

A Review on Structural Audit Report of Oldest Bridges in Pune City

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Abstract— Pune, with its twin rivers, is a city that has a smattering of bridge, linking either side of the rivers. The history of bridges in Pune dates back to the British era, when they built the Fitzgerald Bridge, or Bund Garden Bridge, over the Mula-Mutha river. Pune has developed greatly since then, and over the years more bridges have come up. But what's more significant are the parallel bridges which can be found all over Pune along the banks of the Mula-Mutha rivers, including Baba Bhide bridge, Gadgil bridge or Z bridge, Sambhaji bridge, Lakdi Pul or Shivaram Mhatre bridge and SM Joshi bridge. In total, there are 36 bridges in Pune Municipal Corporation (PMC) limits, of which, 22 bridges are across the rivers, and 14 are flyovers and rail bridges. Currently, Pune is one of the fastest-growing cities in the Asian-Pacific and this has been true for some time. Between 1991 and 2001, the city grew by 40%, increasing from 1.6 million to 2.5 million. The decadal growth rate of Pune for the last 40 years has been at least 40% and it's estimated that population will hit 5.6 million by 2031 if this trend continues. The Pune Municipal Corporation has found that about 40% of the city's population was living in slums in 2017. The life of these bridges has expired in keeping with the deadline set while constructing them. It is always a threat when we would continue to use these bridges for traffic. In These paper Beware, Brit-built oldest bridges of Pune are in precarious state as per Structural Audit report recommends urgent repairs of ten bridges in Pune, but work is yet to begin owing to red tape.

Keywords- Structural Audit, Bridge

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Introduction

Pune, is the second-largest city in Maharashtra, India and the ninth largest city in the country. Pune is located on the Mutha river and it was once the power center of the Maratha Empire. Today, the city is considered Maharashtra's culture capital. Pune has an estimated population of 3.99 million. The city proper has a population density of 5,600 people per square kilometer (15,000/square mile). The larger metropolitan area has a population of 5 million, which makes it the 7th largest metro area in India. Pune is now emerging as a manufacturing and IT center with the 6th highest per capita income in India. It also has a large automotive industry and it's the headquarters for the Automotive Research Association of India. As we look these difference between population demographics and construction of bridges from British era to the current. Therefore, we all beware about the risk to the lives of people who use these bridges every day.

Review Of Oldest Bridge

Sambhaji bridge or Lakdi Pul

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.



Fig No.1 View of Sambhaji Bridge Currently

The audit report states that the bridge is built in stone masonry arch bridge extended on both sides by steel brackets. It has four-lane divided carriageway with overall width of 28.8m. Steel brackets are provided to widen the bridge for footpaths. The steel brackets are in good condition. After Independence, the bridge was widened on upstream side. It is not known whether the widened arch ring is of reinforced cement concrete (RCC) or stone masonry. There is leakage between the stone masonry of old bridge and its widened part. There is vegetation growth on the arches. In the head wall, there is a hollow circle at every pier. If the flood level increases, some flood discharge can be released by this provision. The report also states minor repairs like removal of vegetation, since during flood, every year; branches of trees are stuck up in the steel structure and have to be cleaned. The flooring on footpaths is damaged needs repairs. Railings of steel pipes at the side of the footpath needs to be repaired wherever damaged. Repair of footpath and slab by grouting, core strengthening of masonry structure is needed, the report states.

Old Harris Bridge

Harris Bridge is 122 years old and needs repairs besides improving the approach portion as it is badly cracked. According to the report, stone masonry of arch ring of the bridge is good. However, it has been repaired by cement mortar grouting. The narrow bridge has been widened on both sides by erecting a steel brackets/frame anchored at deck and on pier cap. It is a triangular frame with wider top having a horizontal angle. The widening was done after Independence.

The 100-year-old bridge constructed over the Mula River along the Mumbai-Pune Highway, a vital thoroughfare connecting Pune and Pimpri-Chinchwad.



Fig No.2 View of Harris Bridge currently

The Fig No.2 shows that condition of footpath on Harris Bridge. Audit report mentioned that there were cracks in these bridges that needed immediate repair. There was also urgent need to replace of tar layer of roads over the bridges, gap repairs and consolidation work. The PMC and PCMC have decided to jointly construct a new bridge parallel to Old Harris bridge due to the traffic chaos with widened road space on either side of the bridge. But till today's date condition of traffic on Harris bridge as shown in Fig. No.3. It's all about the risk to the lives of people who use these bridges every day.



Fig No.3 View of Traffic Chaos on Harris Bridge

Concluding Remark

According to B. G. Birajdar, a professor at the College of Engineering, Pune (CoEP) who was part of the team that conducted the structural audit, cautioned, "Though the audit shows no threat to the bridges, the ancient ones need to be shut down for traffic by constructing alternative bridges in case any cracks appear. The life of these bridges has expired in keeping with the deadline set while constructing them. It is always a threat when we would continue to use these bridges for traffic.

The PMC had carried out the structural audit of the bridges on Mutha River in its jurisdiction through a private agency. A detailed study of the bridges based on information provided by the civic administration was carried out with recommendations for safety purposes. The audit report does not have information on the year of their construction, as per the PMC traffic

planning department. The two bridges are quite old and there are no records available on their construction. This is a serious concern for us to start repair and consolidation work of these two old bridges on an immediate basis.

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