freyssinet-india
FPCC LTD.

FREYSSINET INDIA

The Freyssinet Prestressed Concrete Co. Ltd.

"Reinforcing Indian Infrastructure"

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Corporate Profile 2022

OVERVIEW

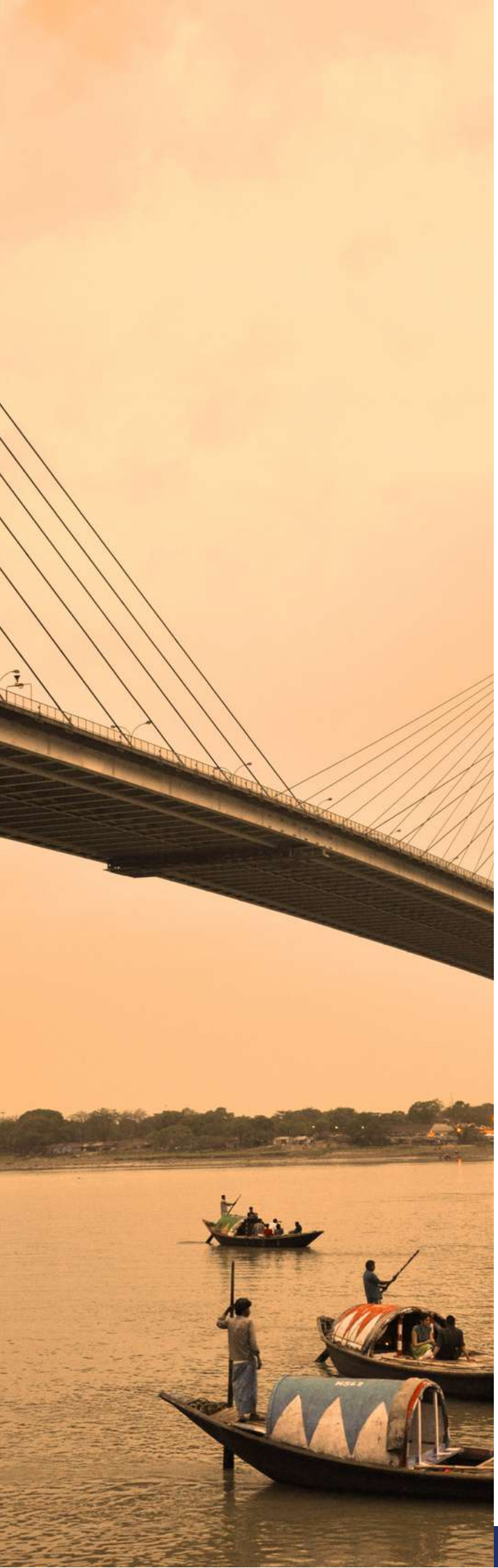
The Freyssinet Prestressed Concrete Company Limited was established in **1954** to promote state of the art *"Prestressing"* technology and related products in India.

It has successfully made pioneering efforts to apply this technique in all types of structures and undertake the works on turnkey basis. It has developed the range from a modest 20 MT prestressing anchorage to 700 MT anchorages.

Over the years, the Company diversified into areas of Repair & Rehabilitation of Structures, Re-building of Bridges and Civil construction, Handling of Heavy Loads etc.

By virtue of expertise attained, it has been recognized as a Civil and Structural Engineering firm in the country particularly in the specialized field of Prestressing and Repairs & Rehabilitation of Structures. Many of the Structures executed by the Company have won accolades in National and International fields.

> *Restrengthening Indian Infrastructure since the past 67 years.*



STATISTICS

67

YEARS OF EXPERTISE

Dedicated team with 6 Decades of specialized engineering knowledge.

300 +

PUBLIC & PRIVATE SECTOR CLIENTS

Customer satisfaction being the benchmark of our performance.

250+

COMPLETED SITES

Faster completion of projects & helping our clients beyond project handover.

1800+

STRUCTURES

Presence in all major industrial structures from bridges to buildings to dams.

100+

CITIES

Executed jobs in 129 cities & 24 states across different geographies pan India.

ABOUT THE COMPANY

WHO WE ARE

Freyssinet India brings an unmatched array of specialist civil engineering knowledge since its inception. Freyssinet offers integrated technical solutions in two major fields: Construction & Structural Repair.

MISSION

To elevate standards of company through our key principles; Quality, Precision, Reliability to meet the requirements of projects by experience & technology. Our specialist civil engineering expertise enables us to handle very challenge.

VISION

To be the esteemed company recognized as a provider of best solutions & services in infrastructure, buildings & ground engineering along new constructions. Deliver efficient and sustainable solutions for our customers.

VALUES

We strive for perfection across all our activities. Employee Safety, Training, Human resources, solution design, risk control & execution with a special focus on developing skills of our employees & setting new standard for customer satisfaction.

OUR BUSINESSES

PRESTRESSING

- Pre - Tensioning
  - Roads & ROB
  - Highways & Railway Bridges
  - Flyovers
  - PT Slabs
  - Elevated Structures of Metro Rail
- Post - Tensioning
  - Bridges
  - Flyovers
  - ROB
  - Jetties
  - Dams
  - Elevated Structures of Metro Rail
  - Ground Anchors
  - Industrial & Public Buildings (Chimney, Silos, Power Stn.)

REPAIR

- Bridge
  - Road Bridges
  - Flyovers
  - Railway Bridges
  - Cantilever Bridges
  - Metro Rail Bridges
- Industrial Buildings
  - Silos
  - Chimneys
  - Power Station
  - Jetties
  - Dams

SELECT CLIENTS

PUBLIC SECTOR

SELECT CLIENTS

PRIVATE SECTOR

LARSEN & TOUBRO

HCC

Reliance Infrastructure

Shapoorji Pallonji

GAMMON
Builders to the nation

TATA PROJECTS

AFCONS
AFCONS INFRASTRUCTURE LIMITED

Ahluwalia Contracts (India) Ltd

Patel
Since 1949

BEKEM
INFRA PROJECTS PVT. LTD

Reliance
Industries Limited

GMR

LANCO

JAYPEE
GROUP

Indiabulls

UltraTech
CEMENT

ACC
cement

Shree
Cement

THE RAMCO CEMENTS LIMITED
RAMCO

Binani Cement

LODHA

Panchshil

SUPREME
Bringing Spaces To Life

PENINSULA LAND
CREATING INTERNATIONAL LANDMARKS

omkar

PRESTRESSING

Prestressing is a specialized engineering business. This system is complex and made up of multiple elements which require extensive experience, technical knowledge, research, innovation and considerable means for installation.

