

# Revolutionizing Road Infra with Modern Equipment, Technologies, Sustainable Materials and Policy Guidelines

February 29<sup>th</sup> - March 1<sup>st</sup>, 2024, Manekshaw Centre, New Delhi

## SUSTAINABLE TECHNOLOGY AND INNOVATION IN BRIDGES

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**International Road Federation  
India Chapter**

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**SUSTAINABLE  
TECHNOLOGY AND INNOVATION  
IN BRIDGES**

1. DEFINITION
2. MATERIAL
3. EQUIPMENT
4. SAMPLE PROJECTS

# THE THREE PILLARS OF SUSTAINABILITY

## Environment, Social, Economic

### 1. DEFINITION



### ASSESSMENT OF SUSTAINABILITY: CRADLE TO GRAVE

- SITING
- DESIGN
- MATERIALS
- CONSTRUCTION
- OPERATION
- MAINTENANCE
- REPAIRS
- DEMOLITION

# ON PUBLIC TRANSPORTATION

**HON'BLE HIGH COURT DELHI:**

**"A DEVELOPED COUNTRY IS NOT ONE WHERE THE POOR OWN CARS. IT IS ONE WHERE THE RICH USE PUBLIC TRANSPORT".**



# UHPC

(ULTRA HIGH PERFORMANCE CONCRETE)

## 2. MATERIALS UHPC

- HIGH COMPRESSIVE STRENGTH
- HIGH TENSILE STRENGTH
- IMPROVED DUCTILITY AND DURABILITY
- REDUCED CROSS SECTION AREAS
- LONGER SPANS

Properties of UHPC:

Compressive strength > 120 MPa

Post cracking tensile strength >5 Mpa

Self compacting

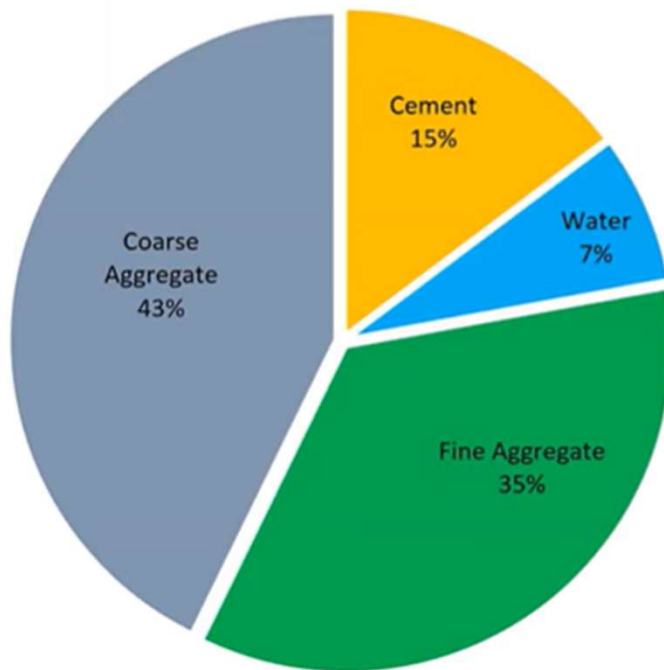
- Fiber-reinforced, cementitious composite
  - Low w/cm (<0.20, typically)



