

GAMMON **BULLETIN**

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Scientists study the world as it is; Engineers create the world that has never been.

- Theodore Von Karman

IMS POLICY

Editorial



We are pleased to publish April- June, 2014 issue of Gammon Bulletin.

We take pleasure in presenting some of our recent significant achievements, successes, learning and events from across the country to our Gammon family, our esteemed customers and other beloved stake holders.

Santacruz- Chembur Link Road Flyover was opened to traffic on 18th April, 2014. Gammon is proud to be a part of this Project. This double deck flyover - which is first of its kind in the country is 2.45 Km long (viaduct portion) and will ease traffic in this busy corridor to a very large extent apart from reducing travel time by nearly 30 minutes. This successful achievement is important especially because the project was hindered by numerous obstacles and removal of these hindrances called for concerted efforts from all concerned including Gammon in the capacity of a contractor. Various innovative and creative tailor- made solutions were worked out for this Project which was to be executed in a highly congested area under live busy rail traffic.

Second article in the Bulletin covers innovative method adopted by Gammon to rectify the tilt of unprecedented magnitude in P3 and P4 wells of Passighat Bridge. The magnitude of the tilt was as high as 1 in 2.3 and no conventional method of tilt rectification would work for such a high magnitude of tilts and accordingly an innovative method was developed to rectify the tilt.

The News Flash section of Bulletin flashes the news of completion of tallest cooling tower at Nigrie (190.5 m tall) and 16 diaphragm panels of Intake well at Patna done by innovative technique for the first time in the country.

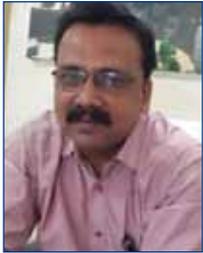
In our quest to continually improve the Bulletin, we will be glad to receive feedback and suggestions from our valued readers to make Gammon Bulletin more and more interesting and informative for the readers.

Your feedback and suggestions may please be sent to bulletin@gammonindia.com

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LINKING SANTACRUZ & CHEMBUR - INDIA'S FIRST DOUBLE DECK FLYOVER AT MUMBAI



Amitesh Ranjan
Dy. Gen. Manager

1. Introduction:-

The ambitious Project of construction of double deck Flyover was conceptualized and conceived by MMRDA to provide connectivity from Eastern Suburbs to Western Suburban of Mumbai. Funded by the World Bank, the Project is implemented by MSRDC on behalf of MMRDA (Govt. of Maharashtra). Gammon India Limited has had the distinct honour to execute this Project as a Main Contractor.

The total length for this East – West connectivity of SCLR is 6.45 Km. Out of which main viaduct part of SCLR section – II (2.45 Km), double decker flyover (0.69 Km) with additional cross arm of 0.9 Km was in Gammon scope.

2. Challenges of acquiring hindrance free ROW:

When awarded, the project site was full of Hindrances. Effective and constant coordination with all Stakeholders was done relentlessly by MMRDA, proactively supported by Gammon, to remove physical hindrances and have the ground cleared to commence execution of the works.

Challenge	Particulars	Remarks
ROW Availability	Initially planned ROW of 30m was revised to 45.7m	Formalized in 2007
GAD Drawings especially in Railway Zone	Composite Super Structure scheme approval by Railway Authorities	Nine revisions took place to meet the requirements and specifications of Railways.
Railway Crossings	Two Railway Lines (8Tracks)	Central Railway line and Harbour line
Rehabilitation	3500 hutments, Mosques, 16 Nos (G+4) MHADA Buildings were restored	

Out of total land for construction, 47% land belongs to Indian Railways and 26% belongs to MHADA. As per Railway norms before work in their area commences, each drawing & design needed to be approved by Railway. For execution also their permission and approval is required. Initially as per GAD the ROW was 30m but the same was revised to 45.7m in year 2007. There were several and frequent changes made in GAD to meet the requirements of Railway authorities. Finally ninth revision of GAD with composite super structure over Railway track was approved after vigorous follow up and coordination of all the agencies involved in the Project.

To provide this connectivity from east to west, the herculean task was to cross the two extremely busy Railway Tracks of Mumbai suburban local lines (central and harbour) which was a challenging job. The same was complicated further, as the layout has to pass through number of hutments (approx. 3500nos.), Mosques, Temple and 16 (G+4) MHADA buildings. It was extremely difficult to shift so many families and holy structures. But MMRDA was determined to do this and after vigorous efforts of several years successfully shifted all the structures and made the land available for construction of flyover.

3. Construction of Foundation:-

The Foundation of the Bridge mainly consisted of Pile Foundation for all the piers except one Open Foundation at A1 Abutment. Bored cast in situ Piles of 1200 mm dia were designed for Minimum Load Carrying Capacity of 3000 KN at Founding Level. Pile was socketed upto a length of 4.85m (3.6 m in Soft/Weathered rock and 1.25m in Hard Rock)

Out of total 1420 nos. piles, 24nos piles of P5A foundation were very critical which was much closer to main rail track (i.e. just 3.3 m from track face). The piling has been done by Rotary Rig,

so as per Railway requirement in spite of permanent liner we had to drive 35 m sheet Pile at a distance of 2.4 m from face of the track involving a depth up to 5m to prevent possible caving due to constant moving loads of trains running at the frequency of every four minutes. It was done in five hours of one night shift. The entire works from sheet piling to substructure were completed in 110 days without any need to obtain shut down from Railway.

It could be done safely only due to our proper coordination and meticulous micro planning for all resources. The various stages of P5A foundation construction are pictorially shown below:



4. Construction of Sub Structure:

The pier caps of the Bridge Portion was flared Shape with varying dimensions. Maximum Size of Piercap was 57.88m x 2.9m x 3.5m in nearby LT Terminus station.

For Construction of Piercap, we have to demolish the LTT Railway Shed for supporting arrangement of Piercap. This single pier cap is connecting 5 No's of Pier. The pier cap is constructed under heavy pedestrian & Traffic movement.



There were 5No's of Piercap in single Row that also within the distance of 50m Length. Two no's of Piercap for first level RHS & LHS side, two no's of pier cap for second floor level RHS & LHS Side and another one is in at Middle location. The super structure over the pier cap is connecting the Four no's of Arm in one Location. As per the site & Drawing condition we have to cast Middle Piercap after completion of Two Nos of Second level Pier & Piercap. After completion of second level piercap within the available restricted space we have to start Pier work at Middle location. It is very difficult to accommodate Supporting

arrangement, Reinforcement fixing & Shuttering fixing/removing for the Middle Piercap due to restricted space between two second level Piers.



5. Construction of Super structure:

Whereas the Super Structure of this Viaduct Portion consisted of Box Girder Constructed Cast in situ. The super structure for Railway portion was cast in Situ I Girder & Pre-Fabricated Steel Girders with RCC slab.

