



South Central Railway

Inspection of ROB No. 7A at Lakdikapul



**Preliminary Report
September 2019**



Name of the Project	: VISUAL INSPECTION OF ROB (7A) NEAR LAKDIKAPUL
Location	: LAKDIKAPUL (186/33-35)
Location Co-ordinates	: 17°24'24.1"N 78°27'43.0"E
Date of Inspection	: 22,23 & 26 AUGUST, 2019



Summary:

- a) Structural Cracks have been observed in the Mid spans of Longitudinal Girders.
- b) Spalling and Reinforcement exposure is observed at the bottom of slab.
- c) Cracks are observed in the Secondary Girders.
- d) Elastomeric Pad bearings are in distressed condition.

Tests to be conducted:

- a) Rebound Hammer test to measure surface strength of the concrete.
- b) Ultrasonic Pulse Velocity (UPV) Test to determine the Quality of concrete, such as uniformity and homogeneity of concrete, location of internal defects in concrete, porosity.
- c) Profometer Test for the concrete cover and diameter of rebar.
- d) Half-cell Potential Meter to measure the the probability of corrosion.
- e) Micrometer/card comparator is to determine the Crack width and depth.
- f) Core Drilling to evaluate the exact compressive strength of concrete
- g) Tests for Carbonation, pH and Chloride Content to determine the extent of chemical attack on concrete
- h) Vibration analysis using sensors

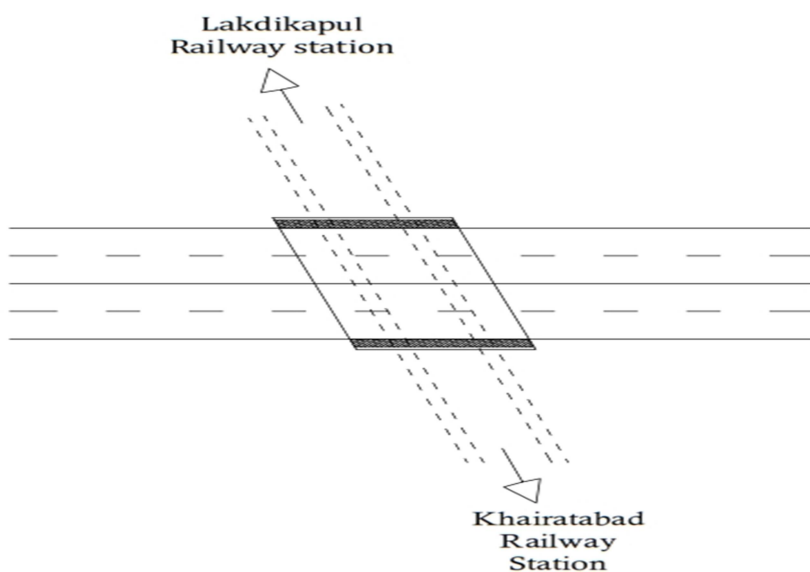
VISUAL INSPECTION OF ROAD OVER BRIDGE

Name of the Project	Inspection of ROB no. 7A near Lakdikapul railway station
Location	Lakdikapul
Date of Inspection	22, 23 & 26 August 2019.

PART 1 GENERAL INFORMATION AND OBSERVATION

1.1	Name of the Bridge	ROB 7A
1.2	Location Location co-ordinates	Lakdikapul (186/33-35) 17°24'24.1"N 78°27'43.0"E
1.3	Type of Bridge	RCC Girder Bridge
1.4	Year of Construction	1992
1.5	Grade of Concrete	Not Available
1.6	Design Load	Class AA-70R (Assumed)
1.7	Roadway Width	2 x 10.5 m
1.8	Overall Deck Width	2 x 12.5 m
1.9	Average Skew	20°
1.10	Span arrangement (no x Span in meters)	1x 18.3 m (Sq.) /1x 19.475 m (Sk.)
1.11	No of Railway Lines Crossings	2 tracks
1.12	Vertical Clearance (from rail top to girder bottom)	6.264 m
1.13	History of Repair/ Maintenance	Not Available
1.14	Original Structural Drawings	Not available