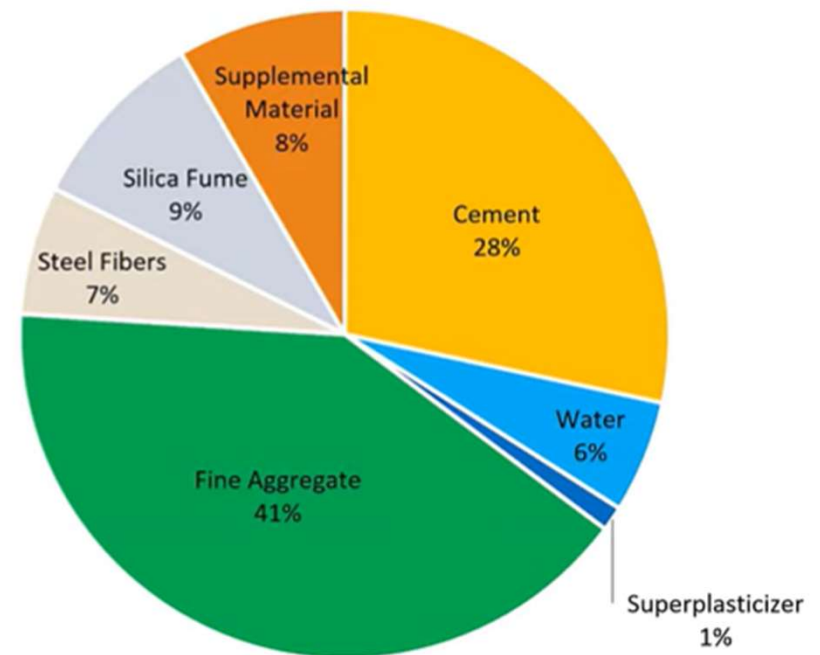
[https://www.youtube.com/watch?v=kDs\\_IMyB-YM](https://www.youtube.com/watch?v=kDs_IMyB-YM)

