



## Remodelling of Kharicut Canal in Ahmedabad City, Gujarat

**Conversion of Open Concrete-Lined Canal to Reinforced Concrete Box**

**An Urban Rejuvenation and Transformation Project**

**Apurva Parikh**

*Director- MMCPL*

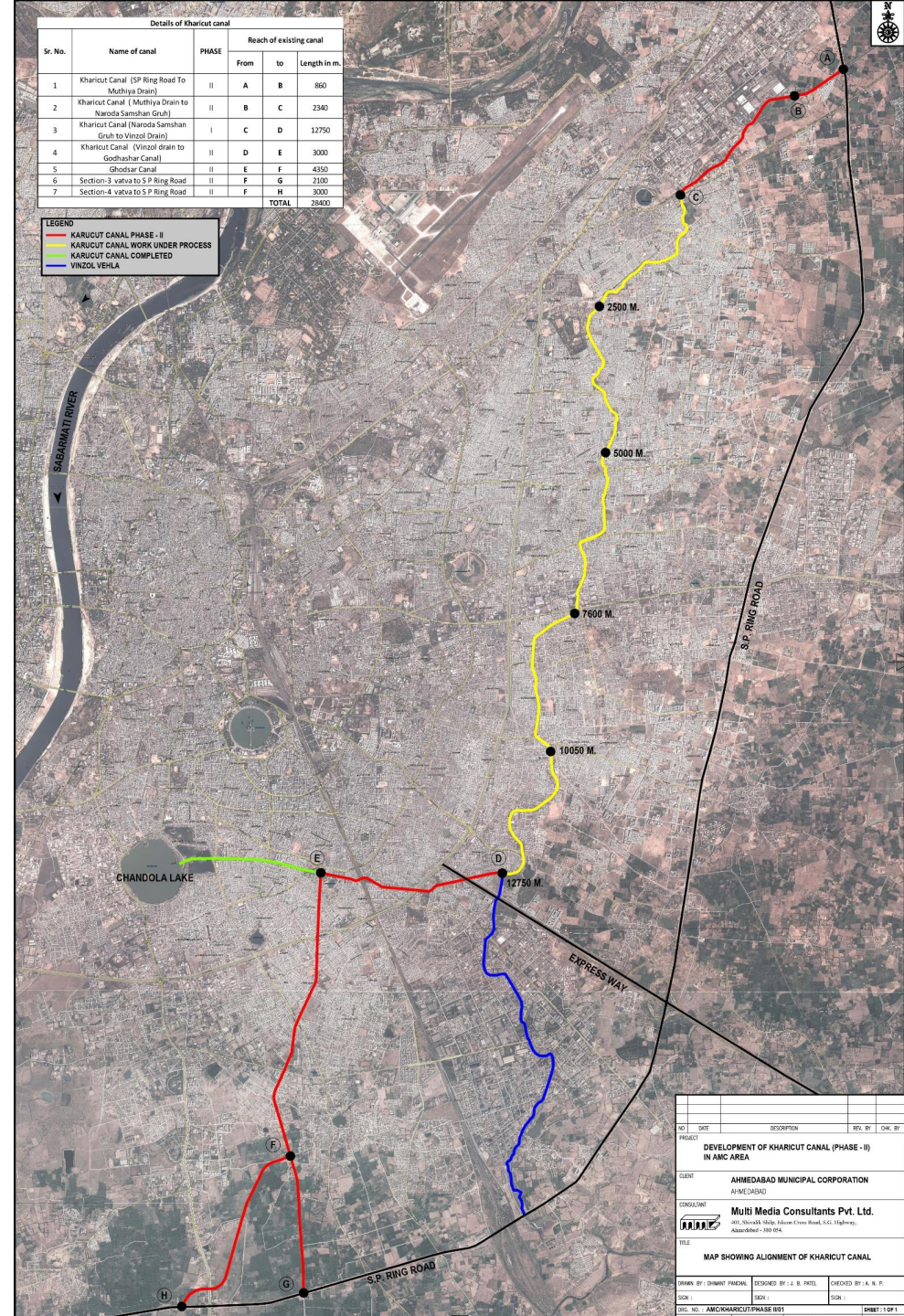
## Introduction to Project

It is an **Urban Rejuvenation and Transformation Project** in which we have converted an

**Open Concrete-Lined Canal to Reinforced Concrete Box**  
to improve water flow management and minimizing environmental impact

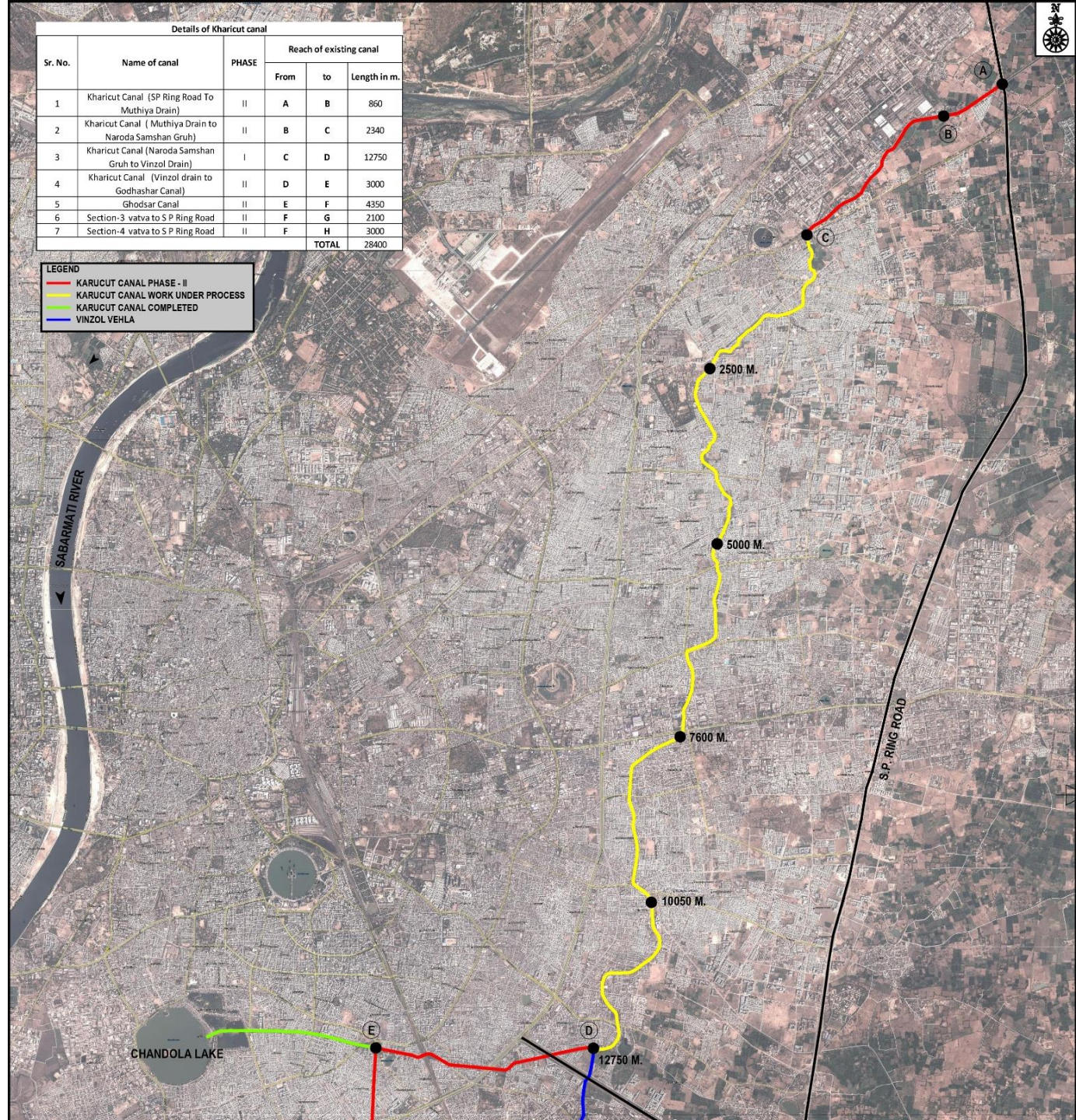
Through this process, the project seeks to create a safer, cleaner, and visually appealing environment while addressing infrastructural needs in urban areas.

