



SPECIALIZED ENGINEERING AND CONSTRUCTION COMPANY

“WE GO BEYOND YOUR EXPECTATIONS”



COMPANY PROFILE



DGC with commitments “Beyond your Expectations” executes repairs, rehabilitation and retrofitting of structures. Seeing the current growth and revamping of the entire Indian infrastructure market, which includes Railways, Airports, Roads, Bridges, Hydro Power Plants, Residential and Commercial high-rise towers, the company has established offices across major cities and have a business relationship with various national and international organizations. In response to the innovative, high quality, and safe execution of SRRR on time DGC has been called upon to solve some of the most challenging structural problems in the Construction industry with the objective of sustainability.

Company is actively involved in structural Audit of buildings and structural health monitoring of bridges and civil infrastructure along with the Structural Analysis for important structures. We aim to innovate with new testing methods and make existing instrumentation and make the existing instrumentation more friendly and accurate by doing in-situ and laboratory research work.

From design and constructability analysis through project sequencing and safety planning, DGC is there to complete projects under the tightest schedules and in the toughest working conditions.



DGC SERVICES

DGC provides turnkey solution to its clients in the field of structural repair, retrofit and rehabilitation delivers projects to project owners, developers and contractors using the latest and execution technologies available in the market.

1) CONDITION ASSESSMENT OF CIVIL INFRASTRUCTURE

- Structural Audit of Structures
- Structural health monitoring of bridges
- Retrofit Consultancy

2) EXECUTION SERVICES

- Retrofit of Non-engineered buildings
- Retrofit of Masonry, Heritage Structures & RC Buildings and Foundations
- Retrofit of Bridges.
- Retrofit using FRP Composites, RC Jacketing and Externally bonded steel plate.
- Structural and Non-structural Repairs.

**DGC has rapidly acquired a brand image as a
"Specialized Engineering & Construction Company".**



DGC SERVICES

A. EXECUTION OF STRUCTURAL STRENGTHENING



A. Structural Strengthening using Fibre Reinforced Polymer (FRP)

This technique of retrofitting involves utilising high strength low weight fibre reinforced polymer for strengthening of structural elements. The FRP are either surface bonded to the flexural element or wrapped around the columns and shear wall to provide adequate strength. New technologies are also developed by DGC where prestressing of Carbon fibre sheet and laminates are achieved to further enhance the capability of FRP. This technology provides negligible additional weight and minimal architectural disturbance to the existing structure

B. Reinforced Concrete (RC) Jacketing

RC Jacketing is the technique of retrofitting that involves section enlargement by adding a concrete jacket with reinforcement. DGC is well quipped to provide RC jacketing service in all kind of structures.





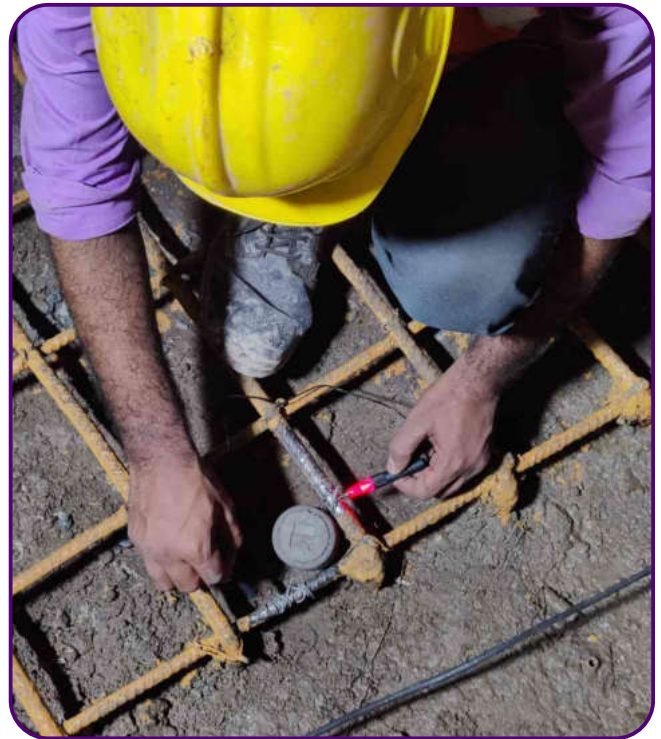
D. Structural Repairs

Apart from specialized Structural strengthening, DGC is expert in providing repair execution services like:

- Corrosion Treatment
- Cathodic Protection
- Polymer Modified Mortar Treatment
- Grouting
- Waterproofing

C. Externally bonded Structural Steel Plate

In this method, structural steel plates are externally bonded to the concrete surface using anchors. The steel plate can be grooved inside the concrete cover to provide smooth finish or can be externally applied. High young's modulus of steel causes the steel to take a large portion of axial load.



DGC SERVICES

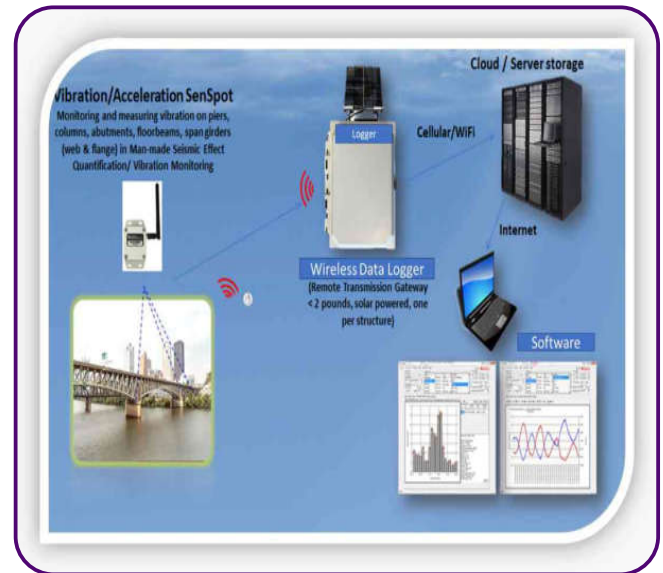
A. EXECUTION OF STRUCTURAL STEEL WORKS



DGC also provides structural steel fabrication works to the clients using high strength steel sections, built up sections

C. STRUCTURAL HEALTH MONITORING

Structural health monitoring (SHM) involves the observation and analysis of a system over time using periodically sampled response measurements to monitor changes to the material and geometric properties of engineering structures such as bridges and buildings. With all the advanced sensors, both wired and wireless, DGC Engineering is fully equipped for structural health monitoring of civil infrastructure.



D. STRUCTURAL AUDIT AND RETROFIT CONSULTANCY

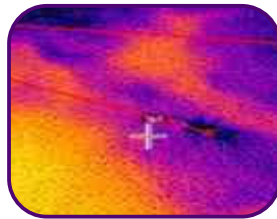


DGC Engineering carries out all the necessary tests required to assess on site properties of materials, capacity assessment of structural members or structure as a whole.

DGC gives a unique approach to every individual project. The diagnosed problem is discussed between the team of auditing, design, execution and associates from well-known organization to come up with suitable solution. The proposed design will be approved by associates in well – known organizations like IITs, NITs ,Research sectors etc.



Petrographic Test



Infrared Thermography



Ground Penetrating Radar (GPR)



Capo Test



Vibration Analysis



Impact Echo Test



Rebar Mapping



Slab Load Test

DECADE OLD PROJECTS

A. RESIDENTIAL BUILDING



The Hyde Park, Noida, UP

- The Hyde Park, Noida is a Multi storied residential complex Towers housing developed by IITL Nimbus Group.
- The Non-Tower Area lacked required Grade of concrete and DGC Strengthened the slab and beam using CFRP Laminate Technology, while the columns were strengthened with GFRP Fiber wrapping.
- Post strengthening, the structure was subjected to load testing and the efficiency of the strengthening work was 100% achieved.

