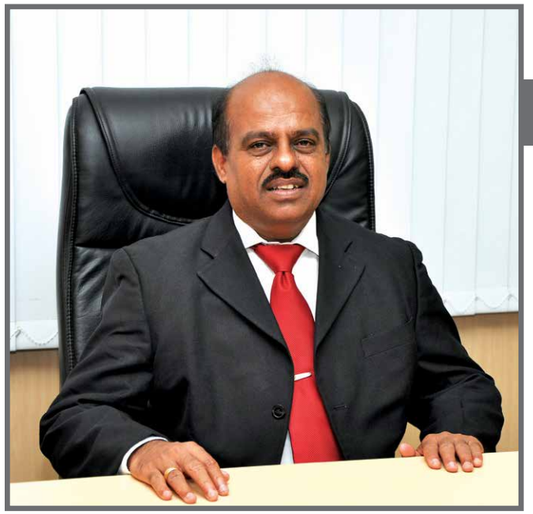
HELMET

Environment Health Safety

EHS journal of L&T Construction

Volume - 8, Issue - 1 *January - March 2018*

Featuring projects being built to Speed & Scale



Foreword

Safety, Environment and Health are the way of life.

Dear L&T-ites,

Business growth needs speed. Speed drives people to perform. Safety as a culture and value enhances performance.

We are aware that in the construction industry, to achieve order inflow, invoice with margin in the committed period is imperative. During this journey, it is our duty to take care of the environment where we live/work, our own and our family's health, which will contribute to a safe and happy life.

In today's digitalised world, people across the globe are connected 24x7. To be 'live' and active we have to be online, otherwise we become offline! We are able to share with each other information on a real-time basis. Let us make use of available digital tools to enforce and implement safety at all levels at sites.

Mobile phones have revolutionised our life, but its abuse and misuse can cause us great harm. Let us show restraint by using phones only in safe locations at the required time, giving it our undivided attention. Multi-tasking while on the phone can cause serious damage and harm, and should be avoided.

When we talk about the environment, we always think of protecting the land, flora and fauna, water, etc. At Geo sites, in particular, we reuse sweet earth removed from the top for gardening purposes, treat and recycle water to reduce wastage to a great extent, and plant trees and bushes as required for specific locations.

To be 'live' and active we have to be online, otherwise we become offline!

Similarly, the health of each individual is our lifeline. It is necessary to provide medical help to assess the sickness, if any, for taking proactive preventive measures, which in turn, can safeguard our people. In fact, most of the time, as per statistics, sickness causes memory loss, and drives toward the risk of committing mistakes.

Having said that, the level of safety required, particularly for Geo type of sites, vary based on the type of equipment deployed to execute different challenging underground works. To execute large diameter deep boring, barricading is required at an appropriate distance as per the procedure already developed, and high-end input from geotechnical experts/geologists for additional safeguards, which will in turn, take care of the serious risk of soil caving in. The heavy equipment such as piling rigs/cutters have to be positioned at appropriate distances with all precautionary measures, and operated by well-trained technicians to prevent any untoward incidents.

Generally, people at sites are provided with safety helmets, reflective clothing, life jackets when working in marine conditions, and other safety gear like goggles, gloves and shoes. In my view, these alone do not protect a person. Attitude and discipline are required to observe, learn and practise. These are the most important behaviours for safe working.

Behaviour of people varies during the day and night. Working without eating a proper breakfast is a health hazard, significantly increasing the possibility of falling from heights, falling into a pit, etc. Similarly, for those working during night-time, appropriate food at the appropriate time is required to avoid sleep-related mistakes. Another important aspect for working at night is right illumination for men and machinery movement.

Attitude and discipline are required to observe, learn and practise. These are the most important behaviours for safe working.

In case of people working in marine conditions, resistance to wearing life jackets due to discomfort, is an indiscipline, and increases the risk of serious harm. In case of P&M personnel, while repairing small rotating/vibratory tools, not wearing hand gloves and goggles can cause injury. A casual attitude of taking things lightly causes serious damage and loss of time.

Another important aspect which site leadership has to give importance and directive in the case of safety, is housekeeping. At sites, staging, formwork material, rebar, etc. are generally kept close to the working area, blocking pathways and causing hindrance to many activities. The process and procedure to take care of better housekeeping has to be formulated and educated to site supervisors, including workmen, to keep sites clean and tidy like our own sweet homes to prevent accidents.

We are getting awards and rewards for good safety and environment protection. But, we have to achieve the same level of performance in all sites across and outside India. The risks have to be assessed at the beginning and people must be enlightened with the knowledge to mitigate those risks.

Safety and environment protection does not stop with the workmen. It is applicable from the top to bottom of the organization. Safety being top-driven, it is every senior's responsibility and duty to give utmost importance for safe working.

It is my strong belief that continuous education on environment, health and safety will enhance safe behaviour, and that alone can help to achieve zero accidents, and in turn, achieve the management targets with ease. Everyone must keep in mind that there are people and families depending on us, and they always look for our safe return.

Let us all practise safety as a way of life, have health check-ups for better health and take care of the environment, which will take care of our future.

Wish you all the very best!

Warm regards,

S.Kanappan
Head & Chief Executive,
L&T Geostructure

Contents

4 It's all about listening and leading by example!
Project Medigadda Barrage

8 Safe in, safe out! The result: 15 million man hours!
Prestige Lakeside Habitat, Bengaluru

12 A road-cum-runway built fast. Built safely!
Unnao-Lucknow Access Controlled Expressway

16 A safe strategy for a powerful mission
400 kV Ibri-Izki Transmission Line

20 Striving safely to meet a vital need
Adilabad Water Supply Scheme

25 Towards building a safe city!
Mumbai Surveillance Project

29 Delivering a safe promise to 9 towns and 1097 villages
Nagaur-Bikaner Water Supply Scheme

34 Size doesn't matter if PDCA is followed to the 'T'!
Hyderabad Metro Rail Project

"It's all about listening and leading by example!"

Project Medigadda Barrage

The Medigadda Project took its time to get going but after overcoming starting issues, it has been progressively expanding to presently nearly 50% more than originally envisaged. The pace has increased to almost frenetic levels too. One can thus well imagine the cascading impact and mounting pressure on men, material and machinery deployed across two work fronts on the right and left banks of the river Godavari. Even at its narrowest, the barrage will still be about a kilometre and a half wide. To manage the two work fronts simultaneously, Project Manager – M V Ramakrishna Raju, split the project. "We cleanly divided the project into two completely separate sub-projects each with its own dedicated resources, men, equipment, material and leaders." He points out to almost similar establishments on both sides of the river, the only differences being that the right bank set-up is larger and is in the state of Telangana while the left back is across the border in the state of Maharashtra.

N. Ramesh Kumar
Safety In-charge

My safety policy is simple: it is all about listening to the people, giving an ear to their problems and issues and then leading by example.

Creating and maintaining a safe work culture in such trying circumstances can be a tall order but surprisingly, Safety In-charge N. Ramesh Kumar (NRK) presents a calm and composed demeanour, quite in contrast to his mercurial Project Manager. To my opening question, his response is a trifle offbeat for he does not rattle off a list of safety initiatives he has taken. "My safety policy is simple: it is all about listening to the people, giving an ear to their problems and issues and then leading by example," he begins, standing in a pit, dwarfed by the mammoth structures of the barrage. "There are almost 3,000 workmen at site on the two banks. We are pouring concrete every day and activities are going on multiple work fronts so we have to depend to a large extent on the people themselves to remain safe and look out for each other." As many as 90 concrete mixers criss-cross the site all day and night which is just a small statistic about how tough his task is. "If you listen to the workmen, they feel comforted; they feel you are on their side and then they are willing to listen to you. Of course," he smiles, "we cannot solve all their problems but by sharing, they feel lighter and are therefore able to concentrate on their tasks. Then, it is all about leading by example. If you follow the rules, they will follow them too. It you slip up, they will start to think that safety is not important and that is asking for trouble," he warns.

What sets NRK's approach apart is that he follows behavioural safety; he believes in the human touch to maintain our high safety standards.

M V Ramakrishna Raju
Project Manager

Raju, joins us after a quick chat with another one of his young, able lieutenants and with an arm around NRK's shoulder he interjects, "What sets his approach apart is that he follows behavioural safety; he believes in the human touch to maintain our high safety standards." NRK nods in appreciation for his Boss's elaboration and continues, "It is about communication; both verbal and non-verbal. They connect with you and therefore they are more receptive when we share with them the importance of safety. Then they are ready and willing to follow the rules and regulations we lay down. It is not that all the time we have to be soft and understanding. We are firm and aggressive when the situation demands but the important thing is to be consistent in our behaviour. That is what they watch out for and follow," he adds meaningfully.

> **"What I am really proud of is that the safety we follow at this site is entirely self-driven!"**
>
> N. Ramesh Kumar
> *Safety In-charge*

Darkness has fallen on the site and the floodlights have started to take effect but the approaching night has not seen any slowing down of work. "Training is another very important aspect," NRK picks up the thread. "Very few of the local villagers come for this job so we are forced to get labour from the UP, Jharkhand, Bihar, Odisha areas. The other serious issue, which I am sure, other sites must also be facing is the migrant nature of the labour. Almost every day new workmen come and some old ones leave," he laments, shaking his head, "so constant training and re-training are critical. We have regular training sessions here and we have even sent a few to our Safety School of Innovation in Kancheepuram for special training. After that, it is rigorous follow-up, regular inspections and strict monitoring that make the difference."