FPCC has developed multifarious types of anchorages for prestressing force ranging from 185 KN to 7000 KN. Some of the products manufactured are:

- Anchorages & Sheathing
- Hydraulic Jacks
- High-pressure Hydraulic Pumps
- Neoprene Bearings
- Flat jacks
- Grouting equipments
- Strand threading Machines

The techniques developed by Freyssinet are characterized by their durability and increased compactness:

Anchorage system -K Range

- External prestressing
- Un-bonded tendons

The quality & efficiency of these techniques have led to the Freyssinet's predominant presence on all mega, prestigious projects in different categories.

- Bridges
- Irrigation structures
- Offshore platforms
- Nuclear containment vessels
- Liquefied natural gas tanks
- Silos
- Geotechnics
- Buildings

SELECT PRESTRESSING PROJECTS

BRIDGE PROJECTS

#	Project	Client	HTS Qty (MT)	System
1	Kosi Bridge	Gammon India - Tranrail	5338 MT	19K 13
2	Mumbai Metro	Reliance Infrastructure	4391 MT	12K 15 / 19K 15
3	Delhi Metro	DMRC	2433 MT	12K 15 / 19K 15
4	Barapullah Bridge	Larsen & Toubro	2300 MT	12K 15 / 19K 15
5	J & K Udhampur Ramban Road	Gammon India	2300 MT	19K 13
6	Delhi Metro Wazirpur	DMRC	1600 MT	12K 15 / 19K 15
7	Brahmaputra Bridge	Gammon India	1500 MT	12K 15 / 19K 15
8	Hyderabad Metro	Larsen & Toubro	1450 MT	12K 15 / 19K 15 / 5S 15
9	Signature Bridge	Gammon India	1410 MT	19K 15
10	Wazirabad Bridge	Gammon India	1410 MT	4K 15 / 19K 15

SELECT PRESTRESSING PROJECTS

Barapullaha Bridge, New Delhi

Client: Larsen and Toubro

Details:

- Length of Corridor : 6.00Km.
- Total Nos. of SPAN : 210 Nos.
- Length of span: 25 to 45 mtr
- Nos. of Pier Cap : 450
- Total Nos. of segment : 2850 Nos

Pre-stressing Systems Used

(A) 19K15 : 5150Nos.
(B) 12K15 : 3516 Nos.

- H.D.P.E. Duct 107 mm: 92400 RM
- H.D.P.E. Duct 84 mm: 54000 RM
- Average Time Cycle of PER SPAN: 03 DAYS (Threading & Stressing
- Maximum Stressed in 01 Month = 100 MT

Challenges:

- This was a cable stay bridge and having a 45mtr long span. Pre - stressing activities were carried out simultaneously at multiple locations of simply supported spans of length 45mtr (18MT) in record 3 days so as to meet the time cycle of the project.

SELECT PRESTRESSING PROJECTS

Brahmaputra Bridge, Assam

Client: Gammon Engineers and SP Singhala Construction Ltd (JV)

- Length of the Bridge: 3.015 Km.
- Bridge consist of 9 modules and have 27 pier.
- Length of the Span: - 120m
- Construction method : Cast in Situ Balance Cantilever
- Post Tensioning system used is Freyssinet **19K15** and **12K 15**

SELECT SEGEMENTAL PROJECTS

Beas Bridge, Kullu, Himachal Pradesh

- Beas project was constructed across river Kullu in Himachal Pradesh.
- Due to heavy current of water and geological condition, typical arch of 100 mtr span was constructed to support the deck and columns of the bridge.
- Freyssinet was involved in carrying out the erection and its analysis of arch. The arch was constructed in the segment and alignment was maintained / adjusted using temporary stays which were anchored in temporary steel towers.

Delhi Metro Rail Corporation (DMRC), Delhi

- A Prestigious & landmark project of the Indian government.
- FPCCL has carried out 52 km stretch elevated sector.
- The total quantum of post tensioning carried out by FPCCL was 9635 MT.
- FPCCL holds record of carrying out post tensioning of 45 spans in a month in single package.

Delhi Noida Bridge, Delhi - Noida

- The decking of this bridge was constructed by precast segmental construction.
- It was post-tensioned by 27K15 Freyssinet external tendons which were used for the first time in the country at that time.

SELECT SEGEMENTAL PROJECTS

Hebbal Flyover, Bangalore - Karnataka

- This Bridge is located in Bangalore the total length of flyover is 2.34k.m.
- The total number of segments were 785 no's
- The 19K13/7K13 system was used.

Bangalore Metro, Bangalore - Karnataka

- The total length of flyover is 1.5k.m.
- The total number of segments were 584 no's
- 19K15 system was used.

Bassin Creek Bridge, Mumbai - Maharashtra

- This Bridge is located on Mumbai-Delhi Highway on NH-8.
- The bridge was constructed by using segmental cantilever method.
- The decking was prestressed by Freyssinet 19K13 system.

SELECT DAM PROJECTS

RADIAL GATES

#	Project	Anchors	Client	State
1	Tupakulagudem Dam	2,640	Bekem Infrastructure	Telengana
2	Maheshwar Dam	1,892	NHPC	Madhya Pradesh
3	Omkareshwar Dam	1,228	NHDC	Madhya Pradesh
4	Chamera Dam Phase 1	760	NHPC	Himachal Pradesh
5	Indira Sagar Dam	656	NHDC	Madhya Pradesh
6	Baglihar HEP (450 MW)	250	NHPC	Jammu & Kashmir
7	Chamera Dam Phase 2	118	NHPC	Himachal Pradesh
8	Karcham Wangtu HEP (1000 MW)	96	NHPC	Himachal Pradesh
9	Baspa HEP Phase 2 (350 MW)	44	NHPC	Himachal Pradesh
10	Vishnuprayag Hydro Electric Project	36	NHPC	Uttarakhand

SELECT DAM PROJECTS

RADIAL GATES

Prestressing of Radial Gates of Thupakulagudem Barrage Project, Telangana

Client: Bekem Infrastructuure

Details:

- Freyssinet system of 27K15 & 12K15 was used on piers of radial gates.
- Strands used are of PE coated of 15.2 mm diameter.
- Total quantity of tendons 750 MT, among which 660 Nos are transverse tendons and 1222 Nos, are Longitudinal tendons.

