# Hammersmith Bridge

## Engineering & Programme Overview

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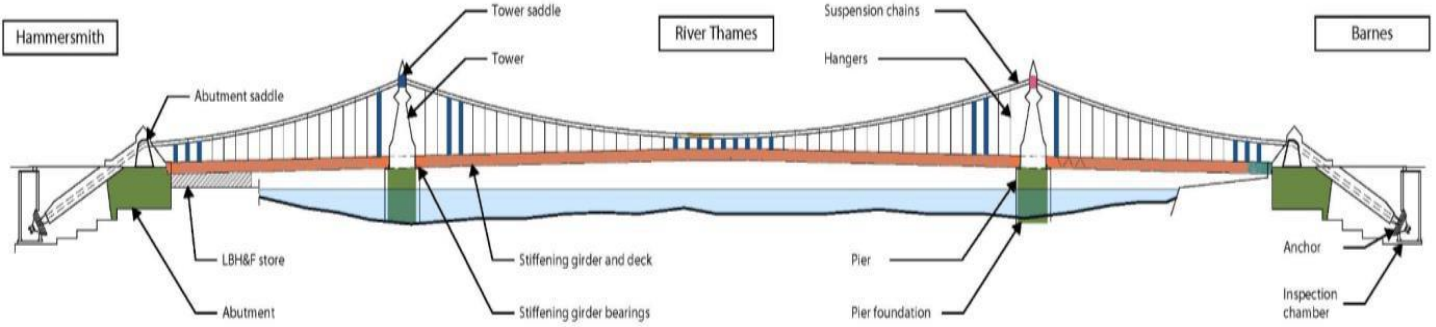
# Hammersmith Bridge
## Grade II* Listed Structure

# Hammersmith Bridge Overview




- A classic suspension bridge which relies on suspended chains to hold up the deck.
- As well as resting on two towers, at each corner the chains pass over a cast iron pedestal.
- Victorians included roller bearings on these pedestals and on top of the towers to allow chains to move a little, as temperatures or loads on the bridge changed.

# Identified Challenges

- 137 year old aging structure with the immediate problem that the bearings have seized.
- Seizure has resulted in lateral forces acting on the pedestals and towers which they were never designed to take.
- Cracks have been found in all cast iron pedestals
- These are not the only challenges, some 17 major defective elements need addressing before the bridge can be fully opened.

## Removal of Casings, Analysis and Modelling of cracks

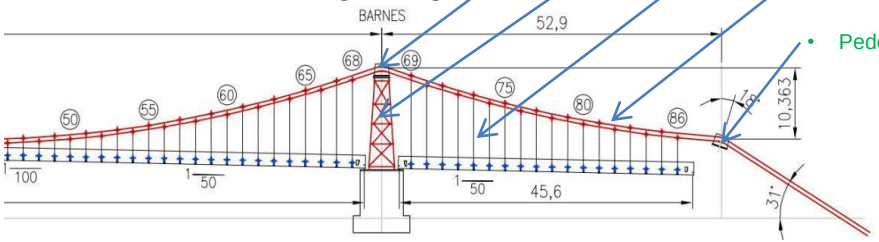
- Can't be sure of identifying all cracks until paint has been removed by blast cleaning.
- Have to temporarily remove decorative cast iron casings
- When removed from N.E pedestal new cracks were found (April 2019), triggering closure of bridge to vehicular traffic.
- Crack growing in N.E pedestal in Aug 2020 triggered complete closure.
- Now need to do the clean and inspect the NW and SW pedestals - 4 months duration.
- Also installing a temporary Temperature Control System to reduce risk of further damage caused by extreme temperatures.


# Project Approach / Considerations

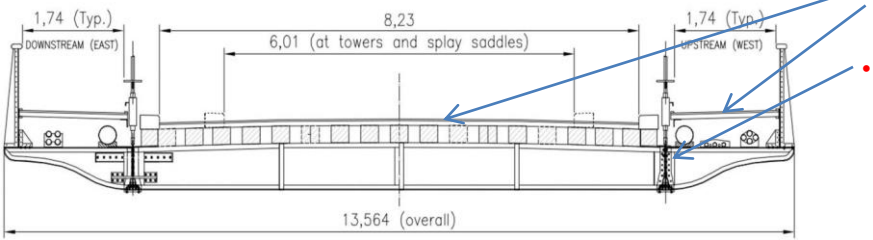
- Health & Safety / Public Safety is everyone's top priority
- Practical Solutions
- Value for Money (current proposals have a benefit:cost ratio of 10:1)
- Funding availability
- Time