"No work will happen on its own and you cannot afford to lose focus because with so many people performing so many different tasks across so many work fronts, you have to be always alert and on your toes. My team and I keep moving about regularly inspecting the work, constantly monitoring and correcting if need be. Of course, there are also times when we have to be strict and forceful," he says sounding almost apologetic.

NRK's team is not a big one: he has eight safety stewards with him, 4 for each bank, and three safety officers but it is this focus, attention and refusal to take anything lightly that has helped the site to keep its safety record intact. Coming with the experience of a number of other hydel projects, NRK is aware of the possible safety pitfalls that a project of this nature can encounter and is

> **It is about communication; both verbal and non-verbal. They connect with you and therefore they are more receptive when we share with them the importance of safety.**
>
> N. Ramesh Kumar
> *Safety In-charge*

doing his best to pre-empt and be better prepared for them.

A normal day always begins with a pre-start briefing, a clear setting of expectations of deliverables and work does not start until it is safe to start. "Assessing the risk involved in any activity and being aware of it is half the battle won," shares NRK, "for example, concrete pouring is the most hectic activity at this site. We are pouring concrete day and night so I always check and certify the safety of the working platform before the pour starts. In fact, once I found no handles and the staircase missing so I stopped work. There was a lot of pressure on me," he says with a quick glance at Raju who has moved away and is in deep conversation with another section head, "because we were slipping in our schedule but I insisted that the pour could start only after addressing my issues. The pour that was to start at 9 am, finally began at 10.30 am but only after the matter was rectified. Yes, a little time was lost but we could have lost much more if something untoward had happened."

NRK is extremely happy that his huge site has already clocked 5 million safe man hours and "I am looking forward to receiving the certificate from my IC Head. So far we had been receiving the certificate from our BU Head," he shares with a huge smile.

"What I am really proud of," he sums up, "is that the safety we follow at this site is entirely self-driven! We are aware of our safety responsibilities and my team and I work hard to keep reminding all the people at site of those responsibilities and that has been the reason for our success here!" Here's wishing Raju, NRK and his young brigade many more safe man hours till the project is commissioned. ■

Safe in, safe out! The result: 15 million man hours!

Prestige Lakeside Habitat, Bengaluru

The workmen who come to site at 8.30 in the morning should return safe and sound to the labour colony at 8.30 that night. S Lakshminarayanan (SLN), Senior Manager (EHS) at the Prestige Lakeside Habitat project follows this simple dictate and the fact that the project has reported no fatalities at site and has already clocked 15 million safe man hours is testament that his dictate is being well followed.

The two major safety concerns that confronted Project Director, T Chandrasekar (TCS), were those of height and width. "Some of our towers rise to a height of 100 meters so working at heights had to be addressed. Secondly, since our project is spread over almost 100 acres consisting of 24 towers some of up to 29 floors, two basements and a total of 3426 flats and 269 villas, we required 'extra eyes and feet' to closely monitor EHS adherence." This was coupled with TCS's other issue of workmen attrition which meant that training had to be a continuous exercise.

At peak time, we had to manage nearly 4,500 workmen that required a fool-proof Safety Plan.

S Lakshminarayanan
Senior Manager

The safety team and their safety plan

SLN had with him a relatively small team comprising a safety manager, three safety engineers and 8 safety inspectors but with big responsibilities. "At peak time, we had to manage nearly 4,500 workmen that required a fool-proof Safety Plan," shares SLN, "and I'm happy that it has worked well thus far," he smiles rather diffidently. This Safety Plan dealt with some basic measures with the accent on rigorous and continuous implementation that helped create a safe work culture at site.

Every workman entering the site had to undergo a site-specific induction programme during which the general information of the project was shared with him along with key elements of the EHS policy, his duties and responsibilities, emergency procedures and the like. Apart from providing the basic PPE, training on its importance and usage, job-specific and external training sessions were organized as and when required. The work allocation system was strictly implemented as was the safe to start work card system and as SLN states, "we followed a policy of 'No Card, No Work' at site" and each day began with a pep talk.

Risk assessments, method statements, impact assessments and safe operating procedures were developed for every activity and communicated to all the employees and workmen before starting the job. For critical activities, job specific plans and emergency procedures were drawn up, implemented and reviewed periodically.

Use of mobiles phones was taboo for operators and drivers during working hours as part of SOP and a biometric

A safety engineer is like a coach, whereas the site engineer is the performer and a coach can only guide, he cannot perform!

system ensured that only authorized personnel operated the passenger hoist. Only authorized operators armed with 'Green Cards' were allowed to operate MCWP, PH and other equipment.

Improper housekeeping can be a huge safety hazard hence for half an hour every day, housekeeping was religiously followed and implemented by the site engineers. TCS conducted

The Project Director recognized one person at site as the 'Safety COnscious PErson' (SCOPE) every month.

weekly walk downs while joint weekly safety inspections helped to promote and maintain safety standards and EHS reviews were a regular part of the Monthly Committee Meetings.

Checks and balances

Safety nets, barricades and harnesses ensured that the workmen had a safe environment to work in especially at heights with fully-protected working platforms. Rope suspended platforms and scaffoldings were used when working at heights in the presence of scaffolding inspectors. All towers

had 'No Go Zones,' the lift shafts were as per SOP as were the floor and shaft openings while the RSP and MCWP working areas were protected by hand barricading. All vehicles were fitted with delay start mechanisms. In addition, SLN adds that two water tankers continuously sprinkled water across the site to control dust.

Each group of workers had a mate/ supervisor to monitor their work, progress and safety aspects while a motivation scheme rewarded the best 'safe' worker with incentives on a monthly basis. The Project Director recognized one person at site as the 'Safety **CO**nscious **PE**rson' (SCOPE) every month.

SLN had the additional responsibility of monitoring the adherence to EHS norms by members of other special agencies or nominated contractors, "which was tough," he says although, he adds, "it helped greatly that all EHS aspects were monitored through a mobile app." He also made it a point to develop and follow permit systems for all critical activities.

Managing hygiene issues

The site was equipped with a full-fledged first-aid room, a full time doctor, a male nurse, a first aider and an emergency vehicle, rest and dining areas, adequate drinking water facilities, and toilets were regularly inspected jointly by the IR and EHS teams. Special care was taken to keep the labour colony clean and safe; cooking was not allowed in the dwelling units.

Cross-functional audits identified and recognized the best parcel from a safety perspective. The celebration of Safety Months and Safety Days helped keep EHS ever alive in the minds of all at site. In addition, the Safety Officer/ Inspector was recognized and section in-charges and site engineers monitored benchmark scores in EHS performance. "My objective was to achieve more than 90% scores in the SOP/EHSMS audit," smiles SLN.

"A safety engineer is like a coach, whereas the site engineer is the performer and a coach can only guide, he cannot perform!" Happily, SLN is performing and the appreciation certificate he has received from the client, the Prestige Group, for achieving 15 million safe man hours is something he treasures!

Although the project is winding to a close with demobilization in progress, work on some fronts is still proceeding at full swing. SLN and his team, however, cannot afford to let down their guard. They have to keep striving to keep their safety record intact till complete handover. ■

A road-cum-runway built fast. Built safely!

Unnao-Lucknow Access Controlled Expressway

On November 21st, 2016, the Unnao-Lucknow Access Controlled Expressway was launched very uniquely to the reverberations of a fleet of aircraft (both fighters and transport planes) of the Indian Air Force that involved a mix of French Dassault Mirage-2000, Jaguars, Sukhoi-30s MKI and an AN-32 transport plane. It was the first time that a transport plane had used a road for take-off and landing bearing testimony to the quality of the infrastructure.

Shorter time, faster pace, greater risk

The first challenge for Chief Project Manager, Manish Samtani was the cutting of the project time line from 36 to 22 months. "Suddenly the dynamics changed and everything had to be fast-tracked: the mobilization, the sourcing, the opening up of several work fronts simultaneously which carry huge risks to safety of men and material. Just to give an idea of the magnitude of our task: we handled earthwork to the tune of 1.30 Cr cum which translates to about 50,000 cum per day and 40 lakh MT of aggregates that works out to about 12,000 MT per day! We were obviously doings things faster than the norm which increases the danger of something going wrong." His team had to be prepared to face this tough asking rate and they wonderfully rose to the challenge.

Manish Samtani
Chief Project Manager

Suddenly the dynamics changed and everything had to be fast-tracked: the mobilization, the sourcing, the opening up of several work fronts simultaneously which carry huge risks to safety of men and material.

"Yes, we had to work quickly and smartly and so we started in earnest right at the beginning with the basics," explains EHS In-charge, Pramod Kumar Singh. "We set site specific objectives and action plans and ensured that competent resources were available to implement our plans, monitor the achievement against our EHS objectives on a monthly basis and monitor all action plans and performance across many work fronts." The team also did the basics right: conducted weekly walk-downs and effectively implemented the EHS Golden rules at all places across the site.

