A large tracked crane is lifting a massive, cylindrical concrete structure, likely a well or bridge pier, on a riverbank. The structure is heavily reinforced with a dense grid of steel rebar. A worker is visible on top of the structure, and another is on the crane. The background shows a river and trees. The text is overlaid in blue.

RECTIFICATION ON TILTING OF WELL BY KENTELEDGE  
METHOD INCLUDING PROBLEM ENCOUNTERED ON  
FORMWORK  
DURING CONSTRUCTION OF KARNALI BRIDGE,  
KOTHIYAGHAT ,BARDIYA  
- A CASE STUDY

PRESENTED BY :ER.GANESH KUMAR GAUTAM

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## BRIEF DESCRIPTION OF WELL

Location : Left Abutment

Design Detail :

- Diameter : 8m
- Depth : 24 m
- Thickness: 1.18m
- Curb: Tapered RCC over cutting edge(steel angle), depth=2m

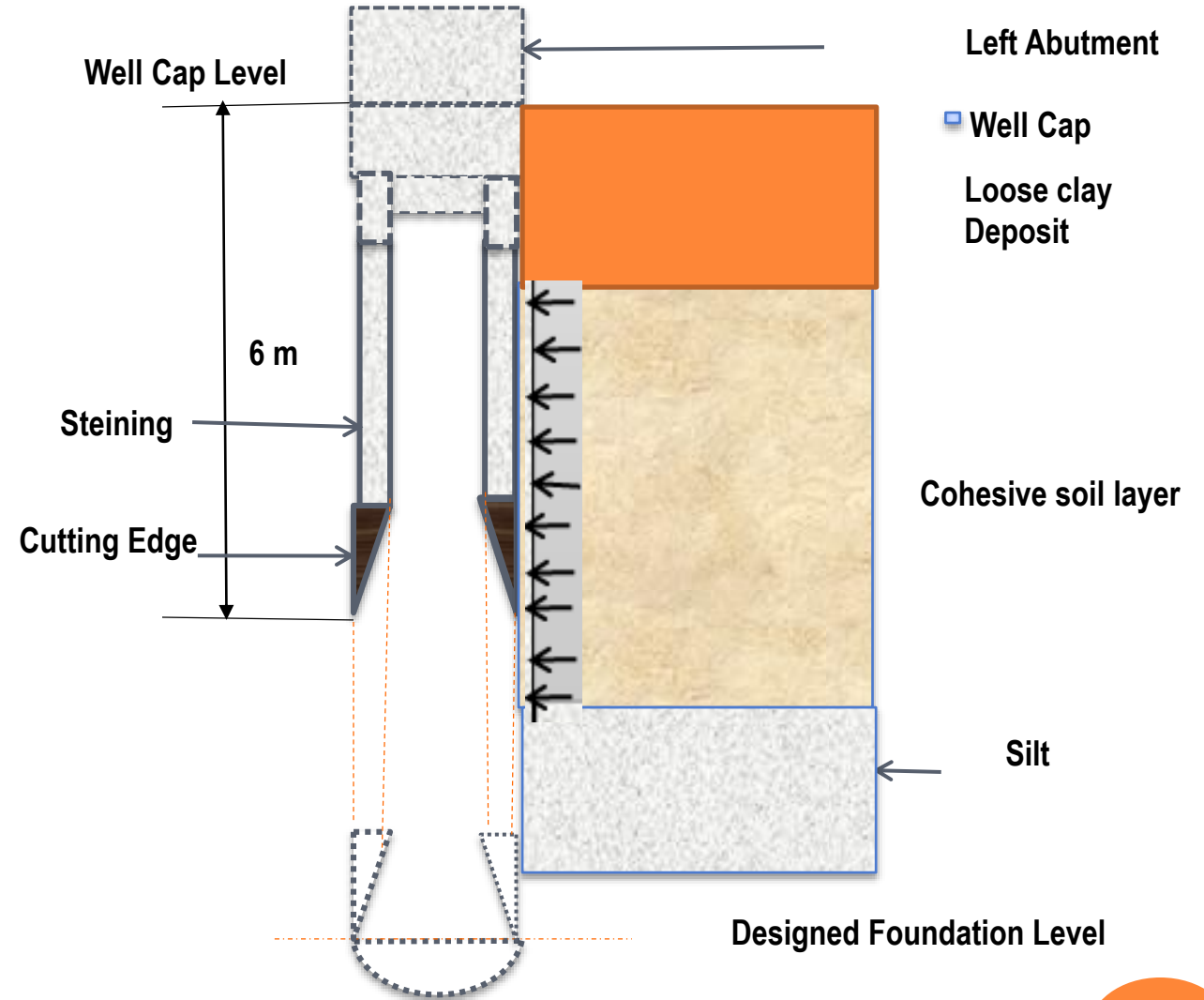


# WELL SINKING

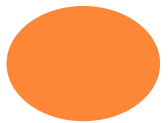
## Construction method adopted:

- Excavation of Ground level by 1m
- Laying of cutting Edge
- Concreting of well curb
- Individual lift of well steining = 2m
- Sinking of cutting edge manually

After sinking of curb each lift of 2m were sunk by grabbing method. Till the depth of 6m from Ground Level well sinking was achieved smoothly. During the sinking of next lift the well was tilted by 4 cm due to the presence of highly cohesive soil layer.

