



Title: Diagnosis of the pathologies of a bridge, section: Champotón Bridge

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Introduction

Bridges are structures built in order to allow the passage, above all, of vehicles with different capacities through areas of difficult access and safely, they are built of different materials, either in steel, concrete or wood.

The continuous use of these bridges, climatic factors, the movements of normal settlements, seismic movements and the age of their structures, are the cause of pathologies that appear over time that affect their physical state and their original operating condition, generating insecurity for those who make use of them, therefore, they require inspections for a continuous scheduled periodic maintenance that allows evaluating their physical condition and thus determine if they require any type of intervention to keep them in good condition and thus fulfill the function for which they have been built.

"Visual inspections are one of the most important parts of a bridge management system, they are carried out through non-destructive evaluation methods, which can be used as a tool for verifying the structural conditions of bridges" Masoumi, F., Akgül, F. and Mehrabzadeh, A. (2013).

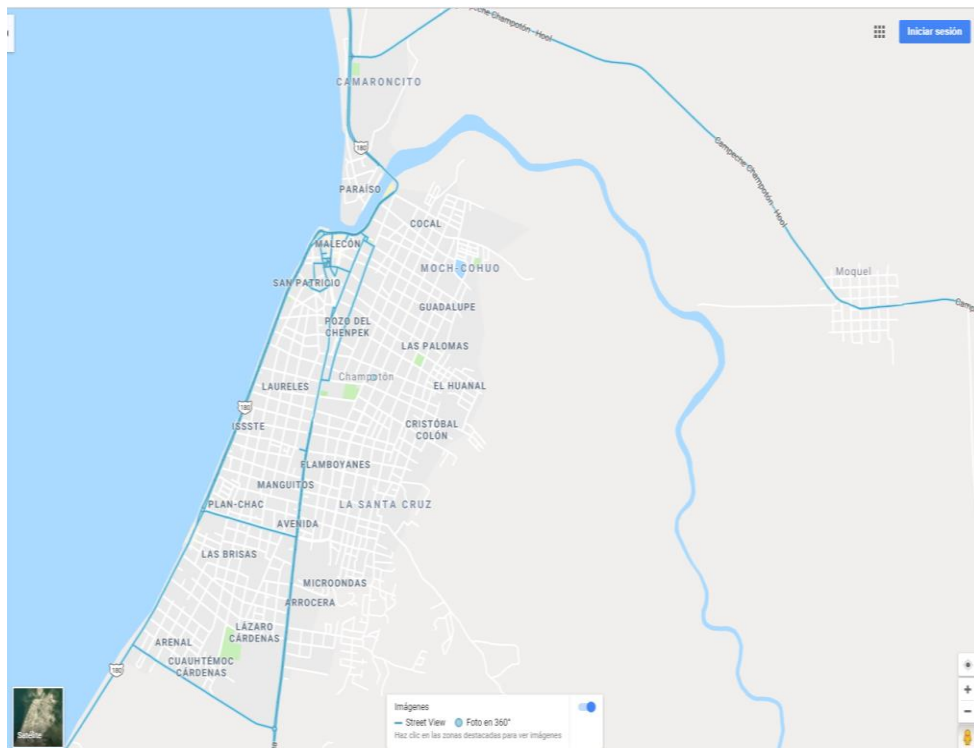
Characteristics

- The bridge is more than 50 years old, since it was built in 1968.
- Projected useful life of 100 years.
- The bridge has a total length of 213 meters. that crosses over the Champotón river.
- Contains two approaches.
- Four beams.
- Two lanes of traffic on both sides of 4 meters. crown width.
- Three concrete slabs, with a thickness of 10 cms.
- It is a road called A2, with two traffic lanes of 4 meters. crown width.
- It has 6 meters. high to the upper bed of the river.
- Reinforced concrete slab on beams in order to place an asphalt layer as a bearing surface.

¿Why is this study important?

Keeping the bridge in good condition represents the following advantages:

- It joins two continental massifs, it is the connection of the peninsula with the rest of the country through it.
- Maintain the safety of users, without any risk or delay when passing through it.
- Help directly, both in communication issues and the flow of the economy, for commercial transactions.



Problematic

The Champotón Bridge presents various types of visible pathologies, such as: Drains in poor condition, reinforcement exposed by corrosive processes, undermining, landslides, invasion and rooting of vegetation (shrubs and trees), damage to construction joints, fissures, erosions, rusted materials, paint in an advanced state of deterioration, lack of railings, loose and destroyed sheets, rusty posts, cracked, fissured and / or worn pavements, approaches with worn joints, broken and / or exposed electrical installation, cracked beams and slabs .

These impairments are caused by:

- Heavy traffic volumes (for being the connection of the peninsula)
- Maximum design load weights (bridge has been in service for over 50 years)
- Exposure to aggressive environmental environments (effects of chlorides from being in a marine environment)
- Alkali-silica reaction, carbonation and corrosion protection.
- Materials with a lack of quality (Repair of the bearing surface of the bridge, which increases vehicle operating costs)

Methodology

A detailed visual inspection was carried out in the field using non-destructive methods:

1. Historical research and antecedents of the study area.
2. Descriptive study of the area.
3. Visual inspection of the study area.
4. A survey of the infrastructure (materials used and construction systems).
5. Inventory of existing elements in the area.
6. A diagnosis of the area and changes inherent to the current traffic was carried out.
7. Carry out a quantitative and qualitative investigation of alterations and deterioration (state of conservation of the bridge).
8. The degree and type of intervention required was evaluated.
9. Raising and updating of architectural plans.
10. A descriptive study of the environment of the area, to analyze and detail what future activities, contexts and events will be like.

Results

1. The results that we obtained after a detailed visual inspection of the existing pathologies in the Champotón bridge, later including and analyzing all the information collected in field work, is that the bridge requires constant routine maintenance and the pathologies found require a short-term preventive rehabilitation, in order to prevent them from continuing to advance and generate probable damages.
2. The main causes, as a result of visual inspection, can be concluded that they are related to corrosion, wear and lack of coatings in different parts of the electrical wiring elements, which generate the presence of plant material, organic agents, concrete contamination of the structure and pavements.
3. Information was obtained on elements with less structural damage, since the beams and the system of piers presented non-significant superficial failures and that do not represent any risk of collapse or functionality of the structure.

Conclusions

1. The Champotón bridge does not present critical conditions that warrant a meticulous intervention according to its pathologies found in the inspections, which shows adequate preventive maintenance of this type of structures.
2. It could be determined that the Champotón bridge presents a series of pathologies that minimally affect the elements that make up its structure, however, due to atmospheric agents and its daily service operation, it has generated deterioration, in addition, it is present in the study, related to acts of vandalism, dumping of garbage and substances that little by little affect a constant deterioration and the presence of pathologies.

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