Risk management and control

It is important to understand the risk involved and be prepared for it. As Pramod shares, "We prepared a very comprehensive and systematic method of identifying, analysing and responding to risks to achieve our EHS objectives. For this, we first developed a Risk Profile of the project and listed out all the high-risk activities. Then,

Pramod Kumar Singh
EHS In-charge

We prepared a very comprehensive and systematic method of identifying, analysing and responding to risks to achieve our EHS objectives.

we developed a safe work method for all site-based activities right from an established technique of risk assessment, which formed a part of the EHS management system." Method statements were prepared to define the scope and methodology that were followed for every activity, risk assessments were prepared for all activities by taking the inputs from the method statement, as per procedure, which were constantly reviewed and revised as per the requirements.

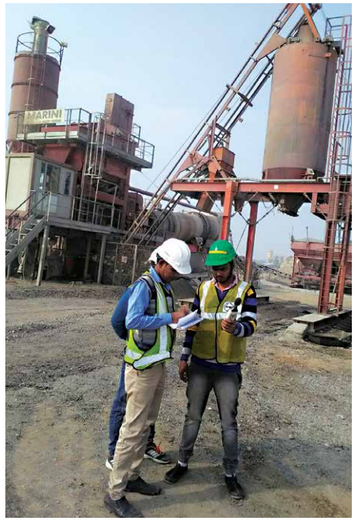
Planning and preparation

To make matters simple and targets relatively easier to achieve within the compressed timelines, Pramod divided his team into three teams each with a specific set of responsibilities. "Since the entire project was split into various work fronts, it made sense to split the EHS team too for greater and more in-depth coverage," says Pramod. These teams met on a bi-monthly basis to review the status as per the requirements and addressed gaps. Subsequently, the Operational Head and CPMs reviewed these to guide the Project Managers to carry out their responsibilities properly. Various potentially unsafe situations like formwork, scaffolding, etc. were addressed at a very early stage since the safety parameters were integrated into the scheme drawings.

Of course, there were safety issues in handling and controlling the quantum of aggregates that the site had to contend with and then there were the problems that arose during the monsoons. Apart from logistics, the construction of earthwork during the monsoons was a challenge and had to be carried out with due planning, care and training. Cluster Head, Manish Samtani says, "The real challenge was to get the right man for the right job to implement the work strategy correctly."

Training is key

"We established a sound EHS induction process," shares Pramod, "and set up training facilities with special displays of safety miniatures of vehicles, various equipment, pedestrians, material handling, Pick & Carry cranes and a safety park comprising formwork, hot-work, electrical, lifting and rigging, project specific safety signage and PPEs." These steps went a long way in familiarizing the workmen with the needs for safety at site.



Environmental initiatives

Several environmental-friendly initiatives were conducted by the team like setting up a wheel wash facility to clean trucks before entering the site and sprinkling water on loaded trucks before entering the site to control dust generation while dumping. The team erected dust screens along the perimeter fence to control the dust from spreading into the neighbourhood and around aggregate bins, pan mixers and conveyers. The concrete debris was used to compact the access roads that helped both the site and the neighbouring populace. Trees were planted and rest shelters erected at prominent locations that proved very useful to not only the workmen but to the drivers and operators too.

A job well done

For Manish and Pramod, their efforts bore fruit with lots of accolades flowing in from the client and senior political leaders commending team L&T on a tough job very well done. For Pramod, the taste of success was even sweeter as the site clocked 14 million safe man hours and won British Safety Council's Safety Award too! ■

A safe strategy for a powerful mission

400 kV Ibri-Izki Transmission Line

L&T's Power Transmission & Distribution (PT&D) IC has successfully raised corridors of power over the last eight decades enabling expansion of its business into new geographies thereby earning the adage of 'L&T's Columbus'. A significant portion of its growing international operations is now spread across the Middle East, ASEAN and African regions. What defines PT&D's success in projects is its stringent safety and quality standards that have been vital enablers in its way forward. Among its recent overseas benchmarks is the 400 kV Izki-Ibri OHL which was realized by clocking more than 2.35 safe million man-hours for Oman Electric Transmission Company across 265 km in just 28 months!

Finding the right men

Like all seasoned transmission line professionals, S. Ayyappan, Project Manager, stuck to the time tested formula of getting the right men for the right job as a large part of scope of the work was related to raising 645 monoliths of steel 50 to 60 meter tall. "For work at height, additional precaution was taken by conducting a screening of linemen fit for scaling heights through a medical checkup and a vertigo test." Passing the test was one thing and demonstrating

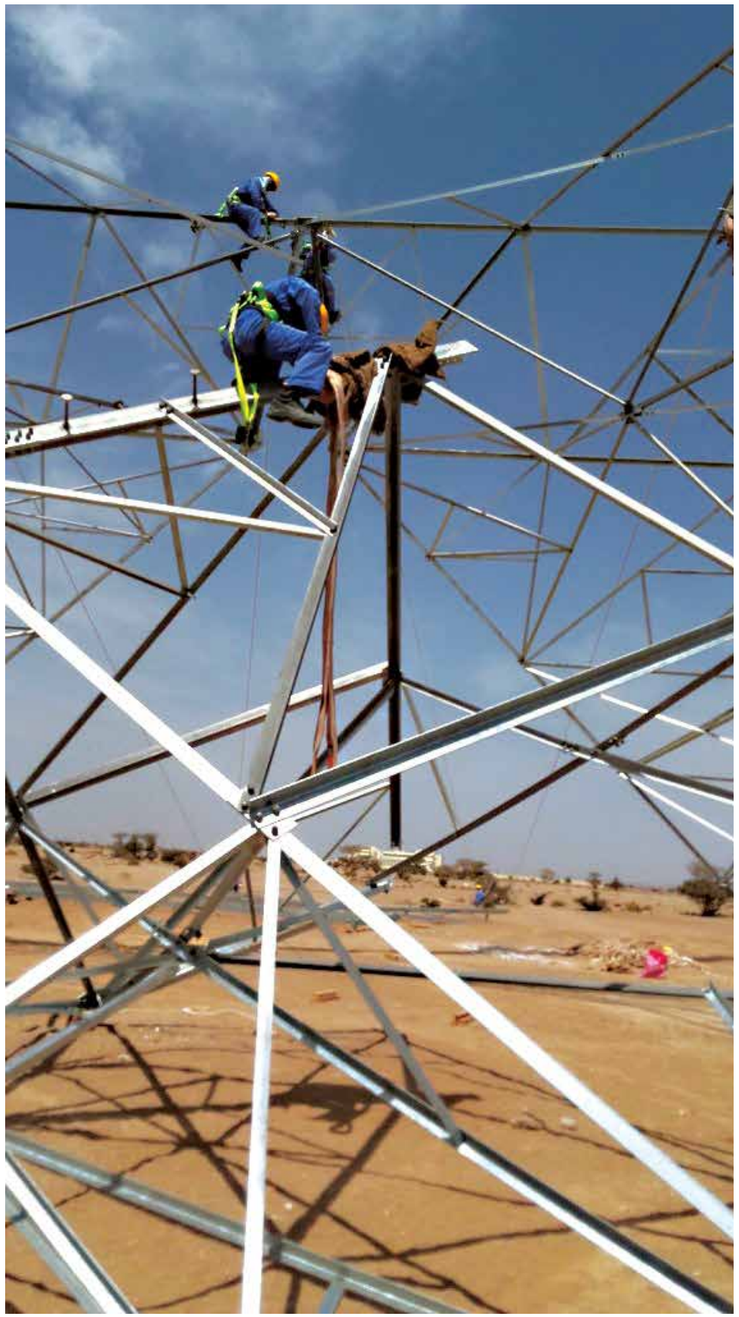
S. Ayyappan
Project Manager

There is no room for a second chance and thus it was mandatory to close all gaps for which we came up with some innovative life lines that made all the difference.

the ability to take up the works is an entirely different proposition indicates Ayyappan. "We have had cases of people not matching up to the on-field requirements" but for those who made it, "A two day training was conducted with rescue operations by a competent external agency which was followed up with a competency assessment." The safe selection process culminated with an authorization card and allotment of respective PPEs along with inspected tools and tackles.

Reaching high … safely

You may be skilled, bold and raring to go but scaling heights is akin to mountaineering, remarks Ayyappan and cautions, "There is no room for a second chance and thus it was mandatory to close all gaps for which we came up with some innovative life lines that made all the difference." Lifeline ropes were further secured with a rope grab fall arrestor for ascending and descending along with a positioning belt. "This meant a workman would not fall! But we had a plan in case of any unlikely incident backed up by the "Provision of an emergency rescue kit with trained rescue teams stationed at each height work location." At intermediate points of 20 km, there was were mobile units that could reach the locations swiftly.



Banking on a buddy system

To make working at heights safer with 360 degree monitoring, a unique buddy system was implemented by making one person responsible for a group of 8 workmen. "It is a simple bonding scheme that worked very well as each gang had a monitor who was placed outside the scope of work to look into details like weather conditions and inform the crew about adversities, if any. Additionally, a safety work log was maintained for linemen so that none of the team worked at a stretch of more than 4 hours and climbed more than 3 times a day. This initiative significantly addressed work stress and fatigue levels of the crew while, at the same time, created a safe work environment.

Taking cover during the heat wave

A constant barometer that had to be factored in was the rising mercury level across the vast dry zones for which a feasible work approach was planned with the establishment of rest shelters at junctions along the alignment. During summer, it was always an early call to work for the team with the daily targets achieved well before the heat increased. All along, sufficient oral rehydration supplements were made available. A dedicated emergency vehicle with advanced first aid ensured complete back up in case of any likely emergency.