INDIABULLS Greens, Panvel

- India bulls Green is an elite residential project. The client required to expand vertically by 3 floors and hence retrofit for columns were required.
- The building was retrofitted using Concrete Jacketing and helped achieve the building reach higher height.



B. COMMERCIAL BUILDING



Platina, BKC

- Platina by The Wadhwa Group, this commercial haven is situated right in the heart of Bandra Kurla complex.
- The existing structure was strengthened using a combination of Carbon Fiber Reinforced Polymer Composite Pultruded Plates and CFRP Sheet composites.
- The floor loading capacity was increased Post strengthening of the existing Post Tensioned (PT) slab.

Ackruti Trade Center

- Commercial building owned by Hubtown, had undergone fire damage at the 6th & 7th floor of the structure.
- The dome structure was damaged, and the structure was distressed. Strengthening of structure using CFRP fiber sheets and restored for working space.



DECADE OLD PROJECTS



IBIS Hotel

- IBIS Hotel is located in the west of Pune strategically in the Rajiv Gandhi Infotech Park.
- The Hotel PT slab were strengthened using micro-concrete jacketing and the structural steel brackets at the slab bottom.
- The strengthening of slab was done to compensate the steel deficiency.

Suvidha Square

- A G+7 Under construction Commercial building of about 3600 sq ft. Area located at Andheri.
- The structure was enhanced for the additional 2 floor load using CFRP Technology and Steel Jacketing for Columns.



C. INSTITUTIONAL BUILDING



The United States- India Education Foundation

- The 65-year-old Brick masonry structure located in New Delhi. The Masonry Structure was subject to cracks due to underground excavation work in nearby area for metro construction
- The structure was strengthened using a CFRP Composite to restore functionality of this load bearing structure.

D. INDUSTRIAL BUILDING

HPCL Refinery, Mumbai

- HPCL's Mumbai refinery is one of the most complex refineries in the country. It is one of the projects where repair work was challenging in the view of safety.
- RCC jacketing technique along with anti-corrosive treatment was adopted to strengthen the deteriorated columns. CFRP wrapping system was used to strengthen the junction.



DECADE OLD PROJECTS

E. HOSPITAL



Rajiv Gandhi Cancer Institute & Research Centre, Rohini, New Delhi

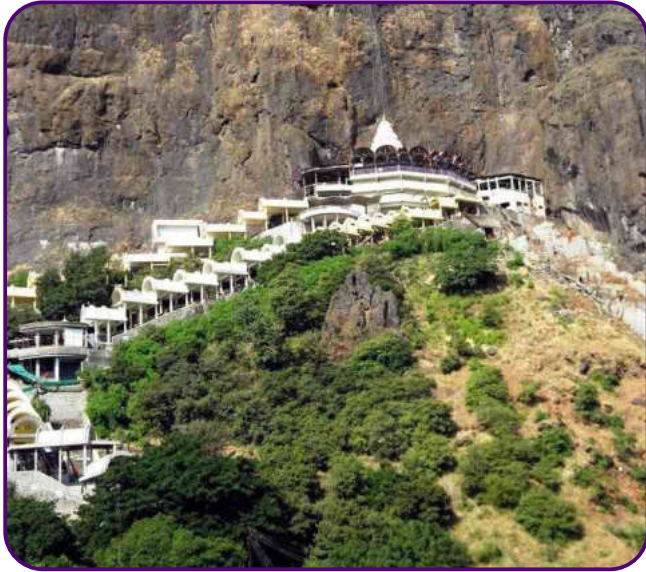
- Rajiv Gandhi Cancer Institute & Research Centre located in Delhi is one of the best cancer Treatment centres in India.
- The building was structurally audited for undertaking certain additions and alteration in the existing structure. Through audit, it was required to have additional strength in the vertical columns.
- Structure was strengthening and retrofitted by the DGC team with the hospital fully functioning and running. Strengthening was done considering all the safety and health requirements of the hospital.

F. HERITAGE STRUCTURE

Barnes School, Devlali, Nashik

- 92 years old school stone masonry structure was strengthened in 2007. This heritage structure was rehabilitated to its original form without causing any disruption to its culture.
- CFRP confinement was considered as an effective stabilization technique which was able to increase the structural safety of the damaged stone columns.





- Project was accomplished with lot of difficulties faced during the repair process, including access requirements for team and materials. Our team mounted about 2000 steps everyday with material manually.

Saptashrungi Devi Temple, Nashik

- Saptashrungi temple is one of the most important pilgrimages in India.
- This structure was deteriorated due excessive loading, carbonation & corrosion. The temple rehabilitation work was done by DGC without disturbing the throng of devotees visiting the temple.
- The structure was rehabilitated using a combination of micro-concrete jacketing and CFRP composites.



DECADE OLD PROJECTS

G. BRIDGES

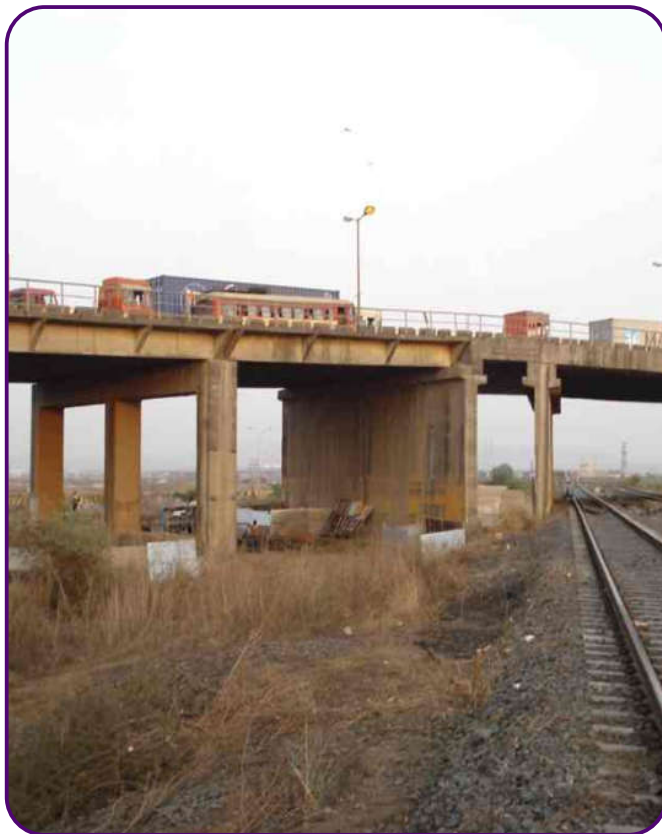
Runway Bridge, Mumbai Airport

- A bridge at Mumbai Airport over Mithi River was initially designed for smaller aircraft loads. However, loads of new aircrafts were heavier and hence there was need for strengthening of this bridge.
- The analysis has shown, maximum moment at the support is found to be 351T-m and in the span 356T-m. Carbon laminates are used for the purpose of strengthening of beams for flexural demand.



