

# Current State of Infrastructure Maintenance and Monitoring in Pakistan

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**Presented by**

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# Outline

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1. **Background of Infrastructures in Pakistan**
2. **Current Infrastructure condition**
3. **Maintenance plan**
4. **Bridge Maintenance Scheme**

# Background

Total Area

796,096 km<sup>2</sup>

Road Network

500,000 km

National Highways & Motorways

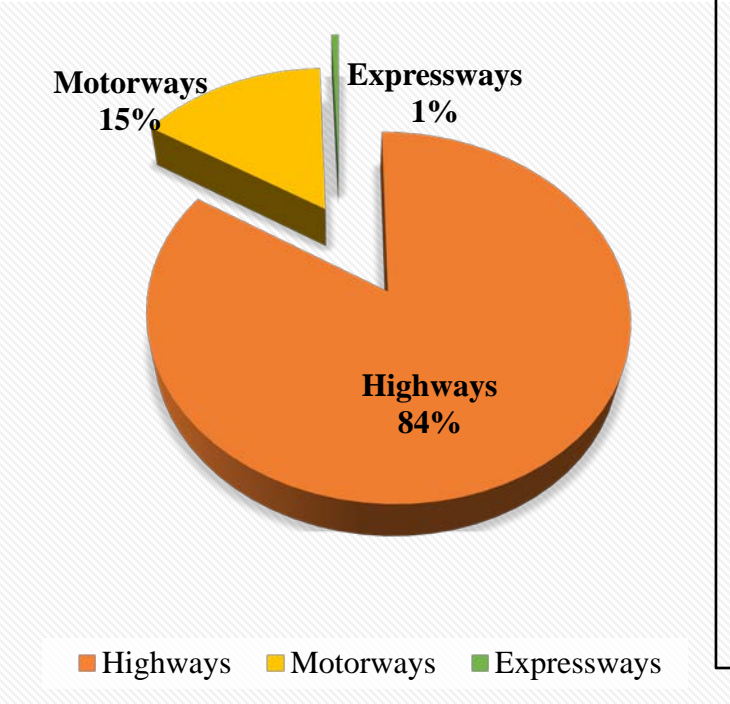
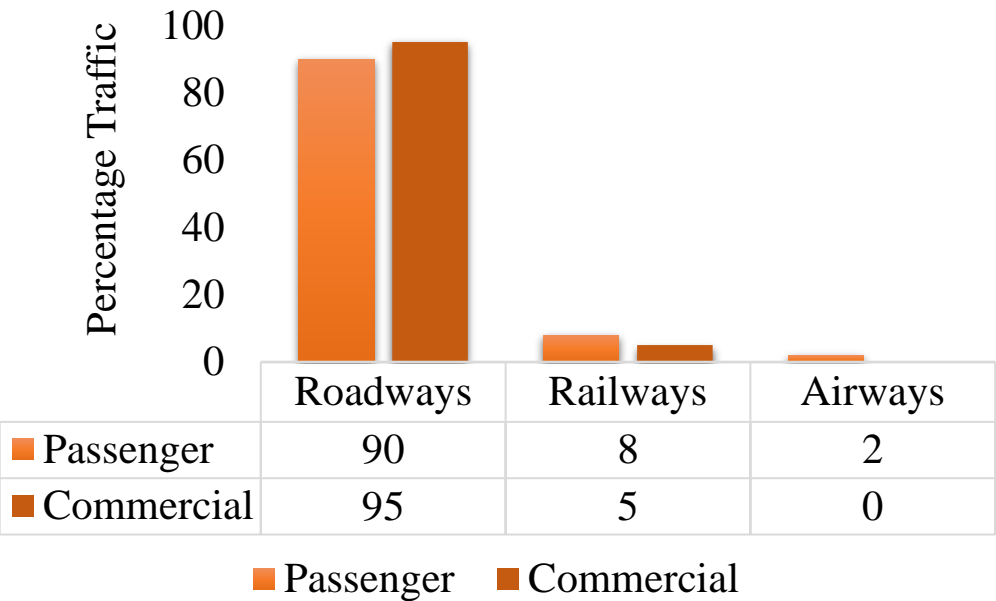
13,570 km