5.1 Box Girder:-

Total 102 nos of Pre-stressed Box Girders were cast, out of which 58Nos Box Girders were at 1st level & 44 No's Box Girders were at 2nd level. The Length of Box Girder varies from 21m to 49m. The width of Box Girder varies from 8.6m to 10.6m. Height of Box Girder is 2.3m including 250mm thick deck slab. The concreting of Box Girder was done in two stages. In first stage web & soffit concrete & in second stage Deck slab concrete done. Out of 102 No's of Box Girder casting of 2nos of Box Girder of 49m span Length over 18m height from the Ground Level was very critical because of heavy pedestrians and traffic movement.

At Junction Area, first level super structure was with I Girders & second level super structure was with 49 m Box Girder. As the area near the LT Terminus station having heavy movement of vehicle & people, a pathway from Tilak Nagar Local station to LTT Station was planned. Firstly Pathway diversion was done by the approval of Railway after that Box Girder activity was started. Due to the availability of less working area, more public movementetc. special composite supporting arrangements of Box Girder were planned & executed.

1. Supporting arrangement by trestles was erected over I Girder Deckslab at

RHS Side (1P20-1P21) & at 1P20 Piercap at LHS Side.

2. Supporting arrangement by cuplock system was erected over the First Floor Piercap.



3. Due to less space & safety Point of view, supporting arrangement for 31m length of Box Girder was done with inverted truss support & balance 18m Trestle Arrangement Support.



As per approved Supporting arrangement drawing, the erection of Trestle & Inverted truss done by Crane and box girder cast in two stages.



5.2 I Girder:-

Flyover consists of total 198 no's of PSC I girder, out of these 140 no's girders were at junction. These Girders are over the existing road and way to Tilak Nagar local station & Kurla station from LTT station, where heavy traffic of

light vehicles and public movement was unavoidable. To add up these constraints, a 14m wide open drain is crossing from one side and LTT station building at other side of fly over. So working space was the major constraint to execute the work in this area. The pircaps were designed in skew; as a result the length of girder varies from 15.5m to 31.7m with different cross sections in this area. The gap between two adjacent span PSC girders were only 100mm so we have to plan both in proper sequence i. e. casting one span girder with adjacent span stressing. In this particular area (7000 sqm) we have cast 140no's PSC I girders at first level and 10 no's box girders at second level in following sequence.

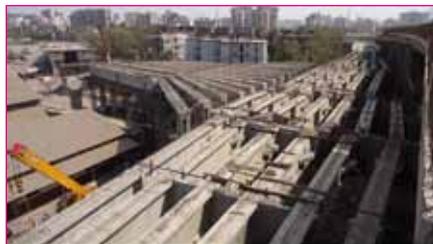
1. Cast RHS Side 1st Level I Girder & RHS Side 2nd Level Box Girder.
2. LHS Side 2nd Level Box Girder & after that LHS side 1st Level I Girder.
3. Mid Span 1st Level I girders.

Due to various length of I Girder & the transverse distance between two, I-girder is more varying from one end to another end. Due to this we were not able to complete the I Girder casting by one time erection of supporting arrangement for a single span. We have to go for erecting of two or three supporting arrangement at the same time for completion of I Girder in single span.



At another span at P33-P34 where 14 Girders were to cast, Trestle erection for I Girder Supporting was not feasible due to space constraints. The Span is over

Nallah. so we had to go for Inverted truss Supporting arrangement. Inverted Truss was erected over the Nalla wall was acting as a ground surface for Cuplock system erection. We erected the Cuplock system over Inverted truss at one location & cast two girders and side shift the same again side shift the total supporting



arrangement over the truss for next two girders casting.

I Girder at middle Span for connecting four arm at 1st Level. -

Middle span I girders casting was started after completion of 2nd Level Box Girder at 2P19-2P21 (I Girder span is below that Box Girder span only) as well as RHS & LHS Side I Girder & adjacent span I Girder also completed. Hence there was space constraint from all the three sides as well as there was no room for crane & Hydra Movement due to height restrictions.



5.3 Steel Girder:-

In Railway area, there are total 80 no's of steel Plate girders out of these 52no's are over Railway track. The maximum steel girder length was 51m with weight of 70 t.

Steel Girder execution involves activities of Fabrication, Painting, Transportation, Assembly & Erection.

5.3.1 Fabrication:-

Fabrication of this steel Girder included web plate, Top & Bottom flange of Built up I Section, End Cross Girders, Intermediate Cross Girders, Splice Plate, Stiffners Plate, Bracings & Gusset Plate etc. All structural steel conform to FE410WB as per IS:2062 Grade-B.

Upon receipt at Fabrication yard, plates are stacked as per the Heat No. Proper Marking was done as per approved drawing. Material was cut to size by OXY-ACETYLENE Flame Cutting or Sawing. All Flame cut edges shall be machined to clean, square & True edges. Edge Preparation for welding shall be done by Machine controlled Flame cutting with edges free from Burrs, clean & Straight. welding is carried out in accordance with approved welding Procedure by RDSO. For welding Two Flange Plates & Flange Plate with Web Plate Submerged arc welding shall be used as Per IS 4353-67. Minimum Thickness of Fillet weld for Fabrication of Built up sections was varying from 6mm to 14mm. After completion of

welding the segments dimension shall be checked as per approved drawings.

After fabrication of 5 nos of segments (no of segment vary based on span length) trial assembly of Girder will start. At the time of trial assembly it is inspected by client & Railways engineers jointly. After the approval from both of them, it will go for Sand Blasting & Metalizing or Painting work.



Painting system is Epoxy based applied in Five Coats (DFT=200 Microns) after completion of Grit blasting work.

5.3.2 Assembly of Girder at Site:-

After reaching to site the Plate Girder is stack on 500mm elevated ground on wooden or concrete Block. During the assembling approved nut & bolt Purchased from approved RDSO Vendor has been used. Bolts as per IS:4000 & Nuts as per IS:6623 & washers to conform IS:6649.

After Assembling of Girder the Final dimensions were checked and approved by Railway Engineer.



5.3.3 Launching of Steel Girder:

We have taken Railway & CRS approval for two methods of Launching for different spans:

1. By 300 t Capacity single crane - For all five spans.
2. By Launching Truss and two 300t crane on both side – For launching of P4 – P5A (51m) span girder over main line



Method for Launching of Steel Girder at Central Line (Pier P4-P5A) :

As per the Launching scheme we have to erect 3 Nos of Truss {Length 35m (Weight-34t), 15.88m (Weight-13t), & 18.04m (Weight-15 t)} over P4-P5A Span. So After completion of 14 nos of Girder assembly one truss (Length -18.04m) Erected over Piercap at P5A & P6 for Trail Run of Steel Girder.



And one Trial Run of Steel Girder was shown to Railway officers for Approval. After the Trail run Railway agreed to give the main line block.

As per Railway Requirement, Launching Activities of Steel Girder including Temporary arrangement i.e (Erection of Trestle & Placing 2nos of Truss & Launching of 14nos of Girders & Removing of 2 Nos of Truss & 1 nos of Trestle will be complete within a time Period of 13 Nights in 2hr 30minutes Shift /Night. Acutually we have completed all Launching Activities within a time Period of 10 Nights in 2.10 hr Shift/Night.