Rail Over Bridge (ROB) At Karal

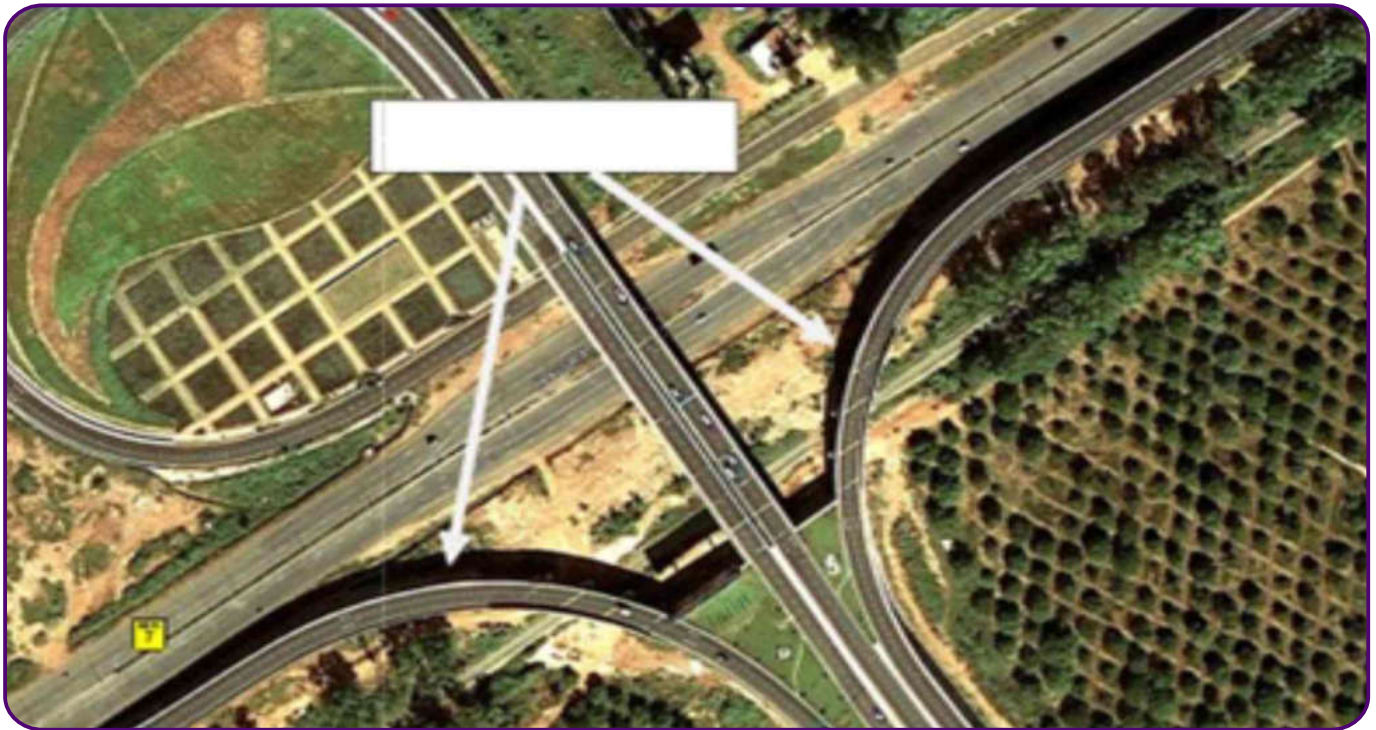
- The Rail Over Bridge at Karal had heavy traffic movement and had started showing signs of distress. The bridge was initially designed for IRC 45R loading. As per the revised recommendations of IRC and prevailing practice, the bridge was required to sustain IRC Class 70 R loading.
- Existing RC girders were rehabilitated using CFRP laminates and additional steel truss system was introduced to relieve the forces from RC girders. After strengthening, it was demonstrated using health monitoring sensors that there is reduction of 8.5% in fundamental frequency of vibration. In addition to this, the amplitude of acceleration was reduced by 50%. An average reduction of 26% in the deflection of bridge superstructure under standard loads was also recorded.



DECADE OLD PROJECTS

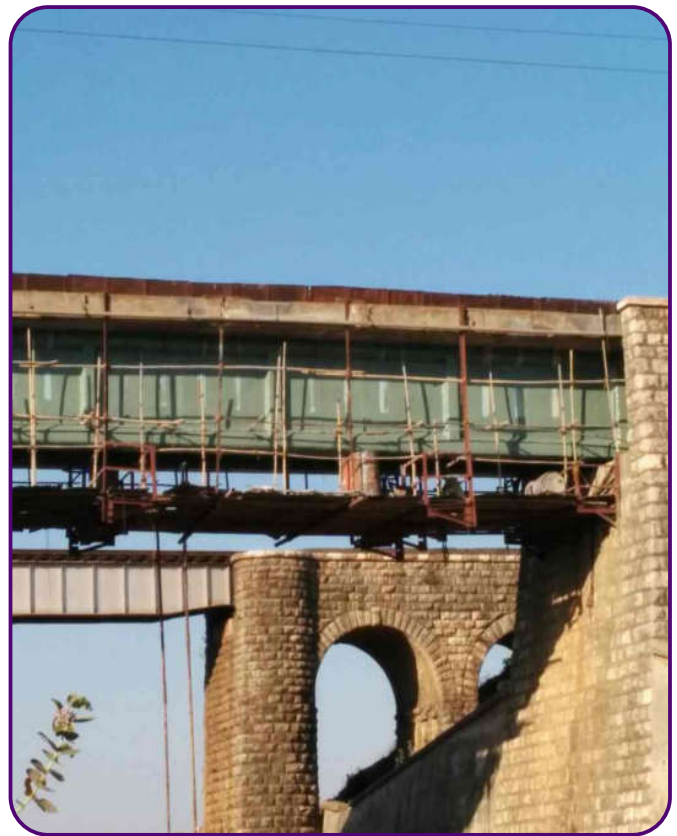
Skewed Deck Slabs At Devanahalli, Bangalore

- The two flyovers, one from Devanahalli and airport and the other from airport to Bangalore were constructed for connecting the newly constructed Bangalore International Airport to the highway in record time of 6 months.
- The deck of the bridge is skewed. Due to unaccountability of skewness in reinforcement detailing, cracks were generated at the bottom of the slab. These structural distresses due to deficient detailing of reinforcement required strengthening



Rail Over Bridge (ROB) At Ratlam

- Western Railway has proposed rehabilitation of PSC I girders on Bridge of Godhra-Ratlam section of Ratlam Division of Western Railway, India. The Bridge has been observed to require immediate strengthening.
- The main reason for retrofitting of the PSC I girders on the bridges was due to development of cracks on the girders. These cracks were active and were further propagating.
- After strengthening, it was demonstrated that there is an average 71% reductions in deflection in the cracked girder and improvement in natural frequency by 25%. Speed restriction was put for 20 kmph, after strengthening the trains are allowed at 100kmph thereby saving 17mins between Godhra and Ratlam.



DECADE OLD PROJECTS

Rail Over Bridge (ROB) At Ramavaram, Andhra Pradesh

- The construction of ROB located near Ramavaram village at KM 37/2 on podili-Markapuram road, Prakasham District, Andhra Pradesh was started in February, 2009.
- The bridge needed to be rehabilitated due to structural reinforcement deficiency. CFRP laminates were utilised to compensate for the additional reinforcement demand in 13 spans which were already constructed and operational.



Segmental Bridge At Boisar

- The bridge across Surya river Boisar Mumbai was in under construction stage when it was found distressed. Cracks were generated in the segment as soon as PT tendons were stressed during post tensioning. These minor cracks had been necessary to be rectified to prevent secondary effects further.
- Groove Laminates and R&M Wraps were employed to address the loss in strength due to crack generation.



DECADE OLD PROJECTS

Bridge Pier In Mumbai

- The Sahar Elevated Access Road connects the western express highway near Hanuman Nagar junction in Vile Parle, with the forecourts of terminal T2 of the Mumbai Airport.
- The portal beam was retrofitted with prestressed CFRP laminates for additional flexural demand. Further in the pier cap there was strengthened using CFRP sheet wrapping and laminates.
- Flyover Inauguration date was announced before the problem could encounter. Team worked day and night to complete the work within the inaugural date. A special U shape pre-stressing was performed on pier cap.