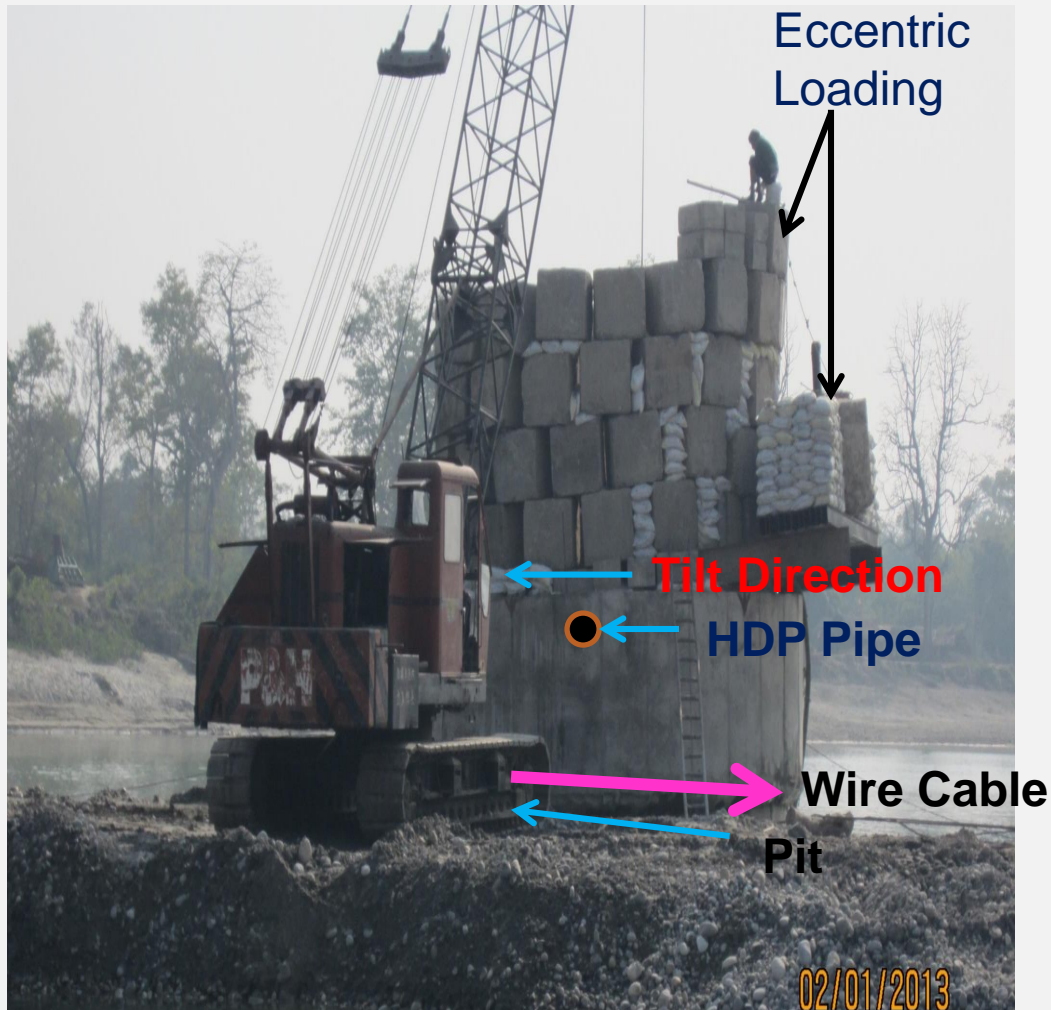


Section of well Foundation





## REMEDIAL MEASURES



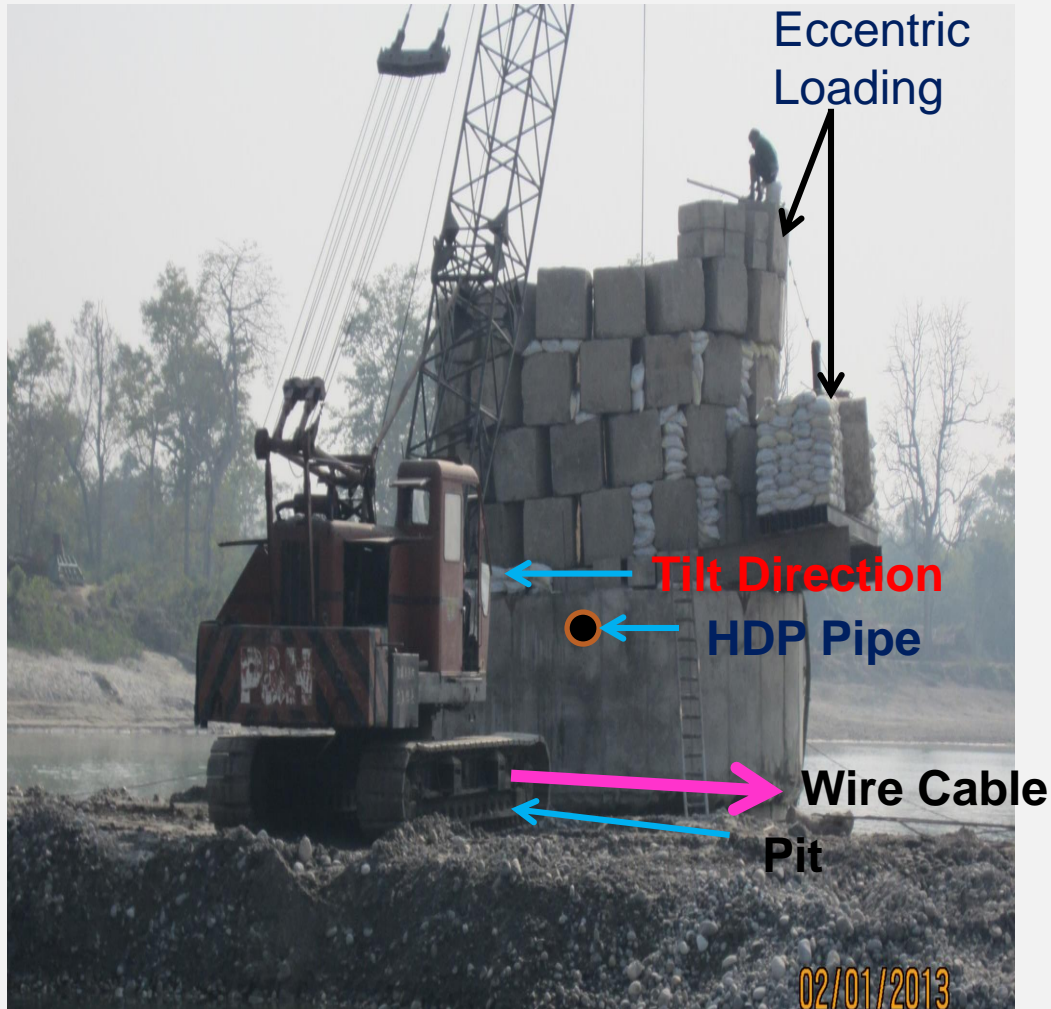
## METHODS ADOPTED

To rectify the Tilt, the well is loaded eccentrically against the direction of Tilt and Kentledge method is applied during further Sinking of the well.

The following Steps were taken:

- Top layer of Loose clay(2m) was excavated.
- To reduce the outer Friction pit was dug for 1m depth around the well.

## REMEDIAL MEASURES



## METHODS ADOPTED

*continued* .....

- HDP Duct of 100 mm dia provided at 1 m below the top of stening for tying the steel girders with stening so that eccentric loading can be placed on top of the well.
- The next lift of concreting was done and the steel girders were placed projecting outside for the Kentledge loading and tied by ropes anchored through the holes provided.
- The well was tied by wire cable against the Tilt at GL