At a time we launched two steel girders duly connecting with each other with cross diaphragms and bracings. Longitudinal shifting done by motorized trolley and after reaching its position girders placed on pedestal by using two cranes on either sides.



By following this method all the 14 nos of Girder has been launched & Transverse shifting of Girder Done. After Completion of Launching, Truss & Trestles are removed from that Locations.

6. Challenges in the Project:

The projects of this magnitude do involve various challenges but in this project, the magnitude of the challenges was abnormal and this coupled with heavy traffic, space restrictions etc made execution of this project quite challenging.

- Land availability for construction and removal of physical hindrances
- Shifting of utilities with the permission of various Government department
- Number of revisions in GAD
- Approval of drawings from Railway
- Approval of Launching scheme from CRS
- Obtaining shut downs from Railways.
- Launching of Steel girders over running track within block time
- Extra safety and stand by arrangement to construct substructure & super structure near the rail track
- Due to space restriction for execution and critical design we have to follow the sequances for construction

7. Safety Precautions:-

1. For Launching work responsibility Chart Prepared for staff & PRW and they were strictly working as per their responsibility given in the chart.
2. Training conducted by Railway Engineer to all the staff & Labours for working in Railway Area
3. Animation made for launching Scheme & through that responsibility for each task has been defined and awarded to individuals. Due to this workers are having idea about the scheme of Launching & work as per the scheme.

4. Not only for launching work, but also for work in Height for Box Girder & I Girder work also Training was conducted for Labours.

5. Safety Plan Prepared for Launching work. Similarly Crane Lifting Plan & Crane Safety Checklist were Prepared & followed the same as per the Approved Plan.



8. Conclusion:-

1. In spite of several hindrances seriously affecting the smooth working at site, Gammon team has achieved the success of completing this first double decker flyover in India.
2. Gammon team developed many innovative engineering solutions to execute the work at different locations. By effective co-ordination and vigorous follow up with clients and various authorities, hindrances were removed. By meticulous Planning & team work, Gammon has completed the prestigious project of MMRDA in extended duration of the Contract. It is a dream project for Mumbikars and seen as a game changer for travel from eastern suburbs to western suburb. Its unique layout also enhances the beauty at ground as well as from aerial angle.

The Art of Photography

Just days after the Gammon's SCLR flyover was thrown open to public, the Photographer Mr. Umesh Vaghela was in limelight. His beautiful aerial photographs of SCLR Flyover have gone viral, and got high appreciation on Social Networking sites. We wish to give here an insight of the technique used, difficulty and thrills experienced while executing the shoot of the structure before accomplishing the final product of these pictures, which had been trending on social networking sites and applications.

Clicking pictures capturing aerial views is always an uphill task. Since the area was an air funnel zone, being close to the airport, we had to seek permission from concerned authorities before starting shooting. After detailed study of various locations on and around site in several site visits, Mr. Vaghela decided to shoot the picture from the median of the upper deck of the SCLR flyover which was providing the best shot with the view of the entire junction, including the upper and lower deck, the arm of the flyover that goes towards LTT Terminus and Tilak Nagar.



The pictures were taken using a 12 megapixel, GoPro Hero 3 + camera, mounted on a drone which can be flown to the height of 100 m. Its movements can be tracked and angles can be adjusted using a Wi-Fi connection. For SCLR pictures drone was released 70 m above the SCLR. Once everything is in place, pictures are clicked using a remote control. Without this equipment it wouldn't have been possible to take such beautiful photographs.

INNOVATIVE SCHEME FOR RECTIFICATION OF UNPRECEDENTED TILTS FOR WELLS OF PASIGHAT BRIDGE



R. RAGHAVAN
General Manager

1. INTRODUCTION

A large area of Arunachal Pradesh is devoid of proper road communication system and hence is inaccessible. With a view to provide impetus to the economic growth of this region, Govt. of India decided to develop and improve road communication in Arunachal Pradesh. Accordingly various plans were prepared including extending NH37 in Assam. To translate these plans, several formidable rivers which come in the way are to be bridged. The first major bridge is across the river Siang to connect Pasighat on south to Mebo on the north of the river.

2. THE RIVER

The long Siang river covering a distance of 1625 K.m., originates from Tibet and enters Indian Territory in high reaches of Arunachal Pradesh. From there it travels another 226 K.m. and reaches Pasighat. Beyond Pasighat it takes the name of Brahmaputra and joins Lohit river before it enters Bangla Desh and finally is engulfed by the Bay of Bengal.

Siang river is known for its immensely turbulent waters, unprecedented floods of high velocity and having large catchment area which receives heavy rainfall. A little rise in the water level increases the velocity considerably which makes navigation in the river extremely difficult especially maneuvering around well locations. The unhindered working season for the river is hardly four months in a year between December to March that too when winter season is at its peak.

3. THE BRIDGE

After examining several alternatives, it was decided by the department

(Border Roads Organization) to have multi span bridge with cantilever super structure.

The bridge is 703 m. long having span configuration of 4 x 117m, 1 x 112m, 1 x 64m and 1 x 57m.

4. THE WELLS

The wells P3 and P4 which were located in the midstream of the river in a high velocity zone were designed to be installed in place by floating caisson. The actual river bed strata encountered during the process was entirely different from what was envisaged in the tender based on pre-tender sub-soil investigation. Densely compacted and vary large boulders were found right from the upper level posing a real threat for sinking efforts which proved to be an uphill task.

5. THE MISHAP

During the season of mishap, the river experienced prolonged period of floods with discharge as high as 41000 cumec. During the flood, the river carries lot of floating logs and boulders and water level remaining as high as at 162.5m, i.e. 9m. above designed LWL. The well P3 and P4 were exposed to this unprecedented river floods and remained submerged for over six months.

After floods resided to a level upto which well was cast in previous season but when top of the well was not visible, it was realized that due to prolonged floods and heavy discharge, massive uneven bed scours must have taken place which resulted in abnormal tilts. When floods resided further and navigation around wells was possible, the tilts were measured and found to be having unprecedented in magnitude viz of the order of 1 in 2.34 and 1 in 6 for wells P3 and P4 respectively. This magnitude of tilt is highly abnormal and possibility of rectifying these tilts by conventional sinking methods was ruled out. The options left were to either nurse the tilted wells by rehabilitation by some special method or failing which abandoning the entire

wells. The proposal of abandoning of the wells is highly time consuming hence there was a need to work out a solution for bringing the well back to its normal position. The creativity of Gammon team of Engineers came into play and innovative tilt rectification scheme was worked out.



6. THE INNOVATIVE RECTIFICATION SCHEME

After a prolonged and careful thought, it was decided to pull the wells towards downstream by means of 12/8mm HT wires from either side of the bank with the help of Anchor blocks and stressing the cables. Required forces were worked out and suitable design of Anchor blocks was arrived. Besides the system of pulling, it was also necessary to carry out an extensive grabbing of river bed on the downstream side of half circle portion of tilted well with 2nos. cranes so as to reduce the surrounding earth pressure and allow the well to fall on the downstream side by its own weight in a resistance free manner as pulling continues.

