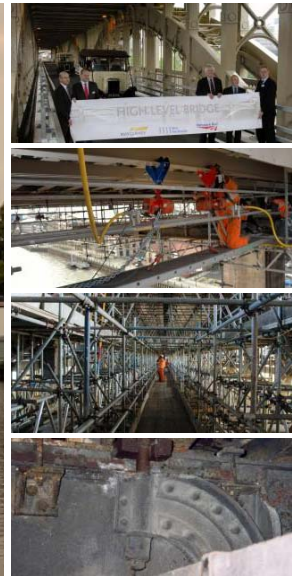


# Restoration of Newcastle High Level Bridge



## Client

Mott MacDonald for Network Rail

## Project Description

Newcastle High Level Bridge is an iconic structure and a major part of railway, engineering and local heritage. It is a Grade I Listed cast iron structure, designed by Robert Stephenson and opened to traffic in 1849. It has six arch double-decked spans with two tracks at the top level and a road deck below. The project was a significant achievement carried out over a period of 7 years and undertaken on a progressive basis as the defects in the structure were able to be uncovered. The design of repairs to be metalwork were controlled by its heritage status which demanded minimal change to the appearance of the structure.

## Cass Hayward Role(s)

- Independent Category III design checker and peer review of design proposals
- Interpretation of strain gauging data to determine the behaviour of the structure under load
- Check of fatigue analysis of cast iron cross girders using historical loading data from the opening of the bridge to the present day
- Peer review and witness of fatigue testing of cross girders removed from the structure in order to derive S-N curves for application in the fatigue analysis
- Review of plate bonding repair proposals which were not implemented

## Project Statistics

- Completed May 2008
- Restoration cost £43m
- Six 38m-long tied arch river spans on masonry piers up to 40m tall

## Special Features

- Substantial fatigue damage especially to cast iron beams required extensive numerical and physical testing and repair
- Check of repair details to badly corroded components such as road deck hangers, longitudinal stringer beams, swan neck girder hanger bolts and wrought iron chains tying the ends of the arch

## Awards

- Two Historic Bridge and Infrastructure awards from the Institution of Civil Engineers; one for research into Cast Iron and one was for the Physical works
- National Railway Heritage award
- North East of England branch of Institution of Civil Engineers "Special Conservation" award
- National Rail Award - Civil Engineering Achievement of the year
- Grand Prize for Conservation from Europa Nostra
- Network Rail Partnership award for Heritage