1.15 Key Plan



PART 2 STRUCTURAL SYSTEM OF THE BRIDGE			
			Notes
2.1	Foundation details		Foundation not visible
	Type of foundation		
	Foundation Details (if available...)		
	Foundation Status (Check Settlement, abnormal Scour and Tilting, if any etc...)		
	Type Of Damage (Check cracking, disintegration, decay, erosion, Cavitation's etc..)		
2.2	Abutment (A1 & A2)		
	Type	RCC Wall Type	
	Maximum height of Abutment from Ground level	6.5m	
	Abutment width along the Track	13.3m	
	Abutment thickness	Not Available	
	Condition (Crack, Settlement, Scour, Tilting, Steel Corrosion, Strains and other damages etc...)		All abutments are in fair condition
	Efficiency of drainage of backfill behind Abutments (Check functioning of weep holes, evidence of moisture on Abutment faces, etc..)		Weep holes are functioning properly.
2.3	Pier		
	Type (Shape)		There is no Pier, as bridge is having only one span.
	Material		
	No. of Piers in a row/column		
	Maximum Height of Pier		
	Pier Diameter/Dimension		
	Pier Cap Material		
	Pier Cap Condition		
	Pier Condition (Crack, Settlement, Scour, Tilting, Steel Corrosion, Strains and other damages etc...)		
	Efficiency of drainage of backfill behind Abutments (Check functioning of weep holes, evidence of moisture on Abutment faces, etc..)		

2.4	Bearing & Pedestal		
	Type of Bearings	Elastomeric Pad	
	General condition (Check Corrosion, cleanliness, seizing of plates silting, accumulations of dirt in case of submersible bridges)		All the bearings are in distressed condition
	Type/ shape of Pedestal		There is no Pedestal
	General condition (Check Corrosion, cleanliness, seizing of plates silting)		
2.5	Super Structure (Concrete Girder)		
	Type/Shape of Girder (I-beam, box-girder etc.)	I-Girder	
	Material of Girder	RCC	Precast RCC Girders
	No of Girder	2x 5 Nos.	
	Dimensions of Girder		Total Depth = 1.6m Width of the Web = 0.3m Width of the Bulb = 0.6m
	Structural System of Girder		Simply Supported
	Condition of Girder		Structural cracks have been observed in mid span of the girders (Refer Fig-1)
	Type/Shape of Secondary Girder	Rectangular	
	Material of Secondary Girder	RCC	
	No of Secondary Girders	2 x 5 Nos.	
	Condition of Secondary Girder		Distresses are observed near main & secondary Girder junctions(Refer Fig-4)
2.6	Slab		
	Material of Slab	RCC	
	Thickness of Slab	-	Not Accessible
	Condition of Slab from Bottom		Spalling & Reinforcement exposure has been observed. (Refer Fig-2)
	Condition of Slab from Top		Not visible, as covered with wearing coat
	Condition of Flooring/Wearing Coat	Good	
	Parapet wall/Railing		
	Type of Parapet wall/Railing	Parapet wall	
	Height	1.8 m	
	Condition of Wall/Railing	Good	

PART 4 SURVEY OF SIGNS OF DISTRESS, DEFORMATION IN BRIDGES

4.1

- ✓ Structural Cracks have been observed in the Mid spans of Longitudinal Girders.



Fig.1

4.2

- ✓ Spalling and Reinforcement exposure is observed at the bottom of slab.



Fig.2

4.3

- ✓ Corrosion and Spalling observed near Drainage Spout



Fig.3

- 4.4 ✓ Cracks are observed in the secondary girders.



Fig.4

- 4.5 ✓ Distresses are found in the Elastomeric Pad bearings.



Fig.5

PART 4 SURVEY OF SIGNS OF DISTRESS, DEFORMATION IN BRIDGES			
	Defects	Location	Notes
	Cracking in RCC components	Main Girders, Secondary Girders	cracks are observed in Main and secondary girders
	Water seepage		No water seepage is observed
	Spalling	Slab and Secondary Girder	Spalling is observed in Slab & Secondary Girder.
	Reinforcement Exposure	Slab	Reinforcement Exposure is observed in Slab

Visual Inspection with the help of **traction car** was carried on 23rd Aug 2019 night from 2:15 to 3:45 AM, during power cum traffic block.



Few snapshots taken during visual inspection using a traction car on 22nd Aug 2019. Minor cracks are observed during this inspection.

