feat,” smiles Sarasindu, “achieving 80,000 cu.m. of excavation and 70,000 cu.m. of backfilling for the Cut off Trench.”

With their customer satisfied with their effort, the team clocked significant billing in seven months since the unlock. To maintain this pace of delivery, it was imperative to monitor progress daily and meticulously which is where Procube was heaven-sent as Planning Manager, Vivek Iyer shares. “Through Procube, we were able to quickly escalate constraints and bottlenecks and work out mitigation measures. In fact, progress speeded up thanks to quick decision-making.” He mentions the constant attention of Chief

Executive, Mr. S Kanappan and his office to ensure progress.

Successfully mobilizing an expert contractor to commence the challenging task of fabricating the gate was a huge achievement for the site and SCM team - otherwise it could have been a huge bottleneck. Regular follow-ups with the Forest department bore fruit, as the team was able to obtain various tree-cutting approvals and other clearances within just one-and-a-half months. Currently the activities are geared up and the site team is determined to complete the project within the planned schedule.

## Unlocking potential in difficult times

There is a disarming honesty to Rajaneesh as he admits that there have been some setbacks in performance due to the pandemic. “We have, however, taken various measures to adhere to the budgeted invoice,” he reassures. Here too, daily monitoring of activities through Procube facilitated quick decision-



“As a team, we have been concentrating on project progress making appreciable ground, thanks to our digital solutions, and of course, the contribution and dedication of our people during these extremely uncertain and unprecedented times.”

**Rajaneesh Kumar Rai**  
Project Director,  
New Navigational Lock at Farakka

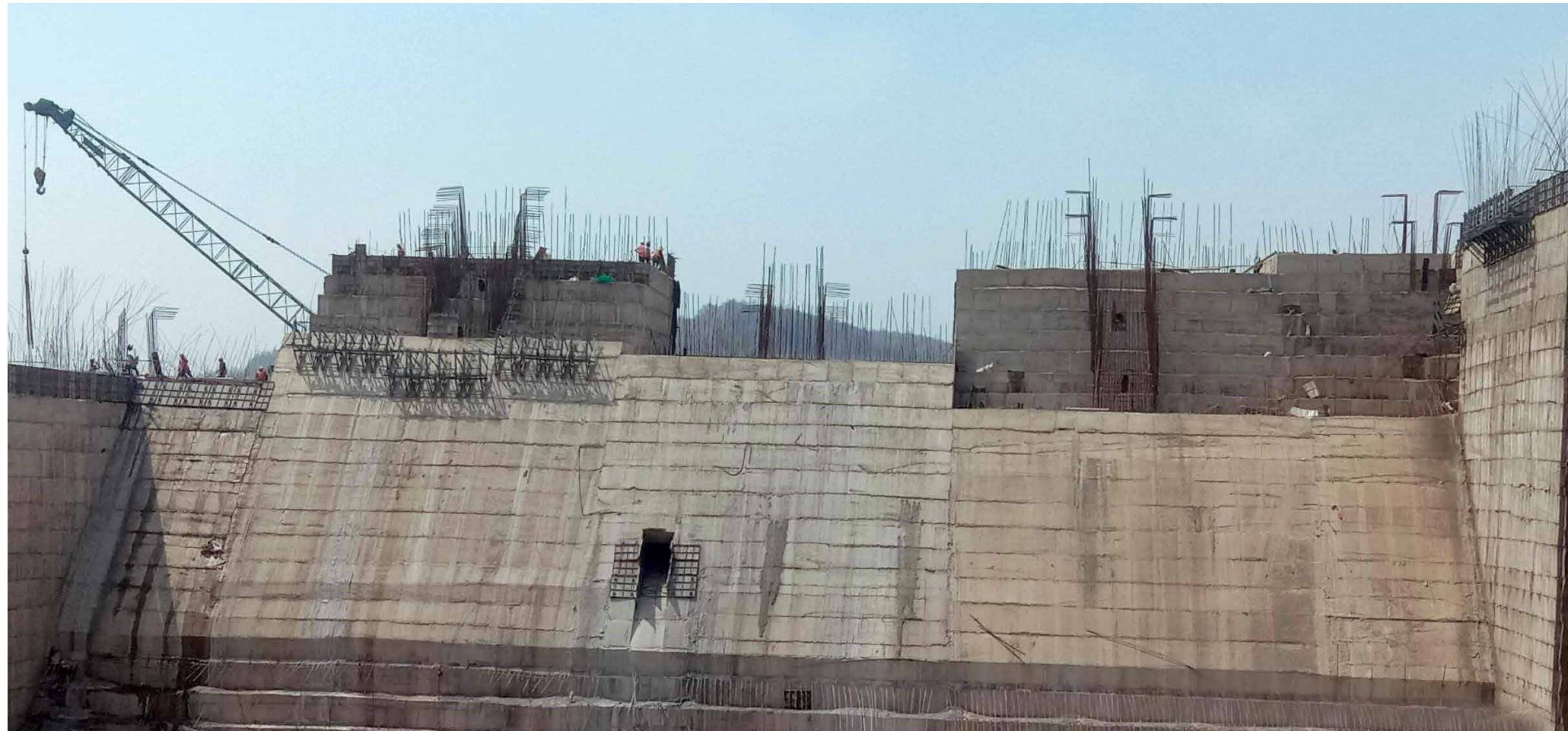
making, follow-ups, and progress. “While it was important to address progress, the project execution team had to focus on quality too,” reminds Sachin Thakkar, “for which we implemented the QIR (Quality Incident Reporting) app to track process across all levels, to ensure that no major NCR was raised by the client.” The EHS team used the Safety App to monitor and promptly alert relevant personnel about incident reports. Despite worldwide restrictions, the SCM team interacted with vendors from across the world to ensure timely supply of bought-out items to site, from various parts of the country and even from Europe.



