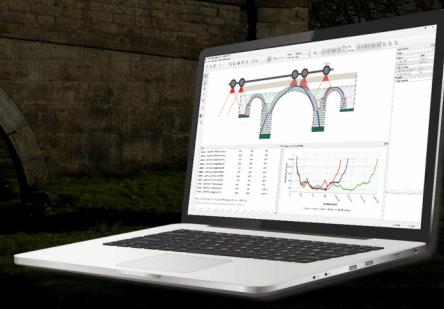




limitstate:RING

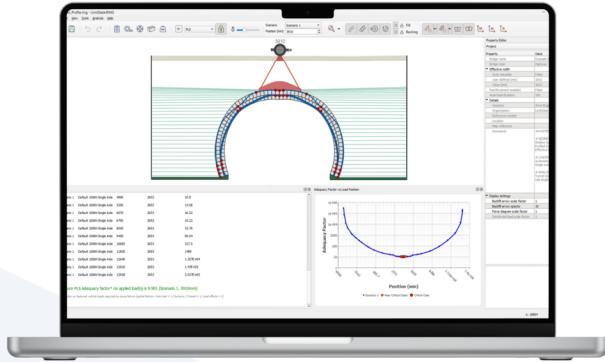
RAPID MASONRY ARCH BRIDGE ANALYSIS



ASSESSING HIGHWAY MASONRY ARCH BRIDGES TO CS 454 & CIRIA C800

Masonry arch bridges are durable and crucial components of our highway infrastructure, but they face ongoing challenges due to the combined effects of ageing and modern transport demands.

LimitState:RING is the only software to consider both the CS 454 and CIRIA C800 approaches to the assessment of masonry arch bridges under service loading.



TEMPLATE FILES FOR CS 454 & C800

Reuse essential parameters when conducting new bridge assessments to ensure consistency and accuracy.

LimitState:RING's template library provides pre-configured files to allow CS 454 (Cmin) and C800 Permissible Limit State (PLS) service load behaviour to be assessed with ease.

BUILT-IN CS 454 LOAD VEHICLES

LimitState:RING's built-in vehicle library includes a comprehensive selection of CS 454 and related load vehicles, while also allowing you to create and share custom loads.

Define multiple load scenarios, and LimitState:RING will automatically identify the critical case.

OPTIONAL PLS ANALYSIS MODE

When you switch to Permissible Limit State (PLS) analysis mode in LimitState:RING, the backfill response is adjusted and the appropriate partial factor set applied.

Analysis then focuses on the primary load-resisting features, following the guidelines outlined in CIRIA C800.

EASY TO INTERPRET OUTPUT

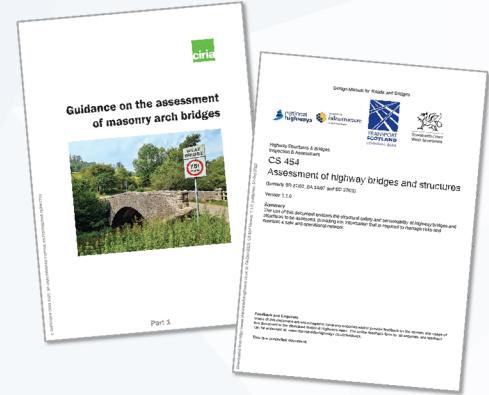
LimitState:RING outputs key analysis results, including the critical failure mechanism and Adequacy Factor, a measure of live load capacity on the factored input.

Simply check if the factor exceeds 1.0 to determine if the structure is adequate.

CONSOLE MODE & BATCH SOLVE

Console mode functionality enables you to edit and analyse files directly from the command line or a batch file.

Bypass the performance overheads typically associated with GUI operations; modify and evaluate multiple bridge designs in a more efficient manner.



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SERVICE LOAD BEHAVIOUR

Traditionally, the **Ultimate Limit State** (ULS) has been the main focus of bridge assessment, despite ULS failures being rare in practice.

However, changes in loading can cause a well-conditioned bridge to **degrade rapidly** and become unserviceable. UK code DRMB CS 454 and CIRIA C800 now both **consider service loading effects** to help mitigate long-term deterioration.

LimitState:RING allows engineers to assess ULS and service load behaviour to both CS 454 and CIRIA C800, providing a **full evaluation of bridge performance**.

DRMB CS 454 APPROACH

DRMB CS 454 requires the user to **determine the factor** (C) that can be applied to the assessment loading without being in **excess of the resistance at ULS** (equivalent to LimitState:RING's Adequacy Factor).

This factor must exceed the value of a capacity factor (C_{min}) that corresponds to expected levels that may result in **distress of the arch**.

As such, both the ULS and service load behaviours are determined from the **same ULS analysis**, incorporating both primary and secondary bridge resistance.

CIRIA C800 APPROACH

The CIRIA C800 **Permissible Limit State** (PLS) offers a more nuanced approach than CS 454.

Rather than applying a single, critical loading factor, C800 requires the assessed resistance to **meet or exceed action effects**, considering factored masonry strength values and both permanent and variable actions.

Crucially, soil pressures for the PLS are assumed **without relying on large deformations** to mobilise large pressures.



ABOUT LIMITSTATE



We specialize in the development of powerful, yet easy-to-use software tools for civil and structural engineers.



Our expert support team are on hand for swift assistance with technical and licensing queries.



From independent firms to multinational corporations, engineers in over 30 countries around the world rely on our software.

OUR PRODUCTS

Discover unique software solutions that set themselves apart by taking full advantage of state-of-the-art optimization algorithms to rapidly and accurately analyse the critical mode of response.

We strive to ensure our software output is as useful for the user as possible. Query forces and failure mechanisms, gain a deeper insight into your engineering problems and address crucial 'what if?' questions.



SCAN ME