Being cautions at crossovers

A watchful approach was advocated for all tasks adjacent to the live lines but thankfully in our scope there were no hotline crossings, shares Ayyappan. "Permit to work system was strictly ensured while in locations where access was limited, the team provided proper scaffolding and safety nets especially when work was taken up near existing live lines." What made the tasks further foolproof was the fitness of the equipment. "Right through, the equipment used for tower erection was assessed before engagement to work with the statutory requirements such as registration, license and preventive maintenance duly updated facilitating speeding up of works."

Nurturing a cross-cultural bonding

With close to 800 workmen across different nationalities it was important to propagate a feel good and secure message which was a joint effort. "The clients and other stake holders were involved in the process by organizing motivational and reward programmes on a timely basis," shares Ayyappan. As a part of corporate social responsibility, larger responsibility of being a safety ambassador was inculcated through participation in road safety campaigns, blood donation camps and other out reach initiatives.

Reinforcing ties

With close to 1500 MW of power now being channelized to the existing grid, Ayyappan and his team have reinforced L&T's ties with OETC as a premium power infrastructure developer with the credibility to deliver quality projects with the highest standards of safety. ■

Striving safely to meet a vital need

Adilabad Water Supply Scheme

A team of hardy professionals from WET IC raised the safety bar to accomplish a humongous mission of delivering water to over 10 lakh people in 21 mandals across 3 districts for India's youngest state – Telangana. Certainly, this huge task was fraught with many challenges but each milestone was achieved with care and diligence thanks to which the project was completed in just 23 months!

Understanding the terrain

For Murugan Lakshmanan, Safety In-charge, it was a hectic start as he was the 'go to man' to firm up the safe work plan across terrains which was back breaking, shares Murugan in a lighter vein. "Probably I have lost count of the number of trips I made across the alignment passing through towns, villages, trudging over hillocks and forest areas." Of course, he admits, "Every assessment was worth the effort as it enabled putting in place a specific strategy for conduit laying and integration, " a tactic that got better and better in the challenging environment for Murugan and team.

Implementing a need based induction

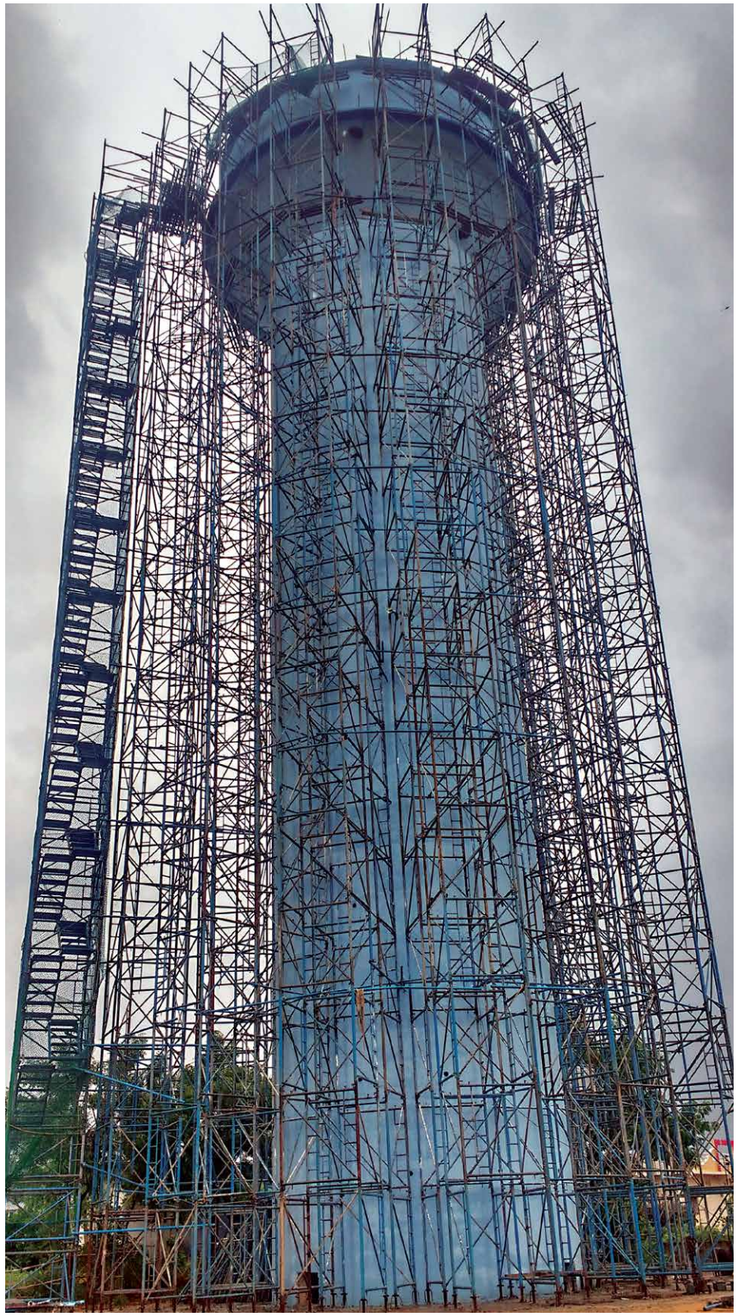
Getting to decode the work plan was the crux of the matter as essentials of the processes had to be specifically communicated to a mixed group of workmen that included skilled, semiskilled and unskilled gangs. "Appropriate exposure was given with mock-drills on safety norms along with first aid training to mitigate emergency situations," shares Murugan. In addition, "Periodic training programmes were held to nurture ground level know-how so that the workmen themselves could identify hazards and take remedial steps." It was a vital initiative as it brought about a shift in the behavioral attitude of workmen who now looked at safety not only from an execution point of view but from a conscious standpoint too."

Murugan Lakshmanan
Safety In-charge

Periodic training programmes were held to nurture ground level know-how so that the workmen themselves could identify hazards and take remedial steps.

Regulating the interventions

While training ensured safe play to a large extent, a lot still depended on how well the on-field interventions could be regulated like in residential areas where the constant flow of traffic and people made working more dangerous than across a virgin track. You had to be doubly safe, stresses Murugan, "In opening up and closing fronts." However, he reassures, "Our counter measure involved taking up section wise roads wherein one side was prepared for pipe laying and integration with the other half safely zoned for public commutation." The challenge here, he adds, was to get the approvals from the local bodies and closing in on the stretches as quickly as possible. Hard barricading with reflectors was mandatory for all roadside pipe laying along with full



body mannequins installed at the entry and exit areas to alert people about work in progress.

Laying secure approaches

Moving the pipes to the respective locations was a heavy task, heavier still especially while ascending hillocks. “To reach the higher levels, approach ways were laid similar to that of a compact sublayer in a road job,” shares Murugan, “following which authorized new generation Escorts cranes carried the conduits to their respective locations.” Apart from the pipes, for construction of civil structures on rocky terrains, the existing approach roads were strengthened with the installation of safety nets and platforms wherever necessary to facilitate safe movement of men, material and P&M.

Being alert in the woods

For those working along the 700 km alignment that passed through forest areas, the safety stewards who continuously surveyed the surroundings always sounded an extra caution. Not at all an easy job, says Murugan, “Strict instructions were given to close works by 5pm and always hold together as wild animals were frequently spotted in the vicinity. Plus, there was also the threat of Naxalites. Thankfully, we passed all those stern tests safely.”

Multiplying EHS enablers

Mission safety is always a holistic effort and at site, Murugan played the enabler card to perfection to address the scattered work locations. “Every engineer was put through safety

training thereby transforming them to be potential safety ambassadors,” a ploy that worked very successfully for the project team. “We were able to take forward the safety culture to each and every workmen,” mentions Murugan proudly. This also helped in downsizing the big numbers, orienting the workmen while piecing together one work frame after another.

Remaining safe is always a priority

All the good work has translated into many gains for Murugan and team as the site has clocked more than 3 million safe man-hours, gained laurels from a demanding client while also reassures that, at L&T, safety is always a top priority. ■

CLOSE CALL

Go Devil

Scenario

The pile cleaning object (Go Devil) was not contained during the post concrete wet pass concrete pipe line, resulting in it falling from a height of 70m thereby damaging cars parked on the ground below.

What was the cause?

1. Non closure of post concrete wet pass leading to setting of residue and concrete with the pipe line
2. Keeping pipe line open at placer base section
3. Assuming everything was clear at work spot

What are the precautions to be taken to prevent recurrence?

1. SOP guidelines to be adhered
2. Placer operators should ensure proper arrangement (bucket - as shown in picture) for containing cleaning object
3. Workplace hazard should be addressed by concerned in-charge prior to start of activity

PHEW!

Towards building a safe city!

Mumbai Surveillance Project

Mumbai is a city of paradoxes. Many of India's richest reside there, as also has some of the poorest. Where skyscrapers coexist with sprawling slums; it is India's commercial capital and the highest tax-paying city in the country with perhaps the least civic amenities; a city considered amongst the safest for its citizens, especially women, but still with a dark and violent underbelly of crime.

In the aftermath of the infamous 26/11 attacks of 2008 on Mumbai, the state government, the municipality and the police evolved a number of plans to shore up the city's defences against similar incidents and, in the process, control the law and order situation. While many of these remained stillborn, one that did come to fruition was the Rs. 1,000 Crore Mumbai Surveillance project, which is also presently the largest, such project in the country. Awarded to L&T's Smart World & Communications business unit, the project involved the installation of nearly 6,000 cameras at 1,510 sensitive junctions connected to 3 state-of-the-art Command & Control Centres to bring the maximum city spread over about 600 sq. km with a teaming population of 18 million and counting under the third eye.