5.0 Numerical Model

- Three-dimensional numerical model has been developed from the dimensions obtained by physical measurements and assumptions. Obtained model and results are shown below.

Assumptions:

Grade of Concrete: M30

Loading Condition: 1 Lane of Class A + 1 Lane of Class AA-70R

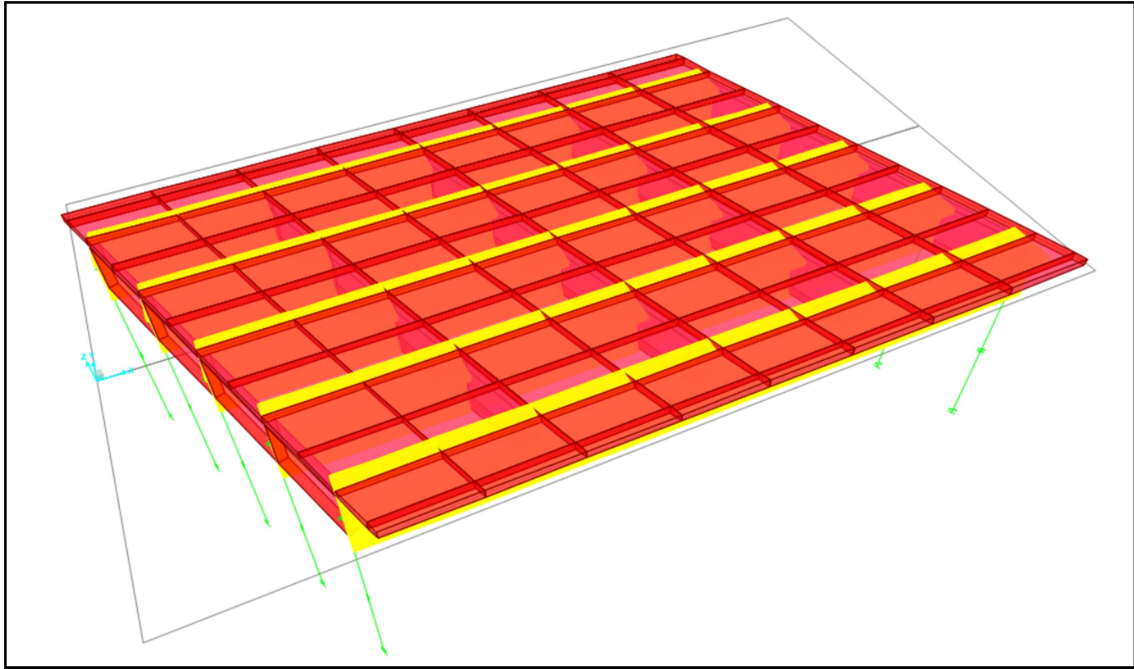


Fig: 5.1 Numerical Modeling of Lakdikapul ROB (Developed from Visual inspection findings)