PROJECTS DELIVERED IN PAST 5 YEARS

A. RESIDENTIAL BUILDING

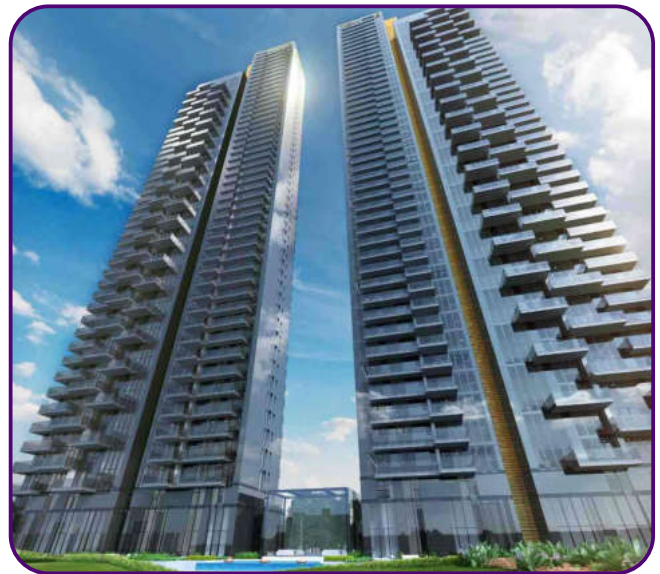


Laxmi Sadan

- A 62-year-old residential building, which was declared unfit for habitation.
- Due to foundation settlement, the building had tilted from one end. In addition to space constraint, DGC worked through the Covid 19 challenges, and the building became habitable within 10 months.

Tribeca Trump Towers

- A residential project located in the heart of Gurgaon' evolving cityscapes.
- Under construction Tower was strengthened by DGC for 21 floors using R&M carbon reinforced polymer sheets and Steel Jacketing to accommodate the extension in the number of floors.



PROJECTS DELIVERED IN PAST 5 YEARS

B. COMMERCIAL BUILDING



AGILE – By Malpani

- 22 floor commercial building is located at Silicon Valley of Pune with 1,370,258 sqft area.
- Structural strengthening using CFRP sheets and externally bonded steel plates were done to accommodate 2 additional floors in the building.

WIPRO Pune

- Commercial building of 7 floors located in Pune, Maharashtra.
- CFRP Strengthening of slab was done by providing temporary supports of double height of 7.5m, thereby increasing the load bearing capacity of slab.



C. INSTITUTIONAL BUILDING



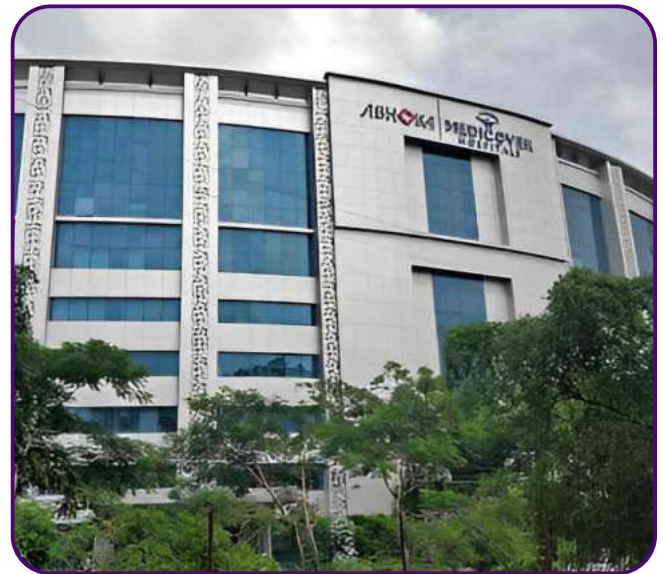
Kendriya Vidyalaya, MES, Thane

- Structural cracks were observed on the 25-year-old school building and was detected unsafe for school activities.
- Temporary sheds were erected for working as not to disturb the Functioning of school.
- RCC Jacketing and CFRP Sheet strengthening was done on structural members making it safe for habitat.

D. HOSPITAL

Ashoka Institute Of Medical Science And Research

- 8-year-old Hospital building located in Nashik was strengthened to accommodate the change in loading of the building.
- Load bearing members of the building were strengthened using CFRP Composite system at various levels of the building.
- Post-strengthening, the required change in loading was done successfully proving the strengthening system to be 100% effective.



PROJECTS DELIVERED IN PAST 5 YEARS

E. HERITAGE STRUCTURE



Badrika Ashram

- DGC was appointed as rehabilitation specialist on turnkey basis for the holy abode of Sri Badrika Ashram.
- The residency of the sadhak located in deep valley of Himachal Pradesh was rehabilitated using advanced carbon fibre reinforced polymer, new raft casting and reinforced concrete jacketing within a short period of 90 days.

Brick Chimney At ITC Campus, Bangalore.

- A 100-year-old monumental brick chimney was proposed to strengthen and restore by R&M carbon fiber wrapping.
- The chimney was about 24m high with two pedestals.



F. INDUSTRIAL STRUCTURE



Pidilite Industries, Vapi

- Industrial building located in the industrial belt of Valsad. This 35-year-old Industrial Building was subjected to severe Deterioration in structural components.
- Structure was strengthened with a series of strengthening techniques from PMM Repair, RCC Jacketing, MS fabrication and CFRP Techniques.

Mohan Rocky Springwater Breweries Limited, Khopoli

- Industrial Building located in the Industrial city of Khopoli was severely deteriorated over a long span of usage.
- The building structure was repaired, and rehabilitation was done with the help of RCC Jacketing and R&M Carbon Fiber Reinforced Polymer sheet strengthening.



PROJECTS DELIVERED IN PAST 5 YEARS



Udaipur Station Building

- Indian Railway started construction of Udaipur railway station in 2013 with regards to serving connectivity between Agartala to Udaipur. Unfortunately, the work had been stopped due to soil settlement in parent structure & the dream of 25 lakhs people was to remain incomplete till Dec 2015.
- We chased the difficulties in project, and we proved that challenges lead to solutions in life.
- Working on the site was almost impossible, but our team had completed the challenge in four months with Dedication, Determination and Discipline
- DGC Installed Carbon Fiber Wrapping & Prestressed Laminate system to remove distress from existing structure. Also, to ensure plate action, the combination of micro-piling, additional plinth beam & monolithic slab construction system were adopted.

MLPU Shed & Control Building at NRPL Ambala

- The 40-year-old structure was severely deteriorated, the structure was showcasing Corrosion in Reinforcement, spalling of concrete cover & severe deflection of slab.
- The structure was repaired using a series of repair and retrofitting procedures from Grouting to RC Jacketing.
- The building after retrofitting was revamped in both functionality and looks.



G. WATER TANK STRUCTURE



- Various repair techniques such as Grouting, application of Polymer Modified Mortar, anticorrosive treatment was adopted. Strengthening of components was done with CFRP wrapping. The entire work is protected from the UV rays.

Elevated Service Reservoir, Jodhpur, Rajasthan.

- A 18m height elevated reservoir was strengthened at Ajarar, Loharki and Ekka was proposed mainly due to the Concrete grade deficiency.