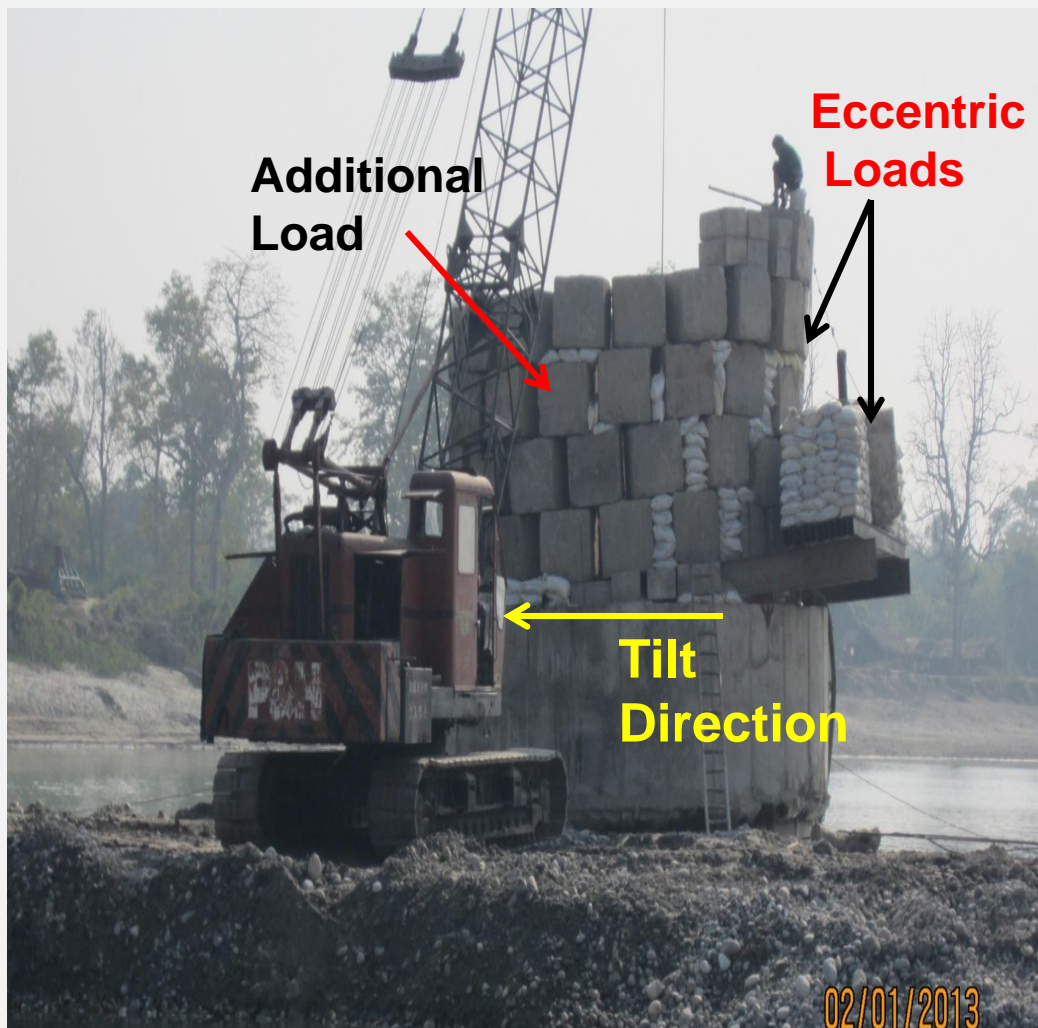
## METHODS ADOPTED

*Continued.....*

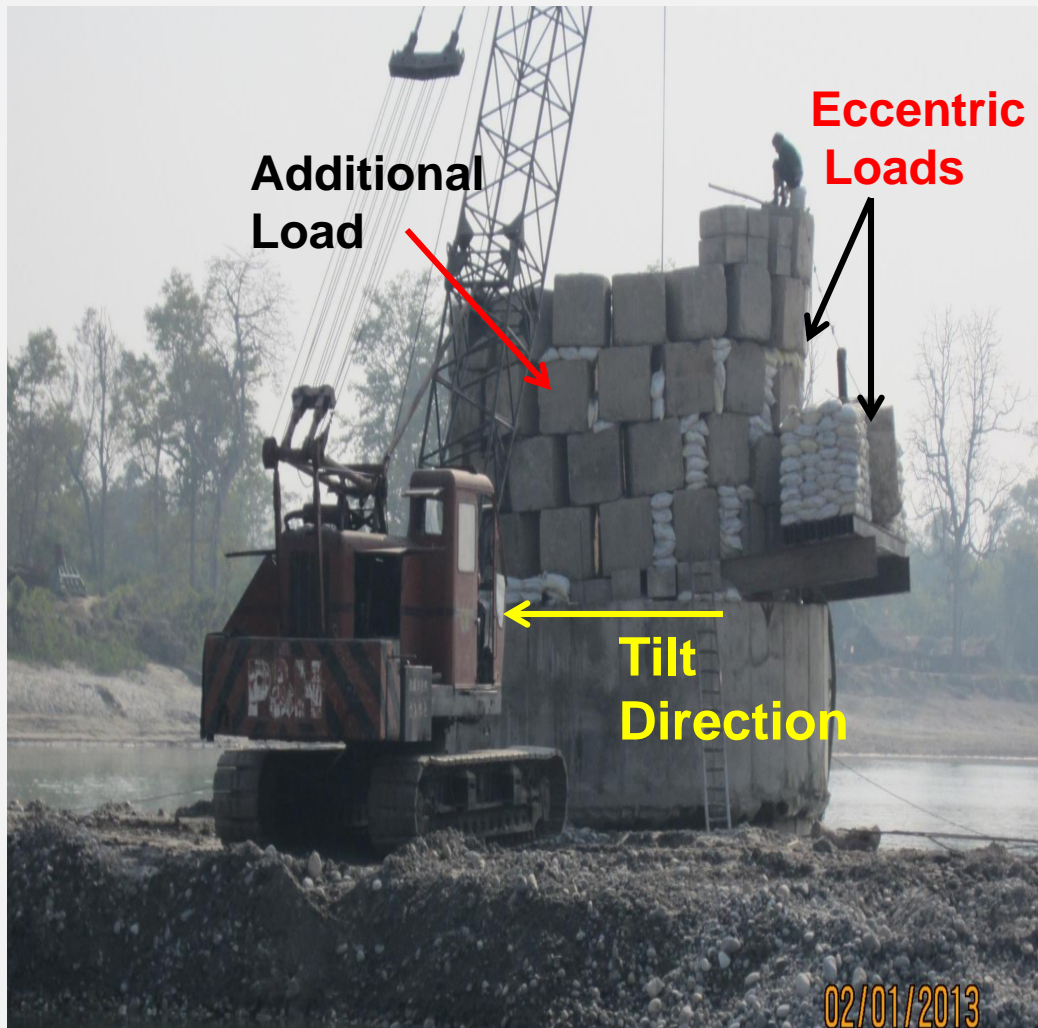
- **Kentledge loading of adequate weight at required distance from well axis was placed eccentrically on the higher side of the well**