# UHPC Vs Conventional Concrete

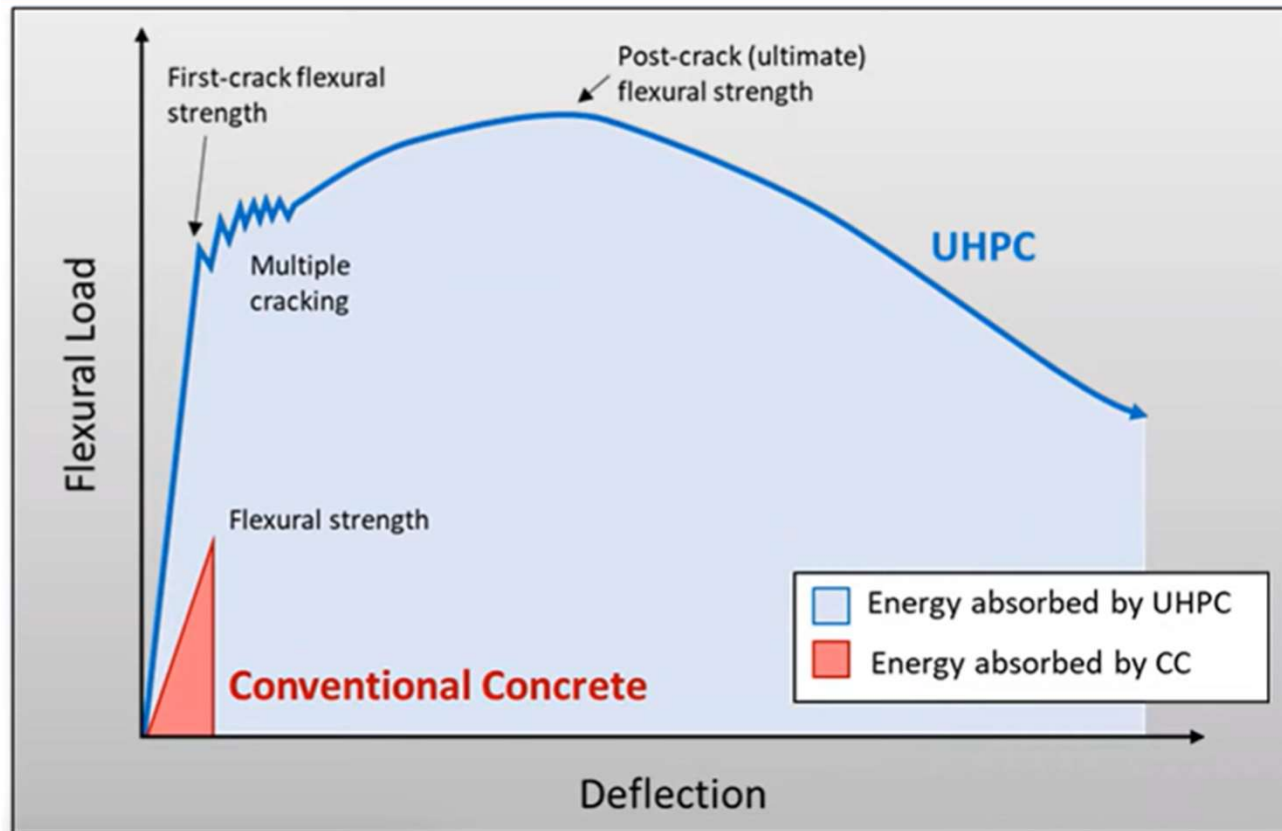
## Conventional Concrete



## UHPC



# UHPC VS CONVENTIONAL CONCRETE



# Conventional Launching Girders

## 3. EQUIPMENT





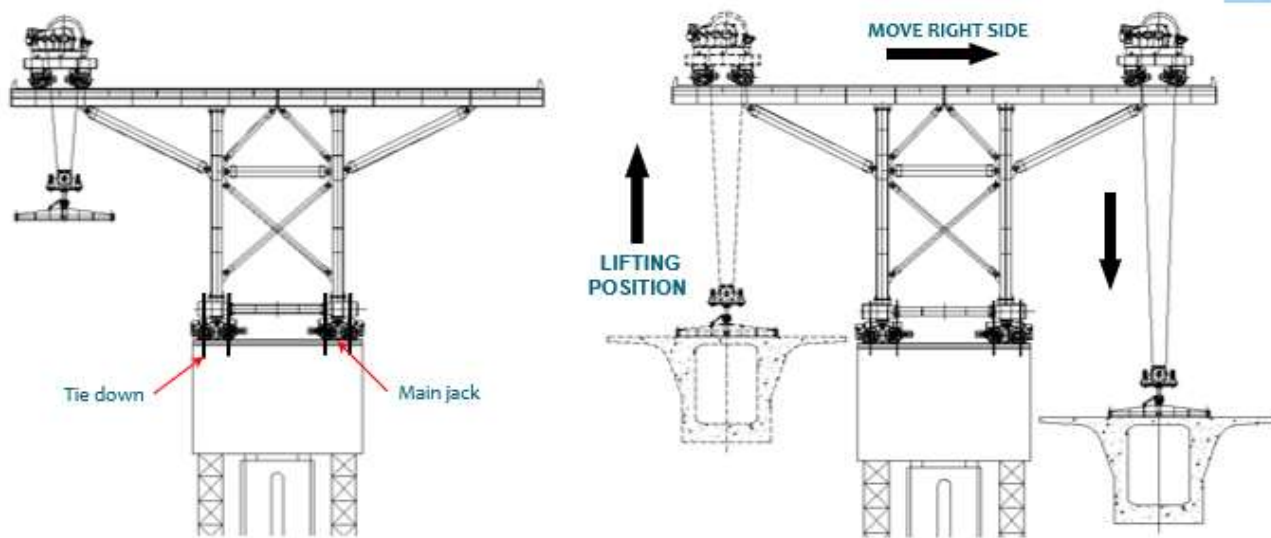
# GOLIATH CRANES OPERATING IN TANDEM FOR ERECTION OF 60t PRECAST PRE-TENSIONED GIRDER



# Segmental Lifter



# Segmental Lifter



- Jack up the supports of Segment Lifter by hydraulic jack & tie down for both supports.
- Lift the 1<sup>st</sup> segment with overhead crane & place it to the assembly position. Then, the segment to be pre-stressed by temporary cable.