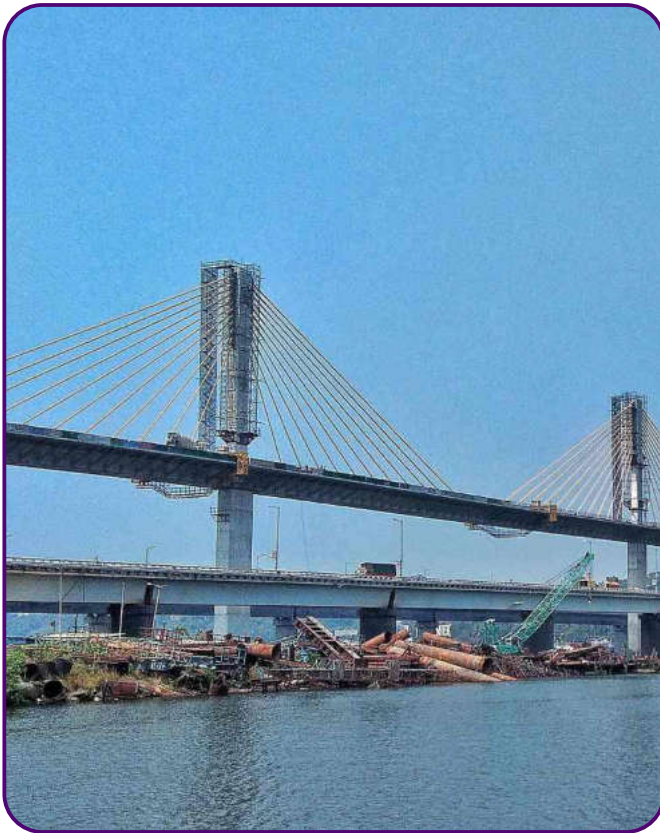


PROJECTS DELIVERED IN PAST 5 YEARS

H. BRIDGES

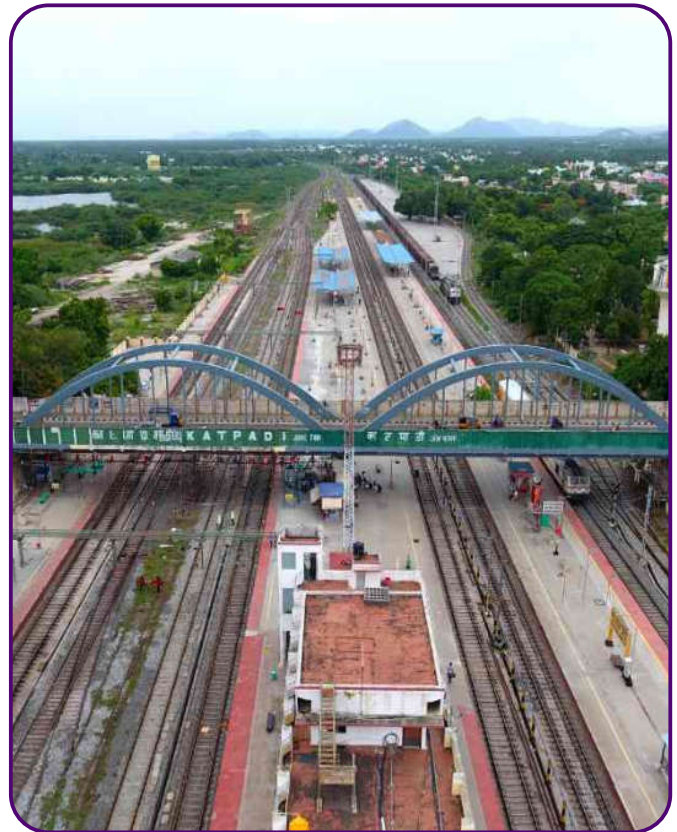
3rd Longest Cable Stayed Bridge (Spine-Wing Type Bridge) At Goa

- A bridge across Mandovi river in Goa runs between Panaji and Porvorim. It carries National Highway 66 (NH 66) over the tidal part of the Mandovi River. It is the third longest cable stayed bridges in India.
- The deck of the segment had shown crack during post tensioning process of the segment. The erected segments are strengthened at its location thereby saving project cost and time required in recasting of segment



Bow-string ROB At Katpadi

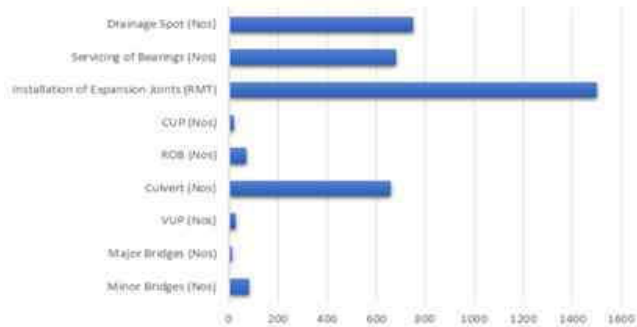
- The Rail Over-Bridge structure at Katpadi Junction is completed in the record time. DGC was awarded strengthening of Rail Over-Bridge structure at Katpadi major railway Junction which connects major cities like Chennai, Bangalore, Tirupathi and few others. The strengthening of the same is carried out without much disturbance to road and railway traffic. In a two hours block time provided, the team erected temporary staging, perform strengthening activity and dismantle the staging giving clearance to railway traffic. The project was completed within the given railway blocks.
- Pre-strengthening and Post Strengthening tests were performed to record and demonstrate the effectiveness of activated R&M laminate system.



PROJECTS DELIVERED IN PAST 5 YEARS

Bridges At Vishakapattanam

- DGC was awarded the specialized repair work for 783 structures which included Major Bridges, Minor Bridges, Culverts, ROBs etc. spanning from Rajahmundry to Gundugolanu & Puintola to Ichchapuram. All 783 structures were completed with 1 year only thereby setting a remarkable bench mark in infrastructure space.



Rail Over Bridge At Delhi.

- Working on transportation infrastructure requires a keen understanding of the unique challenges, demands, and requirements of these structures. These range from the importance of maintaining access, minimizing disruption, and maximizing safety to the need to optimize the quality and performance of infrastructure repairs that must stand up to public use for decades. Keeping all these requirements in a note, DGC has done rehabilitation of 40 years old ROB
- The strengthening was done by using various repair methods such as jacketing, fibre wrapping, anti-corrosive treatment, Anti Carbonation Treatment, strengthening with pre-stress Laminates & Polymer modified mortar treatment at the distressed area.



PROJECTS DELIVERED IN PAST 5 YEARS

Bridge Pier Cap At Alappuzha Kerala.

- A bridge on NH-47 from Km 408+100 to Km 414+900 in the state Kerala, required strengthening of pier cap in P82 pier. The change in the alignment of the span due to presence of railway track at site, lead the spanning girders skewed. Hence, there was necessary to strengthen a pier cap for additional shear capacity



Twin Cell Box Bridge, Dabhoi

- A condition assessment of 3-year-old Rail under Bridge (RUB (Twin Box) structure located in Dabhoi, Gujarat revealed deficiency in the grade of concrete. Hence, there was a requirement for the rectification work
- The structure was strengthened using CFRP Bands without affecting the train traffic on top of it. The demonstration showed that the structure is safe under static deflection and dynamic deflection as per codal provisions.



PROJECTS DELIVERED IN PAST 5 YEARS

RC Girder Bridge, West Bengal

- The bridge is located between Farakka and Raiganj Section of NH-34 (Package 4) in Malda District. There are separate bridges of two lanes in each up and down directions. Each bridge consists of eleven spans of 28m length. The superstructure of each bridge consists of four numbers of RC longitudinal girders with composite RC deck slab.
- Pre-stressed laminates are used to strengthen the girders for their flexural capacity followed by CFRP wraps to improve their shear capacity. Further, the complete system is protected by providing vermiculite plaster applied by the method of guniting.



RC Girder Bridge In Solapur, Maharashtra

- The Vehicular under pass located at Solapur, Maharashtra is a RCC Girder and Deck Slab. It was observed that the quality of concrete in girders and Slab was poor and thus it required strengthening.
- There were restriction for the high axle load vehicles hence the bridge girders are strengthened using combination of Pre-stress and Non Pre-stress laminates. Further the deck slab is strengthened using CFRP Bands. Bridge is now allowed for its regular use.



STRUCTURAL HEALTH MONITORING

A. LOAD TESTING OF BRIDGES

VISAKHAPATNAM PORT TRUST BRIDGE

- Client: - IITH
- This Flyover is located in Vishakhapatnam connects the port area and Airport to Vishakhapatnam city and NH-5. The length of this flyover is 1.2 km.
- This flyover bridge is constructed on pile foundation, having Reinforced concrete piers. The superstructure consists of RCC girders with composite RCC deck slab.
- All spans are deviated longitudinally from their original positions and different gaps were found between them.