Achievement:

- The project is completed within the stipulated and specified time by Govt. Of Telangana.

SELECT DAM PROJECTS

Omkareshwar Dam, Madhya Pradesh

- The dam is 949 meter in length and is 33 meter in height. It is a high concrete gravity dam. There are 23 radial gates of the size 20 meter x 17 meter in the spillway section anchored to the pier.
- RCC trunion girder of size 10 meter x 5 mtr x 5 mtr using Freyssinet 27K15 unbonded tendons.
- The project was one of the fastest completed hydroelectric projects in the country during the period 2004 to 2006.

Indira Sagar Dam, Khandwa - Madhya Pradesh

- Indira Sagar Dam is located on River Narmada at Narmada Nagar, Dist. Khandwa. Its installed generation is 1000 MW.
- The powerhouse has 8 turbines each having capacity to generate 125 MW electricity.
- The dam has 20 radial gates of the size 20 mtr x 17 mtr anchored to the pier through steel trunion girder using Freyssinet 27K15 system.

Maheshwar Hydroelectric Power Project, Madhya Pradesh

- Maheshwar Dam constructed across River Narmada in Madhya Pradesh.
- It is the longest dam in Madhya Pradesh. It is 3420 mtr in length and is 36 meter in height. There are 27 radial gates of the size 20.5 meter x 17.5 meter anchored to the pier through the trunion girder using Freyssinet 19K15 and 12K15 tendons.

SELECT GROUND/ROCK ANCHOR PROJECTS

#	Project	Client	Capacity(Mt)	Anchor	Length(m)
1	Parbati HEP, Himachal Pradesh	NHPC / Gammon India	110	700	24,500
2	Inclined Soil Anchors, UP	Larsen & Toubro	40 - 70	1,100	20,900
3	Century Mills, Mumbai	Shapoorji Pallonji	90, 120, 150	1,061	13,608
4	Rock Anchor, Wazirabad	Gammon India	150	192	13,440
5	India Tower Inclined Rock	D B Realty	175	350	12,250
6	ICICI Bank Building, Hyderabad	Larsen & Toubro	60	1,100	12,100
7	Hotel Leela, Chennai	Gammon India	145	232	9,280
8	National Stock Exchange, Mumbai	Larsen & Toubro	120	290	7,250
9	Kaiga Atomic Power Reactor, Karnataka	Gammon India	350	280	7,000
10	Novatel Hotel, Mumbai	Gammon India	22	850	5,100

SELECT GROUND/ROCK ANCHOR PROJECTS

Signature Bridge, Delhi

- **Challenge:** Sinking of wells was required for the construction of the bridge.
- **Solution:** Freyssinet soil anchors with a capacity of 150 tonne were employed for this purpose. Each anchor was taken 70 meter deep by pneumatic drilling rigs. The casing, too, was taken to same depth and was withdrawn completely during grouting. In all 24 wells, 8 anchors were executed in this manner.

Parbati Hydroelectric Project, Himachal Pradesh

Client: N.H.P.C./ Gammon India

- **Details**: The project is located in the hilly terrain of Kullu.
- **Challenge:** During construction of the power house a portion of the slope behind the power house collapsed. The slopes were to be stabilized to prevent further landslides and caving.
- **Solution:** A system of prestressed anchors and rods was devised to stabilize the slopes. Freyssinet 12K13 tendons were used. Shortcreting was done on the slopes after anchoring of the tendons to prevent damage to the slopes due to water. A total area of 90 meter x 175 meter was stabilized in this manner.

Subansiri Project, Andhra Pradesh

- **Challenge:** The slopes of the hills adjoining the diversion tunnels had to be stabilized.
- **Solution:** Freyssinet rock anchors with a capacity of 60 tonne were used. The anchors were inclined 15° to the horizontal and embedded 12 meter deep in the sandstone strata. Freyssinet 7K13 tendons were used for anchoring.

SELECT SILOS/TANKS PROJECTS

#	Project	Client	State	Year
1	Jajpur Cement Grinding Unit	Larsen & Toubro	Odisha	2019
2	Blending Silo at Tadipatri	UltraTech Cement	Andhra Pradesh	2018
3	Ethylene Storage Tank	Larsen & Toubro	Gujarat	2016
4	Rajasthan Atomic Power Project	H.C.C.	Rajasthan	2014
5	EPS of Blending Silo	UltraTech Cement	Andhra Pradesh	2013
6	LNG Storage Tank	Afcons Infrastructure	Gujarat	2012
7	Dahej Tank	ITD Cementation	Gujarat	2011
8	Clinker Silo	Prism Cement	Madhya Pradesh	2011
9	Clinker Silo	UltraTech Cement	West Bengal	2008
10	Blending Silo	ACC	Bihar	2004

SELECT SILO CASE STUDIES

Alathiyur Silo (Blending), Tamil Nadu

- This blending silo with a 22 meter diameter and a height of 53 meter using the slip-forming system and Freyssinet 12.7 mm wire system for prestressing.

Gagal Silo (Clinker), Himachal Pradesh

- This clinker silo with a 35 meter diameter and a height of 41 meter using the slip forming system and 12K13 system was adopted for prestressing.

Ambuja Cement Clinker Silo, Punjab

- This is one of the largest clinker silos constructed in India in 2003.
- This Silo with a 66 meter diameter and a height of 45 meter.
- It is provided with 8 ribs for anchoring Freyssinet 12K13 tendons.