“While it was important to address progress, the project execution team had to focus on quality too for which we implemented the QIR (Quality Incident Reporting) app to track process across all levels, to ensure that no major NCR was raised by the client.”

**Sachin Thakkar**  
Planning Manager,  
New Navigational Lock at Farakka

“As a team, we have been concentrating on project progress making appreciable ground, thanks to our digital solutions, and of course, the contribution and dedication of our people during these extremely uncertain and unprecedented times,” sums up Rajaneesh, reflecting the sentiment shared not only at L&T GeoStructure, but across L&T Construction. ■



Concrete portion of Runj dam, M.P.

# RAILWAYS PROJECTS FIND GREAT TRACTION DESPITE PANDEMIC-CREATED BLOCKS

Often size and scale are cited as deterrents to achieve quality but by winning L&T Construction's Quality Award for 2020, the challenging INR 3000+ Crore JICA funded Dhaka Metro project has proved yet again that where there is a will, there is a way. Project Director, Sunil Khattar's mandate is for a Systems Project including Track, OHE, CBTC Signaling and much more, awarded to a joint venture of Marubeni Corporation and L&T in June 2018. It involves the development of Systems Works for MRT line 6 - 18.9 km stretch with 16 stations.



The brief scope of work involves procurement of E&M systems comprising Track Works, Electrification Systems (Power Supply, Catenary, SCADA, and Energy Storage System), Lifts and Escalators, Signalling, Telecommunication & Automatic Fare Collection Systems and Platform Screen Doors for MRT Line 6 divided into the Uttara North Depot to Agargaon and the Agargaon to Motijheel phases. "Our work commenced on July 11<sup>th</sup>, 2018 and we have been mandated to complete the two phases in 1155 and 1519 days respectively," Sunil points out although his progress was halted for a few days in March 2020 and thereafter ran at only half steam till September.



**“The project team listed out materials required at site under each sub-system, tabulated their present status, developed strategy, implemented measures to mitigate the delays and prevent deterioration of material for each sub-system item. This also helped us to build substantiating data for future claims.”**

**Sunil Khattar**  
Project Director,  
Dhaka Metro Project

## The Dhaka Metro team takes advantage of the lockdown

Of the 3Ms, Material was Planning Manager, Debakash Banerjee's key concern who could ill afford the loss of even a day facing some stringent delivery deadlines. "While physical activity stopped at site, we continued to coordinate with our global suppliers to ensure that they remained committed to their manufacturing and shipping schedules," he says purposefully. The Bangladesh Government stepped in to ease the situation by allowing e-filing of import permits and clearing



Viaduct OCS wiring



Phase 2 works: outside stabling shed

customs to facilitate imports. "It was touch and go but finally the material successfully arrived at our stores safe and sound," Debakash Banerjee's relief is evident.

The Employer – Dhaka Mass Transit Company Limited and the Engineer (Nippon Koei – DMRC – Mott MacDonald) were constantly in the loop on every development be it delays in manufacturing, shipments or port clearances, "for which," Sunil elaborates, "the project team listed out materials required at site under each sub-system, tabulated their present status, developed strategy, implemented measures to mitigate the delays and prevent deterioration of material for each sub-system

item. This also helped us to build substantiating data for future claims," he says with a half-smile. To keep their installed assets, site offices and stores safe during this period of uncertainty, the requisite security arrangements were made including offering incentives and medical facilities to the security staff.

### Restarting operations with all precautions

Operations resumed to the new normal for which SOPs were finalized and circulated to all the staff and key stakeholders including the Employer, Engineer, the JV partner, and the L&T employees that stipulated the various COVID-19 safety protocols.

For the safety of the workmen, four new labour colonies were put up equipped with the requisite facilities, toilets, washrooms, and kitchen. They were provided temporary alternate accommodation till the new facilities were ready. The HR and admin teams, meanwhile, got cracking by reaching out telephonically to the local labour urging them to re-join by offering incentives like accommodation, food, testing and medical facilities. "The Employer supported us in this counselling activity," Sunil chips in. All site personnel were PCR-tested and those positive, quarantined and put under continuous doctor's monitoring. It was easier to restart work as none opted to return to India by the evacuation flights.



Masts for DC Overhead Catenary System

The team's aggressive follow-ups with global suppliers translated into a slew of material from across the world landing safely at site from April to July to sustain progress. These included Rectifier Transformers from TMC, Italy, Copper Conductors from Lamifil Belgium, Escalators from OTIS, China & Master Clock System from Mobatime, Switzerland. In addition, several deliveries arrived from across the border from India including Circular Masts from Valmont, 132 kV Cables from Universal Cables, 33 kV Switchgear from SIEMENS, SCADA Systems from ABB and Telephone Systems from Alcatel Lucent.