The Mumbai police have found an able ally in the surveillance network that aids and fast-tracks investigations,

P R Kumar
Cluster Head

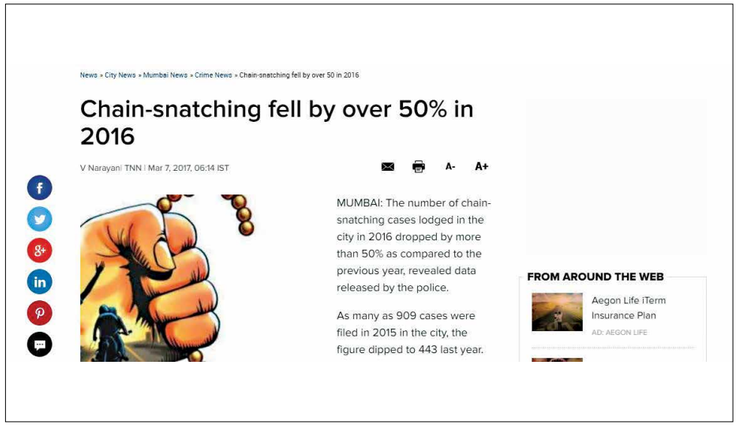
The CCTV network, though robust, will be more effective when integrated to the live feeds from other networks, like that of the suburban railway network and even private installations.

helps improve traffic management, deters, detects and thereby deals with criminal activities, monitors suspicious movements of people or vehicles, vital installations, public places and aids disaster management. Inaugurated on October 2nd, 2016, the impact of the project has been almost instantaneous.

Fall in crime rate

At a conference on 'Technology Modernization for Safer and Smarter Cities', Pratap Padode, Executive Director & Founder, Smart Cities Council India, declared that crime rate had fallen by 7.7% in Mumbai and chain snatching by a whopping 50%, as a leading newspaper headline screamed, both attributable to the CCTV network.

Crime investigations have increased pace and purpose; resolutions quicker and more effective like a gang of 4 who were arrested for robbing people at railway stations. A resident of Malad, in the city's western suburbs, was robbed off his deceased mother's jewellery worth Rs. 12 lakhs. After he had filed his complaint, the police recovered CCTV footage of the robbery committed at Malad station. Once identified, a trap was laid and the gang nabbed. The gang had apparently been following this



Crime investigations have increased pace and purpose resolutions quicker and more effective

Modus Operandi to rob lone travellers at the city's suburban stations for several years!

Finding missing persons quicker

Cluster Head, P R Kumar, SWC narrates an incident involving an employee of LTI, residing in Powai, who was a worried man one afternoon when his daughter failed to return home from school as usual. Worry soon turned to panic as the hours ticked and his daughter remained missing. He immediately filed a Missing Person's complaint with the police who swung into action, first scrutinizing the CCTV footage from around the school. The child's movements were tracked from zone to zone, until finally she was traced, unharmed to Chatrapati Shivaji Terminus at 2 am next morning.

The CCTV network, though robust, will be more effective when integrated to the live feeds from other networks, informs Kumar, like that of the suburban railway network and even private installations. Under the collaborative surveillance project, the state looks to tap into the video feeds of 102 high-value targets like malls, five-star hotels, shops, banks and railway stations, to improve surveillance, enable faster response through real-time streaming, and enhance the level of protection for these institutions. "Once an incident occurs, the system integration will ensure immediate action and a common response," explains Kumar.

Jumping a signal could cost you dear

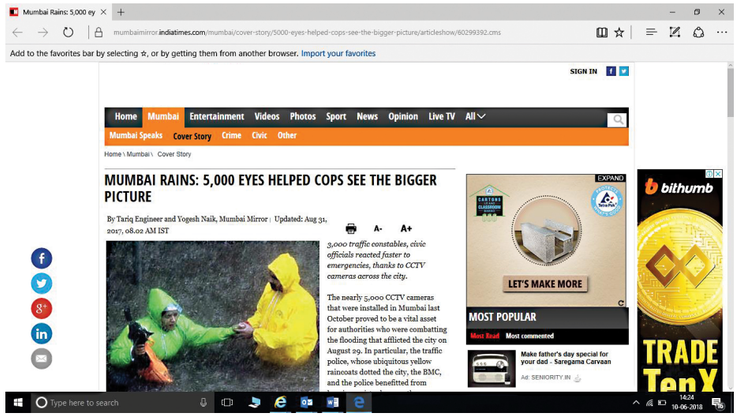
Several people were surprised to start receiving e-challans for their traffic misdemeanours like jumping a traffic light, riding without a helmet, cutting a zebra crossing or even not wearing a seatbelt when driving. This was all thanks to the CCTV network.

The Mumbai Traffic Police struck it rich initially by collecting e-challans from these traffic offenders on the roads of Mumbai. Introduced in August 2016 as a pilot project, the police collected Rs. 11 lakh of fine on the first day of the 'collection drive' and, as per police sources, the figures soared initially. However, as news of the 'electronic checking' spread, the numbers started to decline with the result a modicum of discipline has seeped into the chaos, euphemistically referred to as 'Mumbai traffic.'

A great aid to disaster management

Mumbai has a tryst with the South East Monsoon every year that always leaves the city battered and bruised. While rampant flooding is common, the CCTV network is helping authorities to reach help faster to badly affected areas.

On August 5th 2017, Mumbai was lashed by heavy rains that threw life completely out of gear. The suburban rail network on all three lines came to a screeching halt, huge traffic jams built up on the roads, with abandoned or stalled cars a common sight, as struggling commuters tried to get home anyway they could. A total of 3,000 traffic constables were deployed, spread equally across South Mumbai, the western and eastern suburbs. According to Kumar, the traffic police first realised that flooding was becoming severe around 11 a.m. At that point, they were primarily monitoring South Mumbai. Though there was little they could do about the rising water levels, they focused on getting the traffic flowing, leaving it to the Municipality to clear the water. They even drilled holes in the Sea Face wall to help drain the water; a task, Kumar said, was completed by 6 pm, allowing them to reopen the temporarily closed Worli Sea Link.



Festivals like Ganesh Utsav witness the gathering of millions. The police now have the relatively easier task of electronically monitoring such events and the option of moving in quicker to disturbed areas to bring a potentially dangerous situation swiftly under control.

Keep a good thing going

Most smart solutions are aimed at enhancing the quality of life of the citizens of a particular city and the surveillance project has immeasurable improved the lives of Mumbaikars. It is acting as a strong deterrent against crime, there is increased and improved incident detection, verification and elimination of fraudulent insurance claims, advance warnings on organized crime and potential disturbances and effective and orderly management of huge crowds during festivals. "The impact has been immediate, huge and positive," declares Kumar but he and his team realizes that it is on their shoulders to maintain the promised uptime of 99.9% for the next 5 years for which they have the O&M contract to help keep Mumbai a safe city. ■

Delivering a safe promise to 9 towns and 1097 villages

Nagaur-Bikaner Water Supply Scheme

WET IC has been in the thick of action delivering mega water infrastructure projects across some of the most challenging terrains in the country. Rajasthan, is one such state, where L&T's 'Desert Warriors' have etched a name for themselves by executing significant schemes that have been transforming lives, converting barren stretches into cultivable lands especially in and around the Thar Desert. The IC's recent accomplishment has been to build a composite water infrastructure scheme covering 9 towns and 1097 villages in just 30 months and, at the same time, adhering to the highest standards of safety.

Being familiar with the basics

For Tirthraj Gupta (TG), the EHS In-charge, getting the basics right was top priority as he knew the terrain well. It is evident from his collected poise that this young man was well aware of the ground rules as he relates the very essence of EHS in such jobs. "While the civil scope was confined across a controlled environment, what I was really concerned about was the lining up of the transmission mains across a vast alignment." To make tasks safer and achievable, he adds, "We split the works based on the scope taking into consideration the risk factors involved in

excavation, erection, concreting, laying of transmission mains and logistics."

Defining safe work procedures

With the risks factors lined up for various works, half the job was done for TG and team as these could lead to formulating safe operating procedures "since all activities were streamlined through SOPs and access to work locations was permitted only after a medical and height pass procedure followed by a skill authorization pass." Due precautionary measures were ensured with provision of safety accessories such as railing support wherever required, working platforms and full body harnesses along with safety nets. In addition to the safe methods outlined, new processes were implemented only after a thorough review by the core team backed up by continuous on-field monitoring.

Tirthraj Gupta
EHS In-charge

We achieved 100 % site specific SOP & SEC implementation which was instrumental in completing this mega job within the stringent schedule.

Leading by example

The best way to ensure a safe way is to lead by example says TG, "We needed to make an impact especially with a labor force that was largely from an agrarian background who believed in doing things the way they see!" A team of 14 EHS members were constantly on the move across fronts decoding the operational procedures, "Site specific mock drills were the order of the day during peak works but of course, no scenario was the same" he acknowledges. "Everything thing had to be well planned as it defined the outcome of deliverables across a span that was at times looking humungous." But we worked it out in a modular way, which is the best approach in such marathon jobs, assures TG.