Following tests were performed using wireless sensors

- Static Load test using LVDT's (ii) Vibration Analysis using accelerometers
- Braking Load Test to monitor expansion joints (iv) Crack width measurement
- Inclination of girders.

Conclusion :-

- Tests were successfully performed under the supervision of NHAI, IIT, Hyderabad under guidance of Dr. Suriya Prakash and the supporting team of VJTI under guidance of Prof. Abhay Bambole.



B. STEEL GIRDER BRIDGE IN SINGRAULI

- Client: - SGS
- This Bridge Located in Madhya Pradesh consists of three spans of $2 \times 29.4 \text{ m} + 1 \times 18.46 \text{ m}$ of composite steel girders having RC deck slab. This bridge is designed for 25t loading. Load Testing of the Bridge was carried out to check whether the super structure of this bridge is safe to carry 25t loading as defined in IRS bridge code and whether the structural performance is acceptable in-service condition.
- For this, load test have been performed and results were compared with the finite element model using Midas Software. To perform the load test on the bridge a test train comprising a single LOCO WAG9H with five loaded wagons was used for static and Dynamic deflections.
- After the successful completion of Tests, Bridge was approved for 25t class loading and higher axle speed as deflections and strains measured at site are slightly less than results obtained from FE model. The Static and Dynamic deflections were found to be within 15% of analytical estimations.



STRUCTURAL HEALTH MONITORING

C. EVALUATION OF LOAD CARRY CAPACITY OF BRIDGES

KHOONI NALA BRIDGE – JAMMU AND KASHMIR

- Client: - Hindustan Construction Company.
- Structural Health Monitoring of Khooni Nala Bridge was carried out by DGC Engineering Pvt.Ltd. Awarded By Hindustan Construction Company Limited. Load Testing of One Span at Khooni Nala Bridge Which Is Located Between Banihal to Ramban Section Of NH-1A (Now NH-44).
- The bridge was constructed and opened for road traffic in 1989. It was observed that there is excessive vibration in the deck of bridge. This vibration can be easily felt during the passage of vehicles over it.
- Static load tests were performed to know the behavior of girders in flexure under live loads. Two loaded trucks, each weighing 32 tonnes, were used for performing load test. Axle load distribution and load configuration of the loaded test trucks used for static loading.
- Dynamic load tests: - Natural frequencies of the superstructure were measured by installing accelerometer on the deck. The accelerometer was installed at the bottom of the girders. The deck was excited by getting a vehicle passed over the deck. The response under free vibration were measured in time domain. The response was then converted into frequency domain by using Fast Fourier Transform, FFT.



D. CONDITION SURVEY OF TAXI-WAY FOR AIRCRAFT LOAD

LOAD TESTING OF MITHI RIVER

- A Taxi-way bridge located inside Mumbai International Airport over Mithi River was designed for smaller aircraft loads but the loads of currently designed aircraft are slightly higher hence the condition assessment of Taxi – Way was proposed.
- During the initial Stage extensive Visual Inspection was carried out inside the Box Girder along with Crack Mapping of all the bays. Strain Gauges and Linear Potentiometers were mounted below the Taxi – Way. Mounting the sensors was a critical task owing to sludge, impure water and insects of Mithi river.
- Wired Sensors were used, and a central hub was created at the center where wires from all the sensors were plugged inside the data logger and monitoring of all the sensor locations took place.
- As the Heavier aircrafts arrive during night time the entire testing was conducted during Night and the derived results were submitted to the client along with the strengthening scheme.
- This project remains one of the most iconic projects for the DGC Team



STRUCTURAL HEALTH MONITORING

E. SHORT TERM DYNAMIC MONITORING OF ASEPTIC & MILK PROCESS BUILDING

PRABHAT DAIRY

- A systematic protocol developed and implemented for observing, tracking and logging data over a period of 100 hours in order to characterize the health state of structure and to detect any possible change due to occurrence of damages.
- The proposed accelerometers monitor triaxial acceleration without any wires. The sensors can calculate natural frequency of the building and detects shift in Natural frequency.
- The present structure is an Industrial building constructed with RCC which has previously undergone a structural audit. Based on accurate investigations and analyses, the building pathology is diagnosed and adequate consolidation methods.
- Temperature, Tilt and Vibration sensors were mounted in the factory and all the critical measurements were recorded and a detailed analysis report was submitted to client.



F. STRUCTURAL ASSESSMENT OF STEEL GIRDER BRIDGE

CENTRAL RAILWAY, BHUSAWAL

- The bridge No. 427/1B, situated 20 kms from Bhusawal Station, consists of three spans of $1 \times 19.21\text{M} + 1 \times 31.98\text{M} + 1 \times 25.28\text{M}$.
- The objective of this study was to perform diagnostic Load-test to judge the structural performance and to ensure that the deflections are within acceptable limits.
- Load tests have been performed as per BS/128 guidelines.
- Instrumentation of the girders of identified bridge spans (three identified spans) using displacement transducers for static and dynamic response measurements of the superstructure.
- Field investigations of bridge spans for static and dynamic test case with varying speeds of test train formation.
- Data Processing and analysis of responses acquired from field investigations for assessing the structural adequacy of the bridge spans.
- Assessing the structural adequacy of the identified bridge spans for 25T-Class loading based on results of instrumentation.



STRUCTURAL AUDIT & RETROFIT CONSULTANCY

RESIDENTIAL BUILDING



- Miami Apartments is an approximately 50 years old Structure Located in Mumbai. It is a G+13+Terrace RCC Structure. The Client wanted to carry out Structural Audit of the building to find out the current Condition of the building.

- Advanced NDT methods like CAPO Testing and Rebar Scanning were carried out on site to determine the in-situ Compressive Strength and Rebar Details of reinforcements in columns, beams, and slabs.

STAGES OF STRUCTURAL AUDIT

- External and Internal damages were noted down during the visual inspection of the building.
- Non-Destructive tests were carried out using Rebound Hammer, UPV, half-cell potential test, Carbonation, CAPO Test, Chemical test and Rebar Analysis was carried out stagewise.
- A structural analysis report was prepared and submitted to the client for future course of action.



COMMERCIAL BUILDING

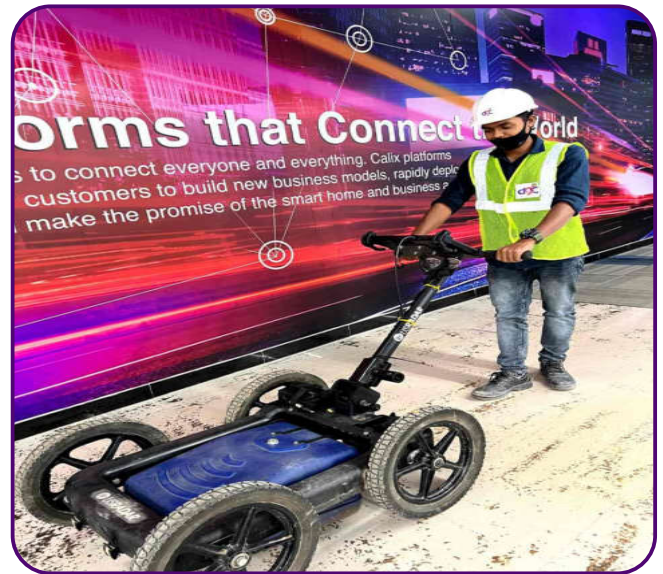


- Foundation details were not available hence Ground Penetrating method was used on site which uses radio waves to capture images below the surface of the ground in a minimally invasive way.

- The G+5 commercial building located in Pune consists mostly of working platforms and cabinets. Requirement of Condition assessment of the building arose due to visible Cracks on the columns and Beams.