Even as businesses started to adopt and adapt to the new ways of digital interface, Factory Acceptance Tests rapidly gained acceptance and the team organized FATs for various signalling items like CBTC wayside equipment, ATS server and Network SW rack; Automatic Fare Collection System equipment like passenger gates and Platform Screen Doors with internal units.

By successfully returning to full steam in 100 days, the team won the Engineer's support who granted an extension of 66 days for the delay and reimbursed their claims for the PCR tests conducted and for constructing the new labour colonies, commending the team for their efforts for holding their stations to overcome the adverse impact of the pandemic.

Both the Engineer and Sunil are delighted that the project team has completed some major physical works for Track Works (plinth construction and track linking), Overhead Catenary System (OCS) works and receiving & traction sub-station works.



“Without wasting any time, we prepared, submitted and finalized contractual submittals with the Client like drawings, work programmes, lists and formats for execution and quality checks.”

**Venkatesh M Nagabhushan**  
Chief Project Manager,  
EPC Project

## Core EPC 7 project back on rails

'Mission Electrification' is a Government of India initiative to electrify the entire Indian Railway Network to reduce both the carbon footprint and the expenditure on diesel. The Central Organisation for Railway Electrification (CORE), an engineering wing of railways, has been assigned this task of electrification. Amidst tough competition, L&T's Railways SBG won the EPC project in early 2020, tasked to electrify the Dindigul- Palghat (Gr. 273), Pollachi-Podanur (Gr. 274) and Shoranur-Nilambur (Gr. 275) sections. The scope encompasses OHE, building eight Traction Substations, 57 SP/SSP, modification of HT/LT power lines and crossings, extending the LT Power supply for CLS work, Signalling & Telecommunication System modifications & inventory, integrated testing and commissioning, civil engineering works, height gauge works, service buildings, PSI depot, 2126 m platform shelter modifications, protective screens, completing tower wagon shed including siding, etc., P-Way works and the plantation of trees.

For Chief Project Manager, Venkatesh M Nagabhushan, the contract commenced in June 2020 and with the pandemic still around, he and his team focused on pushing forward with mobilizations. "Without wasting any time, we prepared, submitted and finalized contractual submittals with the Client like drawings, work programmes, lists and formats for execution and quality checks," he informs. Under the leadership of Cluster head Akula S Phanendra Kumar, the team finalized and mobilized specialized equipment through online discussions with the HQ team and vendors, identified and mobilized the requisite staff, mobilized workmen for initial works from



within Tamil Nadu as the movement from other States was restricted and completed project scheduling and planning using TILOS (Linear networking program) to arrive at an effective execution strategy.

## Action from word "go"

"We got to work from Day One itself, but we faced three primary concerns: the scarcity of workmen in Tamil Nadu, difficulty in remobilizing labour due to the travel restrictions and a rocky, unapproachable terrain at site." Venkatesh describes his challenges, but not ones to be deterred, he and team set about pushing progress. Design modifications were finalized in a focused manner right at the initial stages itself to create design-based work-fronts to avoid any labour idling. "In terms of the terrain, we divided it into three: normal soil, normal soil but with high bank and rock strata, and then deployed the necessary resources accordingly to increase productivity." The team could only mobilize labour from outside Tamil Nadu by September after which progress has been much faster.

Work began in right earnest with the OHE foundation works by engaging local agencies working with the limited relaxation given by the Tamil Nadu Government in various districts and, in the process, the team completed more than 10,000 foundations – a record in the history of the Indian Railways.

## Several reasons for success

Communication, Venkatesh flags off, as one of the primary reasons for his team's success. "I directly communicate with the customer for all actions, decisions, and approvals and close co-ordination with other departments such as planning, execution, and procurement has speeded progress."



*Accessibility challenges owing to Single Line at many sections and passing through hard, rocky strata*

"Close monitoring of site productivity, effective utilization of resources and exceptional strategic methodology have been other reasons for our great performance," ASPK grins.



“With an efficient strategy and proper resource utilization, we have completed over 2,400 foundations.”

**Chandan Kumar**  
Project Manager,  
Package 3

Shouldering the responsibility for the complete electrification of 215 TKM of Gr 272 (Salem-Vridachalam-Cuddalore Port) Section which includes 1 TSS and 10 SP/SSP is Pawan Verma, Project Manager for Package 1. Working with intensity, within a short span of 276 days, Pawan and his team successfully completed the CRS Inspection of the 59 TKM Cuddalore Port Junction – Vriddhachalam, the first block section of CORE EPC 7 Project and the team is gunning to complete this job by October 2nd, 2021.

Electrification works stretching more than 600 TKM were also kicked off despite the challenges of lack of labour, movement restrictions and poor utilization of vehicles and P&M. Project Manager for Package 3, Chandan Kumar tasked to electrify 326 TKM

of Gr 273, Gr 274 and Gr 275 which includes 3 TSS and 16 SP/SSP had to contend with a hard, rocky strata and heavy rains initially. "With an efficient strategy and proper resource utilization, we have completed over 2,400 foundations," says a pleased Chandan, who is confident of commissioning his section in the next couple of months.