Number of Vehicles

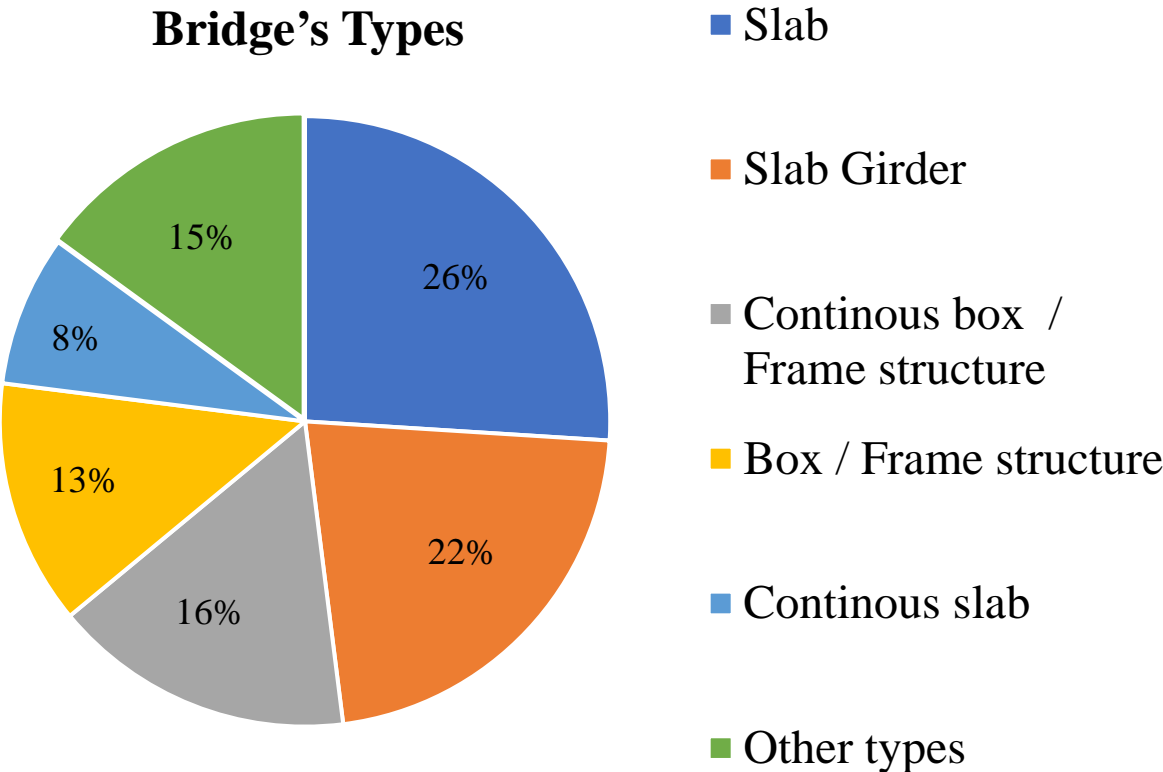
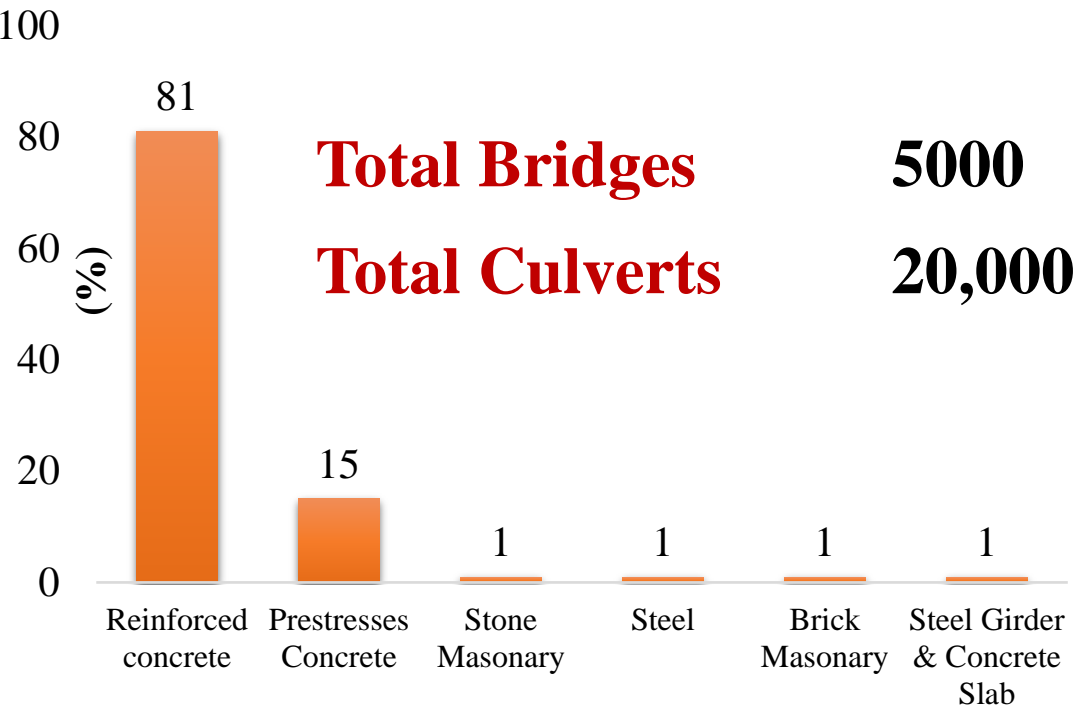
10 Million