The Kharicut canal was **constructed 110 years ago** for irrigation purpose. It was unlined canal. The kharicut canal was originally a natural drain.



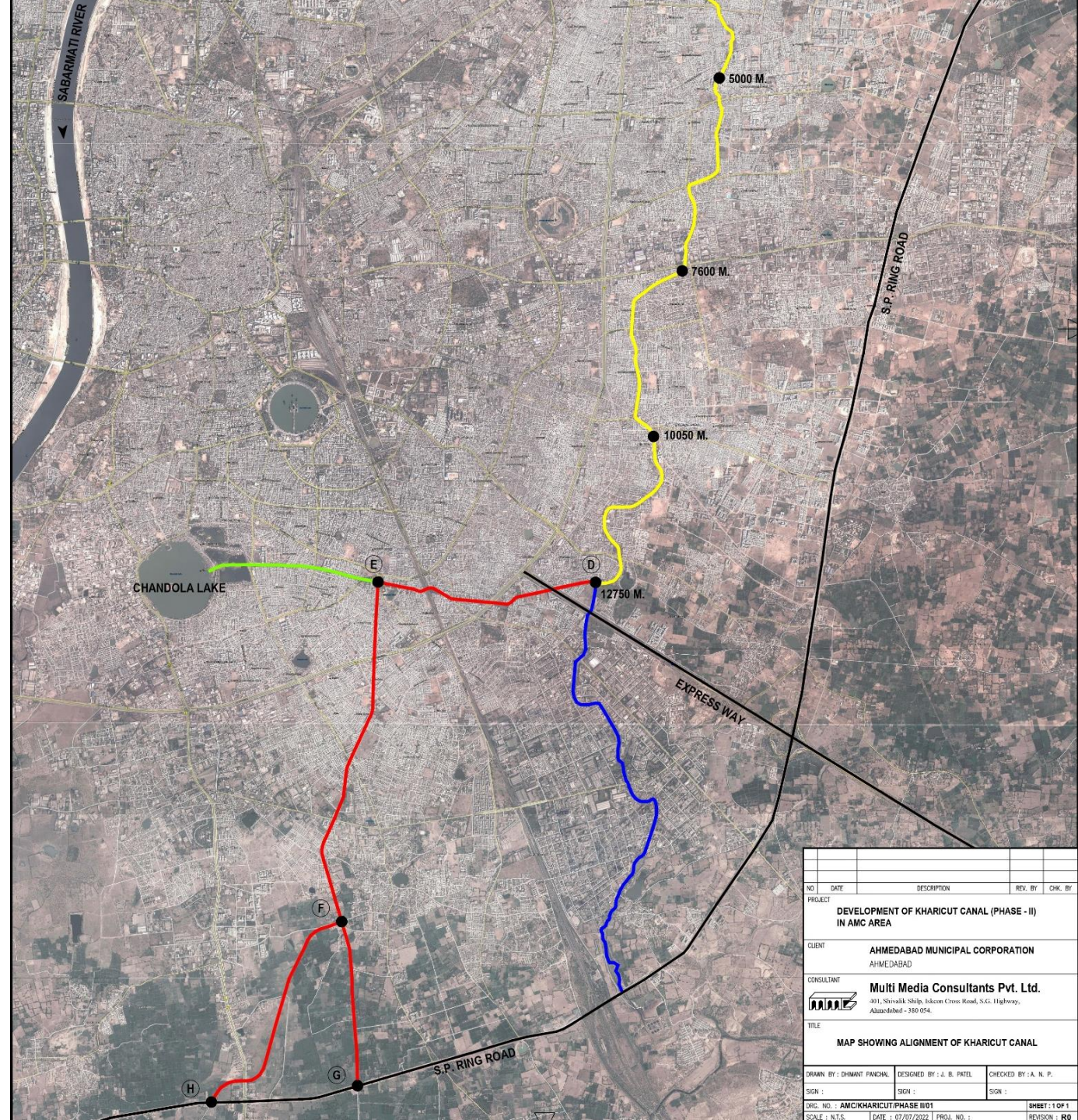
It is in partial cutting and banking in the city. The planned command area was about 10,200 ha.

But it was resectioned and lined considering irrigation of canal and flood water of surrounding the canal.



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NO.	DATE	DESCRIPTION	REV. BY	CHK. BY
PROJECT				
DEVELOPMENT OF KHARICUT CANAL (PHASE - II) IN AMC AREA				
CLIENT				
AHMEDABAD MUNICIPAL CORPORATION AHMEDABAD				
CONSULTANT				
 Multi Media Consultants Pvt. Ltd. 401, Shivraik Shilp, Ekcon Cross Road, S.G. Highway, Ahmedabad - 380 054.				
TITLE				
MAP SHOWING ALIGNMENT OF KHARICUT CANAL				
DRAWN BY: DHAMANT PANCHAL		DESIGNED BY: J. B. PATEL		CHECKED BY: A. N. P.
SIGN :		SIGN :		SIGN :
DRG. NO. : AMCKHARICUTPHASE II(01)				
SCALE : N.T.S.				
DATE : 07/07/2022				
PROJ. NO. :				
REVISION : R				

**A glimpse of the existing condition of the canal**

Field office workshops

## Workshop 02

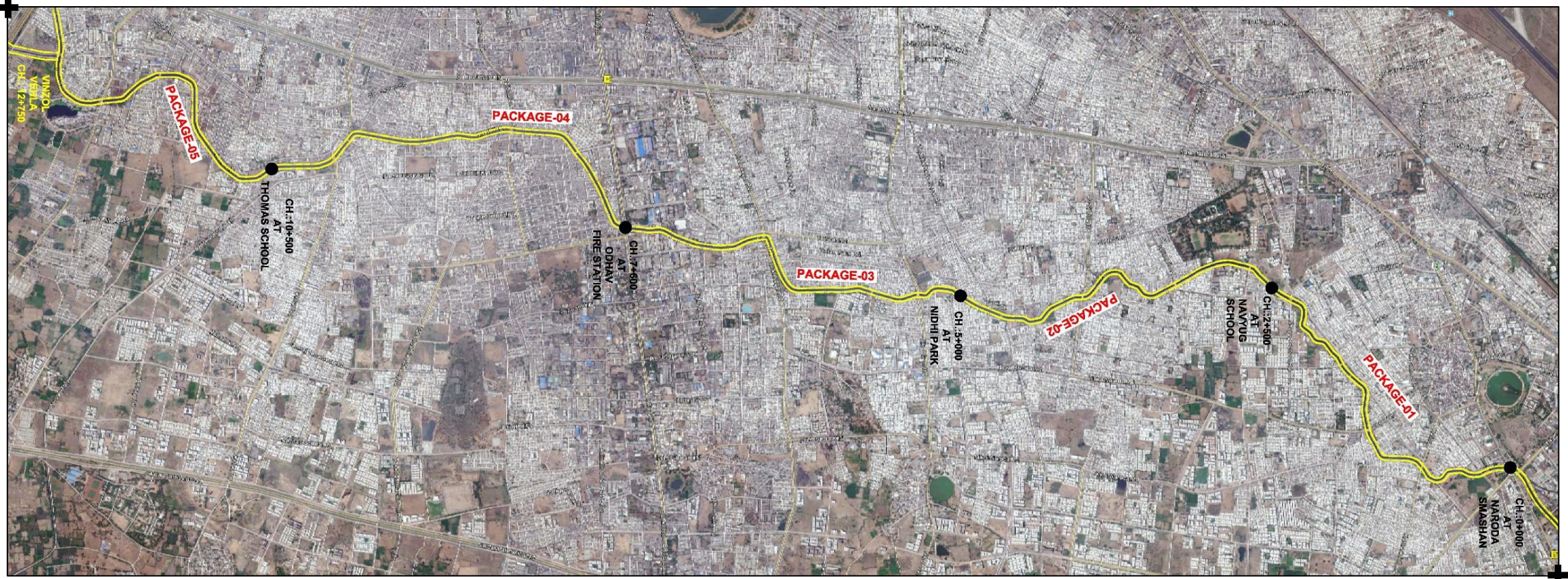
Kharicut canal, Ahmedabad, India

<https://fieldofficeworkshops.org/workshop-02/>



# Remodelling of Kharicut Canal I

## Key Plan





# About the canal

## Salient Features of Canal

The Khari cut canal is passing through the areas of South, East and North Zone of Ahmedabad Municipal Corporation. The Hydraulic features of canal from Naroda up to Vinzol Vhela are :