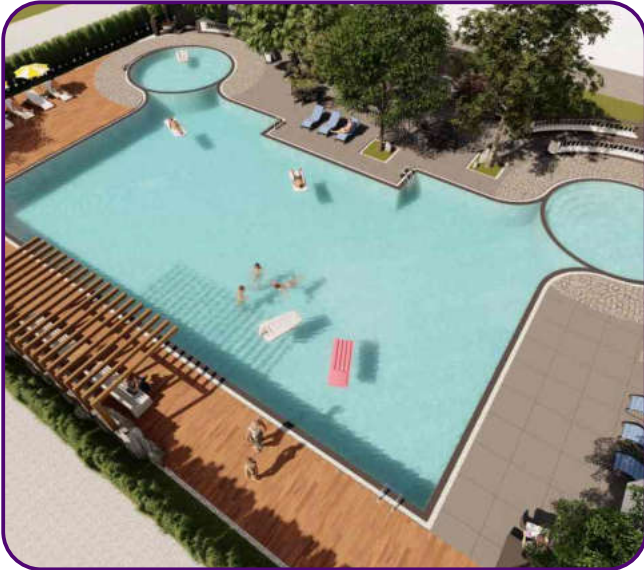
- **Stage 1** Visual inspection of the entire building was carried out to note down the damages, crack mapping was performed throughout the building, Foundations were exposed to check for any distress signs.

- **Stage 2** Non-Destructive tests were executed on site to find the in-situ strength of the concrete and Rebar Scanning was done to prepare structural drawing which was not available with the client.



STRUCTURAL AUDIT & RETROFIT CONSULTANCY

SWIMMING POOL



- Adult and children's Swimming pool subsurface pipes were subjected to pressure testing. 3-D Rendering of the swimming pool was developed and submitted to client along with BOQ and remedial measures.
- It was one of the most unique and prestigious which was completed within span of 2 weeks.

- Condition Assessment of Swimming pool, which is a part of officer's club in Delhi was done due to Leakages and cracks observed by the client. The swimming pool was non functional for the past 2 years.

- During the Initial stage Extensive Visual Inspection was carried out for the entire swimming pool along with Pump room and Pool electrical inspections.

- Thermal Imaging took place on site. Thermal image capturing makes leak detection more efficient and simpler as it identifies the problem areas that cannot be seen with the naked eye. Non-destructive testing methods were used to evaluate concrete properties by assessing the strength and other properties such as corrosion of reinforcement, cracking, and integrity of concrete.



FERRY WHARF JETTY

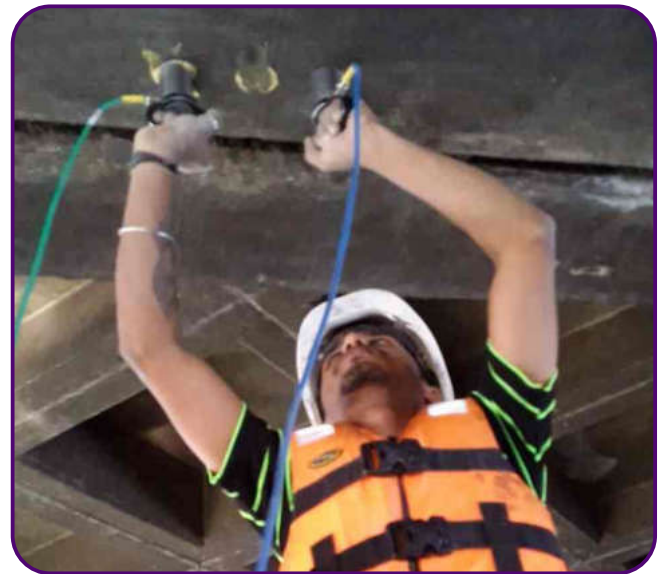


- Tide calendar was observed while carrying out the Non-Destructive Testing and the Structures were investigated grid by grid for ease in observations.
- A strengthening scheme along with Design Calculations was proposed with the height barrier restriction to restrict the passage of any heavy vehicles on jetty.

- Bhaucha Dhakka is a wharf along the coast of dockyard road on the eastern seafront of Mumbai. The Wharf serves as the port for numerous fisherman who bring in their daily catch. Ferry services link up JNPT, Uran to the east, Rewas and Mandwa to the south.

- It has three parts which comprise of Approach Trestle, Passenger Terminal, and Fishery Terminal.

- The Structure under consideration was investigated with the help of a boat for ease in observations. Engineers and supervisors were equipped with Life Jackets and Generator was carried in the Boat for Core Cutting.



STRUCTURAL AUDIT & RETROFIT CONSULTANCY

STRUCTURAL AUDIT OF BRIDGES



- Visual Inspection and Non-Destructive Testing was carried out for 20 Bridges Located in Uttar Pradesh.
- Exclusive Non-Destructive Testing Including Core Testing, Rebound Hammer, Ultrasonic Pulse velocity, Half Cell Potential Test, Carbonation and Rebar Scanning was carried out on the Bridges.

- Designing of strengthening scheme Preparation of strengthening scheme on the basis of results of Non-destructive Test was submitted to the client.
- The Whole Testing procedure was carried out with the help of Mobile Bridge Inspection Bridge unit .



CONDITION ASSESSMENT OF MANUFACTURING PLANT

- Mohan Rocky Spring Water Breweries Limited is an Indian-based Breweries manufacturing company.
- One of the oldest breweries manufacturing plant is in Maharashtra. Which majorly manufactures breweries of the mainly alcohol and other product.
- Condition Survey was carried out to examine concrete for the purpose of identifying and defining of distress.
- The Objective of Condition Survey of a building structure is:-
 - a) To identify - cause of distress and their sources.
 - b) To assess
 - the extent of distress occurred due to corrosion, fire, earthquake or any other reason,
 - The strength of the structure,
 - Its ability for rehabilitation
 - c) To prioritise the distressed elements according to seriousness for repairs and
 - d) To select and plan the effective remedy



RESEARCH AND DEVELOPMENT

A. TEST WITH CPRI (ONE OF A KIND TEST IN SOUTH-EAST ASIA)



- Distressed: The structure was damaged till its plastic limit, major cracks at join and columns, the bars were broken, the structure shown some permanent deflection which was pulled back to some extent from the other side's repair by grouting, micro Concrete, PMM done by specialized agency BINYAS ,Bangalore.

- Theme: Aim of test find the solution for lateral load capacity enhancement using composite CFRP (carbon Fiber Reinforced polymer) wrap and laminate at junction
- Test conducted: The structure was subjected to 90% distress with cable string at each floor level laterally to stipulate pushover test or earthquake load.
- Strengthening: CFRP laminate and wrap at the junction confined by a specialized agency R&M International Result after testing: the structure regain its original strength by 90%



B. TECHNOLOGY OF TRIPLE STRESSING



- A tensile force of magnitude as suggested by the designer is applied on the laminates gradually at the rate of 0.5 tons per min on each of the laminate in the system. Once the designed load is given and the strains are induced in the laminate with the same magnitude the system of loading need to be stopped and retained for about 12 hrs (generally) until the adhesive gets dried and develops bonding conforming to ASTM D 4541 using stopper. The high grade metal plate, which is placed along with the machine need to be fastened before un-mounting the assembly. Test results were acquired and submitted for further Analysis.

- A specially designed machine which is portable and can be fixed on the substrate surface should have the capacity to accommodate at least three laminates in its width equally stressing the same. Adhesive applied conforming to ASTM provisions in its bonding properties to be applied on the laminates such laminates along with the adhesive adhered to the surface.



RESEARCH AND DEVELOPMENT

C. TECHNOLOGY OF SEMI STRESSING



- The adhesive conforming to ASTM D 4541 under bonding strength criteria should be used as a bonding agent. The entire procedure should be completed with on the pot life of the adhesive used in addition further the active plates are anchored by semi-stressing plates.