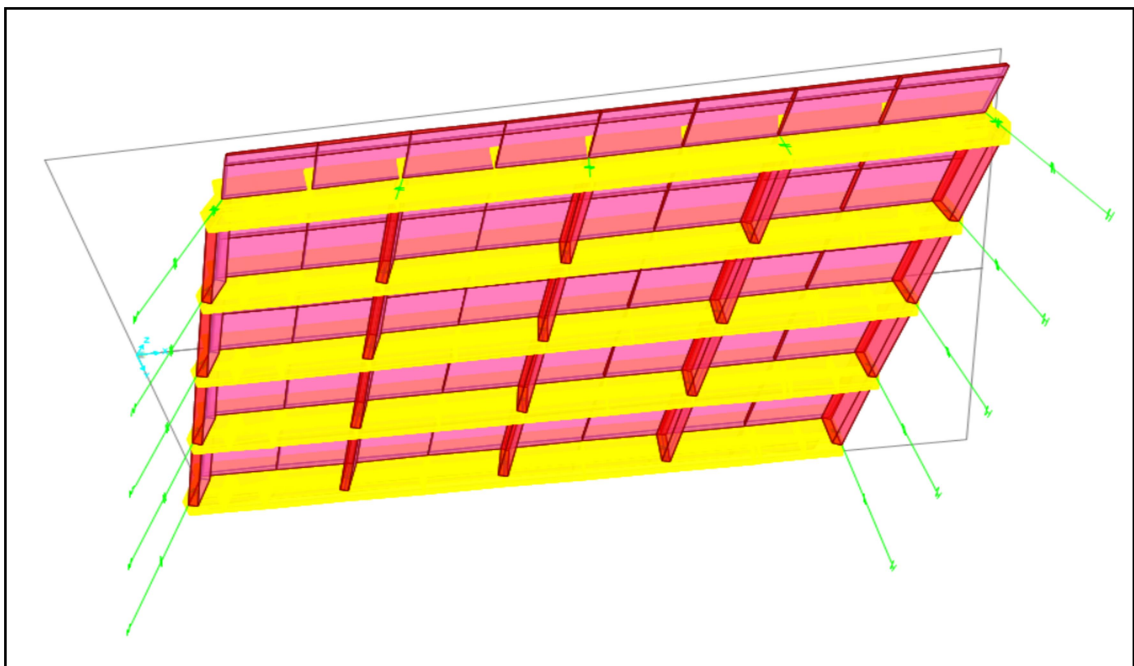


Fig: 5.2 Numerical Modeling of Lakdikapul ROB (Developed from Visual inspection findings)

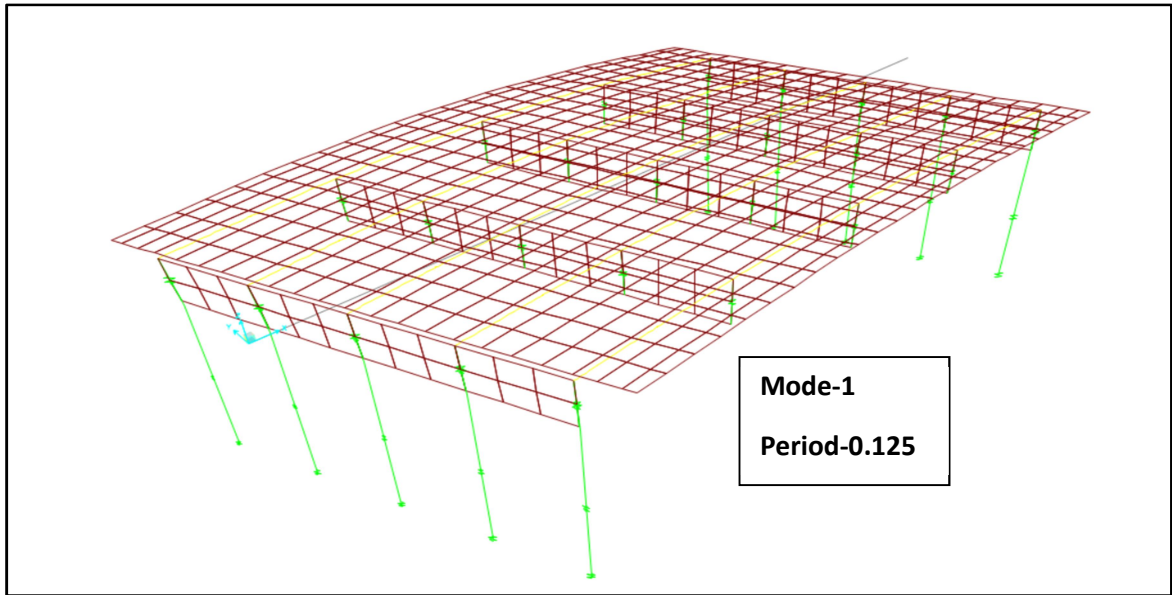


Fig: 5.3 Modal analysis of ROB (MODE-1)