## Major Issue

Only 2.8% of total road network in Pakistan carries 80% of the total commercial traffic.



# Background



## Bridges length

> 30 m	75%	50m – 100m	10%
30m – 50m	9%	>100m	7%

# Background

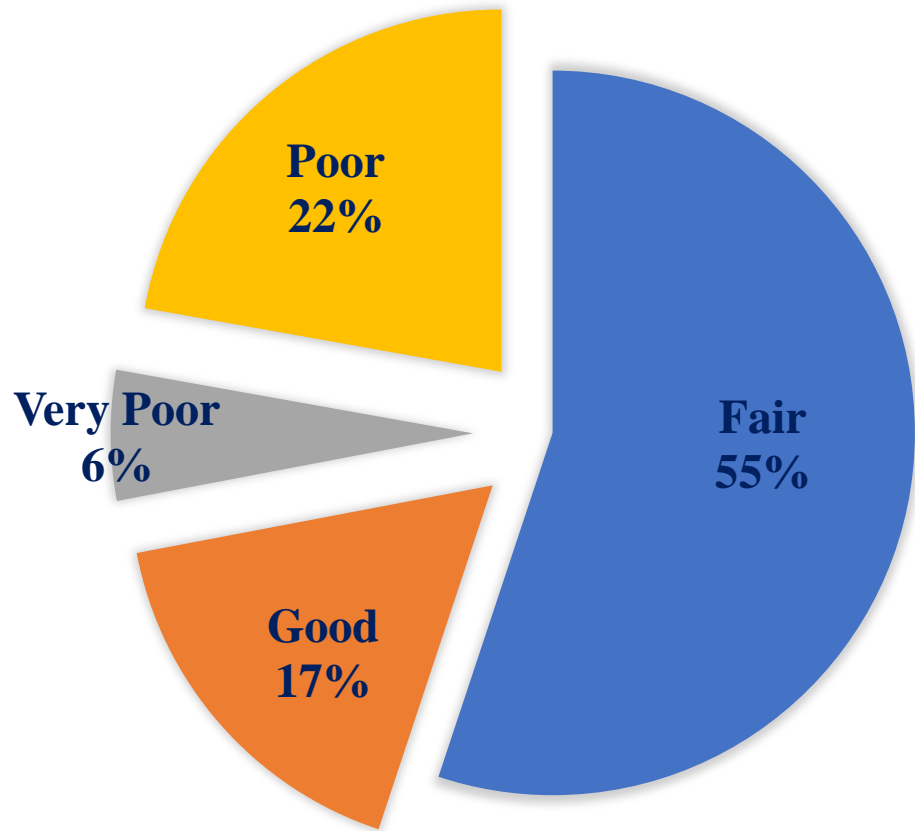
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**National Highway Authority (NHA)** is responsible *to maintain and operate the national highway* in **safe condition**.

The **Road Asset Management Division (RAMD)** is responsible for *maintenance and preservation* of the **road network**.

**NHA** prepare **Annual Maintenance Plan (AMP)** for the *maintenance and monitoring of the infrastructure* lies under the **national highway network in Pakistan**.