SELECT TANKS CASE STUDIES

Ethylene Storage Tank at Dahej, Gujarat

- **Capacity**: 25,000 CUM
- **Height**: 30 MTRS.
- **Prestressing System** : Freyssinet 19K13 for Horizontal & U Shape Vertical Tendons
- **Storage Temperature:** 104 Degrees
- **Year:** 1997

LNG Storage Tank at Kochi, Kerala

- **Height:** 41 MTR
- **Prestressing System:** Freyssinet 19K15 for Horizontal & 12 K 15 for Vertical Tendons.
- **Storage Temperature:** 165 degree
- **Year:** 2011

Ethylene Storage Tank at Jamnagar, Gujarat

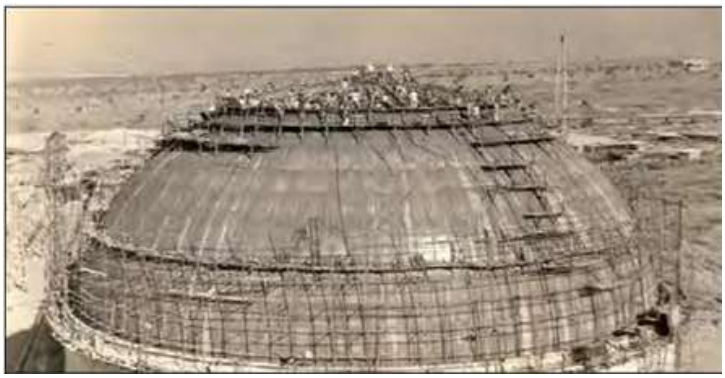
- **Height**: 22 MTR
- **System**: 12K15 SYSTEM
- **Year:** 2016

NUCLEAR REACTORS

Freyssinet India has involved in the post tensioning of Nuclear reactor in India since it is first reactor and till date FPCCL has carried out post tensioning of ten reactors. The typical post tensioning work of nuclear reactor involved installation of semi circle cable, vertical cable and "J" shape cable.
Most of the nuclear reactors in India have been prestressed by Freyssinet.

To name few –
- Kaiga Atomic Power Project – Unit 3 & 4
- Rajasthan Atomic Power Project – Units 1,2,3 & 4
- Madras Atomic Power Project,
- Narora Atomic Power Project,
- Kakrapara Power Project,etc.

Rajasthan Atomic Power Project



Kaiga Nuclear Power Project

Kaiga Atomic Power Project

Narora Atomic Power Project

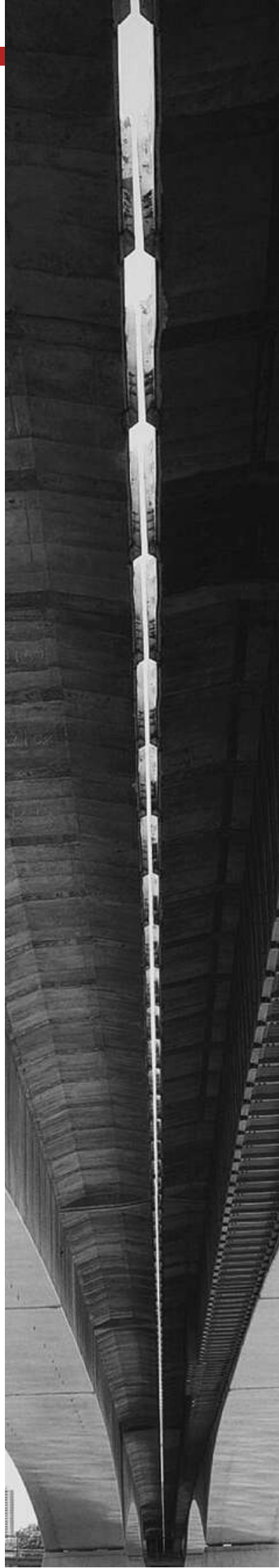
REPAIR & REHABILITATION

Repairs and Rehabilitation of structures is very specialized business which requires a lot of indept structural analysis regarding the existing structures like history, type of foundation, conditions of sub/superstructure, over all behaviour of the elements.

FPCC is the pioneer company having experience in specialized techniques of repair and rehabilitation like external pre stressing of various prestigious structures like balanced cantilever bridges having span length of 120 mtrs, including design and its successful implementation of it.

The company has successfully carried out lifting of super structure and replacement of elastomeric Bearings of about 600+ Nos. in a single contract well within the stipulated time frame and in many more bridges all over in India.

The company has also carried out re-construction and replacement of 7 bridges for Western railways between Surat and Vadodara section for the first time in the Indian Railway history. The existing steel girders were replaced by New Pre cast PSC box girders in a record traffic block period of 4 hours.



OUR EXPERTISE

FPCC has successfully carried out Repairs and Rehabilitation of 400 + various types of structures from 1975. Our specialization in Rehabilitation is as under: -

External Pre-stressing

- Bridges
- Cement Silos
- Chimneys

Heavy Lifting

- Monuments
- Bridges
- Industrial Building elements.

Structural Repairs

- Bridges
- Silos
- Irrigation
- Jetties
- Any concrete structure.

SELECT BRIDGE REPAIR PROJECTS

#	Project	Client	Details	State	Year
1	East West Corridor of KMRCL	KMRCL	Replacement of Elastomeric Bearing	West Bengal	2020
2	Baitarani Bridge	Govt. of Odisha	Assessment, Rehabilitation design, Execution & Post Monitoring	Odisha	2019
3	Bridges in City 1 Division	MCGM	Repair & strengthening of different flyover & bridges across South Mumbai	Maharashtra	2019
4	Lalbaug Flyover	MCGM	External prestressing of box girders, lifting of continuous spans & replacement of Pot-PTFE bearings, carbon fiber wrapping/laminate, replacement of expansion joints.	Maharashtra	2018
5	Ganga Bridge at Moradabad	NHAI	Rehabilitation & Strengthening	Uttar Pradesh	2017
6	Nizamuddin Bridge	PWD Delhi	Rehabilitation & Strengthening	New Delhi	2016
7	Borim Bridge	PWD Goa	Rehabilitation & Strengthening	Goa	2014
8	Thane Creek Bridge	PWD Maharashtra	Replacement of Expansion joints	Maharashtra	2013
9	Sadarghat Bridge	PWD Assam	Rehabilitation & Strengthening	Assam	2012
10	Kodambakkam Bridge	Corporation of Chennai	Carbon Fiber Wrapping, Lifting of Spans & replacement of bearings, & fixing of expansion joints	Tamil Nadu	2011