# MUKARBA CHOWK INTERCHANGE AT DELHI BORDER

## Google MAP and Model



# Existing Features at Site



LAND FILL



MAJOR ELECTRIC SUB STATION



ARCHEOLOGICAL MONUMENT



BURIAL GROUND



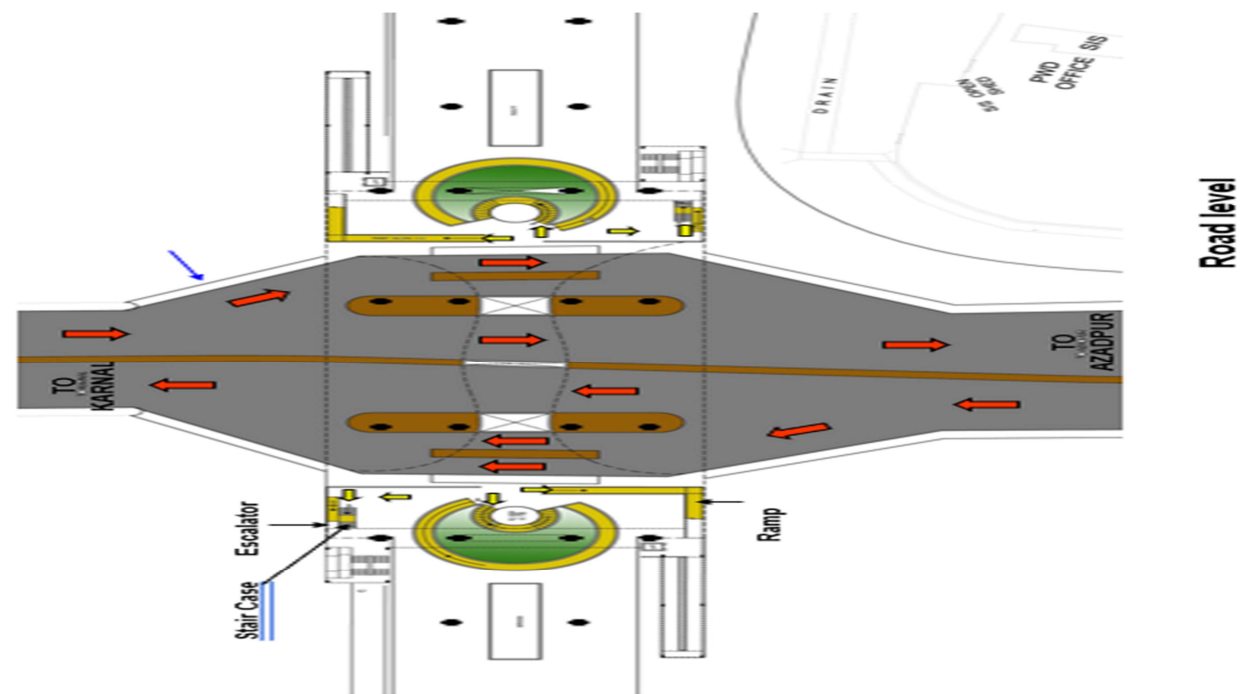
# ELEVATION AND PLAN OF STEEL DECK



# Seismic Restraints of Deck



# Pedestrian & vehicular movement





# Bridge for Pedestrian Movement



# MUKARBA: Aesthetics

## 4. SAMPLE PROJECTS



# MOCK UP of Deck and Pier

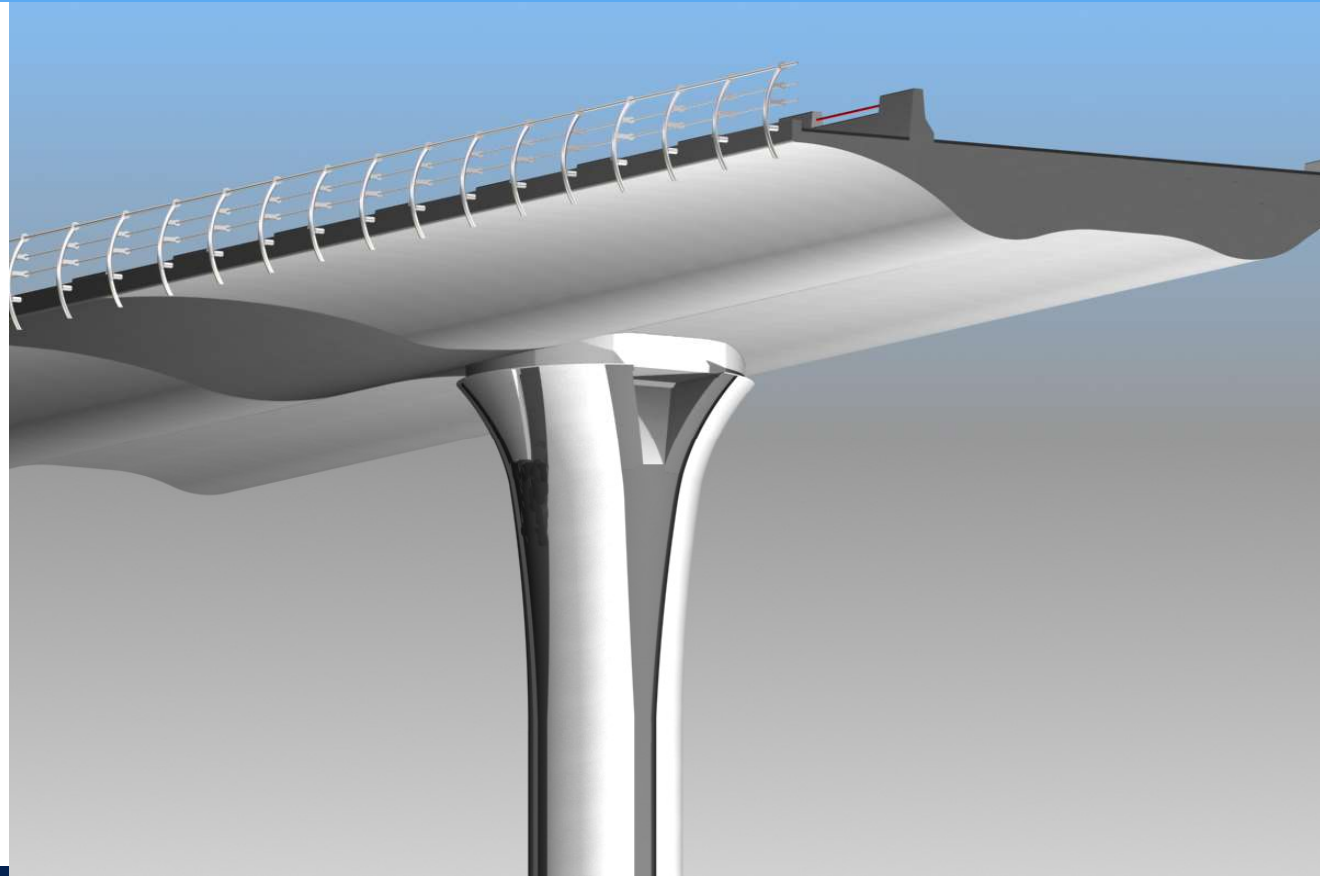


## AESTHETICS





# View from Busbay of Main Flyover



# Horizontal Slip Forming of Crash Barrier



# UNDERSIDE OF FLYOVERS showing fate of unused spaces

UNUSED SPACES