<b>Sr. No</b>	<b>Particulars</b>	<b>Between Naroda Smashan Gruh and Vinzol Vhela</b>
<b>1</b>	Discharge	71.58 m <sup>3</sup> /sec
<b>2</b>	Canal Bed Width	10.00 m.
<b>3</b>	Depth (FSD)	2.6 m
<b>4</b>	Freeboard	0.9 m.
<b>5</b>	Side slope	1.5 H : 1 V
<b>6</b>	Canal bed gradient	1: 1800

# Problems faced at present due to canal embankment

**The embankment of canal divides**

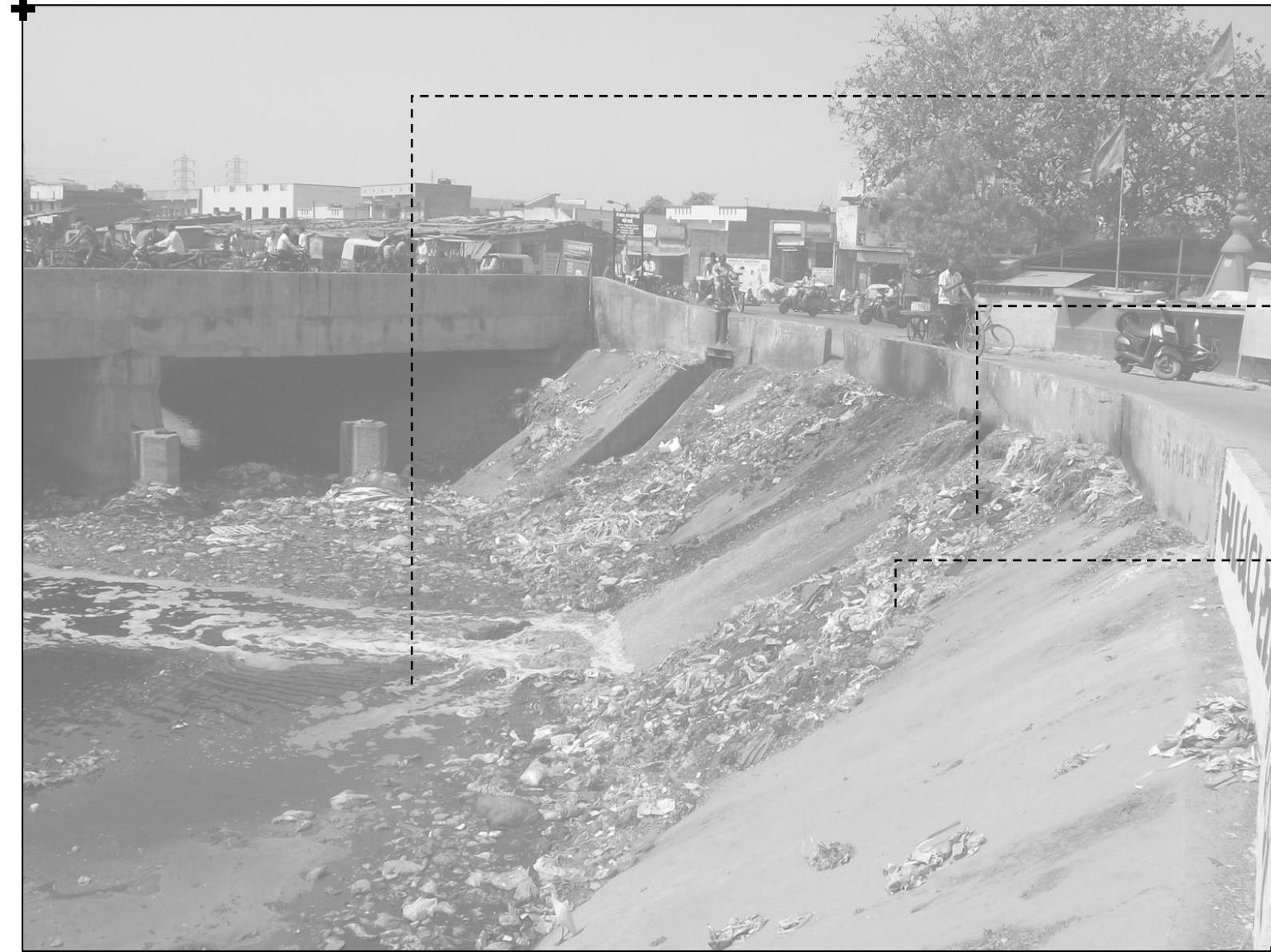
the developed city area which is low lying and thus is

**barrier** for continuity of Sewerage and Storm Water lines.

Water logging and effective disposal of Storm Water

Connectivity for Water Supply line, Sewerage lines and Roads

## Problems faced at present due to canal embankment

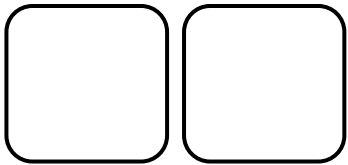


- The flood water during heavy rain spreads into residential, industrial and commercial area adjoining to Kharicut canal.
- Due to open canal, people are throwing garbage into canal.
- Unauthorised sewerage connection creates bad environment to surrounding residents.

## Key Issues

- The Stretch is a Storm Drain Cum Canal. It carries irrigation water throughout the year and Storm Water During the rains.
- The Irrigation Water needs to be released at regular intervals because a large number of farmers are dependent on this water.
- There is a very dense development on either side of the Canal which poses a challenge in excavating the slopes of the canal.

# Remodelling of Kharicut Canal | **Design proposal**



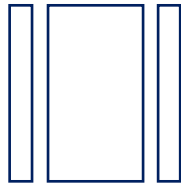
## **Provision of separate conduits for Storm Water Drains and Irrigation Water**

To use the Irrigation Water Conduits in case of heavy inflow of storm water from the upstream catchment areas.



## **Provision of combination of Precast and Cast in situ construction**

To reduce the time of Irrigation Water Closure



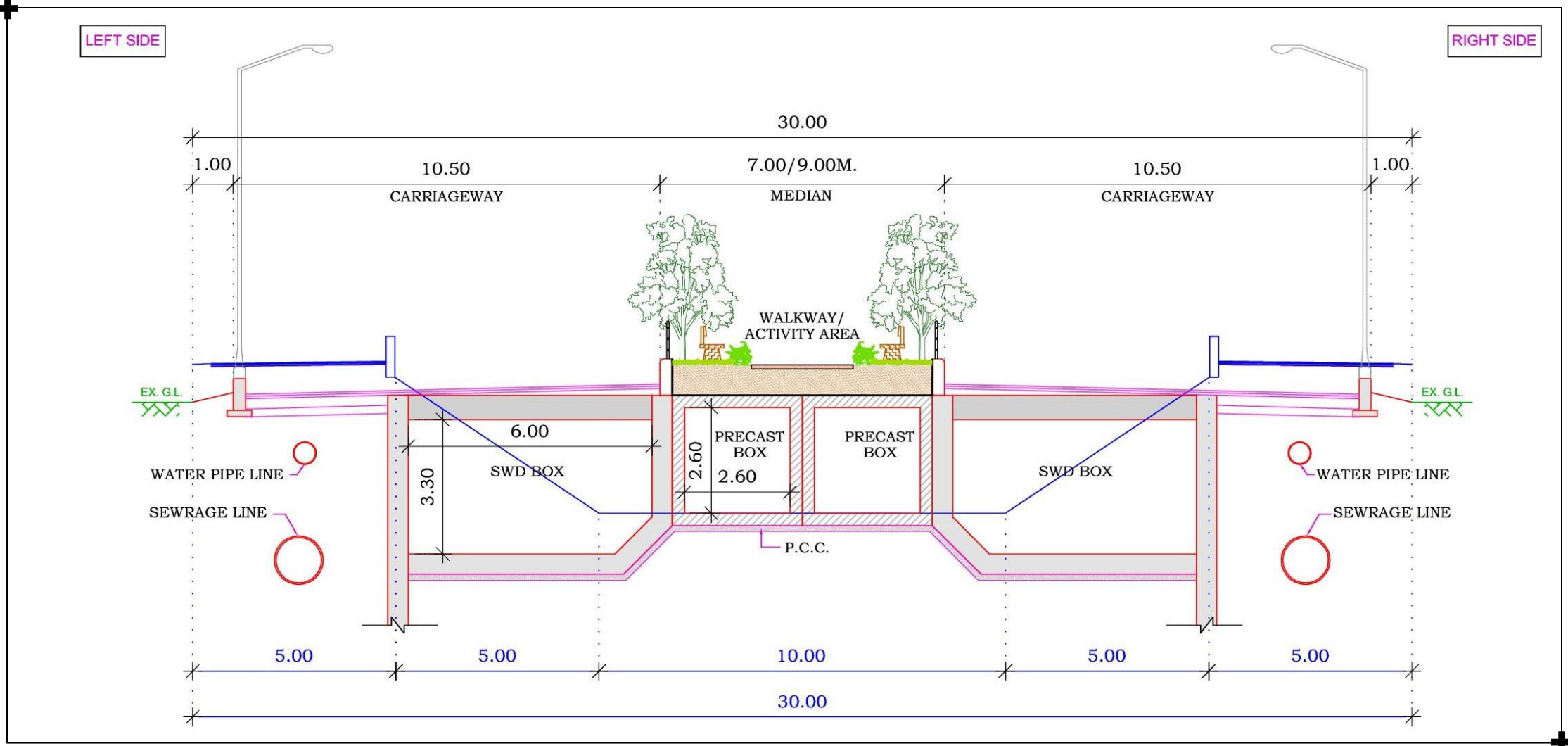
## **Provision of reinforced Concrete Diaphragm wall on either side**

