

# Health Monitoring Assessment of Sambhaji Bridge

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**Abstract** - India is a highly populated country and ranks 2nd in the whole world increasing with a 1.2% yearly. Hence safe transportation is a challenge for the government. Migration is also one of the important aspect of many problems, thereafter the facilities should also be enhanced. Sambhaji bridge is one of historical monuments for the mighty Pune city, but thing in this world has a end and so is with Sambhaji bridge. Construction work for Sambhaji Bridge has completed in 1921 with a life span expected to be 100years, which means a very less life is remaining for the bridge. Precaution is better than cures. This paper contains a structural audit done based on visual observation on site with the consideration of different conditions. Remedial measures have been suggested to increase the life for the bridge.

**Key Words:** Structural Audit, Repairs & Control, Remedial Measures, etc

## 1. INTRODUCTION

A bridge is a structure built to span physical obstacles without closing the way underneath such as a body of water, valley, or road, for the purpose of providing passage over the obstacle. Designs of bridge vary depending on the function of the bridge, the nature of the terrain where the bridge is constructed and anchored, the material used to make it, and the funds available to build it.

The bridge we are about to audit is one of the historical structures (as shown in fig.1). Sambhaji bridge is the oldest bridge in Pune. Also known as Lakdi Pul, it was built in 1761 after the defeat of Maratha army in the third battle of Panipat. Since there was no way for the Maratha army to enter Pune, a bridge was built of wood, which is why it is known as Lakdi Pul. Although destroyed twice by floods, it was rebuilt in 1840 by the British into a stronger stone bridge, and after the 1961 Panshet floods, it was rebuilt and repaired by the Indian Army in just eight days. Now known as Sambhaji bridge, it is closed for two-wheelers, and is only accessible to three-wheelers and four-wheelers. Problems for this bridge have become their residents, as something or the other is coming up day follow.

## 2. STRUCTURAL AUDIT

Structural Audit refers to health check up of building for the safety. The health and performance of a building depends on its quality of original construction and quality of

maintenance. As a building goes older & older it shows wear and tear due to ageing, use, misuse or overuse, exposure to the weathering / environment and structurally unplanned modifications and additions, which do affect the health of the building significantly. It's basically for ensuring that the building and its premises are safe and under no risks. It is a preventive proactive step. As saying goes "stitch in time saves nine". The need of structural audit is for maintenance and repairs of existing structures whose life has exceeded the age of 30 years to avoid any mishaps and save valuable human life.



Fig -1: Sambhaji Bridge.

The concrete is widely used as construction material being inexpensive, easy for construction, applications and because of its high strength-cost ratio. More than ever, the construction industry is concerned with improving the social, economic and environmental parameters of

sustainability. If, further use of such deteriorated structure is continued it may endanger the lives of occupants and

surrounding habitation. There is demand of appropriate actions and measures for all such building structures to improve its performance and restore the desired functions of structures which may lead to increase its functional life.



**Fig -2:** Rubbish Stuck in the Steel Truss



**Fig -5:** Growth of Plants on the Pier Caps



**Fig -3:** Damages of flooring on foot path



**Fig -4:** Arch ring with excellent stone masonry and widening by R.C.C.

### 3. VISUAL INSPECTION OF THE STRUCTURE

- I. Identification of visible structural damage, such as concrete cracking or spalling, and observations on quality of construction
- II. Identification of potential non-structural falling hazards, including ceilings, partitions, curtain Walls, parapets, fixtures, and other non-structural building elements.
- III. Observations on the condition of soil and the foundation
- IV. Documentation of existing conditions with photographs at key locations.
- V. Details about any deviations observed at the site from the original drawings have also to be recorded.

### 4. STATE

- **H.F.L.:** RL 549.900 m
- **Inadequacy of waterway:** By local enquiry it is ascertained that the bridge is not overtopped in floods. Therefore, waterway below the bridge is adequate.
- **Erosion of banks as evident:** No erosion is observed.

### 5. MEASUREMENT OF THE BRIDGE

- No of spans – 09
- Total length of bridge – 150.15m
- Width – 28.8m
- Carriage way – 9.5m

- Footpath – 4.4m both side
- Parapet – 1.10m stone parapet
- Height of top slab from water level – 13.53m
- Electric poles – 37m c/c
- Median Width – 2m
- Bearing – No Bearing
- Water spouts – No water spouts
- Deck – Stone masonry Arch bridge extended on both sides by steel brackets.

## 6. RECOMMENDED CORRECTIVE MEASURES:

- i. Removal of vegetation, since during flood, every year, branches of trees are stuck up in the steel structure at the end, these have to be cleaned every year.
- ii. The concrete posts of parapet wall are cracked and damaged; it is advisable to replace these by same section of the present parapet wall with 75 x75 x 6, four angle frame with cross bracing.
- iii. Flooring on footpaths is damaged and to be repaired.
- iv. Cracks in the pier cap supporting steel trusses to be repaired; it is advisable to provide a 12mm steel plate around this portion to the RCC sides.
- v. Railings of steel pipes at the side of the footpath needs to be repaired wherever damaged.
- vi. Repair of footpath and Slab by grouting.
- vii. Repair pointing of Head Wall, wherever damaged.
- viii. Core Strengthening of masonry structure.

## 7. CONCLUSIONS

The structural diagnosis is vast, important and highly responsible job which is connected with lives of human beings. It is mandatory and advisable to carry out the periodical structural audit of the buildings by professional expert. The success of repairs and restoration is always based on thorough knowledge, correct diagnosis and in-depth studies of problems in building, proper repair practices and finally socio-economic considerations. The effective implementation of auditing enhances the life span of structure, prevents deterioration of building leading to sustainability.

As the structural audit is done on visual basis, hence the recommended repair measures should be followed as soon as possible before any major mishap takes place.

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