SOURCE: TOI



# UNDERSIDE OF FLYOVERS

EditionName:The Times of India

Date:23-10-2016



This is the scene below the flyover on Josip Broz Tito Marg, near the Moolchand Metro station. Debris has been piled up and no one seems to remember to clear it. **Citizen Reporter Parag Mendiratta** says he's seen it there for at least three months now.



# TULPULE FLYOVER, MUMBAI THE 'HAPPENING PLACE' WHERE PEOPLE MEET & GREET, WALK & JOG



SOURCE: BETTER INDIA



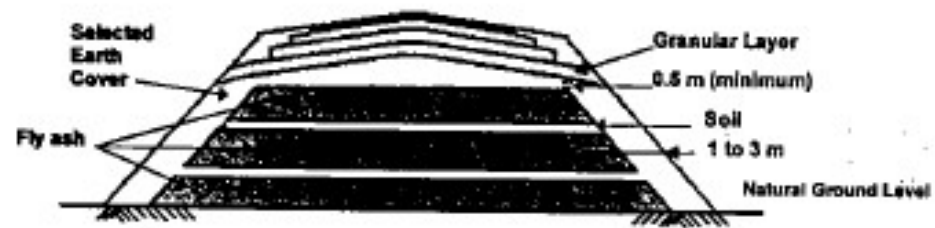
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# Badarpur Elevated Corridor: Alignment