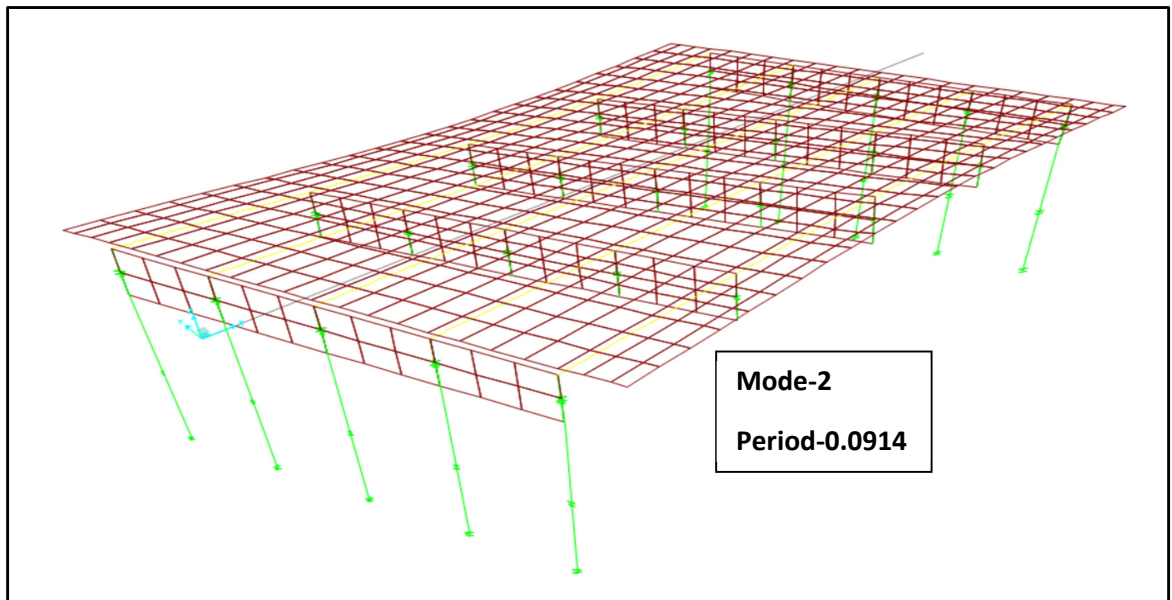


Fig: 5.4 Modal analysis of ROB (MODE-2)

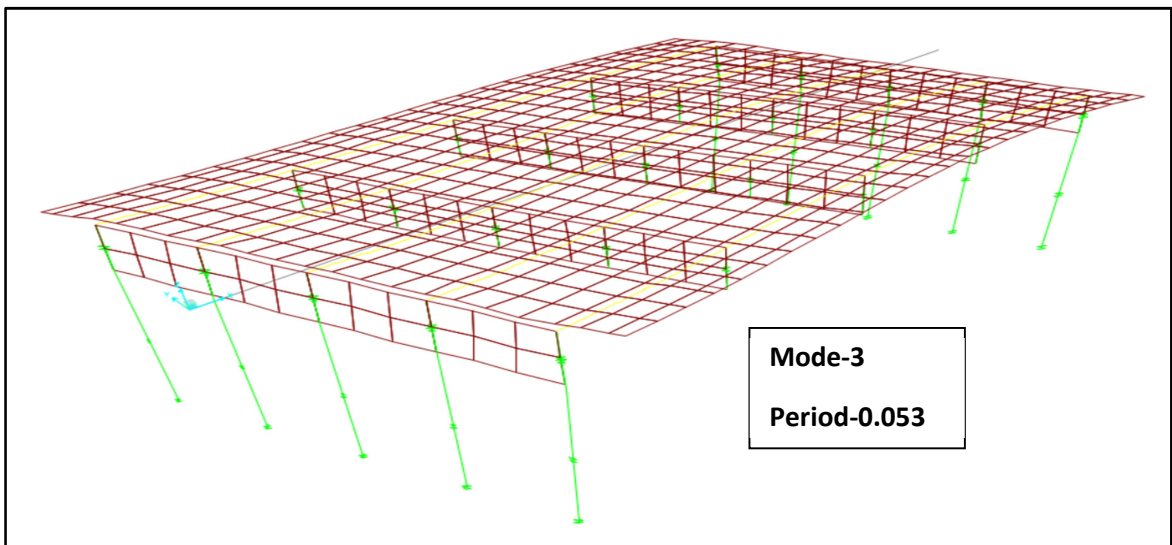


Fig: 5.5 Modal analysis of ROB (MODE-3)