# Current Infrastructure Condition



## Remaining Service Life (RSL)

**Good**

**$RSL \geq 4$**

**Fair**

**$2.5 \geq RSL < 4$**

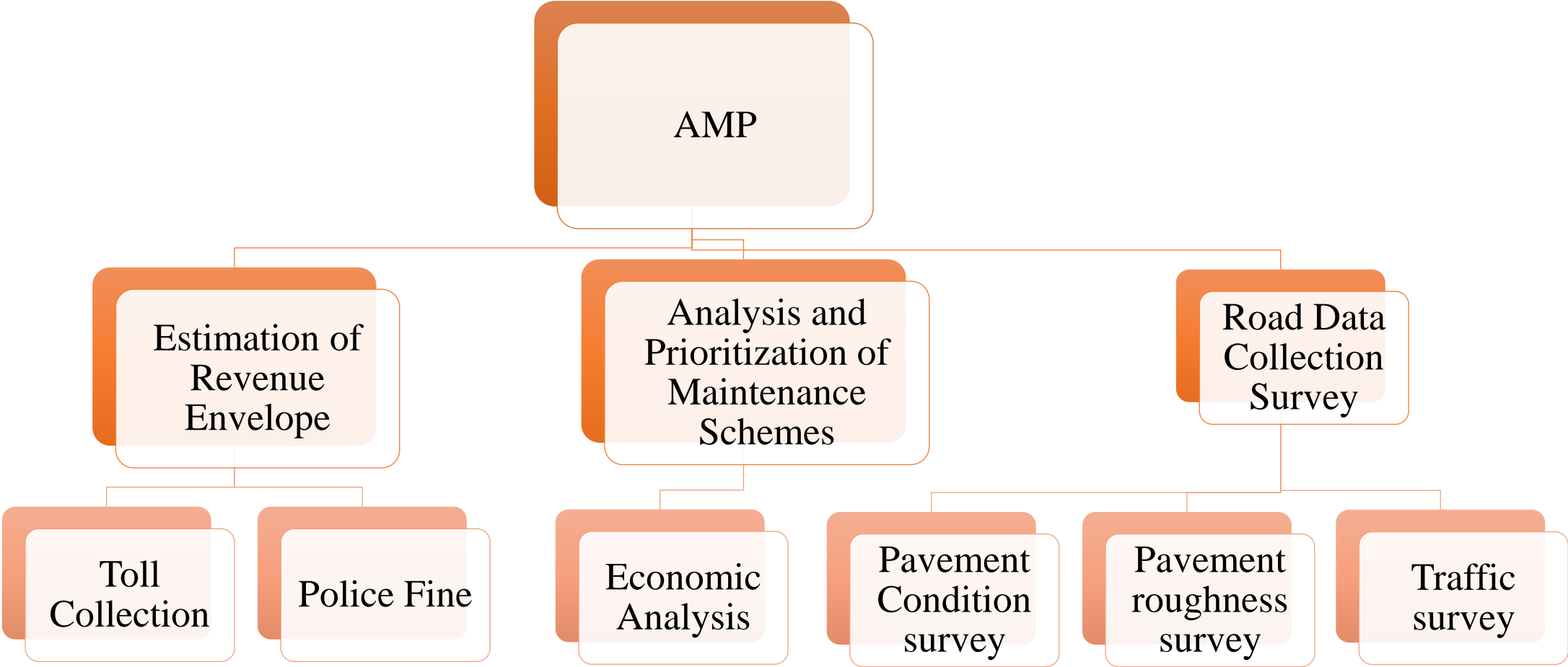
**Poor**

**$1 \geq RSL < 2.5$**

**Very Poor**

**$0 \geq RSL < 1$**

# Maintenance Plan



# Maintenance Plan

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- **Routine Maintenance**

Potholes, patch repairs

- **Periodic Maintenance**