LANDSCAPING





*Fig. 1. Typical Cross-Section of Embankment with Alternate Layer of Fly Ash and Soil*



*Fig. 2. Typical Cross-Section of Embankment with Core of Fly Ash*



# BADARPUR ELEVATED CORRIDOR, FARIDABAD

## Landscaping



: minimise structure,  
maximise embankments

: landscaping

***JALEBI CHOWK***

# GHAZIPUR three level INTERCHANGE

## Landscaping



- Segregation of non-motorised traffic
- Head room for non-motorised traffic
- Incorporation of water body
- Long span of main flyover



# GHAZIPUR INTERCHANGE SHOWING PEDESTRIAN PATH-cum –CYCLE TRACK and FOB





# INNOVATIVE GRADE SEPARATION AT IIMS, DELHI

## Delhi get a new lung

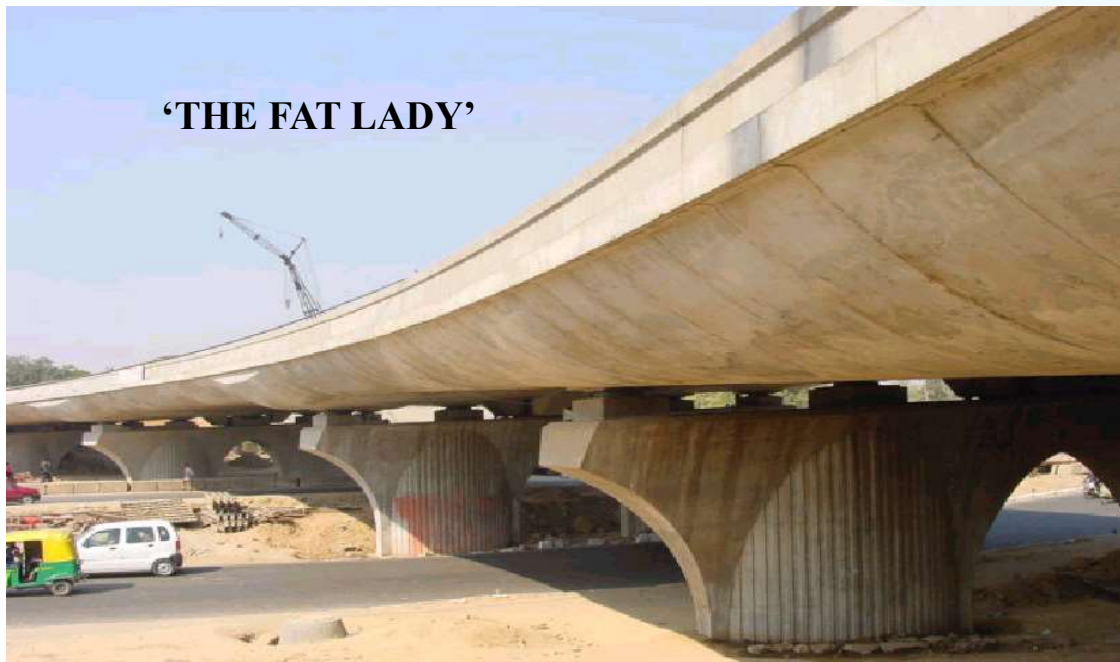
DON'T EMPLOY ABUTMENTS ANYWHERE, EVERYWHERE, EVERYTIME



it is important to integrate more green spaces in our urban fabric. One way of doing this

- **Signal free junction**
- **Landscaping in public spaces**
- **Reduced structure, increased earth embankments**