SELECT BRIDGE REPAIR PROJECTS

#	Project	Client	Details	State	Year
11	Old Sardar Bridge	National Highway Division	Repairs & Rehabilitation of Hinge Bearings, Expansion Joint & Railing work	Gujarat	2011
12	Mahatma Gandhi Setu Ganga Bridge	National Highway Division	Replacement of existing damaged central hinge bearings	Bihar	2011
13	Mahanadi Bridge	Hindustan Construction Company	Rehabilitation & Strengthening	Odisha	2010
14	Indira Sagar Power Station	NHDC	Rehabilitation of 506 M long High Level Bridge	Madhya Pradesh	2010
15	Seven Bridges at Trichy	IJM Infrastructure	Rehabilitation & Strengthening	Tamil Nadu	2009
16	Maraimalai Adigalar Bridge	Corporation of Chennai	Rehabilitation & Strengthening	Tamil Nadu	2008
17	Zuari Bridge	PWD Goa	Strengthening & Cracks Sealing	Goa	2007
18	Cauvery Bridge	PWD Tamil Nadu	Replacement of Elastomteric Bearings	Tamil Nadu	2007
19	Hiremalai Tunnel	PWD Karnataka	Restoration by cement grouting	Karnataka	2006
20	Tungi Bridge	National Highway Division	Repair of steel distressed bridge	Bihar	2006

SELECT BRIDGE REPAIR PROJECTS

Ganga Bridge, Moradabad - Uttar Pradesh

Client: National Highway Authority of India

Details:

- Type of Structure: Simply Supported.
- Span Length: 52 to 54 meters
- No. of spans: 13

Challenges:

- Bridge was shown distresses in the rocker and sliding bearings, cracks in the superstructure.
- Existing strip seal Expansion joints had become Non functional.
- Deflection in the centre of spans observed due to loss of pre – stress level in the existing cables.
- Concrete of deck slab was damaged at several locations and pot holes observed in the deck slab with wearing course.
- Wearing course was damaged in the entire length of bridge. RCC railing, Footpath slab was broken and missing at several locations.
- Concrete brackets supporting to the footpath slabs were broken in the entire length of the bridge

Solution:

- Drilling of holes, cement grouting was carried out in the super – structure.
- Honeycomb concrete was repaired by polymer modified mortar.
- External Prestressing scheme designed after results of Non – Destructive tests.
- External prestressing carried out for all the 13 spans by providing 6k15 High tensile tendons as per the approved drawings.
- Laminate and carbon fiber wrapping applied on the girders as per the approved design and drawings.
- All the concrete brackets were repaired by High early Strength Concrete.
- Entire old railing, wearing course replaced by new one
- Anti carbonation painting applied on superstructure

SELECT BRIDGE REPAIR PROJECTS

Lalbaug Flyover, Mumbai - Maharashtra

Client: Municipal Corporation of Mumbai (MCGM)

Details:

- Type of Structure: Flyover
- Span Length: 26 to 35 meters
- No. of spans: 79
- 2.70 kms long flyover situated in the heart of city between Parel and Byculla.
- Superstructure is consisting of twin cell segmental PSC box girders resting on POT – PTFE bearings. The span arrangements are 3 and 4 continuous spans. There are single strip seal expansion joints are provided on the deck.
- It has 4 lane carriageway of 17.20 meters including central verge of 1.20 meters.

Challenges:

- Within 7 years from its completion, bridge has shown excessive distresses mainly in POT.PTFE bearings, Expansion Joints, riding surface and cracks in the pier caps, box girders.
- The biggest challenge is to lift the 4 continuous spans at a time with suitable capacity of hydraulic jacks, removal of damaged POT PTFE Bearings and provide new bearings.
- The capacity of bearings is from 400 to 500 MT

Solution:

- Methodology for safe lifting of 4 Continuous spans to be prepared.
- Removal of old defective bearings will be carried out.
- Fixing of new POT – PTFE bearings with time line and level.
- Bridge is to be strengthening by EPS as per design prepared by independent structural consultant and proof checked by IIT Mumbai.
- RCC pier loads and superstructure to be strengthen by applying carbon fiber and laminate as per approved design and drawings.
- All expansion joints are be to replaced by new joints with micro concrete.

SELECT BRIDGE REPAIR PROJECTS

Kolkata Metro Railway, Kolkata - West Bengal

Client: Kolkata Metro Railway Corporation

Details:

- Kolkata Metro viaduct consisting of PSC Box Girder of 20 m to 32 m span, resting on elastomeric bearings on concrete pedestal along with pier cap.
- The track was laid on ballast less track having maximum 8.75* curve and maximum gradient 1 in 60. The section is having 8.5 Km length & 344 nos. of Piers .

Challenges:

- During regular service some gaps had been observed in between the top & bottom portion of bearings, soffit of girders and top part of pedestal, resulting in uneven load to the bearings. Few bearings were detected over stressed with signs of budging.
- Viaduct Route Alignment: All piers were located in the centre of Tolly Nullah which was full of city waste water & there was no approach road to place plant and machinery at working location.
- Working Hours: Only 5 Hours was scheduled by Metro Railway at night for Lifting of girder & replacement of bearings with sitting arrangement rectification.
- Daily Operations: It was a big challenge to ensure that daily metro service timing should not be disturbed due to replacement of bearing.
- Materials: Before commencement of work selection of suitable high strength epoxy materials was a big task as it required strength within specified time.

Solution:

- Successfully replaced all 2752 nos. bearings. Every night 8 bearings were replaced within a 5 hour time period.
- Micro planning of time, deployment of highly skilled manpower and using specific tools in respect of each activity.
- We had designed a special type of steel frame which was a hanging working platform to execute the work at pier cap as it was not possible to erect the platform from ground level due to running sludge in Nallah.
- For the first time in Indian Railways a total of 2752 bearings were replaced without disrupting the daily operations of metro showcasing our incredible credibility.