To do the work without compromising the safety of adjacent structures having very shallow foundations

# Remodelling of Kharicut Canal | Existing Development

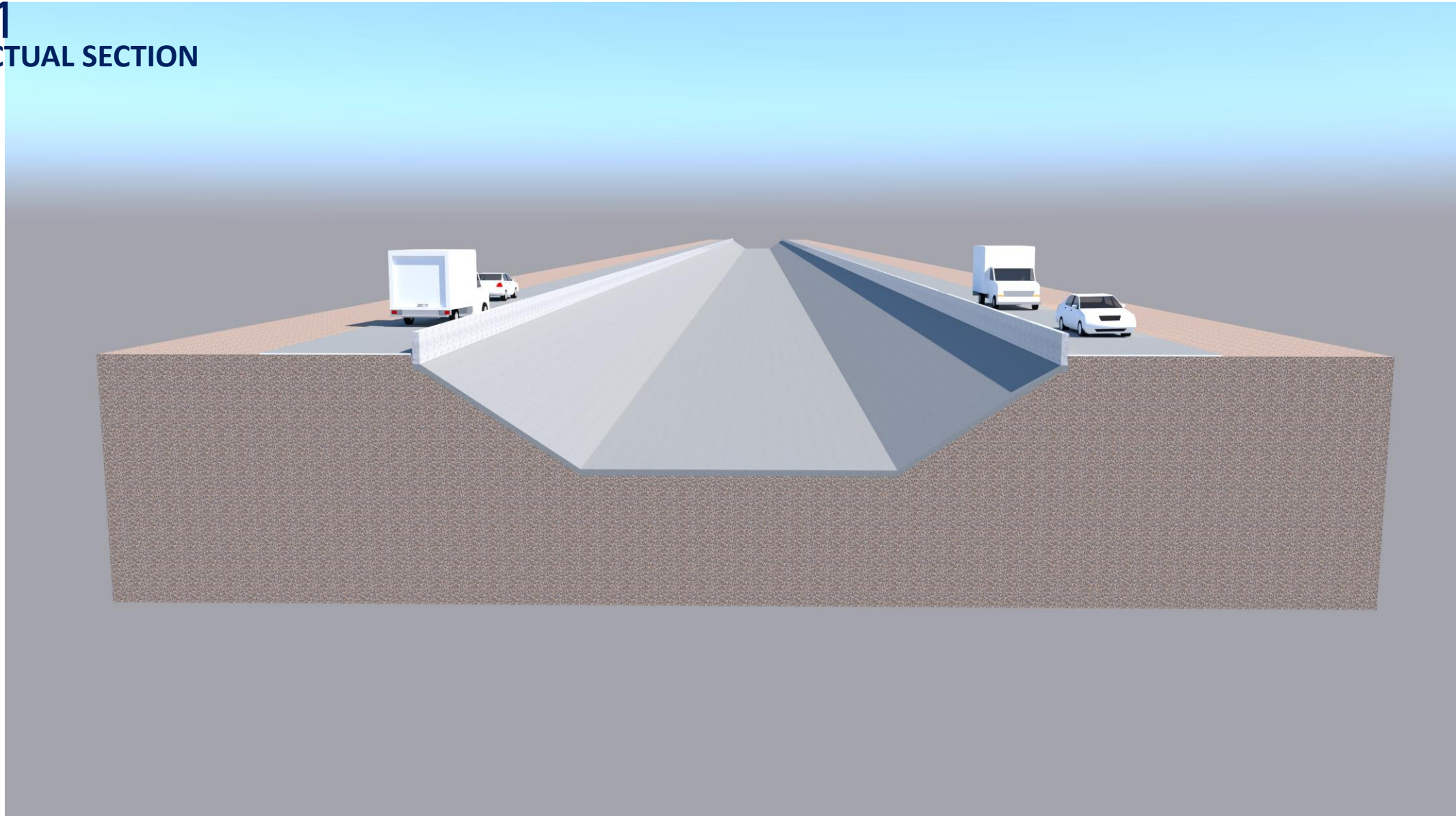


# Remodelling of Kharicut Canal | Cross-section



# Remodelling of Kharicut Canal | Construction Sequence

## 01 ACTUAL SECTION



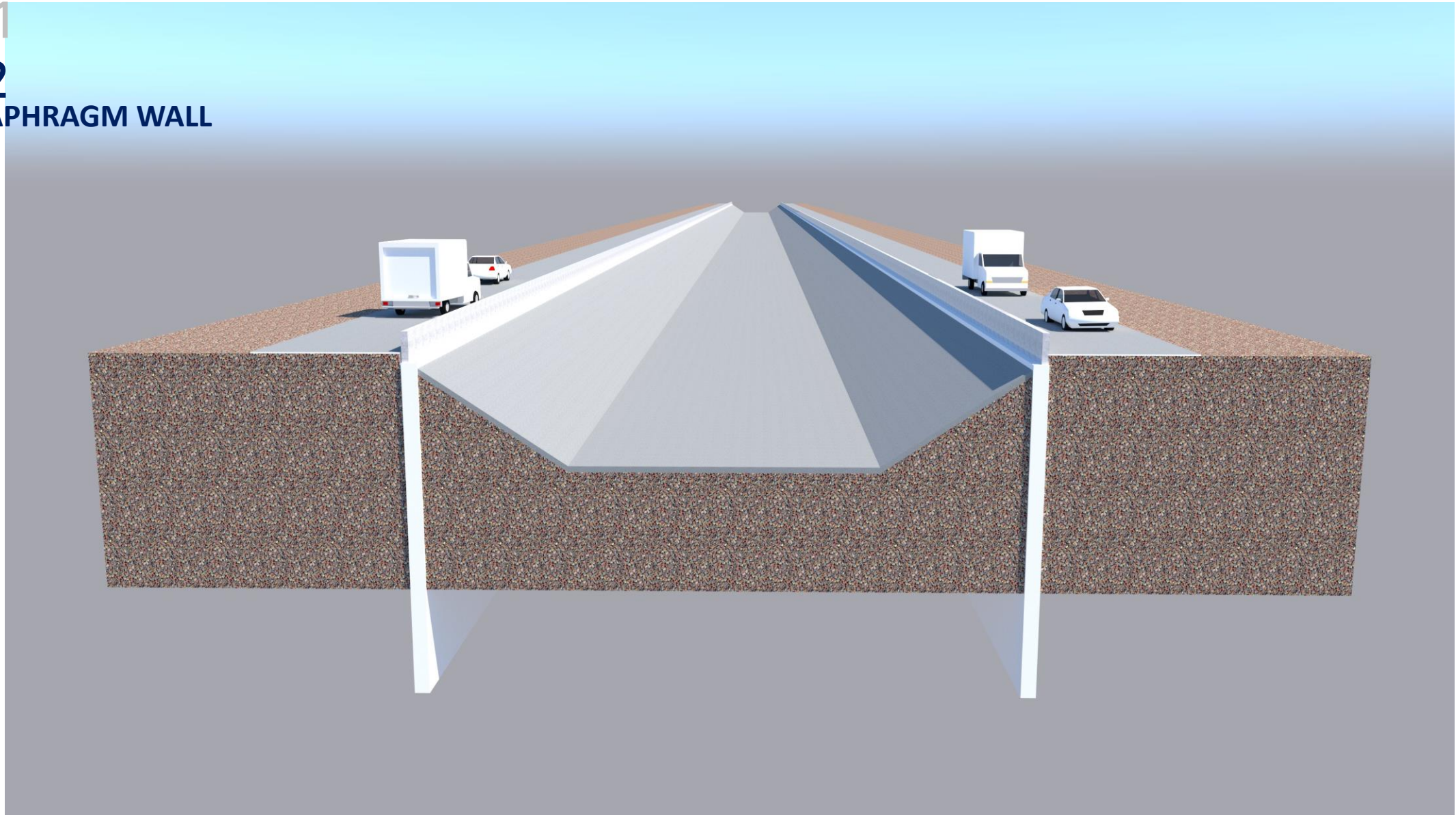


# Remodelling of Kharicut Canal | Construction Sequence

01

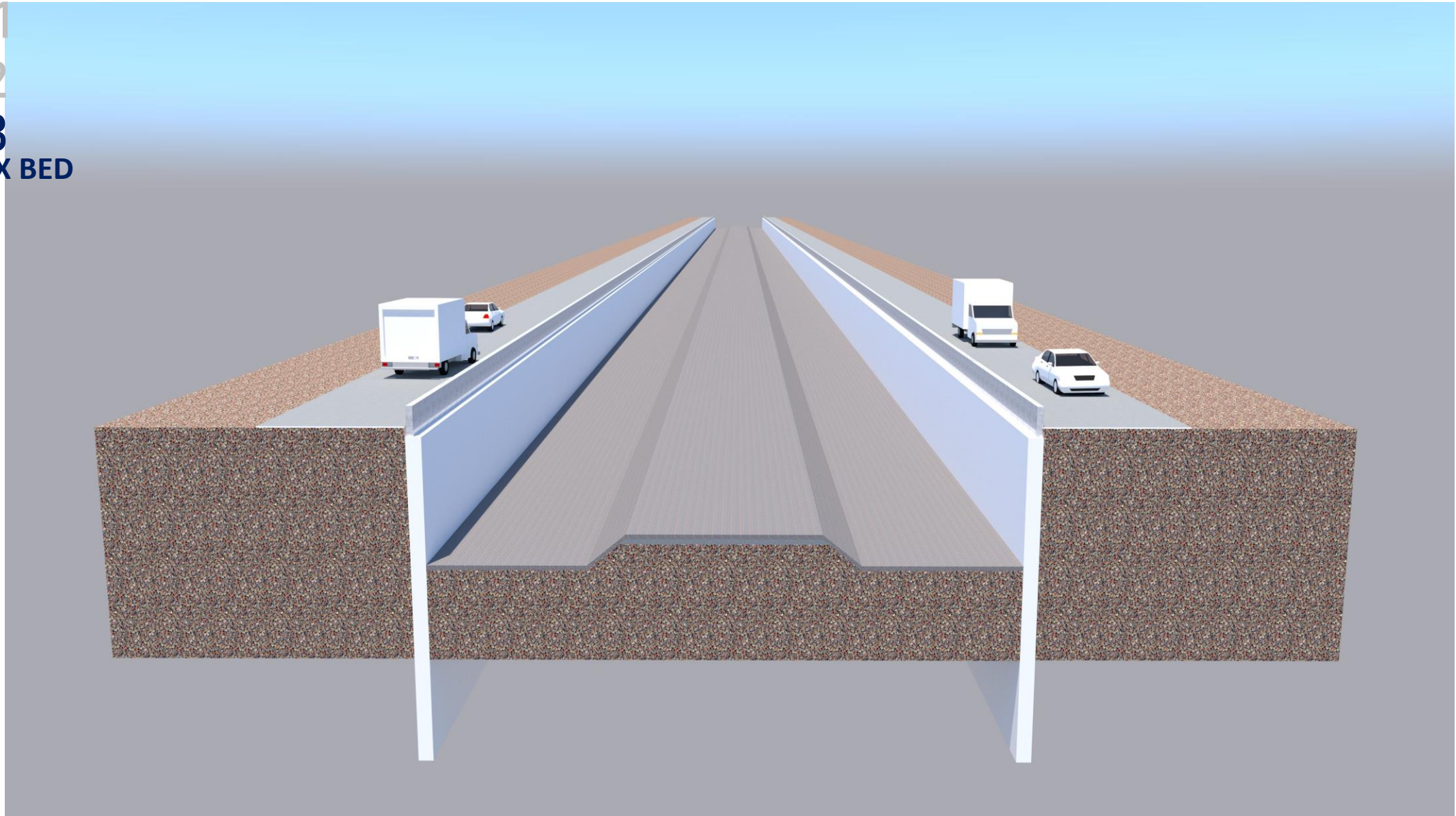
02

DIAPHRAGM WALL



# Remodelling of Kharicut Canal | Construction Sequence

01  
02  
**03**  
BOX BED



# Remodelling of Kharicut Canal | Construction Sequence

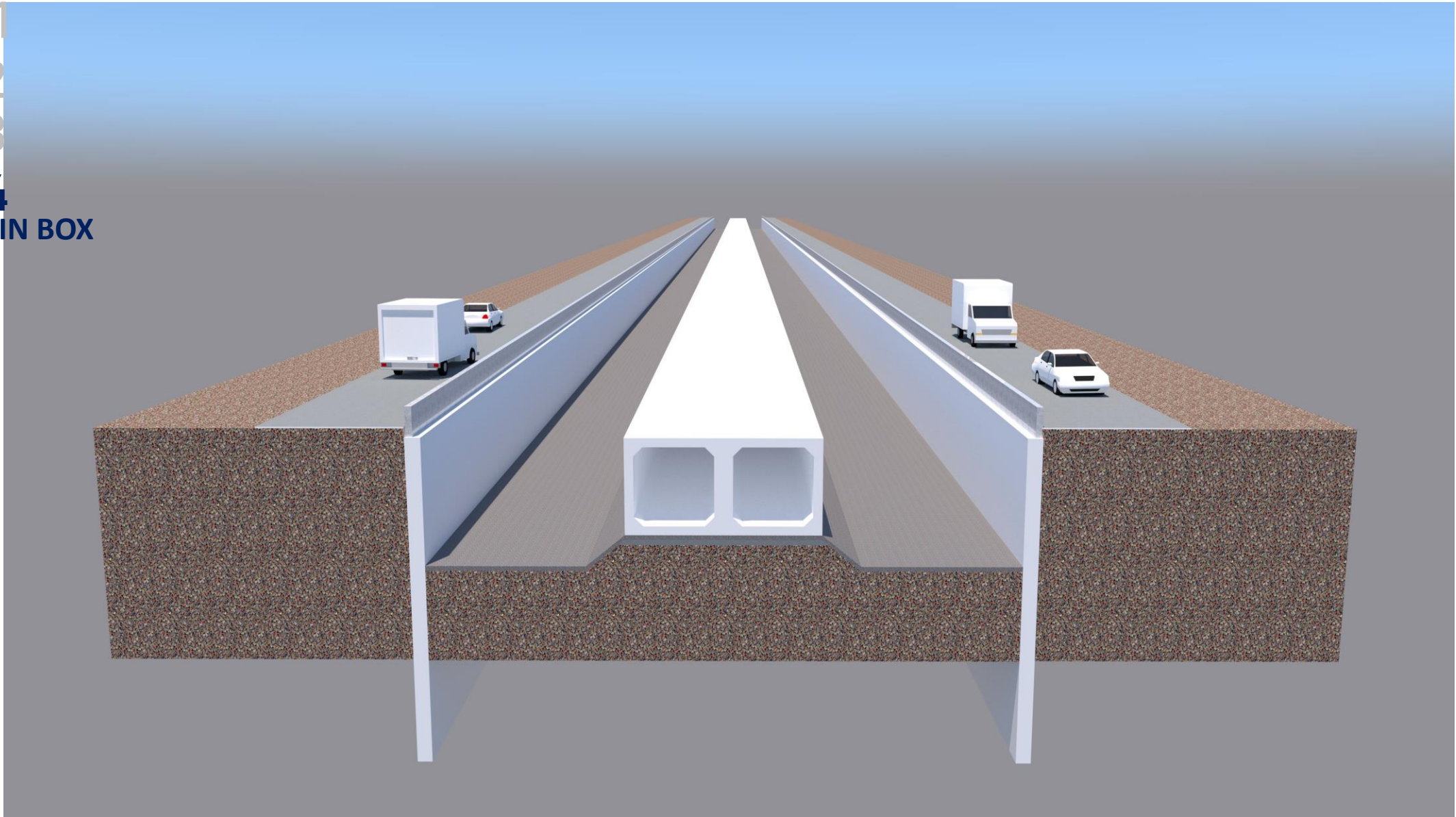
01

02

03

**04**

**TWIN BOX**



# Remodelling of Kharicut Canal | Construction Sequence

01

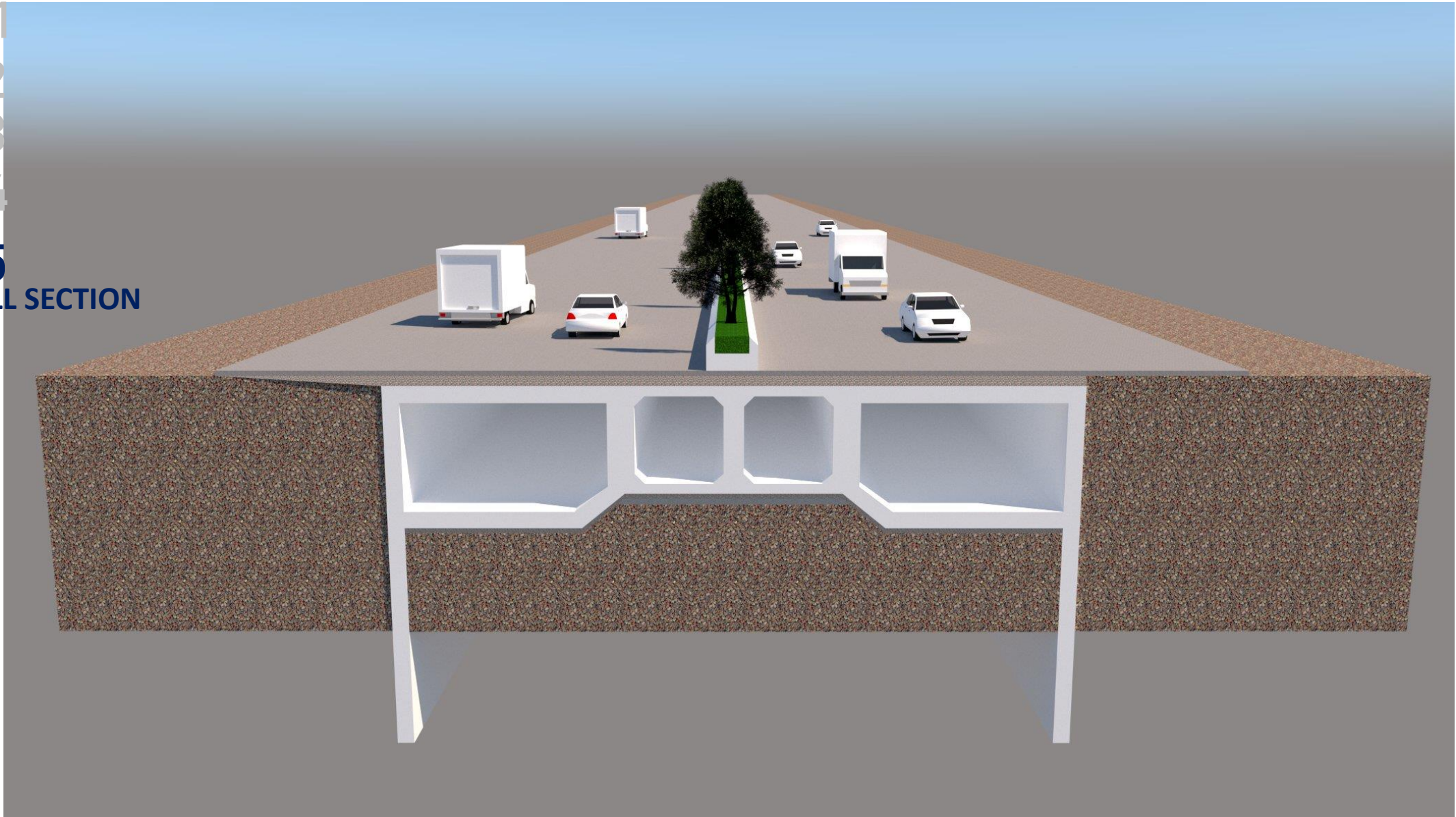