Additional lifts of well steining were cast with a provision of embedding and locking pre-stressing cables at dead end at inner face of the well. This portion was strengthened with additional reinforcement and rich concrete so as to serve as the anchor.

The laying of HT wires in the fast flowing river was extremely difficult task. To facilitate this six floating bamboo made crafts were deployed along the line of alignment of well. Additional precautions were taken to avoid different or unequal sags and twisting of wires while laying.

After laying of wire to the well location the dead end of wires were locked in the well with Freyssinet anchorage system. After laying twelve wires in between well and anchor blocks, the wires were bundled to form a cables and such four cables of twelve wires each were laid from well to both sides of end blocks garlanding the well.

Two nos. of cranes were stationed on barges face to face on either side of the wall along the bridge alignment to carry out grabbing. Simultaneously pulling of wells by stressing of cables from both side end anchor blocks and very extensive grabbing with two floating cranes was carried out both from inside and outside on downstream portion of the well to bring the well to its normal position.

7. PROBLEMS ENCOUNTERED AND THEIR SOLUTIONS

This scheme during its implementation encountered several problems, solutions of which were worked out on-the-spot at field level by able team of GAMMON Engineers.

7.1 Uneven river bed profile

As the river bed profile along the axis in between well and end anchor blocks were uneven and HT cables had to cross substantial length on dry river bed with ups and downs, the cables were touching dry bed at various locations creating friction and thereby losing part of the stress. To avoid such losses, several propped supports were given in dry bed at various locations to maintain the level of the cable profile as desired.

7.2 Crushing of Pre stressing cones

Initially concrete male and female cones were used for stressing cables. But these cones were getting crushed because of enormous stresses generated by repeated stressing, locking and de-stressing of cables. The operation involved number of de-stressing operations as extension of jacks at any given time was restricted to only 300mm. Ultimately to overcome this problem, steel male and female cones had to be provided.

7.3 Difficult Soil strata

Since sub-soil was consisting of densely compacted materials mixed with heavy boulders and gravels, no satisfactory materials were coming out during the grabbing inside the well. At the end of the day when work was stopped, sump was getting filled up with rolling boulders and gravels due to water current. To solve this problem extensive diving inside the dredge hole was restored for clearing the sump area. Also minimum eighteen hours of grabbing was done by each crane every day and thereby reducing idle time during which sump was getting filled.

7.4 Extension of Well steining

It was realised that during the process of tilt rectification, the well may get submerged as tilt rectification will result in sinking of the well. Since the erection of steining shuttering at well location was not possible, the entire steining shuttering in required shape was erected outside the well and placed as a caisson on steining with the help of two cranes. All shuttering plates were provided with gasket and utmost care was taken to make shuttering water-tight before it was put to use.

8. IMPLEMENTATION OF SCHEME

The scheme was first implemented in well P3. Pulling of HT wire with pre-calculated heavy forces and simultaneous grabbing with the help of two cranes was carried out. The cables were stressed using S7 hydraulic jacks. The stress applied and developed in each cable step by step was in the increments of 25t pulling forces.

After grabbing for over 500 hours and removal of soil on both inside as well as outside of downstream portion of well and applying forces through four cables on either side of jack with pressure upto 290 kg/cm² in each cable, positive signs of movement were observed.

When the well started moving in the required direction, operations of grabbing and stressing of cables were continued vigorously in a controlled manner to maintain of the well which was checked regularly by theodolite and leveling instruments. When well was rectified to the level of 1 in 13 tilt, monsoon was set and further rectification was suspended which restarted again after monsoon. It needed further 60 days of extensive efforts in the next season to bring the well to its normal position.

9. CONCLUSION

Successful rectification of massive tilt of well P3 and P4 of Passighat Bridge are great examples of innovative approach in the field of bridge engineering.

Rectifying tilt of this magnitude is in itself a herculean task which coupled with other adverse factors (like unpredictable weather, excessive rains, heavy floods, tremendous velocity of river water, communication problem, extremely limited working season and other limitations of remote location etc.) made this a great challenge for Gammon Engineers. The success in this mission inspite of all odds is a result of sheer determination and dedication of team of Gammon Engineers.



It is expected that documenting of this innovative success story and making it available for use by brother engineers elsewhere will go a long way in the history of innovative bridge engineering.

TEAM MANAGEMENT SKILLS

1. Introduction

You've just got a promotion or a new job as a Manager. Congratulations! What a challenge! Or, maybe you've just been given the task of pulling a new team together. Either way, whether your team exists already or it's your responsibility to create it, it is a challenging task. How will you go about this? What do you do first? What do you do next?

This article looks at some of the key things that team Managers need to do if their team is to thrive and succeed. These range from choosing the right people and deciding who does what, communicating with internal and external people, developing and motivating people. It also covers some of the most common pitfalls to be avoided.

2. First Things First

Before we go to the topic of developing a team, it is necessary to understand the vital difference between management and leadership.

A good starting point is the quote of Warren G Bennis: "Leaders are people who do the right things; managers are people who do things right."

Leadership involves creating a compelling vision of the future, communicating that vision, and helping people understand and commit to it. Managers, on the other hand, are responsible for ensuring that the vision is implemented efficiently and successfully.

Of course, these two roles may overlap and to be fully effective, you need to fulfill both roles. However, the focus of this article is on the specific skills and responsibilities of managers and on the tools available to them. After all, there's no point energizing people to work towards a

fabulous vision of the future, only to fall flat on your face when it comes to implementation.

3. The Importance of Delegation

The top priority for team managers is delegation. No matter how skilled you are, there's only so much that you can achieve working on your own. With a team behind you, you can achieve much more and that's why it's so important that you delegate effectively!

Successful delegation starts with matching people and tasks, so you first need to explain what your team's role and goals are. A good way of doing this is to put together a team charter which sets out the purpose of the team and how it will work. Not only does this help you get your team off to a great start, it can also be useful for bringing the team back on track if it's veering off course.

Only then will you be in a position to think about the skills, experience and competencies within your team, and start matching people to tasks. This is basically a task allocation. In real world you never get a human resource perfectly matching your requirements and it is challenging task to identify and manage the gaps between team members' skill sets and requirements.

4. Motivating Your Team

Another key duty you have as a Manager is to motivate team members.

Popular Theory X and Theory Y explains two very different approaches to motivation, which depend on the fundamental assumptions that you make about the people who work for you. If you believe that they're intrinsically lazy, you believe in Theory X, while if you

believe that most are happy and willing to work, you'll tend towards Theory Y. Make sure that you fully understand these theories – they will fundamentally affect your success in motivating people.

Whatever approach you prefer to adopt, you also need to bear in mind that different people have different needs when it comes to motivation. Some individuals are highly self-motivated, while others will underperform without managerial input. As a leader you need to manage them in either case. Also one particular approach of motivating a person may not work for the other person.