Looking at the impressive progress the team has made, Venkatesh sums up what has worked for them. "Quick mobilization of manpower, equipment & material, implementation of First-Time right principles to avoid rework, close follow-ups with the government authorities for statutory permissions and effective execution based on a clear strategy using TILOS, have been our key enablers," he says, already ready to leap into his next MS Teams meeting. ■

# MMH PROJECTS PROGRESS FUELLED BY DIGITALIZATION

The Mansourah Massarah Gold Project (MMGP) is one of MMH SBG's iconic projects currently being executed in the Kingdom of Saudi Arabia involving engineering, procurement, construction, pre-commissioning, commissioning, and start-up of what will be the largest ever gold project producing an average of 250,000 ounces of gold per year over its lifetime. The good news is that the project is being executed in an entirely 3D environment with the intelligent P&ID's prepared by Aveva Diagram, linked with multiple other deliverables like equipment lists, pipeline lists, valve lists, isometric diagrams, and a 3D model for the entire plant.





## 3D modelling is taking execution to a new level

“Visualization with 3D models improves communication between stakeholders,” shares Project Director, Hare Ram. “2D drawings, including fabrication drawings, are being generated directly from 3D models reducing man-hours, enhancing accuracy and quality.” There are manifold benefits for Hare Ram and his team from 3D modelling; it helps to arrive at complex solutions, enables visual communication, constructability, clash detection to reduce rework in both the engineering and construction phases, and unique work planning with maximum safety. “We have divided the project’s 3D model into 8 zones that reflect the actual working site so that individual zone in-charges are using their particular zones to plan construction through the cloud,” explains Hare Ram.

Equipment lists, developed in Aveva Engineering, are simultaneously updated based on the changes in the

process during engineering while the project’s entire piping has been modelled in Aveva E3D from which isometrics have been prepared that have enhanced productivity and improved quality. Engineering Lead for the Maaden Gold Project, Nirmalya Burman, elaborates “All the structures and foundations are modelled in Tekla and imported into the Aveva E3D platform to reflect the actual plant configurations to check for possible clashes between the structures, piping, cabling etc. in real time to eliminate interferences during the modelling itself resulting in no or minimal rework at site.” In addition, all structural manufacturing drawings are prepared from Tekla models resulting in higher productivity and error-free detailed manufacturing drawings.

## Etihad Rail project rides on digitalization too

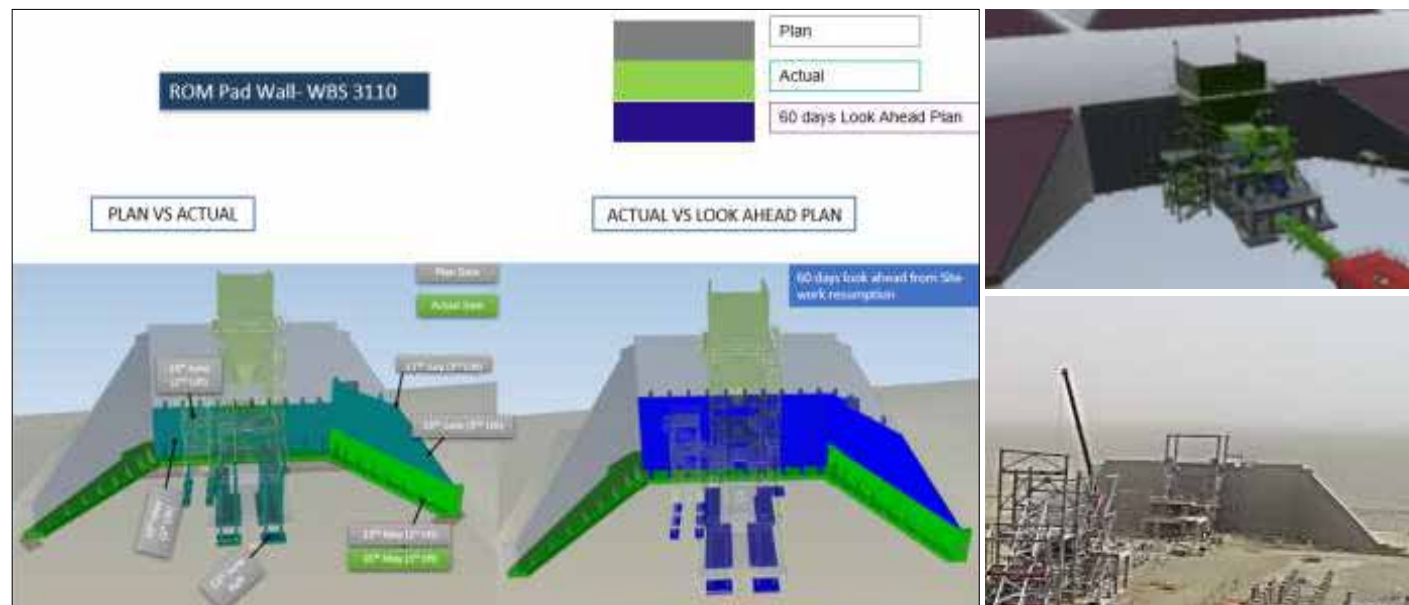
The Etihad Rail project is a proposed railway network, linking freight facilities and passenger stations to form a part of the planned Gulf Cooperation



“Visualization with 3D models improves communication between stakeholders 2D drawings, including fabrication drawings, are being generated directly from 3D models reducing man-hours, enhancing accuracy and quality.”