02

03

04

**05**

**FULL SECTION**



## Remodelling of Kharicut Canal | **Site pictures**



***Double Cell Box Culvert Canal***

## Remodelling of Kharicut Canal | **Site pictures**



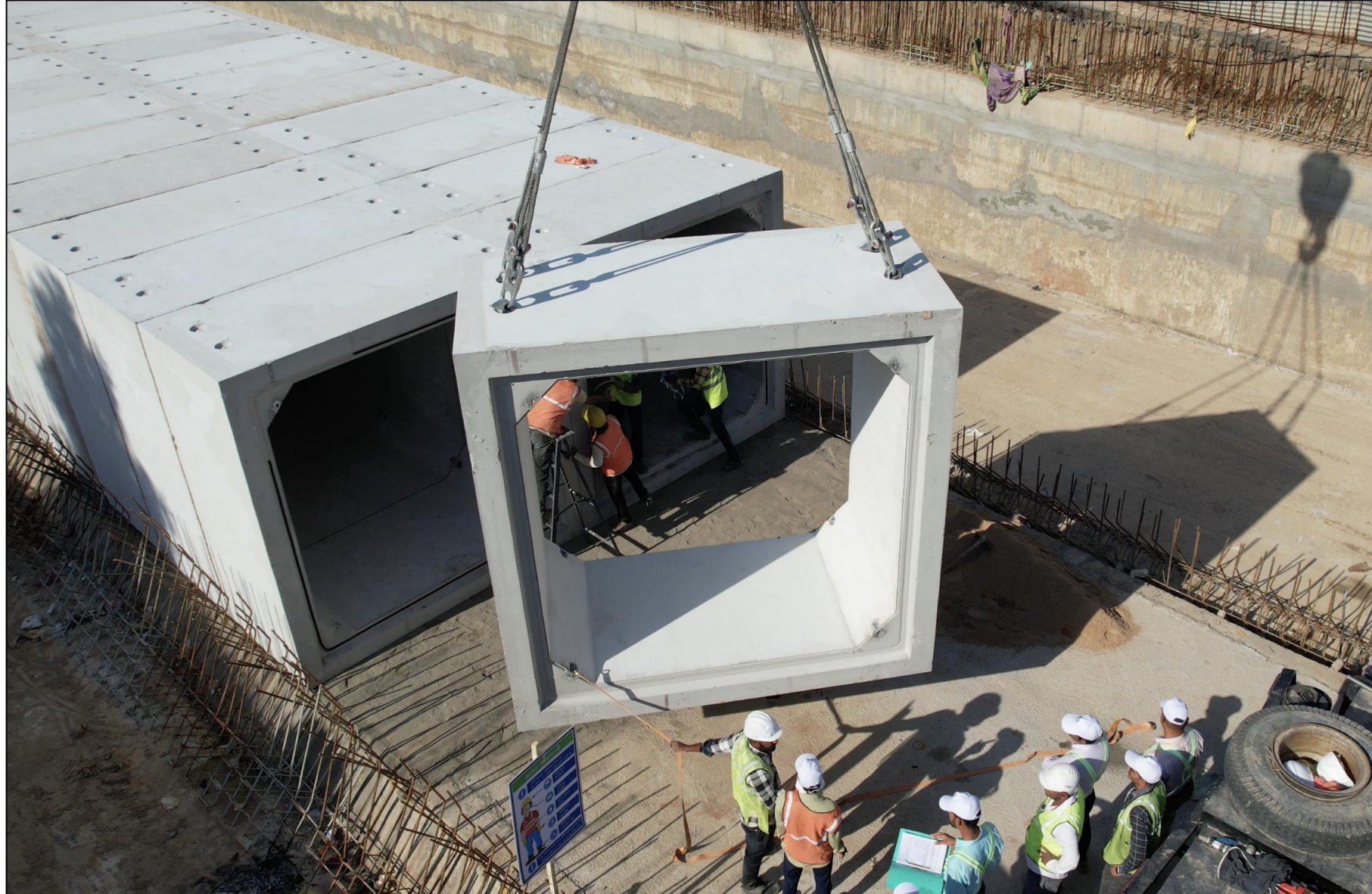
***Lifting Of Box culvert***

## Remodelling of Kharicut Canal | **Site pictures**



*Laying Of Box culvert*

## Remodelling of Kharicut Canal | **Site pictures**



*Laying Of Box culvert*



# Remodelling of Kharicut Canal | Site pictures



*Double Cell Box Culvert Canal*

## Remodelling of Kharicut Canal | Site pictures



***Double Cell Box Culvert Canal***

## Remodelling of Kharicut Canal | **Site pictures**



*Canal development*

## Remodelling of Kharicut Canal | **Site pictures**



*Joint detail*