SELECT BRIDGE REPAIR PROJECTS

Rebuilding of 7 Bridges on Surat - Baroda Section, Gujarat

Bridge No.478 – Complete view after launching of all PSC girders

Client: Western Railway & Gammon India

Details:

- The bridges were more than 100 years old, and were located along a stretch of 109 km. The existing bridges were steel girder bridges having 3 600 mm (phi) cast iron piles covered with stone masonry piers.

Challenges:

- The cast iron piles were corroded significantly and needed to be replaced.

Solution:

- New pile foundations were laid. The plate girder decking was replaced by prestressed concrete girders. The entire project was executed without disrupting traffic.

1st Stage - 35 M.T. existing steel girder was de-launched by 400 M.T. capacity hydraulic crane.

2nd stage – PSC box girder weighing 220 M.T. Lifted using 2 nos. 400MT capacity craneS from ground level

3rd stage – Launching of PSC box girder in progress and is in final stage.

4th & Final stage – View showing PSC box girder placed on Temporary c.c. cribs before finally placing in position on new pier caps.

SELECT BRIDGE REPAIR PROJECTS

Borim Bridge, Goa

Details:
- Type of Structure : Simply Supported
- Bridge Length: 424 mtr, with carriage width of 7.5mtr
- No. of Spans : 8 Nos.

Challenges
- Strengthening of Sub structure & Superstructure Balance Cantilever Span 110 mt length – 2 spans & Viaduct Box Girder 4 nos. of 37.5MT length.

Solutions
- Strengthening scheme by EPS method of balance cantilever spans & viaduct spans was concluded to recovery of distress.

Nizamuddin Bridge, New Delhi

Details:
- Type of Structure : Simply Supported
- Span Length: 40 to 42 mtrs
- No. of Spans : 13 x 2 carriageways.

Challenges :-
- 7 nos. prestressing strands had got snapped, roller & roller bearings had got corroded and non functional.
- Existing bitumen mastic wearing course had got damaged at several points.
- Snapped strands with new one, Bearings were replaced with Elastomeric bearing.
- Existing slab seal expansion joints were replaced with slab seal expansion joints.

Mahanadi Bridge, Orissa

- **Details:** It is a major High Level Bridge constructed over the creek with depth of water varying from 5 M. to 15 M. All 19 spans of bridge were simply supported and comprising of 4 'I' girders with 48 M.

- **Challenge:** This stretch of road was taken up for 4 laning by NHAI. The work of rehabilitation and strengthening of superstructure of this bridge was a highly specialized job and was therefore entrusted to FPCC by HCC Limited at the recommendation of NHAI.

- **Solution :** All spans were strengthened by providing two external cables of 6T15 size for each girder. The cross prestressing was done by using 2 mono- strand Freyssinet cables of 1T15 system.

SELECT BRIDGE REPAIR PROJECTS

Vansadhara Bridge, Orissa

- **Details:** There are 9 spans of 104 ft. each and 2 end spans of 35 ft. with floating spans of 5 ft. The superstructure consists of RCC box girder with twin cells and balanced cantilever supported on solid piers.
- **Challenge:** Due to this the abutment on the right bank together with P1 and P2 and decking got washed away. The superstructure on P3 and P4 shifted towards the downstream side and rested on 2 pedestals only. The piers P3 and P4 were tilted towards the upstream side.
- **Solution:** Damaged concrete removed. Both piers were provided with RCC cladding and anchoring of reinforcement was done with well cap and existing pier. Span was lifted to the original level. Lifted span was rotated for achieving proper alignment. Span lowered on the Neoprene bearings.

Sutlej Canal Bridge, Punjab

- **Details:** Some submersible bridges are raised by jacking up the decks and by increasing the height of piers. Rapid growth of urban areas at times, calls for improvement in bridge structures near the city to take care of the network of roads.
- **Challenges:** During the service life of bridge, time had come when the bridge was required to be elevated.
- **Solution:** The decking of Sutlej Bridge over the canal was raised by 1.2 Metres to accommodate higher FSL.

Thevally Bridge, Kerala

- **Details:** Balanced cantilever decking with 2 main units of 30.48 M. and central suspended span of 15.24 M.
- **Challenge:** One pier and an abutment suffered considerable settlement and tilting thereby adversely affecting the stability and alignment of the bridge. The abutment on Kadavur side and adjoining pier had settled and tilted. The settlement was 1.26 M. and 0.7 M. respectively.
- **Solution :** For pier and abutment 20 and 12 bored piles of 550mm were constructed respectively. On the top, new pier cap was provided Neoprene Bearings were installed on new trestles and the superstructure lowered on to them.

SELECT BRIDGE REPAIR PROJECTS

Khuni Nallah Bridge, Jammu & Kashmir

- **Details:** The bridge, spanning a deep valley, is located in tough Himalayan terrain prone to landslides. The superstructure consists of 2 unequal cantilevers of 19.8 meter and 39 meter towards centre of the crossing and balanced by suspended spans of 30.4 meter. Shore spans are 8.2 meter and 18.6 meter in length.
- **Challenge:** The prestressed concrete single cell box had suffered heavy damage due to a massive landslide resulting in rupturing of 32 out of 46 cables.
- **Solution:** The cable positions were re - established and they were coupled and anchored over a concrete block specially constructed over the pier. The damaged portion of the deck was also repaired and the cables stressed. A Load test was conducted in accordance the IRC standards.

Jui Creek Bridge - Navi Mumbai, Maharashtra

Details: The bridge consists of 2 simply supported spans of 44 M. length supporting two carriageways each of 7.3 M. width, two footpaths and central verge of 1.2 M.

Challenges: An important road passes under this bridge. The only remedy was to raise the decking of the bridge by 2.65 M.

Solution: Temporary diversion of the traffic was arranged. Seven girders of each span weighing 1400 T. were lifted simultaneously by using hydraulic jacks.