Keeping an eye on the routine

Sometimes we take small things for granted but the fact of the matter is that nothing is routine especially from an EHS point of view. "If we can take care of the everyday tasks then most of the other priorities will align accordingly and that's what we ensured at site," TG shares. Regular EHS campaigns and trainings were conducted for the workmen to reinforce safe work methods. Additionally, every equipment deployed was under the safety radar. "At any point of time one could get the complete fitness details both for our own assets as well as those of the subcontractors'." All P&M were comprehensively safety checked before putting them into operation.

Working out on-ground strategies

Taking up works on-ground, especially excavation and trenching, are always fraught with challenges due to varying terrains but for TG and team this was again an area which worked out well. "Our safety journey began with the construction of a 5310 MLD reservoir which is where most of the water would be stored and channelized across the alignment." Pausing for a few seconds and feeling reassured by the sheen of water, TG continues, "This is like an oasis in the desert! Definitely not a steep job by any standards but nevertheless we had to take care as many of our workmen were engaged in excavating around 7.8 lakh sq.m of earthwork and building 4.5 km of embankment." Our established sloping and benching techniques saw us through the task, mentions TG but streamlining was required and the excavated muck was safely deposited 1.5 m away from the trenching area. As an additional backup, 1000 m long ledger pipes and 600 GI sheets were procured for hard barricading with warning lights, reflectors provided along the edges and separate safety ladders installed at strategic junctions for secure access.

Adding might to the logistic plan

When building an intricate network of water life lines running close to 500 km across villages and towns, public interference is a given and it was a continuous hindrance. "The entire sequence of pipe transportation and laying had to closed in phases." says TG,

"and key members of our team were involved in training work gangs on the processes that effectively bridged gaps in execution." Additionally, a holistic approach was adopted to ensure the safety of the locals, shares TG, "A secure traffic management plan was deployed that ensured movement of heavy equipment along the approved pathway thereby mitigating any unlikely interferences on field." It required lots of detailing. And even during transit, the pipes was firmly secured with the provision of an additional welded channel support at the rear of the trailer cabin to mitigate any likely disturbance in load while driving.

Customizing work platforms

Most of the civil structures were executed using customized work platforms as per the site requirement that not only ensured total safety but also enabled faster completion. "At times we made use of the lock type of scaffolding for specific structures and deployed EOT/ Cranes for foolproof execution." This process was always monitored by a trained scaffold professional who controlled the staging and dismantling activities. For access to higher levels, MS ladders with handrails were used along with MS walkways on both sides of the bracings for easy movement of workmen. A tagging system was in place to indicate the dismantled scaffold as a proactive measure to prevent reusing the same. Adequate fall protection was ensured with safety accessories such as static lines, double lanyard harnesses and fall arrestors.

Integrating the water lifelines

A depth of 4-5m may not seem much but with the conduits lined up, it could prove dangerous. Air vent systems were provided across all pipe line works while

during inspections, additional breathing masks were provided. Though the railway crossings were few, it called for a stringent execution plan with only a specific time window of close to an hour available wherein the heavy RCC pipe carriers had to be installed after cutting the track. "A specialized agency was roped in to safely integrate these joints by engaging new generation cranes with advance safety features," informs TG.

Keeping the safety record intact

All the safe work has reaped rich rewards for TG and team as the site clocked more than 4 million safe man-hours, completed all the milestones and emerged successful in the internal and external EHS audits. "We achieved 100 % site specific SOP & SEC implementation which was instrumental in completing this mega job within the stringent schedule." Not the one to rest on laurels, TG knows that keeping the safety record going is important as the onus is with L&T to ensure seamless operations and maintenance support. ■

CLOSE CALL

Mechanical Material Handling

Scenario

When a girder cage was being lifted with slings, positioned at a height of 400mm to fix the cover block, suddenly, one of the lifting points of the strong back sheared from the pipe base bring the cage crashing to the ground. Fortunately, there were no workmen around the area.

What was the cause?

1. Unsafe work method (cover block was improperly fixed)
2. Corrosive lifting point
3. Lack of routine inspection

What are the precautions to be taken to prevent recurrence?

1. Work sequence needs to be followed with a step by step procedure briefing in advance
2. Lifting tools, tackles and lifting points should be checked before each lift
3. Area should be cordoned off during lifting activities
4. Damaged or corrosive lifting materials should be discarded

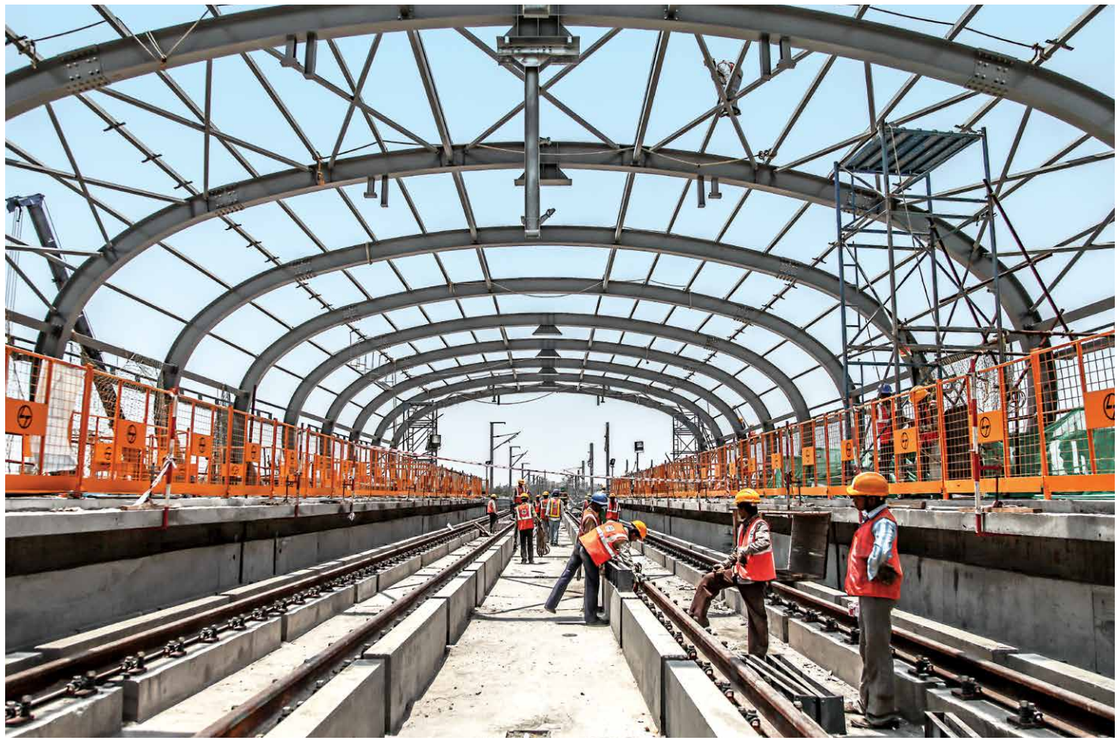
Size doesn't matter if PDCA is followed to the 'T'!

Hyderabad Metro Rail Project

The overwhelming characteristic of the Hyderabad Metro Rail (HMR) project is its size: a 72 km long viaduct, 66 stations. 3 interchange stations, 3 depots, 8 railway over bridges and 18.5 million square feet real estate development with two precast factories and RMS plants. Considering the expansiveness of operations and the number of people involved in creating this great piece of infrastructure, one can well imagine how difficult and demanding the task of maintaining quality and safety would have been for such a large project across various fronts, several of them buzzing with frenetic activity simultaneously.

That highly unenviable responsibility was placed on the broad shoulders of

> **"Of course, there were some people who felt we could relax and go slow on some of the specs, but we stuck to our guns. We won that battle, we have to win many of these small battles to ultimately win the war!"**
>
> K P Sreehari
> *Head-Station Utility Diversion, Quality & Safety Management, EMS & QMS*



K P Sreehari (KPS), Head – Station, Utility Diversion, Quality & Safety Management, EMS & QMS. "Perhaps, the first and best thing that happened for the Hyderabad Metro project from a safety and quality perspective was to select – an insider – to head the portfolio," he begins in a free-wheeling, no holds barred interaction. "The biggest and toughest tasks can be handled well if you are able to simplify them and that's perhaps the secret of our success here for we kept it really simple, following the tried and tested principle of PDCA to the 'T'," he shrugs.

Planning

The 'Insider' moved to HMRP after two decades at L&T Construction with a decided advantage. "Being a long-term L&T-ite helped because, on one hand, I knew the internal workings of the company and how things could be 'moved.' On the other hand, we formed a team that was not afraid to question, and we questioned anything and everything that we did not find proper. For that, you need to be absolutely clear on what you want to achieve, and we certainly were," he says with a definite shake of his head. "The problem is that outsiders, especially consultants, are in awe of L&T and therefore they never question but an insider can," he adds with a smile.

"So, one of the first things we did was to do away with all the outside consultants for quality and safety management though there was our design consultants – AECOM – and we followed their specifications for metro construction which were on par with international standards to the hilt. I allowed absolutely no dilution and enforced complete compliance," he declares. "Of course, there were some people who felt we could relax and go slow on some of the specs, but we stuck to our guns. We won that battle," he laughs, "we have to win many of these small battles to ultimately win the war!"