Milling and Overlay of Asphaltic Wearing Course

- **Rehabilitation**

Removal of existing asphalt

# Maintenance plan

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- **Highway Safety**

Removal of back spots

- **Special Maintenance**

Unforeseen Road improvement works required

- **Geometric Improvement**

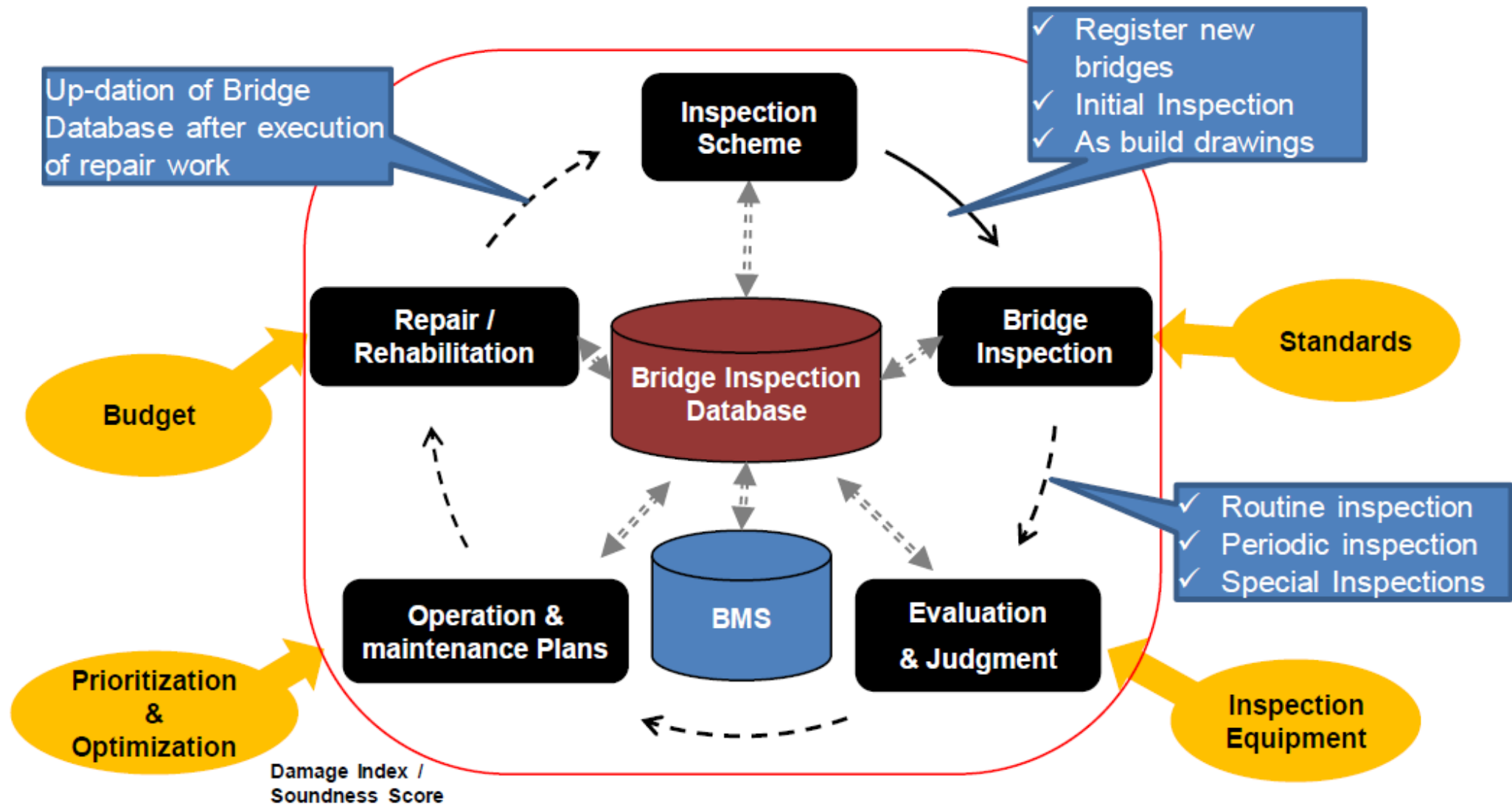
Identification and removal of poor geometric locations to prevailing international