**Hare Ram**  
Project Director,  
Mansourah Massarah Gold Project

Council (GCC) railway network. MMH’s scope of works includes detailed design, procurement, construction, testing and commissioning of all elements of freight facilities at 5 locations. “Our project has interfaces with four packages other than L&T’s 2F2 package,” informs Senior Project Director, Ranjan Roy, “and we are storing our 3D models in ProjectWise



4D Model Plan Vs Actual comparison

cloud along with vendors of other packages to check for clashes without any physical intervention and avoid clashes with internal or external parties during construction.” 3D models for the five stations are available that can be accessed using different devices.

In both the Etihad Rail and Ma’aden Gold projects, 3D models are Digital Twins with respect to construction. The Digital Twin is a representation of the physical object in terms of data and information; an organized collection of design data developed from the detailed engineering 3D model along with final vendor data which the client can access by clicking on a particular object on the 3D model for all relevant documentations like P&ID, GA Drawings, Data Sheets, O&M Manuals, and the like. The entire actual engineering, asset and



Digital Twin - an organized collection of data



“All the structures and foundations are modelled in Tekla and imported into the Aveva E3D platform to reflect the actual plant configurations to check for possible clashes between the structures, piping, cabling etc. in real time to eliminate interferences during the modelling itself resulting in no or minimal rework at site.”

**Nirmalya Burman**  
Engineering Lead,  
Maaden Gold Project

construction details are incorporated in 3D models which will be useful digital information for the Client to operate and maintain the plants in future.

## 4D BIM and Common Data Environment

At both these projects, since data is processed in a 4D model (3D model + Project Schedule) and available on the cloud, it is visible to multiple stakeholders saving time, cost, and effort. All the information is from a single source that addresses all communication issues, it is easier to monitor interfacing with 4D models, enables logistics & site utilization planning and real time risk & impact analysis. “4D BIM improves construction planning and management to help us understand project milestones better,” says BIM Manager, Antara Roy. “It enhances



“Our project has interfaces with four packages other than L&T’s 2F2 package and we are storing our 3D models in ProjectWise cloud along with vendors of other packages to check for clashes without any physical intervention and avoid clashes with internal or external parties during construction.”

**Ranjan Roy**  
Senior Project Director,  
Etihad Rail Project

competency, safety and site space utilization, we can monitor actual vs planned in real time and actual vs look ahead for future project progress planning.” With the pandemic disrupting scheduled project deliveries, the MMGP team appropriately reconciled the actual vs planned and actual vs look ahead project schedule with the 4D model that threw up the missing activities. Apart from proper construction sequencing, the complexity of the structure can be visualized, and resources planned accordingly.

## The benefits of digitalization

“By using the 3D platform in complex EPC projects across the entire value chain of design, manufacturing, material management and site construction and integrating them with scheduling has helped us create a robust 4D project platform,” says Amit Swarnkar, Head – MENA BU.



“BIM has led to enhanced collaboration and coordination among the stakeholders. This is primarily the reason why our engineering deliverables have been error free and on time for the Maaden Project.”

**Ranjit Ghosh**  
Head - EDRC, MMH SBG



“4D BIM improves construction planning and management to help us understand project milestones better. It enhances competency, safety and site space utilization, we can monitor actual vs planned in real time and planned vs look ahead project progress.”

**Antara Roy**  
BIM Manager

“We have witnessed this platform bringing enormous control to interdisciplinary interface management, construction planning, risk management with utmost ease and visually impactful understanding of the project. In the EPC project business space, it is not any more a desire but a necessity to stay ahead in the global race.”

As many as 3,776 hard clashes were discovered at MMGP that were all resolved prior to construction. 3D models open easy avenues of communication between the various stakeholders, enable process and engineering specification reviews with the client on a single platform that keeps the client updated on progress.

“BIM has led to enhanced collaboration and coordination among the stakeholders,” says Ranjit Ghosh, Head - EDRC, MMH SBG. “This is primarily the reason why our engineering deliverables have been error free and on time for the Maaden Project.” Real time project monitoring, analysis of delay and critical paths,

construction review meetings and virtual walkthroughs with VR are all possible.

## 3D scanning hastens progress.

For the brownfield Birla Copper project at Dahej that involves structural upgradation, the team did not have As-Built drawings of the existing plant. 3D scanning came to their rescue with which the As-Built drawings were extracted. “The conventional method of making 2D drawings would have taken a lot of time, that could have been inaccurate and not representing the entire project,” observes Project Manager, Sumit Kumar Jena.