- **Additional weight for a height of 5 m was put in the form of concrete blocks on top of steining.**

- **Sinking continued by grabbing materials against the tilt.**



## METHODS ADOPTED



*continued.....*

- 6 cm Tilt was corrected during further 6m sinking
- No further Tilt correction was achieved during the sinking between 18 – 24 m depth
- Final Tilt remained was 4 cm .  
Since the tilt was well below the limit, the Bottom Plugging was done on that condition



# **PROBLEMS DURING SUPERSTRUCTURE CONSTRUCTION**



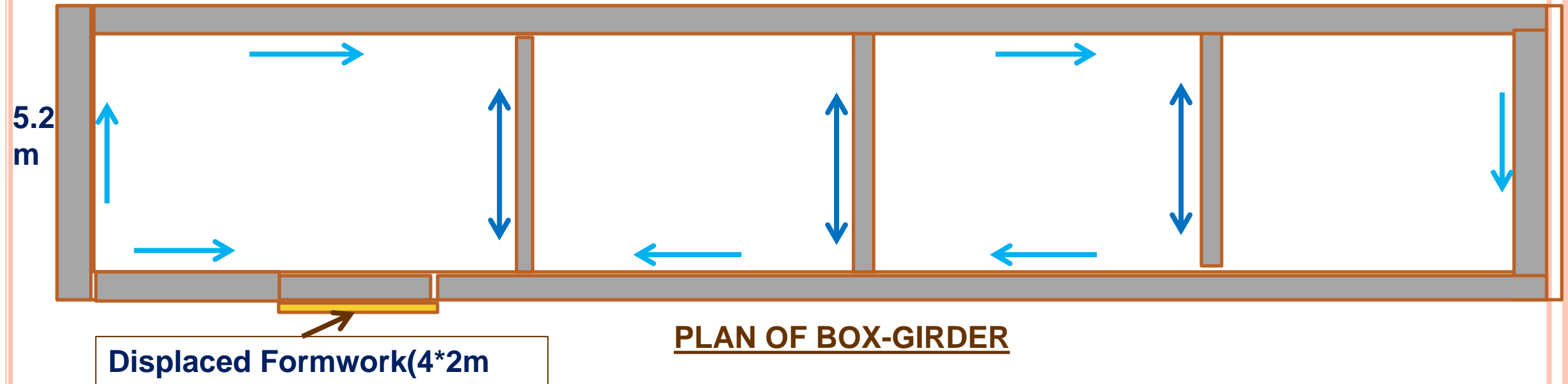
# **DISLOCATION OF FORM WORK DURING WEB CONCRETING**



## DEFECTIVE FORMWORK

Location: Span No.5 (First Web Concreting)