TWENTY YEARS DOWN THE MEMORY LANE !!!

- M U SHAH

A Civil Engineer's wife awakes during the night in a site colony and find that her husband is not in bed with her. She goes downstairs to look for him. She finds him sitting in the verandah with a cup of coffee in front of him. He appears to be in deep thought, just staring at the sky. She watches as he wipes a tear from his eye and takes a sip of his coffee.

"What's the matter, dear?" she asks. "Why are you in verandah here at this time of night?"

The husband looks up sipping coffee, "Do you remember twenty years ago when we were dating, and you were only sixteen?" he asks solemnly.

"Yes, I do," she replies.

"Do you remember when your father caught us in the back seat of my jeep"

"Yes, I remember," says the wife, lowering herself into a chair beside him.

The husband continues, "Do you remember when he shoved the shotgun on my forehead and said, 'Either you marry my daughter, or I'll send you to jail for 20 years?'"

"I remember that, too," she replies softly.

He wipes another tear from his cheek and says, "I would have gotten out today !!!"

5. Developing Your Team

Teams are made up of individuals who have different outlooks and abilities, and are at different stages of their careers. Some may find that the tasks you've allocated to them are challenging, and they may need support. Others may be "old hands" at what they're doing, and may be looking for opportunities to stretch their skills. Either way, it's your responsibility to develop all of your people.

Your skills in this aspect of management will define your long-term success as a Manager. If you can help team members to become better at what they do, you'll be a manager who people aspire to work for, and you'll make a great contribution to your organization, too.

The most effective way of developing your people is to ensure that you give regular feedback to members of your team. Many of us are nervous of giving feedback or feel shy in giving the feedback, especially when it has to be negative. However, if you give and receive feedback regularly, everyone's performance will improve.

You need to appreciate and understand development needs of individual team members, so that they can perform at their best. If you have to bring a substantial number of new people into your team, it is a great challenge. You need to learn the art of forming, storming, norming and performing to learn about the stages you can expect your team to go through. You can do a lot to help your people through this process.

6. Communicating and Working With Your Team – and With Others

Communication skills are essential for success in almost any role, but there are particular skills and techniques that you'll use more as a Manager than you did as a regular worker. These fall under two categories: communicating with team members,

and communicating with people outside your team. We'll look at each in turn.

6.1 Communicating With People in Your Team

As a team manager, you're likely to be chairing regular sessions as well as one-off meetings. Meeting of all kinds, and regular ones in particular, are notorious for wasting people's time, so it's well worth mastering the skill of running effective meetings.

Many meetings include brainstorming sessions. As a team manager, you'll often have to facilitate these, so you'll need to be comfortable with doing this. There's more to this than simply coming up with creative ideas, as you do when you're just a regular participant in such a session. Make sure that you understand where they can go wrong, and what you can do to avoid this.

Active listening is another important skill for managers – and others – to master. When you're in charge, it can be easy to think that you know what others are going to say, or that listening is less important, because you've thought of a solution beforehand anyway.

Don't fall into this trap. Most good managers are active listeners: it helps them detect problems early (while they're still easy to deal with), avoid costly misunderstandings and build trust within their teams.

6.2 Communicating With People Outside Your Team

Your boss is probably the most important person you need to communicate with. Take time to understand fully what your boss wants from you and your team – if you know exactly what he likes, and how he prefers this to be delivered, you'll be better able to meet with his approval.

Don't be afraid to ask your boss to coach or mentor you: you can usually learn a lot from him, but he may not be proactive about offering this. If

you're approaching your boss for advice, make sure you've thought things through as far as you can. Introduce the subject with a summary of your thinking, and then say where you need help.

Also, as a manager, part of your job is to look after your team and protect it from unreasonable pressure. Learn skills like assertiveness and win-win negotiation, so that you can either turn work away, or negotiate additional resources.

Another part of your job is to manage the way that your team interacts with other groups. Use stakeholder analysis to identify the groups that you need to deal with. Then talk to these people to find out what they want from you, and what they can do to help you.

Apart from your own team or other groups in your organization, you need to communicate with external world viz. Customer, Vendors and other Stakeholders.

7. Managing Discipline

However much you hope that you won't have to do it, there comes a time in most managers' careers when they have to discipline an employee. Discipline may be subtly different from basic feedback, because it doesn't always relate specifically to the employee's work. You can give feedback on their phone manner, for example, but handling problems with timekeeping or personal grooming can need a different approach.

Obvious breaches of the law or of company policy are easy to identify and deal with. But what of other situations? On one hand you don't want to seem petty. On the other hand, you can't let things go that should be dealt with.

Use these rules-of-thumb to decide whether you need to take action. If the answer to any is yes, then you need to arrange a time to speak to the employee in private.

1. *Does the issue affect the quality of the employee's deliverable to the client (internal or external)?*

A Section In-Charge regularly comes to site late, although he stays at Site till late evening. Customers are sometimes frustrated by not being able to get through to him at the start of the day, particularly when he's working on critical activities.

2. *Does the issue adversely impact the cohesiveness of the team?*

Individual Section In-charges tend to work on their own sub projects and meetings do take place between them, so cohesiveness is not impacted. However people are noticing his lack of punctuality, and other people's timekeeping is beginning to slip.

3. *Does the issue unnecessarily undermine the interests of other individuals in the team?*

The deputy of late comer Section In-charges is unhappy that he has to field calls from clients and attend to them before he reaches the site and is unable to give a firm answer to the question "When will he be in?"

In this situation, the manager decides to speak to the latecomer because of the impact on his co-worker. They agree that coming in to work late is not a problem (he has a long commute, with heavy traffic en route) but that he will commit to being in site by 8.30 a.m. every day if not at 8.00 a.m. to reduce the number of calls his co-worker has to field, and also give him a fixed time to give clients. He will work late to make up time, and will take on a task as per requirement.

When you are faced with a potential discipline issue, take time to gather information about the situation, decide what you're going to do, and act. Discipline issues rarely go away of their own accord, and they usually get worse, often causing considerable resentment amongst other team members.

8. Traps to Avoid

There are a number of common mistakes that new managers tend to make. Take care to avoid them!

These are:

- Thinking that you can rely on your existing job knowledge and technical skills to succeed as a manager. It is essential that you take the time to develop good management and people skills as well – these can be more important than your technical skills!
- Failing to consult regularly with your boss, in a misguided attempt to show that you can cope on your own.
- Approaching your boss without having thought a problem through, and without having considered how the problem could be solved.
- Embarrassing your boss, or letting her get a nasty surprise. Follow the "no surprises" rule.
- Doing anything that requires your boss to defend you to others. This can cause your boss to "lose face" with his peers and superiors, and it makes it look as if his team is out of control.
- Failing to talk to your customers

(whether internal or external) about what they want from yourself and your team.

- Using your authority inappropriately – make sure that everything you ask people to do is in the interests of the organization.