# Remodelling of Kharicut Canal | **Site pictures**



***Dowel Box Culvert Joint***



***Straight Box Culvert Joints***

## Remodelling of Kharicut Canal | **Site pictures**



***Box Culvert Placed at Manufacturing Facility Stockyard***

## Remodelling of Kharicut Canal | **Site pictures**



***PCC Level Checking and Centerline Survey Demarcation Work***

## Remodelling of Kharicut Canal | **Site pictures**



*Leveling PVC Plates*

***Bed Preparation  
( with leveling of Cement Mortar and PVC Plate )***



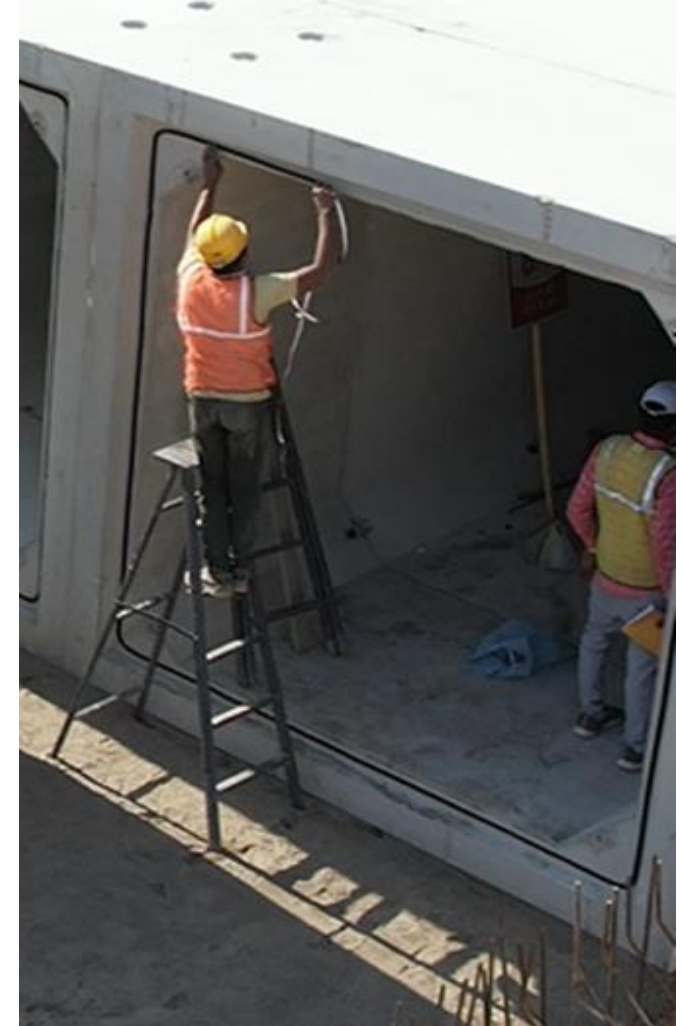
# Unloading of Precast Boxes



# Erection of Precast Boxes



## **Precast boxes fixing work**



High Tensile Nut-bolt fixing

Rubber Gasket Fixing

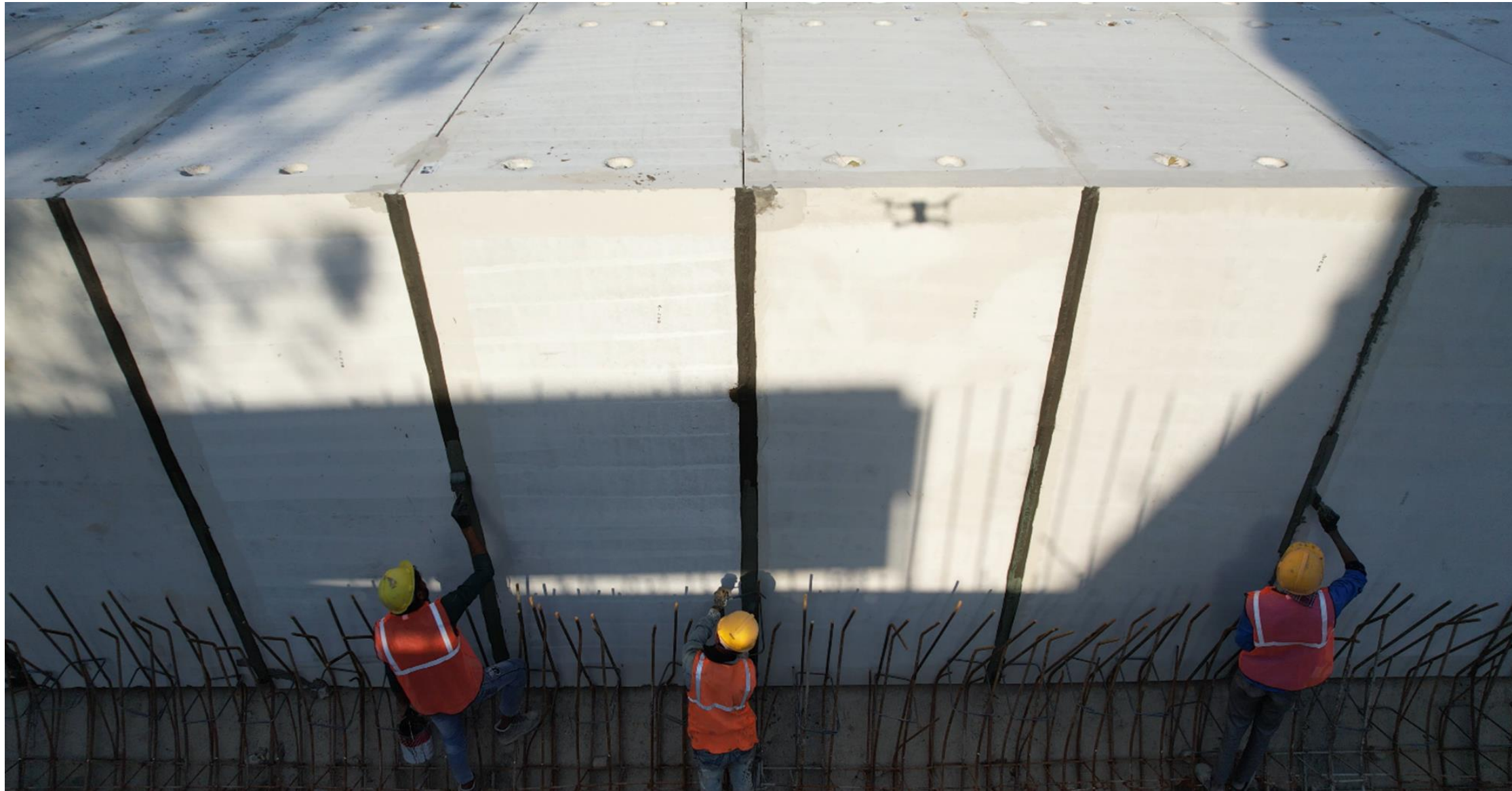
## **Precast boxes to Precast boxes Waterproofing works**



## **Precast boxes to Precast boxes Waterproofing works**



## **Precast boxes to Precast boxes outside waterproofing works**



## **Precast boxes to Precast boxes Inside completed waterproofing works**



## **Erected Precast Boxes (Top View) in Canal Portion**





## **Erected Precast Boxes in Canal Portion**



## **Erected Precast Boxes in Canal Portion**



## Erected Precast Boxes in Canal Portion



# Remodelling of Kharicut Canal | Site pictures



nilgai km." Srivastava said. : capacity building, research, expansion, upgradation and urce

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## DEVELOPMENT GAINS SPEED

TOI

A newspaper photograph showing a wide, newly paved road running alongside a canal. The road is flanked by trees and buildings in the background. The canal is visible on the left side of the road. The photograph is part of a newspaper article.

