CROSS Safety Report

Corrosion concerns on a pedestrian bridge

This month we present a report concerning a pedestrian bridge that may have reduced load capacity due to corrosion at the root of cantilever supports.

Report

A reporter is concerned about a pedestrian bridge that they believe has reduced load capability due to corrosion in cantilever deck supports **(Figure 1)**. With hundreds of people using the bridge daily, says the reporter, the danger should not be neglected. The location of the corroded parts is very unfavourable, being at the root of cantilevers where there is high bending moment and shear.

The reporter believes the situation has come about due to the structure not being adequately checked as a matter of routine. The reporter goes on to say that all existing structures used by the public need to be checked periodically to avoid unacceptable structural deteriorations. In this case, the capacity of the cantilevers should be assessed and verified that they can withstand the loadings according to appropriate regulations.

The reporter has notified the local authority as to the structure's condition.

Key learning outcomes

For asset owners and managers:

- Regular inspections and maintenance can help keep a structure safe before it deteriorates and requires costly repairs
- Inspections should be carried out by suitably qualified and experienced personnel

For civil and structural design engineers:

- The detailing of structures, particularly to ensure the effective shedding of water, is fundamental to their durability
- The corrosion protection specification for structures is important
- Cantilevers give cause for concern as they have no redundancy

Expert Panel comments

The corrosion appears significant, but in cases such as this, it may be difficult to understand the structural implications without removing the corrosion and assessing the steel section loss. Assessing the extent of deterioration and measuring the thickness of the steel that remains appears to be necessary. This investigation and the follow-on assessment of capacity should be done as a priority. Cantilevers always give cause for concern as they have no redundancy and corrosion at the root can be a serious matter. Corrosion, as shown in this example, will continue and the structure potentially fail, unless steps are taken to remediate it.

Asset management regimes

Regular inspections of assets such as bridges are essential. All bridge structures should have an appropriate inspection and maintenance regime regardless of their ownership by a public or private body. Good practice, such as set down in National Highways DMRB document CS450 *Inspection of Highway Structures*, is followed by many UK highway authorities. This standard sets down inspection types and frequencies that are designed to ensure the safety of the structure and facilitate effective long-term management including maintenance. Design sign-off would normally include confirmation of the operational plan to manage the structure during its life.

↑ **FIGURE 1:** Corroded cantilever deck support

Other key related aspects of asset management include:

- all structures to be included in a managed asset database
- undertaking reviews and audits of the quality of inspections
- an escalation process for safety issues discovered during an inspection
- using trained and competent inspectors e.g. Lantra-managed Bridge Inspector Certification Scheme (BICS).

Durability

Finally, but very importantly, too often 'design' is thought of as a process to keep stresses under limits; however, that is just part of the process. Design includes achieving sensible durability and maintenance and certainly, on exposed structures, ensuring that water can be shed effectively. The value of a least-weight design, where repairs may be required just a few years later when some of the steel section is lost, should

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be questioned. Detailing the fabric of the structure to achieve the required durability and avoid expensive repairs and breakdowns is essential.

Alongside detailing, the corrosion protection specification for structures is also fundamental. It should also be noted that once a structure has been allowed to corrode significantly, after repairs, it may be impossible to achieve good surface preparation before repainting. Whatever paint system is subsequently applied is unlikely to last as long as the original surface protection system. So, structures with significant deterioration may have an increased inspection and maintenance requirement.

CROSS has reported previously on bridge corrosion, including report 772 *Corrosion of bridge girder beams* published in 2022 where hidden critical elements were of concern.

The full report, including links to guidance mentioned, is available on the CROSS website (report ID: 1161) at **www.cross-safety.org/uk/safety-information/cross-safety-report/corrosion-concerns-pedestrian-bridge-1161**.

What is CROSS?

Collaborative Reporting for Safer Structures (CROSS) helps professionals to make structures safer by publishing safety information based on the reports it receives and information in the public domain.

CROSS operates internationally in the UK, US, and Australasia. All regions cover structural safety, while CROSS-UK also covers fire safety.

How reporting to CROSS works

The secure and confidential safety reporting system allows professionals to share their experiences to help others.

Professionals can submit reports on safety issues related to buildings and other structures in the built environment. Reports typically relate to concerns, near misses or incidents. Find out more, including how to submit a safety report, at **https://bit.ly/cross-safety**. Your report will make a difference.

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