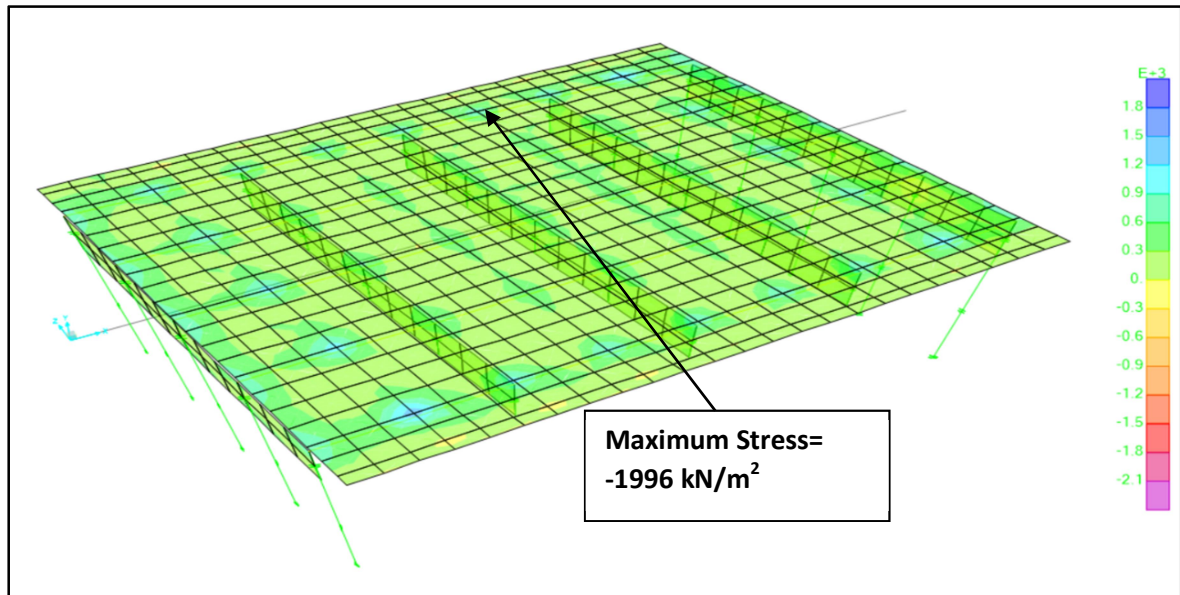


Fig: 5.6 Stress Diagram in the slab due to Dead Load

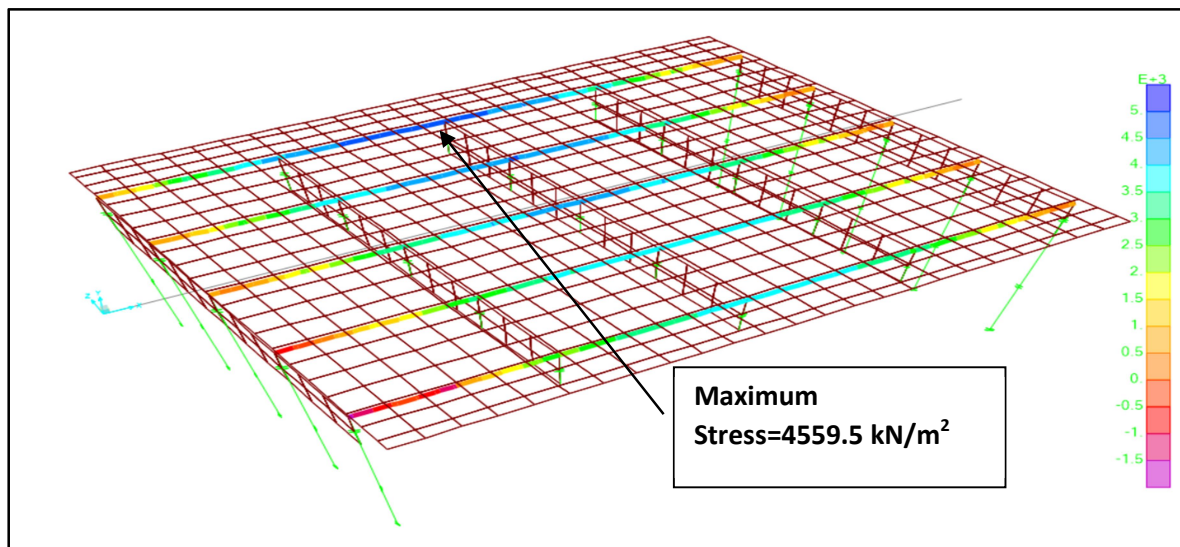


Fig: 5.7 Stress Diagram in the Girder due to Dead Load