Zuari Bridge, Goa

- **Details:** Length of 810 meter, comprises 5 “T” arms of varying length, 2 suspended spans & 5 viaduct spans of 36 meter each. The carriageway width on the bridge is 7.5 meter with a 1.5 meter wide cantilever footpath on either side.
- **Challenges:** Existing prestressed cables were corroded resulting in loss of stresses. Excessive deflection of the cantilevers combined with vertical cracks in the web near the pier was also observed.
- **Solution:** A scheme of external cables was devised to compensate for the loss of prestress, thereby improving the serviceability of the structure. The cables were located on the underside of the deck and over the soffit by deviating them from the web.

SELECT BRIDGE REPAIR PROJECTS

Mahatma Gandhi Setu, Patna

- **Details:** The longest bridge in Asia at 5525 meter, it comprises 45 spans of 121 meter each and 2 end spans of 63.5 meter each. It is a prestressed concrete bridge with pre-cast double cantilever construction on RCC piers and wells. The superstructure consists of cantilever “T” arms of 60 meter each on each side of the pier.
- **Challenge:** Due to distresses some of the segments were forming a gap of 15 to 20 mm. Cracks were observed in the bottom slab of the segment cast box girders in a few spans, and excessive sagging of cantilevers was also observed.
- **Solution:** The rehabilitation of the bridge was carried out by EPS to the deflected cantilever tips and spans, and stitching was done with imported Macalloy bars.

Sharavathi Bridge, Karnataka

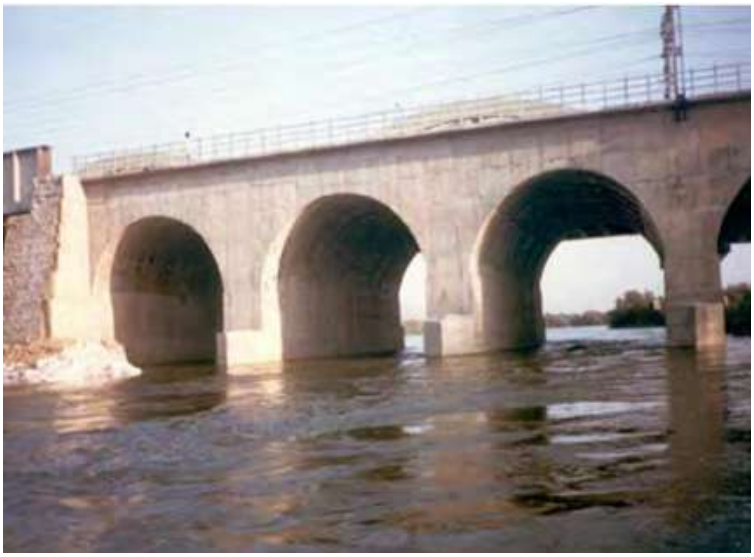
- **Details:** The Bridge, with an overall length of 1047.65meter, comprises 34 spans of 30 meter each. The 2 end spans are balanced cantilever arms. Each main span consists of 5 prestressed “I” girders placed on hammerheads.
- **Challenges:** On account of proximity to the saline environment the existing prestressed cables were corroded resulting in loss of stresses. Distresses were also observed in hammerheads.
- **Solution:** The rehabilitation of the bridge was carried out by strengthening the piers and hammerheads with additional steel brackets and external prestressing of main girders. One of the outstanding features of this project was the load test carried out to assess residual prestress in the girders.

SELECT BRIDGE REPAIR PROJECTS

RAILWAY BRIDGES

Thane Creek Bridge, Maharashtra

- **Details:** The 135 year old bridge has a superstructure and sub-structure built in masonry, resting on open footings. In all there are 23 arches of 9.14 meter span and barrel length of 21 meter.
- **Challenge:** Due to ageing, two arch sections had suffered distress and the mortar had leached loosening the stones.
- **Solution:** RCC jacketing was done. Internment of the arch by RCC was also done. Tidal problems and long length of the barrel added to the challenge during this project. Coffer dams were constructed to isolate the foundation so that the required repair work could be accomplished.



Cauvery River Railway Bridges, Tamil Nadu

- **Details:** The Bridge, with an overall length of 1047.65meter, comprises 34 spans of 30 meter each. The 2 end spans are balanced cantilever arms. Each main span consists of 5 prestressed “I” girders placed on hammerheads.
- **Challenges:** On account of proximity to the saline environment the existing prestressed cables were corroded resulting in loss of stresses. Distresses were also observed in hammerheads.
- **Solution:** The rehabilitation of the bridge was carried out by strengthening the piers and hammerheads with additional steel brackets and external prestressing of main girders. One of the outstanding features of this project was the load test carried out to assess residual prestress in the girders.

SELECT SILO REPAIR PROJECTS

Tadipatri, Andhra Pradesh

- **Details:** Strengthening Blending silos by External prestressing. No. of Plant : 2 units (Phase I & II) Height : 77.7 m with diameter 28 m Strengthening of silo done from 16.757mt to 63.010m of silo height.
- **Challenge:** Due to construction errors, Horizontal cracks were found along the circumference of the silo at various heights. The hoop Stress developed in the silo has made the Silo week and UTCL was operating the silo with 30 to 40% of its capacity.
- **Solution:** A Scheme of External Cables was devised to compensate for the Hoop Stress and the losses in the concrete. The Cables were placed along the circumference of the Silo in equal from intervals with additional steel blocks at 04 opposite directions to hold the silo increased 16.757m to 63.010m.

Diamond Cement, Madhya Pradesh

- **Details:** 2 raw meal silos constructed in 1983 for a capacity of 5500 MT. The 15 meter diameter silo is 33 meter in height.
- **Challenges:** The 2 silos had suffered heavy damage due to vertical cracks, spalling & circumferential reinforcement was not adequate.
- **Solution:** 216 full-size circular mono-strand cables wereprovided and anchored using Freyssinet special connectors. The strands were housed in suitable HDPE ducts with a layer of grease. The assembly of strand & pipe was housed in bigger HDPE ducts and the inter space was grouted with neat cement grout, thus providing comprehensive protection to the prestressing steel.