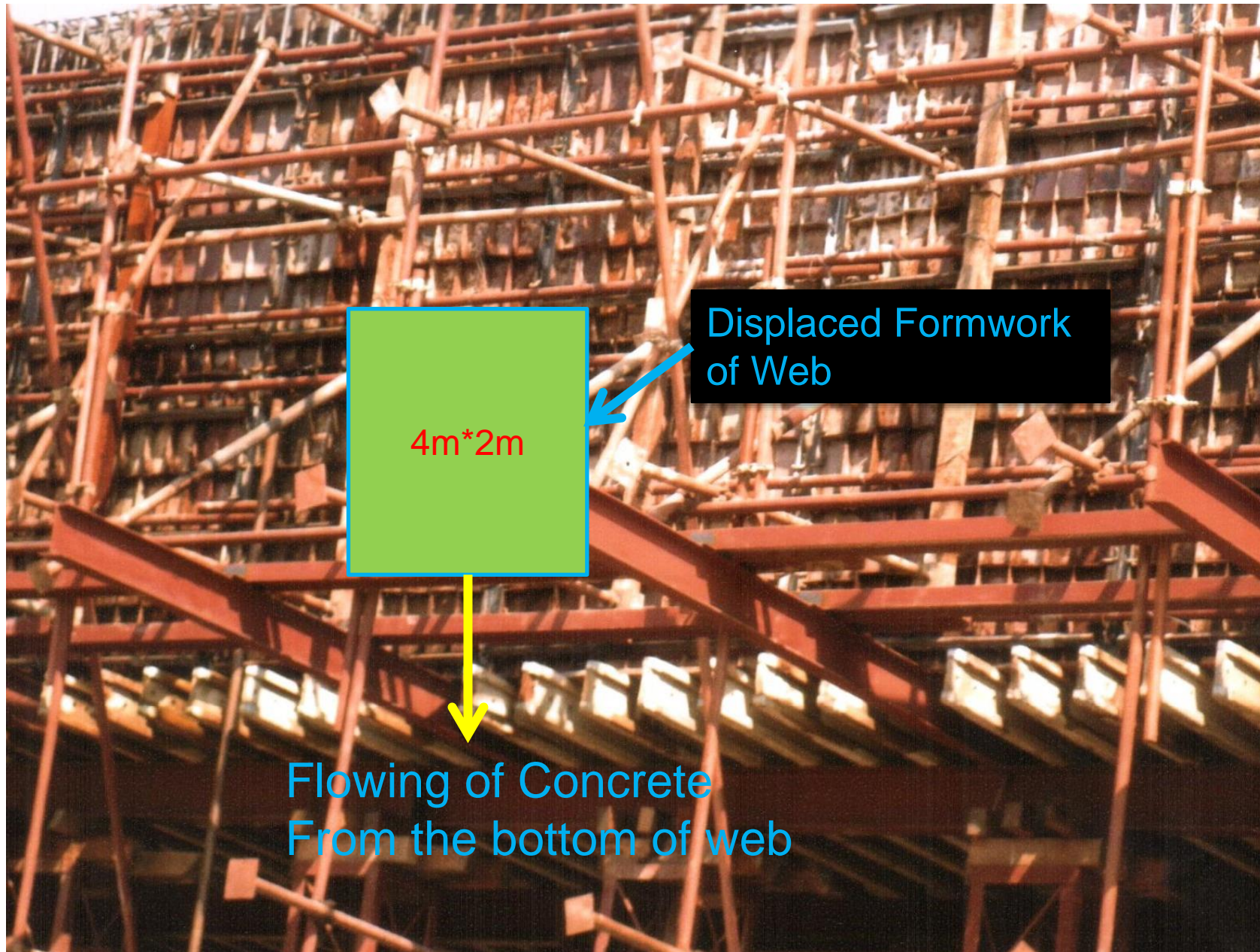
L=55m



**Problem:** Formwork at the base of web with area(4\*2) m displaced from the position during concreting when approximately 30 cu.m of concrete was already been placed with average 30 cm depth covering whole area of the section.

**Cause:** Pumped Concrete with the use of water reducing Admixture, caused high pressure when the concreting was done for a full depth of 3.2m at that section.

**Result:** Concrete Flowing down from the bottom of the Web from all around the web, End and Intermediate girders as shown in the Figure above.