Areas across the project were identified where the 3D scanning equipment was placed and point cloud data generated. The point cloud data of multiple scans were then stitched together using the FARO



“By using the 3D platform in complex EPC projects across the entire value chain of design, manufacturing, material management and site construction and integrating them with scheduling has helped us create a robust 4D project platform. In the EPC project business space, it is not any more a desire but a necessity to stay ahead in the global race.”

**Amit Swarnkar**  
Head – MENA BU

Scene Software, rescanning any insufficient or incomplete data. The point cloud data was then uploaded to a server in the office. “Post this, plant wise 3D models were generated with EDRC helping us to extract and deliver the required 2D drawings,” says Sumit. “The entire operation was completed in just 7 months from initial scan to structural 2D drawings that entailed some 6900 scans across 7 plants.”

## Geospatial technologies drive efficiency

The greenfield project Coal Handling Plant at Dudichua has a unique topology with a geographically dispersed area and natural obstructions along the way which would have made conventional surveying extremely time-consuming and arduous. “Instead, we used drone based topographic survey with DGNSS (Differential Global Navigation Satellite System) that was so much

faster and more efficient,” enthuses Project Manager, Matta Satyanarayan. “The presence of hills, forests, rivers, etc. did not pose a problem for drones and with the reports generated, we could accurately identify the

elevation, excavation areas, land levelling etc.” The entire scanning operation was conducted, and the contour survey generated in 4 days flat that would normally have taken nothing less than 15 days.



Scanning and Modelling



Point Cloud Modelling & Model Output

## CHATBOT is making a telling difference

Accurate progress monitoring is key to efficient project delivery and the typical process involves the Site Engineer updating progress on WhatsApp or some App which the Planning Engineer aggregates to generate the report. "We wanted to leverage the reach and coverage of Apps like WhatsApp and Telegram to bring the entire project monitoring on to an App of choice for easier use and better compliance," says S Sundarrajan, Digital Officer - MMH, who along with Nikhil Sunil Kunnuthottiyil developed the solution. "Now, at the end of a day, our site engineers open and say "Hi" to our CHATBOT and complete the DPR entry within minutes," smiles Project Manager, Sivanesan Ramanujan, CDQ, Dolvi. The DPR entered gets aggregated in the database and Daily Progress Reports are generated automatically. "To further improve its functionality, we have now successfully integrated the CHATBOT with WRENCH to avail off its powerful functionalities," adds an excited Nikhil. Seeing its success, MMH has expanded this feature to all the three CDQ jobs of Dolvi, Birla Copper -Structural Upgradation, SHPS (Solid Pitch Handling System) Vizag and CHP (Coal Handling Plant) Kerandari.

Along similar lines, a CHATBOT has been designed and deployed across 20 projects in response to a request by the EHS team led by Dr K N Sen, EHS Head - MMH SBG, through which users can make Safety Observations on the go in 30-40 seconds via Telegram or WhatsApp. Till date, roughly 2,300 observations have been noted.

Immediately post the unlock, though sites were hungry for new labour, the process of on-boarding



The telling difference that CHATBOT is making

was long-winded, difficult, offline with the added danger of COVID infections. CHATBOT-WISA proved to be the ready answer at Dolvi for five projects - Civil Works SMS II, Supply and Erection work for SMS II, Civil works for BFII, Supply & Erection work for BFII, Construction and Erection of 3 MTPA Coke Oven Plant. In the new feature, the workmen themselves provide all their necessary details on WhatsApp which is aggregated into an Excel file and shared with the Time Office. Using WISA's bulk upload feature, the file is directly added to the system saving time, increasing the number of workmen onboarded and raising the efficiency of the Time Office personnel. Around 870-odd workmen have provided their information using the CHATBOT much to the delight of the Dolvi IR team of Senthilkumar Mani and Umesh Kumar, who took the lead to drive its implementation.

CHATBOT has come in handy even to vaccinate MMH personnel, by digitizing the entire process from data collection to hospital intimation with minimal human intervention. The HR department now gathers, arranges, and shares the data with the respective hospitals daily using a CHATBOT. It is user-friendly, data collection is easier as is sending automatic Emails and can be accessed anytime, anywhere.

## PDSS- Android based QR app captures production hours

The Kansbahal Works operates on a three-shift basis and the production hours of 200 direct workmen and approximately 30 machines must be captured by the concerned shop supervisors in PDSS at the end of the shift the same day. For Dalveer Singh Panesar (Head -Machine and



**"We wanted to leverage the reach and coverage of Apps like WhatsApp and Telegram to bring the entire project monitoring on to an App of choice for easier use and better compliance."**  
**S Sundarrajan**  
 Digital Officer - MMH

Assembly Shop) and P K Sinha (Head - Fabrication Shop), the process was manual, time-consuming, not in real time and prone to human errors. By digitalizing the process, they are breathing a lot easier.

Each part of the BOM is processed through a document called Route Card (RC), available online in PDSS,

which has an inbuilt QR code that defines the part. At the start of the shift, the shop supervisor scans the QR codes of all the parts required for that day through an Android scanning device which is, in turn, integrated with PDSS. The user then gets the details of the RC on the 6" in-built screen of the Android device and records the quantity completed, start time and end time as per the requirement of the job progressively. "The data is now in real time, accurate with errors reduced drastically," smiles a satisfied Sumanta Kumar Mohapatra, Manager IT.