- A manually hand operable/automated machine which can be used to impart a strain in laminate (about 1% of its rupture strain) by giving controlled tensile force along the length of the laminate making it active in load resistance system.



D. TECHNOLOGY OF BAND PRESTRESS



- The FRP system is saturated by the bonding agent (generally epoxy based resin/saturant) the band is locked at one end and sufficient tensile force is given to the band as per the instructions given by the designer and then the stressed band is locked at the other end. Ensuring the FRP system is completely saturated allowed it to cure.

- In this phenomenon the FRP bands of known width need to be given sufficient tensile force so as to suffer controlled strain which is helpful in active participation of the same. The confining property of the CFRP system is significantly enhanced by these stressed bands.



RESEARCH AND DEVELOPMENT

E. RESEARCH PUBLICATIONS

01. Additional life to temple structures By Rehabilitation- Case Study By Dr. Gopal Rai
02. Use of FRP composite for Rehabilitation of Heritage Structures By Dr. Gopal Rai
03. th Proceedings of the 40 Conference on OUR WORLD IN CONCRETE & STRUCTURES 27-28 August 2015, Singapore
04. Retrofitting of Bridges using FRP Composite system By Dr.Gopal Rai
05. Structural Health Monitoring A dire need of India By Dr.Gopal Rai with Gajanan M.Sabnis, Yogesh Singh and Dr. Abhay Bambole.
06. Retrofitting and Rehabilitation of Bridge with FRP: Case Study By Dr. Gopal Rai
07. New and Emerging technologies for retrofitting and repairs By Dr. Gopal Rai
08. Different Strengthening Techniques for RC Column By Dr. Gopal Rai
09. National Conference on Repair and Rehabilitation of Concrete structures Noida, UP, India May 6-7 2011
10. Fiber Reinforced Polymer Composites. A Novel way for strengthening Structures By Dr. Gopal and Yogesh Indolia
11. Challenges in Structural Health Monitoring and Rehabilitation By Dr. Gopal Rai
12. Rehabilitation and Strengthening of Bridges by using FRP composites By Dr. Gopal Rai
13. Serviceability of FRP Strengthened Runway Bridge for International Airport since Decade Case Study By Dr. Gopal Rai
14. Rehabilitation for Disaster Mitigation of Bridge By Dr. Gopal Rai
15. Construction and Building Materials (2008) Performance of reinforced concrete beams externally prestressed with fiber composites. By Dr. Gopal Rai and Abhijit Mukherjee.



SCAN QR FOR PUBLICATIONS DETAILS

16. Strengthening of Bridge by Pre-stressing at JNPT and Testing its efficacy By Dr. Gopal Rai and Dr.A.N.Bambole
17. Retrofit of Residential Building for Increased Floor Height Dr.Gopal Rai with Saurabh Samant and Nasrin Shaikh
18. External Pre-stressing Using Carbon Fiber Laminate with case studies By Dr. Gopal Rai with Kulvinder Singh and Yogesh Singh
19. Strengthening of Runway Bridge at Mumbai Airport using FRP By Dr. Gopal Rai with A.K. Singh, and R.S.Jangid
20. Advanced Active Prestressed CFRP in RCC Structures By Dr. Gopal Rai
21. Semi analytical Modelling of Concrete Beams Rehabilitated with Externally Prestressed Composites By Dr. Gopal Rai with Abhijit Mukherjee and Shivprasad P. Badadi
22. Comparison of Prestressed CFRP with conventional RCC and Steel Jacketing By Dr.Gopal Rai with Saurabh Samant and Nasrin Shaikh
23. Retrofitting of Damage Rail Bridge Girder and Its Performance Evaluation By Dr. Gopal Rai with Dr. Anjani Kumar Shukla and P.R.Maiti.
24. Experimental Investigation on Rectangular Brick Masonry Columns Retrofitted with Fiber Reinforced Polymer By Dr. Gopal Rai with Deepa A.Joshi and Dr.R.K.Jain.





CIA WORLD CONSTRUCTION AND INFRA AWARDS- BEST COMPANY IN STRUCTURAL HEALTH MONITORING 2022



RASHTRIYA GAURAV AWARD-2022 MERITORIOUS SERVICE, OUTSTANDING PERFORMANCE, AND REMARKABLE ROLE.



YOUNG ASIAN ENTREPRENEUR (2020-2021) IMMENSE CONTRIBUTION TOWARDS CIVIL INFRASTRUCTURE IN ASIA.



DGC AS "50 MANUFACTURING INNOVATIVE LEADERS"



AWARD IN DUBAI " 40 MOST INFLUENTIAL LEADERS UNDER 40 YEAR 2017-18"



LEADING STRUCTURAL REHABILITATION COMPANY - 2017



BEST ENTERPRISE - 2014



INTERNATIONAL QUALITY CROWN AWARD LONDON- 2013



TIMES LEADING ENTREPRENEUR AWARD–2022 IN THE FIELD OF STRUCTURAL HEALTH MONITORING.



INTERNATIONAL ACHIEVERS AWARD 2022



DGC AS “ THE EXTRA ORDINAIRE - BRAND “ BY BRAND VISION SUMMIT 2020SUMMIT 2020



ASIA ONE FOR GIVING INDIA'S PRESTIGIOUS AWARD FOR YEAR 2018 -19



CIDC VISHWAKARMA AWARD - 2015



FELICITATION FOR INTRODUCING NEW TECHNOLOGY



PROCESS INNOVATION OF THE YEAR IN CONSTRUCTION CHEMICALS



FICCI CHEMICAL AND PETROCHEMICAL AWARDS - INDIA CHEM - 2012



Dr. Rachana Gopal Rai

Chairman

A passionate young leader, a physiotherapist by profession, she is doing clinical practices under R&M Rehab for the past 10 years. Her interest and ideas for the betterment of the company have setup new targets for the team. As a chairman, she provides support in abundance while leading the company in the right direction with her dynamic vision.



Er. Sahil Mhatre

A thoughtful person who has given his commitment in leading engineering sector of the company by adopting latest instrumentations in the field of Structural Health Monitoring guiding his team from last 6 years. His attitude of being humble to the trainee engineers keeps working space lively



Mr. Mangesh Shukla

A person who has been a strong support, serving the company for the last 8 years. He is guiding the beginners and also experienced employees for years in the directions of upgradations. His professional way of handling every task is always admired. He has over 25 years of Experience in the field of finance.



Er. Perwez Hasan

A dynamic person has contributed his quality service for adoption of unpractised solutions in this company. With his Knowledge and Experience he has handled most prestigious projects of the company. He has over 10 years of experience in the field of Project Execution.





Dr. Gopal Rai

Founder

Being a founding member of the company, he is leading the team of experts with his quality experience in the field of retrofitting and rehabilitation for more than 13 years. He was awarded a Ph.D. from IIT Bombay for his research in FRP composites. He has provided solutions for most of the structures which were distressed within the country and out of the country as well.



Er. Chandan Mirajkar

Energetic and soft-spoken personality with ME in Earthquake Engineering, with specialized experience in Bridge Repair and Rehabilitation for more than 6 years. Involved in the upgradation of Repair Material technology and providing high quality standard specialization to Bridge Engineering in our company for 6 years. He is Executive Director of DGC Engineering and General Manager for the South Zone of DGC.



Adv. Ruhi Agarwal

Spirited young personality and Lawyer by Profession. Carrying 4 years of experience in legal entities. Who is well determined, confident while having a wide array of interests and has a quick and mature decisionmaking skill. Generously participates in all the areas of improvement in the organization.



Er. Santosh Chavan

Result focused professional and boots to the ground personality with Civil experience of more than 12 years. Committed to adapt and adopt new innovative techniques of Repair and Rehabilitation work. Involved in the upgradation of technology and methods of construction for this company.



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