# Bridge Maintenance Scheme

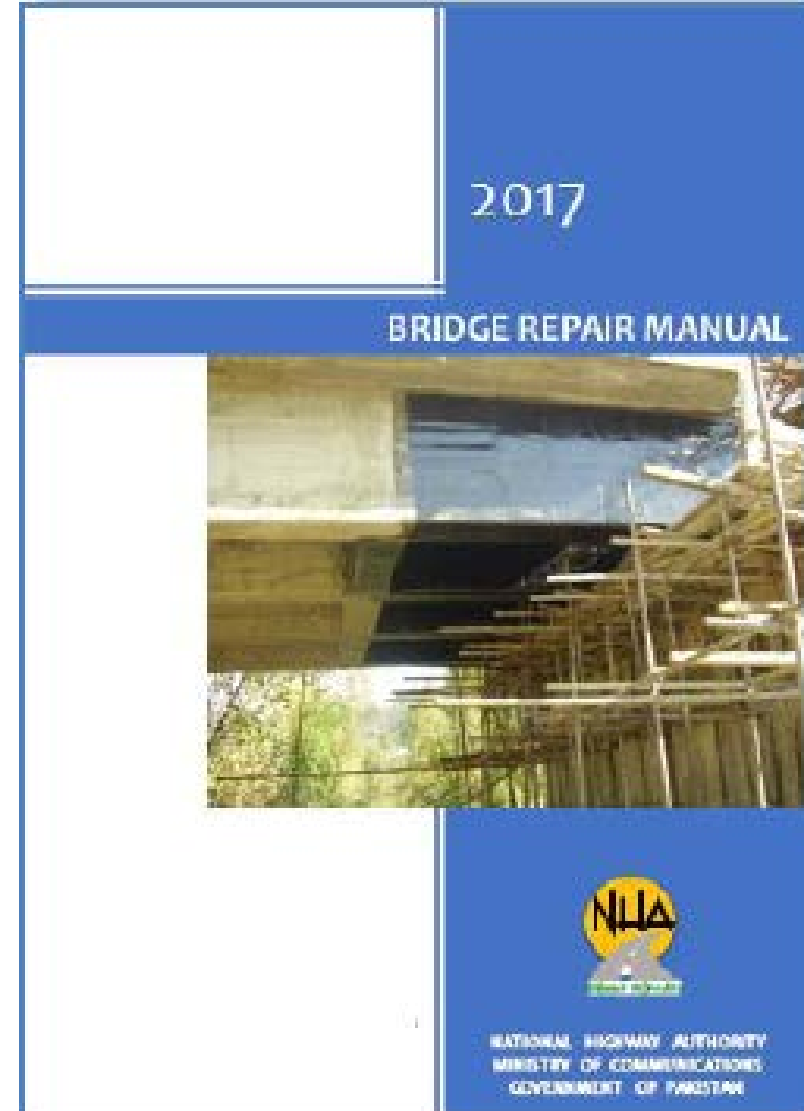
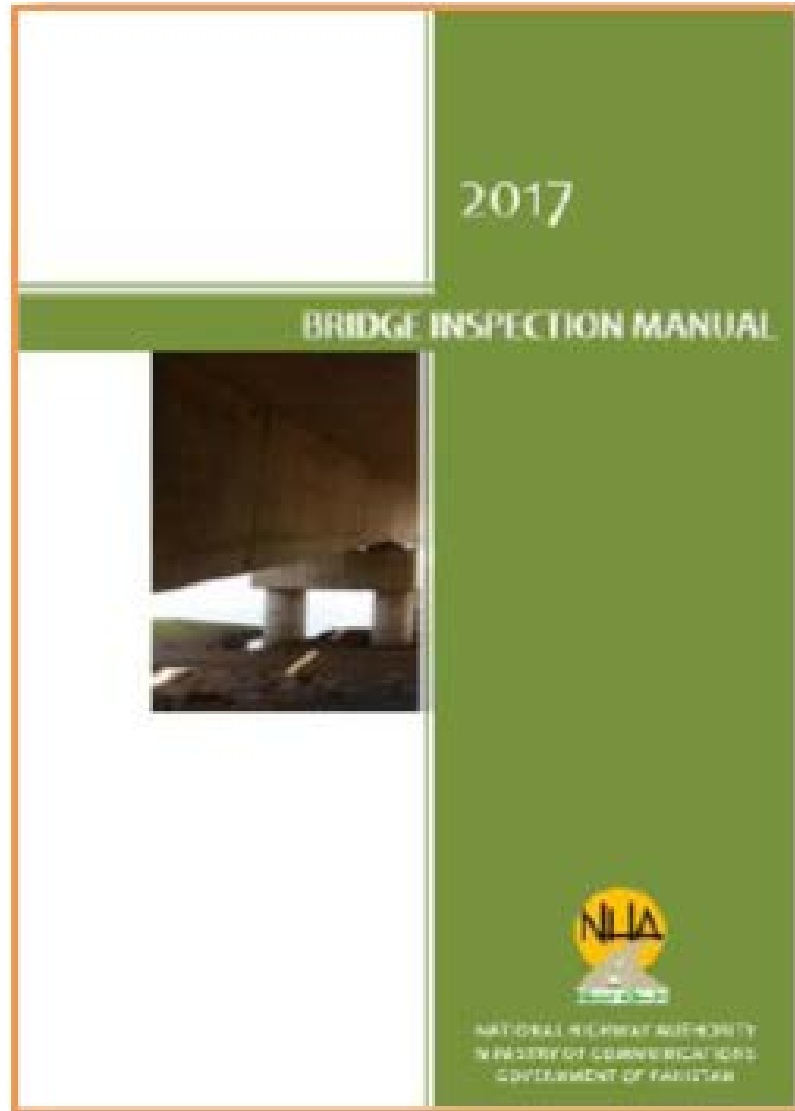
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- **NHA** with the technical Assistance of **Japan International Cooperation Agency** during 2016-2019 developed a **Bridge Management System (BMS)** which is used to evaluate the damages occurred in the Bridges / Culvert.
- Based on the inspection, the **bridge structures** are evaluated with **Soundness Value** ranging from **I –IV**.
- The **bridges** having **Soundness Score IV** are **prioritized for maintenance**.