To fight his many battles, the 'insider' required able lieutenants and thus he set about building his team that soon was 60-strong and then put in place a management system that he describes, "clearly spelt out what was expected of L&T Construction, the contractors, and involved both rewards and punishment." First, the general systems and procedures were laid out and then the team got their hands dirty with some specific ones like work procedures. "We developed SOPs right from design stage. In fact, we personally checked all the calculations because if rectifications

and corrective action were required, they could be carried out at the design stage itself." All the people involved in the work had to draw up and share their work procedures for approvals before proceeding.

The best laid plans can fail if people do not possess the right orientation and skillsets to execute them right. "We evolved an integrated training programme both for workers and employees. Success of such a vast project depends heavily on improving the skill levels of the workmen for if they are aware of what they have to do, then they will be aware of the safety and quality requirements too."

Risk assessment is crucial to safety and quality and they had to contend with risks associated with working at heights, during excavations and the danger of electrocution with so much electrical work in progress. Even positioning of cranes was planned, an aspect often ignored during construction.

Doing

Once the systems were in place, it was time to implement and monitor; to put plans into action and see if they were robust enough to survive real site situations. The metro was coming up right in the midst of a crowded and bustling city with an ever-increasing population of people and vehicles. Certain issues hamper all metro construction: space constraints, traffic disruption, pedestrian intervention, noise pollution, dust creation, the list is long. While most of the huge concrete segments and girders were precast and transported to the site in the middle of the night for erection, work had to continue during the day too. "We thus drew up a robust road safety system to address this issue. Then," KPS ticks the initiatives off on his fingers, "all movement of vehicles at both the various work fronts and precast yards were meticulously managed, heavy lifts were closely monitored and the movement and erection of heavy loads carefully managed."

Good housekeeping included orders of 'No paan', 'No sleeping' under equipment or vehicles for workmen. "This was a learning from my earlier stints at other L&T sites," he points out "because workmen have a bad habit of taking an afternoon siesta in the shade of a parked vehicle or stationed equipment. Further, we took strict action against drunken driving at sites and those who reported to site drunk. We also ensured that drivers were alert when on duty night or day, rain or shine."

Checking

Periodic inspections, regular process and product quality checks were part of SOP. All batching plants were checked as were earthwork and excavations to prevent cave-ins. Run outs were stopped and deep excavations avoided during the monsoons. "In terms of products and processes, we ensured that the shutters were all of uniform 8 mm thickness and we disallowed high temperature concrete pouring." Detailed proactive and reactive monitoring indicators prevented or pre-empted accidents. "By emphasizing accident prevention, we sent out a message of caring. This approach is always less expensive in the long-term. Learning from experience, we issued proactive orders prohibiting hydra cranes, man baskets, rope ladders, manual trolleys on track and agricultural equipment such as tractor trolleys, tractor water tankers and the like that were potentially dangerous equipment."

Action

Once planning, doing and checking were completed, action followed as a matter of course. "If safety and quality standards are set and adhered to, then the pace of construction picks up because there is no loss of time. This is precisely why HMR is one of the fastest projects constructed by L&T," affirms KPS. He and his team should feel proud that their concerted efforts have borne fruit with the project maintaining Accident Frequency Rate (AFR) well below the global benchmark of 0.5 per million man hours and clocking AFR 0.20 with more than 10 million safe man hours till date.

"All I can say is that at HMRP, we had a good system to manage and a good management that supported the team to the hilt," sums up the 'Insider', rather unassumingly. ■

KPS and his team should feel proud that their concerted efforts have borne fruit with the project maintaining Accident Frequency Rate (AFR) well below the global benchmark of 0.5 per million man hours and clocking AFR 0.20 with more than 10 million safe man hours till date.

Safety Roll of Honour

Helmet congratulates to the following sites for achieving million and more LTI free safe man-hours

BUILDINGS & FACTORIES

DLF Capital Green Project, Moti Nagar
41 Million Safe Man Hours
June 2014 to March 2018

ITC Sonar Hotel Project, Kolkata
30 Million Safe Man Hours
August 2009 to March 2018

Emami City Project, Kolkata
23 Million Safe Man Hours
January 2013 to March 2018

L&T Realty, Sanofi Tower Project, Powai
20 Million Safe Man Hours
February 2013 to March 2018

IIT Project, Hyderabad
20 Million Safe Man Hours
August 2014 to March 2018

L&T Realty Bhoiwada Sales Project, Mumbai
19 Million Safe Man Hours
January 2016 to March 2018

UP Awas Vikas Basement Project, Ghaziabad
17 Million Safe Man Hours
August 2012 to March 2018

Omkar Worli Sales Project, Mumbai
17 Million Safe Man Hours
December 2012 to March 2018

ESIC Hospital Project, Coimbatore
14 Million Safe Man Hours
March 2011 to March 2018

ESIC Hospital Project, Joka
14 Million Safe Man Hours
November 2009 to March 2018

BARC Trombay Project
13 Million Safe Man Hours
June 2012 to March 2018

TATA Housing Project, Kolkata
13 Million Safe Man Hours
September 2014 to March 2018

GHP Experion Project, Gurgaon
13 Million Safe Man Hours
July 2016 to March 2018

Safety Roll of Honour

Seawoods Ph-II Project, Mumbai
12 Million Safe Man Hours
November 2015 to March 2018

DLF Cyber Park Project, Gurgaon
12 Million Safe Man Hours
December 2015 to March 2018

King Fisher Tower Project, Bengaluru
11 Million Safe Man Hours
July 2013 to March 2018

Gujarat Housing Board Project
11 Million Safe Man Hours
July 2014 to March 2018

Wipro IT SEZ Project, Bengaluru
10 Million Safe Man Hours
December 2016 to March 2018

Indira Gandhi Hospital Project, Dwarka
10 Million Safe Man Hours
September 2014 to March 2018

22 Nos Projects Achieved
5 Million Safe Man Hours
March 2018

18 Nos Projects Achieved
3 Million Safe Man Hours
March 2018

TRANSPORTATION INFRASTRUCTURE

Western Dedicated Freight Corridor Project (CTP 2)
47 Million Safe Man Hours
April 2015 to March 2018

Kandla Mundra Road Project
21 Million Safe Man Hours
April 2011 to March 2018

Rewa Katni Jabalpur Lakhnadon Road Project
19 Million Safe Man Hours
June 2015 to March 2018

MH-KNT Border to Sangareddy
18 Million Safe Man Hours
December 2015 to March 2018

Development of Unnao to Lucknow Expressway
14 Million Safe Man Hours
June 2015 to March 2018

Delhi Agra Road Project
12 Million Safe Man Hours
July 2016 to March 2018

Safety Roll of Honour

Kannur International Airport Project
9 Million Safe Man Hours
December 2015 to March 2018

Western Dedicated Freight Corridor Project (CTP 1)
8 Million Safe Man Hours
August 2017 to March 2018

Chennai Metro Track works
8 Million Safe Man Hours
February 2011 to March 2018

Ghoshpukur Salsalabari Road Project
7 Million Safe Man Hours
December 2015 to March 2018

BBT Flyover Project
7 Million Safe Man Hours
November 2014 to March 2018

Hospet Chitradurga Road Project
7 Million Safe Man Hours
May 2017 to March 2018

Mumbai Monorail
6 Million Safe Man Hours
June 2013 to March 2018

Riyadh Metro Project
6 Million Safe Man Hours
December 2015 to March 2018

Manwath Beed Road Project
6 Million Safe Man Hours
December 2014 to March 2018

Yadgiri Warangal Road Project
6 Million Safe Man Hours
June 2016 to March 2018

Bijapur Gulbarga Homnabad Road Project
5 Million Safe Man Hours
March 2015 to March 2018

Hospet-Harlapur RC Project
5 Million Safe Man Hours
January 2013 to March 2018

OPGC MGR Project
5 Million Safe Man Hours
July 2015 to March 2018

Western Dedicated Freight Corridor Project - CTP 3 (R)
4 Million Safe Man Hours
June 2016 to March 2018

Safety Roll of Honour

Sambalpur-Barapali RC Project
4 Million Safe Man Hours
April 2014 to March 2018

Lucknow-Sitapur RC Project
4 Million Safe Man Hours
November 2012 to March 2018

Sindhudurg Airport, Maharashtra
4 Million Safe Man Hours
February 2013 to March 2018

Sambalpur Rourkela Road Project
4 Million Safe Man Hours
June 2017 to March 2018

Dholera SIR - Road and Other Infra Works
4 Million Safe Man Hours
July 2016 to March 2018

POWER TRANSMISSION & DISTRIBUTION

ODSSP Erection- Phase II Package-4-OPTCL-5
3 Million Safe Man Hours
October 2015 to January 2018

ODSSP Phase-III Package - 4
2 Million Safe Man Hours
May 2017 to January 2018

UG Cabling works under Advance Scrips Project
2 Million Safe Man Hours
October 2016 to January 2018

K-TL-765KV D/C Angul - Jharsuguda TL Project-PGCIL
2 Million Safe Man Hours
July 2017 to March 2018

220 kV Multi Circuit Kishanganga to Amargarh
2 Million Safe Man Hours
June 2015 to January 2018

400 kV Cuddapah to Madhugiri TL - TW 03
2 Million Safe Man Hours
July 2016 to February 2018

400 kV Jaipur Adilabad District to Jagatial TL
2 Million Safe Man Hours
October 2015 to January 2018