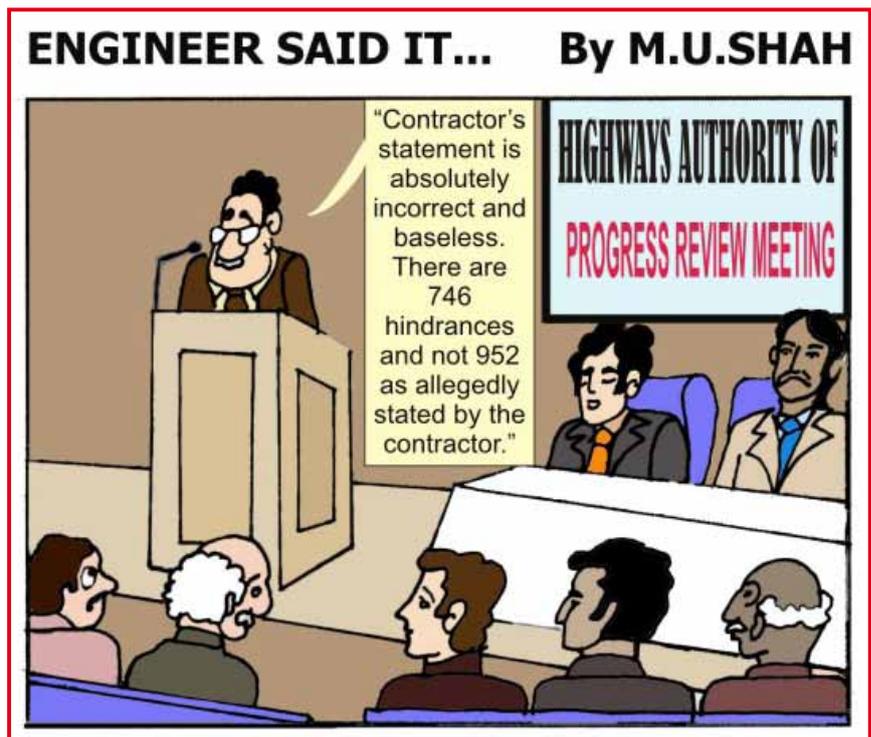
Many of these points sound obvious, however it's incredibly easy to make these mistakes in the rush of everyday managerial life.

9. Conclusions

When you move from being a worker to a line manager, you need to develop a new set of skills, and make use of new tools and techniques. These will help you with the key management activities of organizing, motivating, developing and communicating with your team.

Above all, key thing is learn how to delegate effectively. However, also learn how to motivate people, develop team members, communicate effectively with people inside and outside your team, and manage discipline effectively.

And make sure that you avoid the mistakes that many new managers make!





SERIOUSLY, LAUGHTER IS THE BEST MEDICINE

(LET US) MAKE(IT)UP !!!

- M. U. Shah

From my childhood days I hate looking in the mirror. I don't know why but somehow I don't like looking in the mirror – may be in my own esteem I don't like my face or whatever but the fact remains that I don't like to see in the mirror. I tend to agree with M.F. Moonzajer, when he wrote : "Stop looking in the mirror and forget how you look like; we are all special the way we are."

When my beard started growing I had to compulsorily look in the mirror for shaving but then it was limited to this daily chore at 7 o'clock in the morning (in fact I was using stainless steel blade with brand name 'Seven o'clock' which was popular in those days though because of aggressive marketing by Gillette, stainless steel blades have got practically eliminated). However the frequency of this encounter with mirror was limited to once in a day only. Since then this daily routine continues except that it does not happen on Sundays unless some review meetings are scheduled in office on Sundays.

Once somebody asked me if I had an option of getting fulfilled one and only one wish, what would I ask.

I replied, "I wish I could avoid looking in the mirror for say six months!"

Of course for this I will have to take six months leave from office because currently I don't like my face myself but if I had to grow my beard for more than six months, many people from office will start agreeing with me!

Contrary to this, ladies love mirror- more than their respective boyfriend(s) or husband(s). Study shows that on an average, women stare in the mirror 38 times a day. Some of them do it out of sheer vanity, others because they hate the way they look and want to try and change it. Of course whether they can change it or not is altogether a

different matter. Many women wear thick makeup and even strange looking clothing to disguise the perceived flaws and repeatedly seek reassurance by looking in the mirror. But whatever the reason, it seems staring at our self in the mirror does more psychological harm than good. New research shows volunteers who gazed at their reflections for up to ten minutes at a time gradually became more and more anxious and depressed about their looks - even if they were perfectly happy with them to start with.

Passion for looking in the mirror exist in whole spectrum of population of ladies starting from Miss universe kind of beauties on the upper side of the range to even not-so-beautiful kind of ladies on the other end of the spectrum. We can perhaps understand ladies on north of this spectrum using mirrors but I am yet to understand why those on south of this spectrum need mirror! Similarly this love for mirror has nothing to do with the age - irrespective of age women love mirror with same intensity though Balthasar Gracian, writes in his book, 'The Art of Worldly Wisdom' that "A beautiful woman should break her mirror early" but somehow many women do not agree with Gracian.

A retired Civil Engineer and his wife are getting ready for bed. The wife is standing in front of a full length mirror taking a hard look at herself.

"You know, dear," she says, "I look in the mirror and I see an old woman. My face is all wrinkled, everything else is either sagging or bloated. I've got fat legs, and my arms are all flabby."

She turns to her husband and says, "Tell me my dear, something positive to make me feel better about myself."

The Engineer studies hard for a moment thinking about it and then says in a soft, thoughtful voice, "Well,

your eyesight is perfect. There's nothing wrong with your eyesight!!"

Also women's love for mirror and makeup is universal. Tracy Letts once wrote "All women need makeup. Don't let anybody tell you different. The only woman who was pretty enough to go without makeup was Elizabeth Taylor and she wore a ton."

Similarly Hannah Harrington wrote, "All of them are the same type; girls with over-processed hair and too much makeup and way too much access to Daddy's credit cards. Girls who, if you took away the designer labels, hair dye and cover-up, wouldn't be more than average-looking, but with all that stuff look too plastic to be pretty."

Once I went to one of my close relatives' place in Gujarat. They had a small house with only two rooms and out of these two rooms only one of the rooms was having the facility of mirror. When my relative saw my face unshaved till ten o'clock, he asked me why I have not finished shaving as yet though it is past ten am. He asked whether I need a shaving kit. I wanted to say that mirror is not free but protocol of close family relation prevented me from giving this blunt answer. He had two young daughters who from seven o'clock in the morning - the moment they got up, started queuing up in front of mirror. If younger one takes more time, elder one will come and push her and by the time they both partially finish their work, their mom will come and replace them. Sitting on sofa, with newspaper in my hand, I kept on watching these three ladies struggling to get priority in front of mirror. If one would try to stop the other in the middle, the other would say, " Hold on, it is my turn now. I have not used mirror for even twelve minutes till now. When it was your turn you used mirror for twenty minutes. I am entitled to take twenty

minutes or being elder to you even more." Seeing this I didn't dare to use mirror for shaving purpose. I thought if I start shaving and in the middle one out of three ladies gets an urge to look in the mirror on emergency basis, forgetting अतिथि देवो भव: culture of India, they may push me away from the mirror, while shaving cream is still on my face, which will put not only me but even host also in an embarrassing position. I always try to avoid conflict kind of situations-both in office and at home front and accordingly I decided to postpone use of mirror till it became free but that was not to happen and at lunch time I had to go to a nearby saloon for a shave. The next day morning I got up at 6-30 am, well before these three ladies get up, to use the mirror before it is engaged.