## QR Code based Material Tracking

Material tracking at the Kansbahal Works posed a similar problem with about 15,000+ materials kept at different locations inside the factory under the custody of the Central Stores Department. The materials are issued based on indents given to the Stores department and the Stores personnel locate the materials either based on their experience or by following a manual tagging system. This was an arduous manual process, prone to errors and delays. "We have created an in-house system to generate QR codes against each material code that is printed and pasted on the material," informs Arun Kumar Mishra, Senior DGM (IT). "It is now easier and faster for both the end users and the Stores personnel to locate and issue the material, it is more accurate and helps users to plan further procurement of the same looking at the physical availability," informs Srinivasu Malladi (Senior Manager - Manufacturing), who along with Narendra Kumar Tiwari (Manager, Stores), are driving this initiative. Digitalization has again proven to be a winner!



Bauxite Handling Conveyer - UTKAL

## Wrenching out more efficiency

All operating projects of MMH SBG are managed through WRENCH that encompasses scheduling and auto-progress updation with varied monitoring and control reports and contract management through communication and document management. An intelligent cloud-based platform to collaborate, plan, monitor, and control the lifecycle of projects, WRENCH acts as an integrating central platform enabling data-driven process enforcement and real time collaboration between stakeholders.

With seamless bi-directional integration capabilities with Primavera and MS Project, the entire project schedule can be transferred to WRENCH wherein each individual stakeholder can operate in his/her domain and the progress will be captured automatically and reflected in their respective schedule without manual intervention. The progress of workflow-based activity can be monitored in fine granular level, enabling to do lists for every user and a step-by-step Rule of Credit at each stage. With central data management, the entire data repository is maintained



“When we restarted, every employee at site worked like a frontline worker to push progress and despite the challenges we have made good ground.”

**Prasanta Tikadar**  
Project Manager,  
Utkal Alumina International Limited  
Project

at a single location for easy data access, removal of dependency on dynamic user groups, revision control and tracking for engineering documents and is confidential.

MMH – EDRC has fully enabled and implemented WRENCH for all its EDMS and Engineering Management processes with active involvement of all users. Ms. Subarna Mazumdar is at the forefront of the change management efforts with her team, involved in reconfiguring a new system, training all 350 staff in more than 20 sessions and continuously handholding even during the pandemic disruptions. “I am very

happy that all the Engineering Data is available at the click of a button,” exults Subarna, “and deliverables are tracked on a real time basis pushing progress.”