# Bridge Maintenance Scheme



# Bridge Maintenance Scheme



# Bridge Maintenance Scheme

## SPECIMEN FOR GUIDANCE

## ANNEX-B



FRIENDLY HIGHWAYS

### NATIONAL HIGHWAY AUTHORITY BRIDGE INSPECTION REPORT (Span > 6.5 meters)

Form No. 2002/B/1

Bridge Name CHABLAT BRIDGE Crossing Storm Water Nullah  
Kilometer 132.7 on HASSANABDAL (Town/village) To BURHAN (Town/ Village)  
Inspection Date 10 Feb 2002 Inspected By AD KARIM Tel: 345.678

Province	<u>PUNJAB</u>
Highway No	<u>N-5</u>
Bridge No	<u>B.132.7/2</u>
Side	

POSSIBLE PROBLEM	Problem		How bad?		How much?			Note or sketch reference
	No	Yes	Not very bad	Bad	Very serious	Not much	Some	
<b>1. ROAD SURFACE NEAR BRIDGE</b>								
1.1 GENERAL	<input checked="" type="checkbox"/> Tick Appropriate Column							
Bumpy road surface ?	<input checked="" type="checkbox"/>							
Badly built road	<input checked="" type="checkbox"/>							
drainage near bridge?	<input checked="" type="checkbox"/>							
Blocked or damaged road drains ?	<input checked="" type="checkbox"/>							
Water on the deck ?	<input checked="" type="checkbox"/>							
Blocked or damaged deck drains ?		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
All checked					Yes	<input checked="" type="checkbox"/>	No	

4 DRAINS BLOCKED  
POOR DRAINAGE

No of Spans = 3

Total Span (m) = 90

Vertical Clearance (m) = 6.2

Total Deck width (m) = 10

Clear Width (m) = 7.8

☒ Fill in the Appropriate Figure

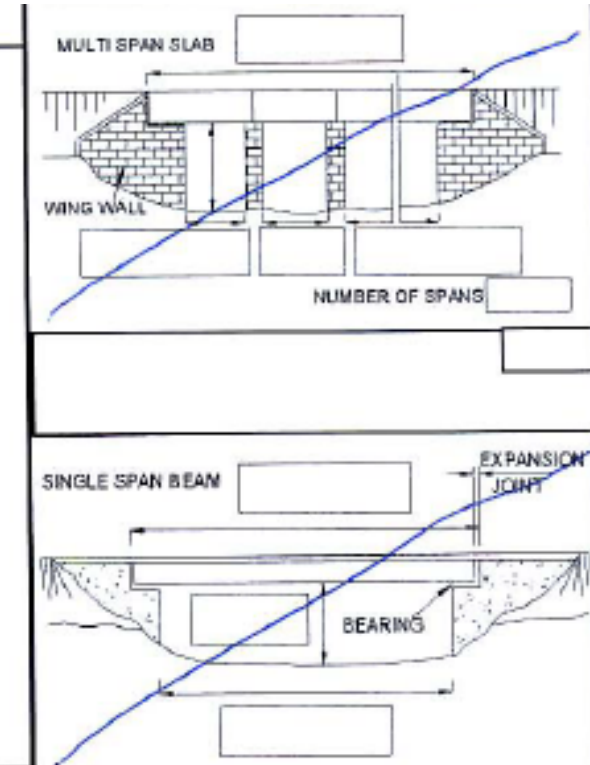
SINGLE SPAN SLAB ☐

WING WALL ☐

MULTI SPAN SLAB ☒

# Bridge Maintenance Scheme

	All checked	Yes	No
<b>2. BRIDGE SURFACE</b>			
<b>2.1 BITUMEN SURFACE OVER BRIDGE</b>			
Surface breaking up or lifting off ?	✓		
Cracking above joints ?		✓	✓
<b>2.2 CONCRETE SURFACE</b>			
Cracking ?			
Spalling ?			
Reinforcement exposed ?			
Poor concrete ?			
Wear of surface ?			
<b>2.3 KERBS FOOTPATHS</b>			
Damaged or loose Kerbs ?	✓		
Damaged footpaths ?		✓	✓
	All checked	Yes	No