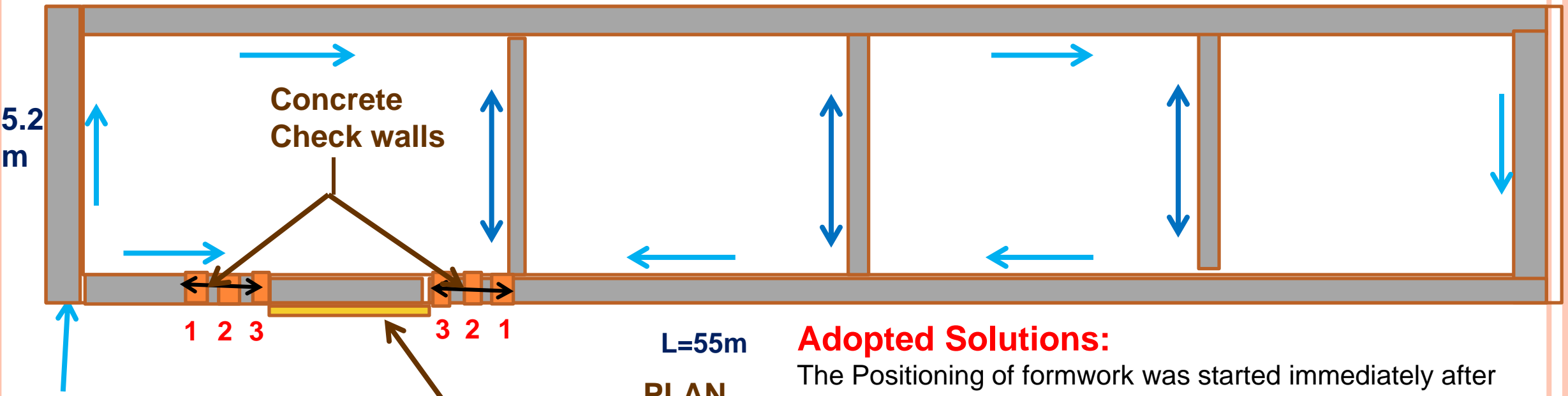


## PROBLEM : DEFECTIVE FORMWORK

Defective form work displaced due to fluid Pressure on Web of Box-girder at span 5



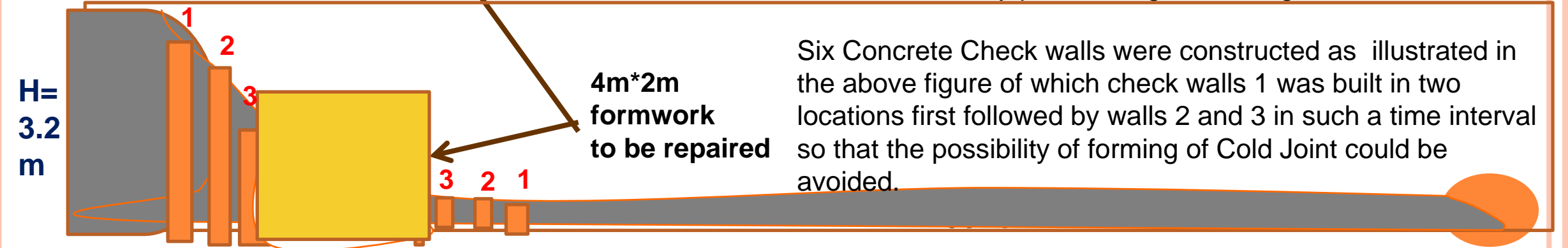
# FLOW DIAGRAM FOR CORRECTION OF FORMWORK AND COMPLETION OF CONCRETING



Start at full depth

## Adopted Solutions:

The Positioning of formwork was started immediately after displacement to align in position as early as possible to avoid **Cold Joint** at any point during concreting.



Six Concrete Check walls were constructed as illustrated in the above figure of which check walls 1 was built in two locations first followed by walls 2 and 3 in such a time interval so that the possibility of forming of Cold Joint could be avoided.

The aligning of formwork was completed in 4 hours and the whole concreting works was completed



# SPAN-5

**First Completed  
Superstructure**



**THANK YOU**