Once one young Civil engineer took his girlfriend to an open air theater for one programme. His girlfriend told him to bring some popcorns from outside. He left for bringing popcorns. Meanwhile there was a down pour of rain. When he returned to his place, he asked the lady, "Excuse me madam, my GF was seating in this seat, do you have any idea as to where she has gone?" What happened next can be understood without writing about it. In fact this was an eye-opener for him at the right time. He realized for the first time in his life the difference between girls with and without makeup. Of course for the purpose of 'go' or 'no go' kind of a decision for marriage, he knew what was more relevant.

In marriage vows they say husband has to take an oath that he will love her both in good times and bad times and that he will never leave her deserted. May be we may have to introduce an additional vow that husband will love her in both situations - with and without makeup.

One frequent traveler Civil Engineer returned from a tour but due to delayed flight it was past midnight when he reached his place. He pressed the doorbell of his flat.

The lady in a night dress (without makeup) opened the door.

He said, " Sorry, madam, I think I am on the wrong floor."

His wife dragged him inside saying, "Come in. I will show you the right floor!"

One gentleman who was unmarried even at age of 35 years plus when asked why he has not married as yet replied, "I am earning wages of Rs. 220 per day. If I marry, my wife's lipstick alone will cost Rs. 220. How can I survive?"

Once I went to a restaurant in the afternoon. I heard a group of ladies chanting aloud: 'Let us make it up! Let us make it up!'

I asked one of the waiters as to what they are doing. The waiter replied, " This is a kitty party of group of ladies. They come here every Saturday."

I said, " That's fine but what this loud chanting is all about?"

He replied, " They are saying 'Let us make it up' i.e. whatever deficiencies are there in our beauty, let us make it up (by makeup)!!!"

That day I understood why Shahnaz Husain's business is growing by leaps and bound when giant infrastructure companies are de-growing at fast rates. I am a student of Stock Market and keep tracking growth stories across sectors and across countries and could trace back growth of all companies but one company whose phenomenal growth I was unable to explain through theory was the company in the business of beauty. Corporatisation of beauty business has converted this business to an enviable billion \$ opportunity as a result of which many board room discussions started focusing on diversification in this space rather than continuing with debt-trapped infrastructure sector. Another beauty of this beauty product business is that it is seldom affected by cyclic ups and downs common for all other sectors. Whether there is a bullish

environment or bearish environment, the business of beauty products grows alike.

Once a Stock Market expert was asked by a television journalist as to which scrip excites him the most. He replied, " Lovable Lingerie !" What he really meant to convey was that this scrip has given a fantastic return of over 50 % in one year. When many companies are struggling for survival, I don't know why both the top line and bottom line of business of lingerie is growing at such a fantastic rate! They say that though lingerie of latest fashion fetch fantastically high price premium, cost of production of such so called expensive lingerie is hardly anything which is the secret of they generating huge profits.

I agree with Mokokoma Mokhonoana when he once said, "Primary purposes of a mirror are twofold:

- (1) To help civilized men realize their imperfections and
- (2) To help the imperfect hide their imperfections."

Inspired by this beautiful quote when I became older, I started using mirror for self-introspection. I realized that mirror is the best tool for self-introspection and accordingly I installed a full size mirror in our house. I liked this idea and started using mirror more and more. Over a period the frequency increased to such an extent that my wife started doubting me. It needed a lot of time to explain to her that I am looking at the mirror only for self-introspection and not for cosmetic purpose. I said to her "You know that I have not used mirror for cosmetic purpose even when I was young. What makes you thing that at this age I could use mirror for cosmetic purpose?"

We are so much obsessed by mirror for cosmetic purpose right from our childhood days that we need decades of personal self-experience to realize what Sophia Nam once said, "The mirror is the worst judge of true beauty!"

WORKS IN PROGRESS



Pylon Fabrication shop in China for Signature Bridge



Pylon base erection at Signature Bridge, Delhi



Elevated Water Tank at Patna, Bihar



General Civil Works for 3 x 660 MW Power Plant at Sasan, MP



Pylon Pedestal Casting at Surat Cable Stay Bridge, Surat



Sub-structure Works at Gangapath Elevated Road, Patna, Bihar



Repairs Works at Old Ganga Bridge, Patna, Bihar



Flue Can Erection for Chimney, Sagardighi, West Bengal



A Million thanks to our **ESTEEMED CUSTOMERS**



NEWS FLASH

1. Change in Skyline of Nigrie.

Gammon's Project Team Successfully Completed the Shell for Second Natural Draught Cooling Tower (NDCT-2) at 2x 660 MW Ultra Mega Power Project for Jaiprakash Power Ventures Ltd. at Nigrie, Madhya Pradesh with remarkable Quality, Safety & perfection in Shell Profile.

Standing tall at 190.5 m and changing skyline of Nigrie, this is the second tallest NDCT constructed by Gammon Team till date.

2. Completion of Diaphragm Panels for Intake Well at Patna.



GIL Patna Water Supply site completed the last and 16th panel of diaphragm wall of Intake Well on 5th June, 2014.

Well by diaphragm wall method has been done for the first time in the Country. GIL adopted this innovative technique instead of conventional method of casting well. Whereas conventional method of laying kerb and casting lifts of staining one by one and simultaneously sinking the well is quite time consuming, this innovative method requires very short time for construction. In major rivers like Ganges where working season is very limited, the construction of well by conventional method could span two working seasons and between two seasons the well is vulnerable to possible tilts during floods. As against this construction of well up to the level of island by diaphragm method has taken about three months only resulting in substantial saving of time.

INSPIRING STORY OF THE PREGNANT DEER

In a forest, a pregnant deer is about to give birth to a baby deer. She finds a remote grass field near a strong-flowing river. She considers this to be a safe place and she plans to settle down there to give a birth to a baby.

Even before she settles down, labour pain begins. Simultaneously all of a sudden dark clouds gather in the sky with thundering and lightening. In a couple of minutes severe lightning accompanied by loud thundering strikes the grounds which leads to a forest fire.

She looks to her left & sees a hunter with his extended bow pointing at her. To her right, she spots a hungry lion approaching her. Thus she is surrounded by a hunter on left, a lion on right, fire on one side and flowing river on the other side.

What can the pregnant deer do?

She is in labour!

What will happen?

Will she survive?

Will she give birth to a baby deer?

Will the baby deer survive?