# Bridge Maintenance Scheme

## 3. PARAPETS, RAILINGS AND GUARD RAILS

### 3.1 GENERAL

Impact damage ?	✓							
Loose or damaged fixings ?	✓							
Loose post base ?	✓							

### 3.2 STEEL PARAPETS

Damaged galvanising or paint?		✓			✓		✓	
Corrosion ?		✓	✓			✓		

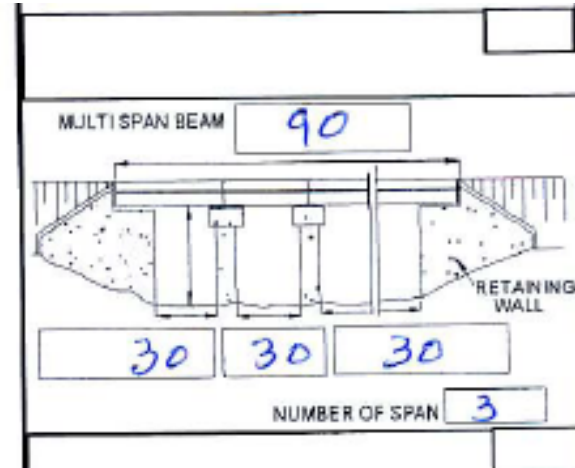
### 3.3 CONCRETE PARAPETS

Cracking ?								
Spalling ?								
Corrosion of reinforcement ?								
Poor concrete ?								

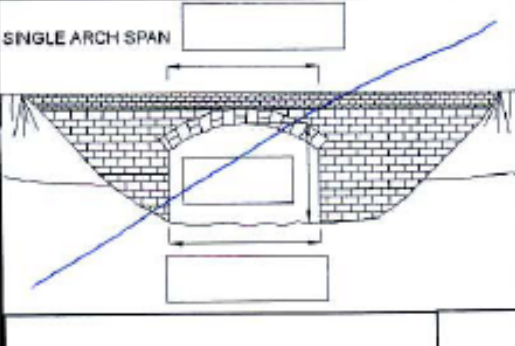
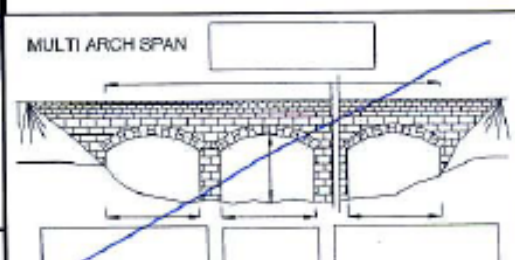
### 3.4 MASONRY PARAPETS

Cracking ?								
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PAINT COMING OFF  
RUST STARTED



# Bridge Maintenance Scheme

POSSIBLE PROBLEM	Problem		How bad?			How much?			Note or sketch reference	No of Spans =			
	No	Yes	Not very bad	Bad	Very serious	Not much	Some	A lot		Total Span (m) =	Vertical Clearance (m) =	Total Deck width (m) =	Clear Width (m) =
Movement or bending of parapet ?									Expansion Joints need extensive repairs and cleaning	SINGLE ARCH SPAN			
Poor pointing ?													
Deterioration of the bricks or stone work ?													
3.5 EXPANSION JOINTS													
Damage to concrete of deck end or ballast wall near joint ?		✓		✓		✓							
Debris or vegetation in joint ?		✓			✓			✓					
Loose or damaged fixings ?		✓		✓			✓						
Damage or corrosion to metal parts ?		✓	✓			✓							
Damage to rubber waterbars?		✓			✓			✓					
	All checked		Yes			No							

4 THE RIVER

# Acknowledgements

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The data presented in this presentation is used from already published studies and/or standards available at [www.nha.gov.pk](http://www.nha.gov.pk) and work available at [https://www.carecprogram.org/uploads/4\\_PAK-English\\_RAMs-20211006.pdf](https://www.carecprogram.org/uploads/4_PAK-English_RAMs-20211006.pdf) (assess date: 06-03-2022).