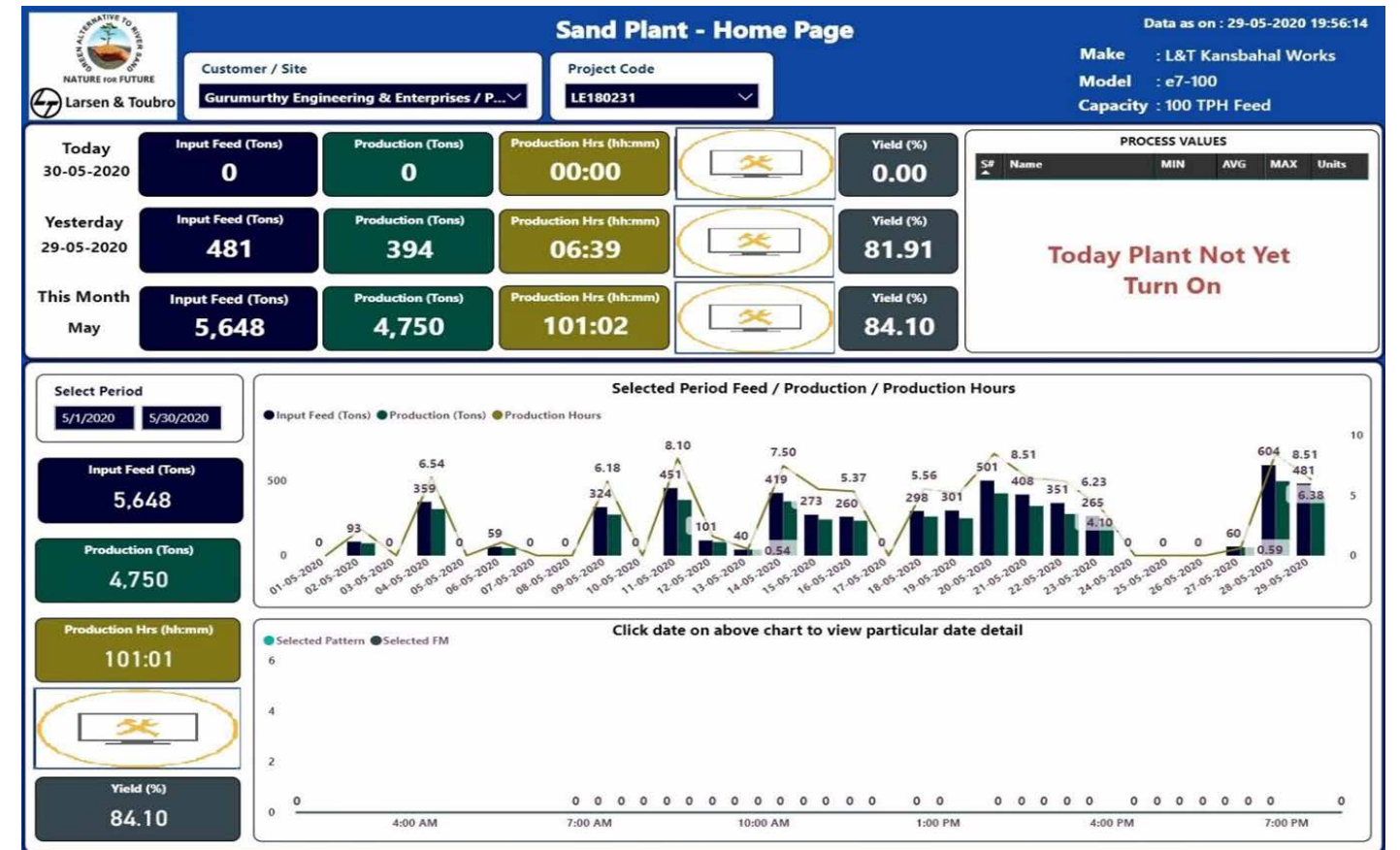
## Pushing quick progress

For Project Manager, Prasanta Tikadar at his Utkal Alumina International Limited project site in the remote Rayagada district of Odisha, the challenges to restart operations after the lockdown were several. He was facing a substantial loss of manpower, especially from out of the State, limited railway connectivity, non-availability of local suppliers for materials and spares, lean skill level of local workers and, to add to them all, a prolonged and heavy monsoon. “When we restarted, every employee at site worked like a frontline worker to push progress and despite the challenges we have made good ground,” declares Prasanta and his numbers back his claim. Since the unlock, in Q1 they completed erecting 850 MT of critical & heavy equipment, 1,380 MT of structural erection, 4,500 cum of concreting and all the electrical panels and transformers in all the substations.

Though the team had initially succeeded to retain 1,500 workmen at site, many left as soon as the restrictions were lifted that forced them to shuffle the remaining skilled workmen and change the crew composition based on discussions with the subcontractors. “To push progress, we gradually shifted from the conventional execution style to focus on automation and digital tools to achieve the desired progress with limited resources,” shares Planning Manager, Sudip Sen. They are planning their piping work using 3D model (Navisworks) software that has made execution easier by addressing the interfaces and identifying the specification lines.



How WRENCH is driving efficiency



A dashboard showing the digitalization of sand plants

“We have introduced modular erection specially for heavy & critical structural lifts like tank top structures at heights of 35 m from ground level and conveyors that are saving hugely on labour time with superior quality and safety,” informs C Muthuraj, Construction Manager – Structural. Disciplined stacking of fabricated structural materials, area wise and line wise colour coding of pipes and spools, using orbit pipe cutting & welding machines, automatic plastering machines and space climbers have enormously improved efficiency.

## Digitalisation of e7 Sand plants

Digitalization of e7 Sand Plants takes care of collecting, storing, computing and dynamically representing both historical and live data to



“To push progress, we gradually shifted from the conventional execution style to focus on automation and digital tools to achieve the desired progress with limited resources.”

**Sudip Sen**  
Planning Manager,  
Utkal Alumina International Limited  
Project

users. Available on a computer or a mobile device, one can view major operational and technical data collected from the Sand Plants such as feed material quantity, product quantity, production hours,

yield, motor winding and bearing temperature, equipment vibration, etc. In addition to the data capture, digitalization helps to take the machine’s PLC control remotely for troubleshooting. After the lockdown, five sand plants have been commissioned remotely.

Smruti Ranjan Purusti and Omkar Prasad Patra from the Engineering team of the Product BU who are driving this initiative point out that they can now monitor the operational status of a plant from their office, analyse plant performance, production, faults, and service support. “We can even optimize or improvise future design,” they chorus excitedly.

The challenges remain but MMH project sites have evolved their unique strategies to keep their noses ahead. Here is wishing them the very best! ■

## L&T 4<sup>th</sup> on LinkedIn's Top Companies India List



### Jumps 19 spots! A reaffirmation that people are our prime asset!

Larsen & Toubro emerged 4<sup>th</sup> on LinkedIn's 2021 Top Companies List in India having climbed up from the 23<sup>rd</sup> position in 2019. It is a remarkable achievement considering that L&T is the only infrastructure company to feature in the Top 10 that is otherwise populated by IT, e-commerce, and consulting organisations.

L&T's steep ascent is attributable to a large extent to our handling of the impact of the pandemic. Early in the piece, we had declared that we would not let go of our people, doubled health insurance for employees, evacuated those stranded overseas and initiated several other measures to help and protect. From an

HR perspective, our sharp focus on grooming in-house talent with most of our Directors on the Board being from within the Company stood us in great stead.

The LinkedIn ranking is based on seven pillars, each revealing an important element of career progression that include ability to advance, skills growth, company stability, external opportunity, company affinity, gender diversity and educational background. The ranking helps people identify the top organisations as successful career destinations possessing unique cultures, espousing the value of meritocracy and offering great opportunities to grow.