Or will everything be burnt by the forest fire?

Or will she get drowned in flowing river?

Or will she perish to the hunters' arrow?

or will she die a horrible death at the hands of the hungry lion approaching her?

She just cannot escape anywhere as she is constrained by the fire on the one side & the flowing river on the other & hunter on the left and lion on the right.

What she should do?

Do you know what she did?

She prays almighty God and focuses on giving birth to a new life completely forgetting about what all happening around her.

The sequence of events that follows are:

- While the hunter was about to release his arrow towards the deer, one more severe lightning strikes & blinds the hunter. The arrow which got released from the hunter's bow zips past the deer but strikes the hungry lion.

- It starts to rain heavily & the forest fire is slowly doused by the rain.

- The deer gives birth to a healthy baby deer.

In our life too, there are moments when we are confronted on all sides with difficulties, problems, challenges, negative thoughts etc. and possibilities or opportunities are not easily seen. However even under such worst situations also possibilities and opportunities do exist. We, somehow need to look for possibilities and opportunities even in such extreme circumstances. We will find that positivity is so powerful that it overcomes our problems & overwhelm us.

Maybe we can learn from the deer. The priority of the deer, at that given moment, was simply to give birth to a baby. The rest was not in her hands & any action or reaction that changed her focus would have possibly resulted in death or disaster. A wrong move and in a fraction of second she could have perished. But under the guidance of almighty God, she rightly focused on the most vital thing at that point of time and completely ignored rest of the things.

Ask yourself, where is your focus?

How strong is your positive approach?

Where is your faith and hope?

In the midst of any storm, do keep it on God always.

He will never ever dissappoint you. NEVER.

Remember, GOD neither slumbers nor sleeps...

COMPANY NEWS

WELCOME TO GAMMON FAMILY



ASSISTANT VICE PRESIDENT

Aniruddha Deshpande

GENERAL MANAGER

PeushShanker

DEPUTY GENERAL MANAGER

KabiladossRajagopal

MANAGER

Abhijit Gupta

BhupatiBera

Pranesh Ghosh

DEPUTY MANAGER

Mahendra Desai

Swaminathan Pichuiyer

Rajiv Rishi

Rakesh Srivastava

SumanGusain

SougataMitra

Narayanamoorthy Panchaksharam

Nikhil Dawda

Anand Holkar

Sandeep Kumar

AWARDS



National Safety Awards

As a part of Corporate initiatives towards promoting Construction Safety culture in the Organization, we participate & nominate various Gammon Sites for Safety Awards declared by National Safety Council every year. In year 2013 also Gammon actively participated for Safety Awards program in a big way.

With profound pleasure, we state that the following Gammon Projects were declared winners for prestigious "Safety Award" of Year 2013.

Prashansa Patra Award

8611 Mumbai Port

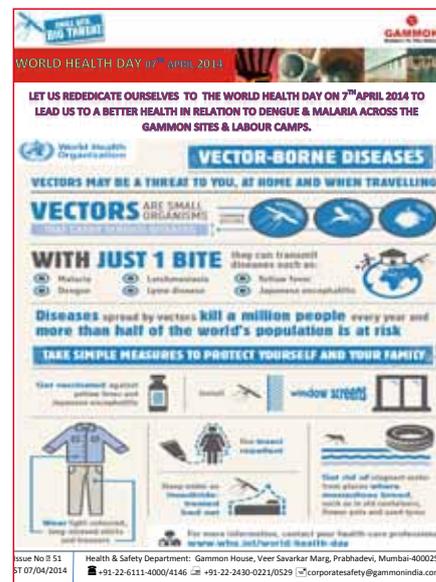
Appreciation Certificates

- 8707 Wazirabad Bridge
- 9012 RVNL Station Building
- 8932 Runwal Elegant Building
- 8950 Lapanga Chimney
- 8804/07 Krishnapatnam DCT
- 8728 Guwahati WSP
- 8949 JSW Civil Works, Bellary
- 8802 Munger Bridge
- 8847 Signature Bridge

We wish to place on record our appreciation to the entire Gammon team of the above projects for this remarkable distinction conferred on the above Projects.

World Health Day

As an initiative towards promoting Safety, Health & Environment culture, Gammon celebrated World Health Day on 7th April, 2014. Various health awareness events & camps were organized across various sites.



Health Check-up Camp

As an initiative towards promoting Safety, Health & Environment culture & create Health awareness among the employees, Gammon, in association with Seven Hills Hospital, Mumbai organized a Health Check Up Camp at Gammon House, Mumbai on 17th June 2014. As many as 227 employees from Gammon HO took the Benefit of the same.



Blood Donation Camp

As an initiative towards CSR, Gammon, in association with J J Hospital, Mumbai organized a Blood Donation Camp at Gammon House, Mumbai on 17th May 2014. As many as 65 employees from Gammon HO donated Blood.



LECTURES DELIVERED



Mr. Janardhanam Varatharajan

Chief Safety Manager, CMRL Project, delivered a lecture on Safety on invitation by the "American Society of Safety Engineers – Professional Development Conference (ASSE-PDC)" at Chennai on 27th May 2014

EVENTS

CYCLOTHON

International Road Federation, (IRF), along with MoRT&H and Delhi Traffic Police organized Cyclothon on 20th April 2014 in New Delhi. The Cyclothon was aimed to highlight safety issues with respect to cyclists, who are among the most vulnerable road users. The use of Cycles being a green initiative needs to be encouraged in a big way as a low cost environment friendly option to negotiate short distances ranging from 1 Km to 5 Km.



A CAPITAL EXCELLENCE

- THE *Signature Bridge* ACROSS YAMUNA AT DELHI



India's First Cable Stay Bridge with an Inclined Steel Pylon

India's first "*Signature Bridge*" being constructed by Gammon across Yamuna at Wazirabad, promises to be a great tourist attraction of Delhi, the Capital of India. This cable-stayed bridge will link NH-1 at Wazirabad on Western bank and at Khajuri Khas on eastern bank of the river Yamuna, connecting North Delhi with East Delhi.

With a length of about 575 m and a height of 175 m, the proposed *Signature Bridge* would have a bow-shaped steel pylon in the middle. Two high towers will provide double cable support in the inner periphery of the carriage way. The deck will be composite (steel and concrete) while the pylon will be in steel.

Equipped with four lanes, this engineering masterpiece will have a 1.2m wide central verge, space for anchoring cables, maintenance walk way and crash barrier on either side of the central verge. Once operational, the *Signature Bridge* will dramatically improve access between North and West Delhi reducing present congestion and traffic jams and will become the identity of Capital City – the way Taj Mahal is to Agra.

CLIENT: DELHI TOURISM & TRANSPORT DEVELOPMENT CORPORATION

CONTRACTOR: GAMMON INDIA LTD- C. CIDADE - TENSACCIAI JV

DESIGN CONSULTANTS: SCHLAICH BERGERMANN & Partners, Germany

PROOF CONSULTANTS: M/s SYSTRA SA, France

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