Raymond Cement, Chattisgarh

- **Details:** The 14 mtr diameter silo is 37 mtr in height and has a capacity of 1.2 million tone
- **Challenges:** The silo tilted by as much as 2 meter when cement was being loaded into it and cracked. It was resting on an adjoining silo, which made the job of repairing and realigning it extremely challenging.
- **Solution:** The portion of the silo above the crack was supported by hydraulic jacks and by fitting steel brackets. Concrete in the distress zone was cut in a controlled manner on the opposite side of the tilt. This was followed by lowering, The damaged portion was then concreted after bringing the silo back to its vertical alignment. The outer jacket was integrated with the existing silo and a PSC ring beam was provided for increased effectiveness.

SELECT DAM REPAIR PROJECTS

Indira Sagar Dam, Madhya Pradesh

- **Details:** The dam has a height of 91 mtr and a capacity of 12 billion cum. It has 20 gates, with 12 radial gates and 8 auxiliary gates.
- **Challenge:** The roller buckets of the radial gates were damaged due to excessive force of the discharged water through spillways.
- **Solution:** Stagnant water in the buckets was dewatered by heavy duty water pumps and loose concrete was removed by chipping. Additional reinforcement was laid by anchoring bars into the existing concrete.

Hirakud Dam, Odisha

- **Details:** This dam is one of the major dams in India situated across River Mahanadi in Orissa near Sambalpur. The 4800 meter long dam is a combination of concrete, masonry and earth section.
- **Challenges:** Considerable leakage through the right spillway was observed, and was traced to several horizontal cracks formed along the spillway length.
- **Solution:** The distresses were tackled effectively by deploying experienced deep sea divers and expertise especially suited for underwater treatment.

Chamera Dam, Himachal Pradesh

- **Details:** Chamera Dam is across River Ravi and its generation capacity is 540 MW. The radial gates of the dam are of the submersible type, with each gate being 10.2 mtr x 12.8 meter in size.
- **Challenges:** The existing bars were to be replaced with cable anchors, without affecting the existing arrangement of trunion girders, radial gates, piers and connected parts.
- **Solution:**6 strands of 15.2 mm diameter were used in each hole. FPCC's new compact anchorage system was used to overcome space constraints. Strand cable was un-bonded.

SELECT DAM REPAIR PROJECTS

Indira Sagar Dam, Khandwa - Madhya Pradesh

Client: N.H.D.C., Indira Sagar

Details:

- This Indira Sagar dam is a multipurpose river valley project on the west flowing river Narmada located at Narmada Nager, Dist Khandwa in the state of Madhya Pradesh. It is a solid gravity Dam 653 meter and 92 meter hight with Gross storage capacity of 12.22 billion cubic meters. The Project is Providing irrigation benefits to the gross area of 1.23 Lac hectares and has installed capacity of 1000 MW electricity generation. The power house has 8 turbines each having capacity to generate 125 MW electricity. The Dam has 20 radial gates of the Size 20-meter x 17 meter anchored to the Pier through steel trunnion girder using Freyssinet 27K15 System
- Total cables were 328 nos, out of which we have tested only 40 cables (i.e. 2 from each pier)
- Total no of 15.2mm dia H.T.Strand at each intermediate pier cables were 24 nos and in end piers 26 nos.

Challenges:

- There was loss of Pre-stressing force in the existing cables and slippage of strands in few cables observed.

Solution:

- All the selected cables were opened upto the bearing plates by removing the caps, existing grease was removed and cables were cleaned. The losses of stressing forces restored with re stressing of all the strands as per the design force
- The caps were refitted with filling of new Graphite Grease. Slipped cables were distressed and then re stressed again as per the design load. Grips of both dead and stressing end have been changed.

SELECT JETTY REPAIR PROJECTS

Kandla Port Trust, Gujarat

- **Details:** The jetty comprises 10 cargo berths in straight quay line in a sheltered creek. Each berth is 200 meter long. There are a number of bays, each 23 meter in length.
- **Challenge:** The salinity of the marine environment had resulted in corrosion of rebars, spalling and cracking of concrete. There was heavy damage to quay walls due to constant collisions with berthing ships.
- **Solution:** Various components of the jetty were restored by removing damaged concrete and building up sections by polymer mortar and guniting, as required.

Jaffrabad Jetty, Gujurat

- **Details:** The main jetty is 211 meter long and is used for berthing of ships. It is connected to the 265 meter long approach jetty. The superstructure of the jetty consists of a 200 mm thick RCC deck slab resting on “T” beams.
- **Challenges:** The main/secondary “L” beams showed excessive distress with as much as 40% corrosion of steel and loss of density of concrete due to the saline atmosphere.
- **Solution:** The main beams, “L” beams, along with the slab were dismantled and replaced by new precast beams. The new deck was cast in parts after erection of the beams. A noteworthy fact was that the entire project was completed without interrupting the operation of the conveyor belt.

SELECT STRUCTURE REPAIR PROJECTS

Lord Buddha Statue, Telengana

- **Details:** Erection & installation of Lord Buddha Statue. The Lord Buddha statue is carved out of monolithic granite, and weighs a mammoth 300 tonne.
- **Challenge:** The statue had sunk in the Hussain sagar Lake in Hyderabad. It had to be salvaged and resurrected.
- **Solution:** The statue was salvaged and erected on its pedestal on Gibraltar Rock. Two lifting cables of 44 strands of 12.mm diameter were used in conjunction with a special cables and anchorage system. The entire operation was completed in 32 hours flat.

Water Tank at Andheri Sports Complex, Maharashtra

- **Details:** The two water tanks of 23,500 litre and 1,95,000 litre weigh 70 MT and 240 MT respectively.
- **Challenges:** The tanks were cast on ground and had to be lifted to a height of 47 meter and 38 meter respectively.
- **Solution:** A state-of-the- art prestressing technique was used in conjunction with hydraulic jacks in order to achieve the challenging task.

Vijaywada, Andhra Pradesh

- **Details:** 7 elements of the boiler supporting structure with a total weight of 450 tonne, which included 4 corner pieces of 64 tonne each and 2 crown girder weighing 110 tonne each.
- **Challenges:** The elements had to be lifted on site to a height of 67 meter on RCC pylons.
- **Solution:** The elements were erected with the help of special lifting jacks – SL-80 and 7 strands of 15 m diameter.

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