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CM Bhupendra Patel on Monday inspected the progress of Rs 1,200cr Kharicut canal redevelopment project. The project includes a road on top of the canal from Naroda to Navyug Char Rasta. The project addresses long-standing issues such as pollution and urban flooding and creates a more usable space for the city

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# Technical Details of the Project

Size of Precast Box	2.6 m x 2.6 m – 2 Nos	Grade of Concrete – M 50 (7250 psi) –Cube Strength – Self Compacting Concrete Reinforcement – Fe500 (72500 Psi ) UTS
Size of Cast in Situ Box	6 m x 3.3. m – 2Nos	Grade of Concrete M30( 4350 psi) – Cube Strength Reinforcement – Fe500 (72500 Psi ) UTS
Diaphragm Wall	500 mm Thick and 10 m Depth	Grade of Concrete M30( 4350 psi) – Cube Strength Reinforcement – Fe500 (72500 Psi ) UTS
Design Code for the Concrete Design	IRC 6 : Standard Specification for Design of Road Bridges – Loads and Stressed IRC 112: Code of Practice for Concrete Road Bridges	The Structure is Designed as a culvert to carry traffic loads as stipulated in Design Codes published by the Indian Roads Congress and applicable for design of bridges and culverts in India

# Details of Precast Concrete Box Culverts - Manufacturing

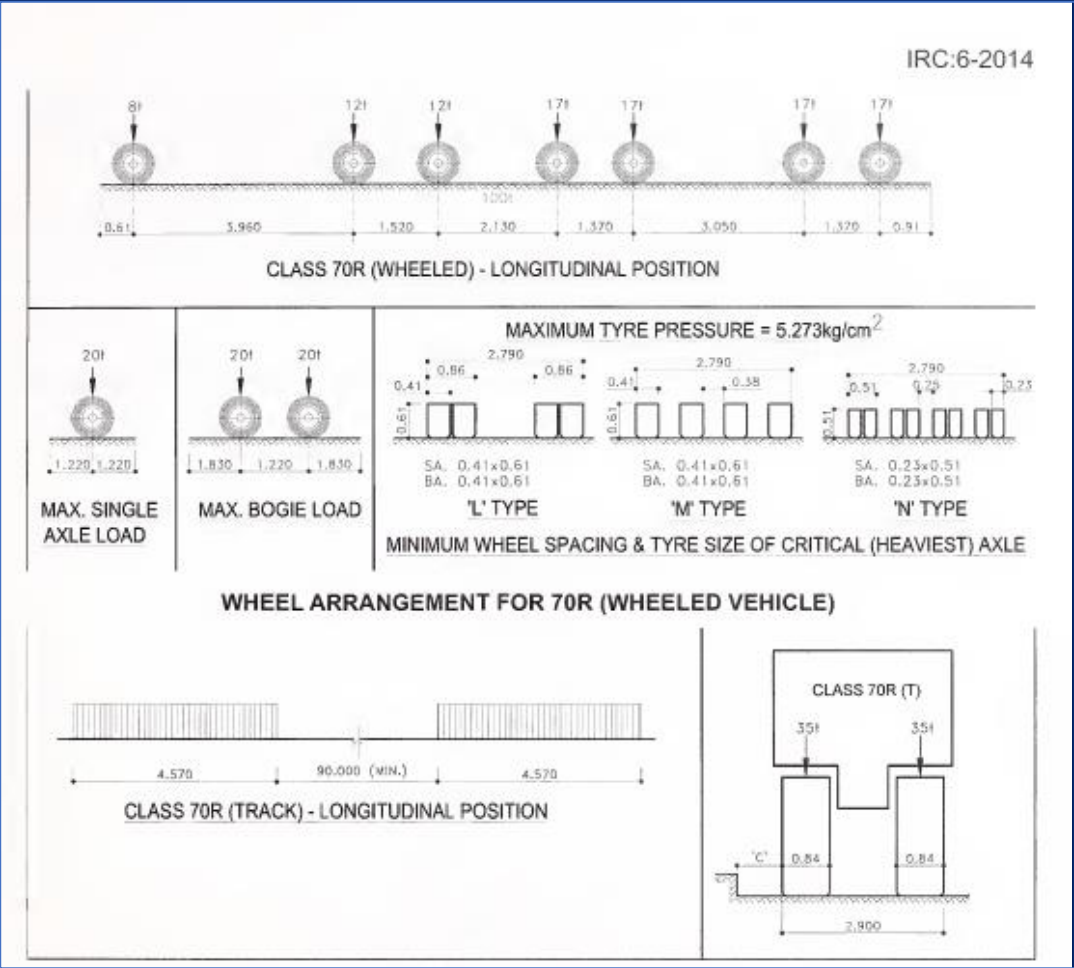
- M-50 grade self compacting concrete using excellent quality sand as per IS-383, maximum aggregate size 15 mm machine cut aggregates of approved quality & size as per IS-383, OPC -53 grade cement confirming to IS:269 of Ultratech Cement, Super plasticizer as per IS-9103, R.O water as per IS-456. Fe 500D steel confirming to IS 1786. High quality lifting studs of appropriate lifting capacity and all other required material to manufacture the excellent quality precast product.
- Concrete mix manufactured by using state of the art computer controlled customised batching plant. Concrete is taken to the assembly line & gently poured into the mould by remote control accessory in place.
- Moulds are made out of using high grade automobile steel from state of the art Japanese technology.
- The reinforcement cage is prepared in automatic rebar plant to ensure accurate distance between two bars. The plant has automated rebar cutting and bending machine. The entire steel assembly is kept into place inside the mould by using high grade necessary plastic spacers.
- After pouring the concrete in the mould, it is followed by steam curing. The entire assembly shall be kept for the minimum time period of 6 to 12 hrs before de-molding. While pouring the concrete in to the mould the concrete samples are taken in the cylindrical mould as per IS code. Each precast unit should have date on manufacturing for traceability. The factory should provide concrete compressive test results on regular basis.
- All the surfaces should have excellent quality smooth finish without any cracks, honeycombing or perforation & each piece should be certified by QC engineer of the factory.
- Box Culverts are despatched at project site after 14 days of manufacturing.

# Details of Precast Box Culverts – Installation and Jointing

- **Installation & Placing:**
  - 
  - Excavation shall be carried out in proper manner as per the required depth and width for easy installation and fixing of Box Culverts.
  - The contractor shall prepare & provide the base using PCC of required thickness as recommended by Structure Consultant. The dry bedding mortar (1:6) are placed on top of the PCC as a levelling course.
  - The contractor shall use auto level equipment to derive the line level. The level shall be recorded properly. The entire assembly should be in line level & perfectly carried out at site as per the design, drawing & instruction given by engineer in charge.
- **Jointing:**
  - Tongue & Groove jointing system are provided in precast box culvert. Precast Box culvert has flange coupling jointing arrangements at four corners. These flange plate is GI coated and connected with reinforcement cage. The jointing of two precast Box culvert should be done by bolting in the in-built flanges.
  - It has special in-built hanging brackets at appropriate locations for faster & safe installation of the product.
  - The straight aligned precast concrete boxes were connected through flange-bolt connection, rubber gasket and mortar connection on both sides for leak proof jointing of two units. However, the canal also had curvatures in its alignment and requirement of monolithic construction joints. At such locations, speciality box culverts with extended dowel bars were manufactured and dispatched at the site. Main reinforcement was placed between two box culverts as per design and parts of the box culvert. Sequence of activities are first base slab, then the walls and then the top slab. A chemical called Masterbrace 1414 was applied to the hardened concrete of precast culvert. This bonding agent helps in structural bonding of fresh and hard concrete. After shuttering, the fresh concrete is poured to complete joint of at curvature locations.

# Design Loads

- Dead Loads
- Live Loads
- Water Pressure
- Temperature Loads
- Earthquake Loads





## Highlights of the Project

Total Length of Precast Box **25 km (15.5 Miles)**

Total Quantity  
of Concrete

**2,55,900 Cum**

Total Quantity of  
Reinforcement Steel

**33,200 MT**

Total Quantity of  
Diaphragm Walls

**2,55,000 Sqm**





**Thank you**