H-TL-TW06 765 kV Kurnool Thiruvalam TL-PGCIL
1 Million Safe Man Hours
August 2017 to February 2018

Safety Roll of Honour

1 **N-TL-400 kV DCDS Khandwa Pithampur TL**
Million Safe Man Hours
April 2017 to January 2018

1 **N-TL-TW01 for 800 kV HVDC Raigarh Pugalur TL**
Million Safe Man Hours
August 2017 to March 2018

1 **132kV D/C JUSNL TL, NIT-42, Jharkhand**
Million Safe Man Hours
April 2017 to March 2018

1 **D-TL-TW04 for 765kV D/C Ajmer-Bikaner TL**
Million Safe Man Hours
August 2016 to January 2018

1 **220 kV Double Circuit Amargarh to Wagoora**
Million Safe Man Hours
July 2015 to February 2018

1 **230 kV Cuddalore to SP Koil Transmission Line - Pkg. F**
Million Safe Man Hours
October 2016 to March 2018

HEAVY CIVIL INFRASTRUCTURE

29 **Vizag Vessels**
Million Safe Man Hours

14 **DMRC CC-28**
Million Safe Man Hours

13 **Kakrapar – Main Plant**
Million Safe Man Hours

12 **Kakrapar – NDCT**
Million Safe Man Hours

10 **Kolkata Metro**
Million Safe Man Hours

10 **Hyderabad Metro**
Million Safe Man Hours

9 **CMRL UG 04**
Million Safe Man Hours

5 **Singoli HEP**
Million Safe Man Hours

5 **Kakrapar – IDCT**
Million Safe Man Hours

Safety Roll of Honour

5 **Kalpakkam - WMP & Allied**
Million Safe Man Hours

4 **Barapullah Bridge, Delhi**
Million Safe Man Hours

4 **DMRC CC-77**
Million Safe Man Hours

3 **Kalpakkam - FRFCF IGCAR**
Million Safe Man Hours

3 **CMRL UG 03**
Million Safe Man Hours

3 **Kochi Metro KC-03**
Million Safe Man Hours

3 **Kudankulam MP**
Million Safe Man Hours

3 **Medigadda Barrage**
Million Safe Man Hours

2 **Lucknow Metro LKCC 01**
Million Safe Man Hours

2 **Hyderabad AFA Project**
Million Safe Man Hours

2 **Mandovi Bridge, Goa**
Million Safe Man Hours

2 **WDFC 15 A Bridge**
Million Safe Man Hours

2 **RAPP Rajasthan**
Million Safe Man Hours

WATER & EFFLUENT TREATMENT

8 **Bhatpara Sewer Network and Waste Water Treatment**
Million Safe Man Hours

7 **Laying of Sewers at Cuttack**
Million Safe Man Hours

7 **River font Development Project, Patna, Bihar**
Million Safe Man Hours

6 **RDA-Pakage-1 Development Works of Kamal Vihar**
Million Safe Man Hours

6 **Kharkai Barrage with Gates and its Allied Works**
Million Safe Man Hours

Safety Roll of Honour

6 **Ratangarh Sujangarh WSP**
Million Safe Man Hours

5 **Sewerage Scheme in Varanasi City**
Million Safe Man Hours

5 **Gadag WSS - Pkg II**
Million Safe Man Hours

4 **Banswara District & Pratapgarh District WSS**
Million Safe Man Hours

4 **DWSP**
Million Safe Man Hours

4 **15 nos LIS in Cluster XV @ Bolngir Subrnapur Boudh**
Million Safe Man Hours

4 **Nagaur Package TM01**
Million Safe Man Hours

3 **19 Nos of LIS in Cluster III at Sambalpur**
Million Safe Man Hours

3 **Water Supply to Adilabad District - TDWSP**
Million Safe Man Hours

3 **Integrated Sewerage Work - Pali (Design and Build)**
Million Safe Man Hours

3 **Mohanpura LIS**
Million Safe Man Hours

3 **13 nos LIS in Cluster XIV @ Kalahandi and Bolangir**
Million Safe Man Hours

3 **Nagaur Package TM03**
Million Safe Man Hours

3 **Bansujara Irrigation Scheme**
Million Safe Man Hours

3 **Development Of IT City**
Million Safe Man Hours

3 **Sikar Alwar Bhiwadi Cluster Sewerage Project**
Million Safe Man Hours

2 **Providing Sewerage facility in Mohan Garden**
Million Safe Man Hours

2 **Erection and Services for PWS-2, Sagardighi**
Million Safe Man Hours

Safety Roll of Honour

2 **Vijayawada SWD**
Million Safe Man Hours

2 **Dholera SIR**
Million Safe Man Hours

2 **WTP for NMDC**
Million Safe Man Hours

2 **Pudukkottai**
Million Safe Man Hours

2 **SSNNL-SBC PS 4-5**
Million Safe Man Hours

2 **Cuttack Sewer Scheme**
Million Safe Man Hours

2 **Ranchi Urban Water Supply Scheme**
Million Safe Man Hours

2 **Water Supply to Khammam-TDWSP**
Million Safe Man Hours

2 **IMT Rohtak Phase III**
Million Safe Man Hours

2 **Drinking Water Supply - Sahibganj**
Million Safe Man Hours

2 **Water Supply and Distribution to GHMC**
Million Safe Man Hours

2 **Kalyani Sewerage Network and Waste Water Treatment**
Million Safe Man Hours

2 **9 nos LIS in Cluster-VI in Cuttack Dist**
Million Safe Man Hours

2 **Nellore UGDS**
Million Safe Man Hours

2 **12 nos LIS in Cluster-XI in Jajpur and Kendrapara**
Million Safe Man Hours

2 **Nagaur Package TM02**
Million Safe Man Hours

2 **Cuddalore Ph I**
Million Safe Man Hours

2 **BAPL Pkg-1- Andal**
Million Safe Man Hours

Safety Roll of Honour

1 **Nashik WSP**
Million Safe Man Hours

1 **Moradabad Sewerage Scheme**
Million Safe Man Hours

1 **Nagaur Cluster Distribution System**
Million Safe Man Hours

1 **Integrated WS and WW Sri Ganganagar Project (DB)**
Million Safe Man Hours

1 **Execution of Lift Canal System of UIIP Kalahandi**
Million Safe Man Hours

1 **Agra Water Supply Project**
Million Safe Man Hours

1 **Ash Pond With Water Recovery System-Bakreswar**
Million Safe Man Hours

1 **13 Nos LIS in Cluster-VIII in Anguldeogarh Sunderg**
Million Safe Man Hours

1 **Barrackpore Sewerage Integration Work**
Million Safe Man Hours

1 **Rourkela WWS**
Million Safe Man Hours

1 **Pune ESR and GSR**
Million Safe Man Hours

1 **Integrated WS and WW works Jhunjhunu Project (DB)**
Million Safe Man Hours

METALLURGICAL & MATERIAL HANDLING

17 **Coal Handling Plant, RRVUNL, Chhabra**
Million Safe Man Hours

13 **EGA Projects, Abu Dhabi**
Million Safe Man Hours

11 **Hot Strip Mill, RSP, Rourkela**
Million Safe Man Hours

5 **Coal Handling Plant, Khandwa**
Million Safe Man Hours

5 **Pet Coke Evacuation Project, IOCL, Paradip**
Million Safe Man Hours

Safety Roll of Honour

4 **Coal Handling Plant, Lingaraj**
Million Safe Man Hours

4 **Coal Handling System, HMEL, Bathinda**
Million Safe Man Hours

3 **Coal Handling Plant, NCL, Nigahi**
Million Safe Man Hours

3 **Coal Handling Plant,NCL, Khadia**
Million Safe Man Hours

3 **LSAW, Abu Dhabi**
Million Safe Man Hours

3 **Slab Caster, Bokaro**
Million Safe Man Hours

3 **Coke Dry Quenching Project, TSL, Jamshedpur**
Million Safe Man Hours

2 **Kansbahal Works**
Million Safe Man Hours

2 **LTEW, Kanchipuram**
Million Safe Man Hours

2 **Material Handling System, RIL, Jamnagar**
Million Safe Man Hours

2 **Coal Handling Plant. Khargone**
Million Safe Man Hours

1 **External Water System for SMS-III, BSP, Bhilai**
Million Safe Man Hours

1 **Benification Plant, SK Mines, Dariba**
Million Safe Man Hours

L&T GEOSTRUCTURE

4 **IOLPL LNG Terminal Project-Ennore, Chennai**
Million Safe Man Hours
January 2016 to April 2018

"Safety is something that happens between your ears and not something you hold in your hands!"

70 batches … 890 people trained … and counting …

Edited by Vinod Jacob Chacko for L&T Construction from L&T Construction Headquarters, Manapakkam, Chennai - 600 089.
Editorial team: V. Eswar | Ashwin Chand, Photography: V. S. Natanavelu
Process Owners: M. Kamarajan | K. N. Sen | Malay Kumar Mahanta | Stephen Philip Storey | Ramachandran N | K. S. Sudheesh Kumar
Technical Associates: P. Nagarajan | Gabrial Fernandez | Sudarsan Rajendran | Kavin. S | Vinoth. A | Minhaj Ahmed Ansari
Mathivanan Palaniappan | S. Anantha Prasanna Venkatesh
Design & layout: Global Print Design, Chennai. Printed at Srikals Graphics Pvt. Ltd., Chennai.