# 'THE FAT LADY' and Environs





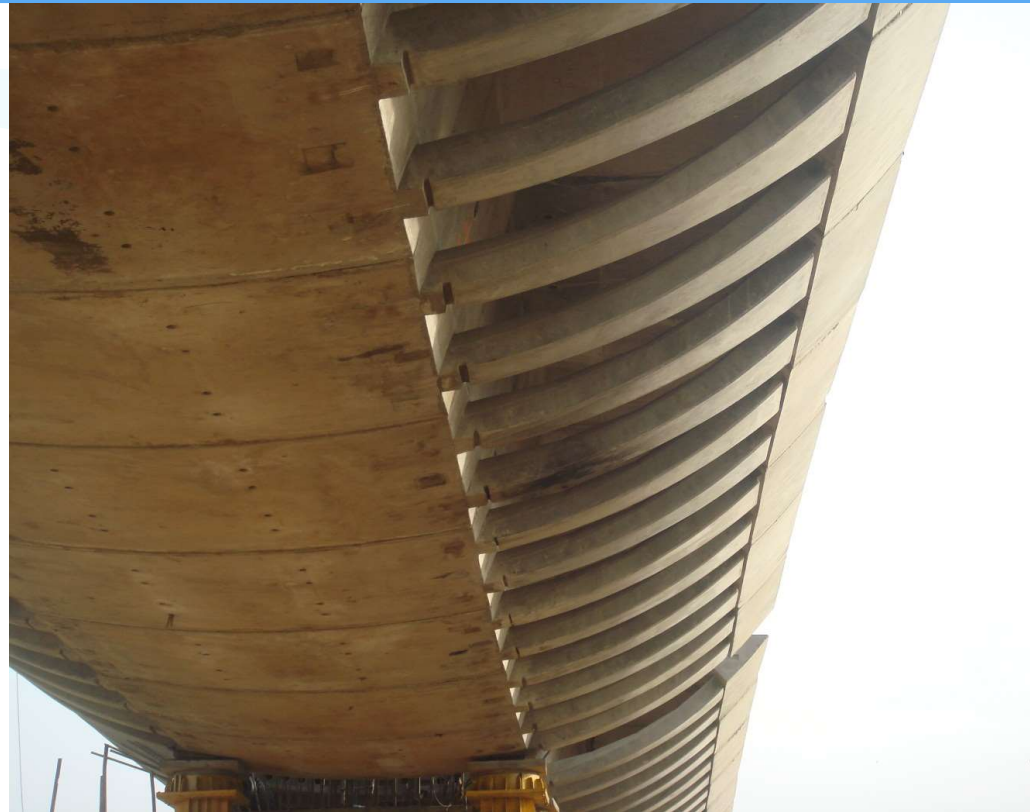
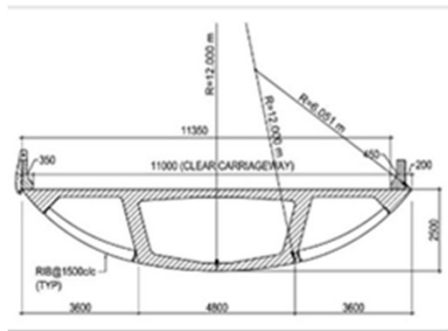
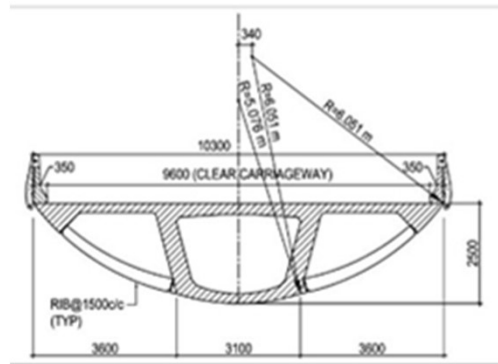
# Aesthetics: The Human spine

## BRIDGE & APPROACHES OVER RIVER YAMUNA, WAZIRABAD, DELHI



# Aesthetics: The Human spine

## BRIDGE & APPROACHES OVER RIVER YAMUNA, WAZIRABAD, DELHI





# Reach-1 Double Decker Viaduct (Metro Twin Tract at level-2 and 2x2 / 2x3 lane highway at level-1) – Substructure (common) and Metro Superstructure





# Alignment: Tight Curves

## Prestressed Concrete Cantilever Bridge



© Mail - Have a great time :)



...Rainwater harvesting...

MANY DEFINITIONS OF SUSTAINABILITY

**SUATAINABILITY MEANS .....**

**REDUCE, REUSE, RECYCLE**

Thank You