# Hammersmith Bridge Works what we know needs to be done

Key:
Blue – (WP1) Phase 1 Emergency Stabilisation
Green – (WP2) Phase 2 Perm Stabilisation
Red – (WP3) Phase 3 Strengthening




- Tower bearings not fully functioning – to be replaced
- Towers to be strengthened
- Hangers – all to be replaced
- Weak chain components - to be strengthened
- Pedestals cracked and bearings seized




- Weak deck panels – to be replaced
- Weak stiffening girders - to be replaced

# Work Carried Out To Date

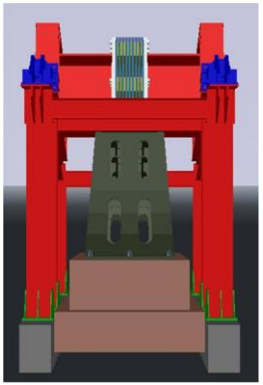
- Detailed Design for both Phase 1 Emergency Stabilisation and Phase 2 Permanent Stabilisation.
- Concept Design for Phase 3 Main Strengthening Works.
- Dismantling of both Eastern Pedestals decretive side casings with detailed investigations carried out to aid design.
- Detailed surveys and testing of bridge elements.
- Monitoring and modelling.
- Chain Temperature Control System Installation (part).
- Development and design of temporary foot & cycle bridge

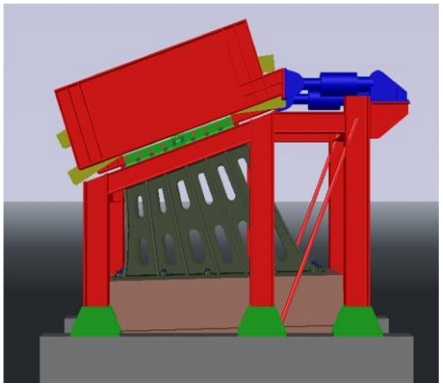
# Engineering Work Required

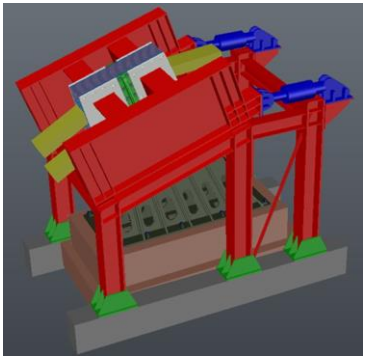
- We know all pedestals have cracks but do not know the detailed extent of the cracks in the western pedestals.
- It will take four months to remove the casings and blast clean prior to investigation.
- This is costed at £2.3m with a Contractor ready to mobilise.

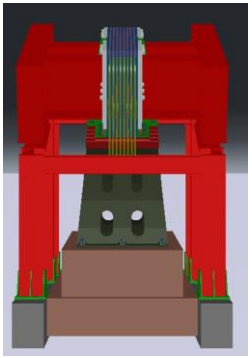
## Emergency Stabilisation by External Frame

- Installing External frame allows the cracked pedestals to be by-passed providing temporary stabilisation to the bridge structure.
- This would allow us to install temporary bearings.
- Pedestrians will be able to use the bridge for a finite period whilst frames are in position.
- Prior to site works commencing the following must be completed:
    - Legal agreements
    - Tendering
    - Planning approvals









- **Overall Duration** - 7 months
- **Estimated Cost** - £13.9m
- Programme and costs subject to review & tender return

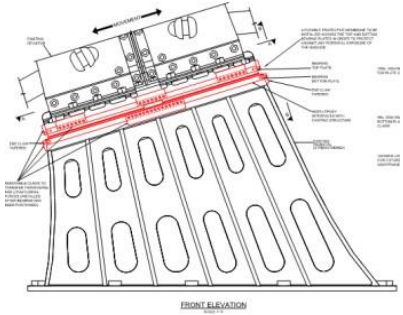
# (WP2) Phase 2
# Permanent Stabilisation

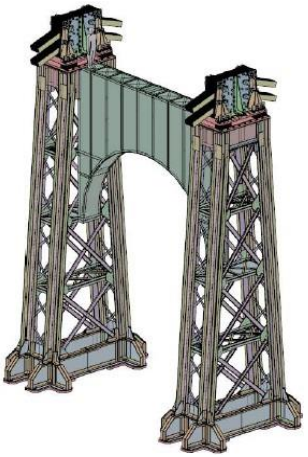
# Permanent Stabilisation

- Prior to site works commencing we would need to complete:
  - Planning approval
  - Legal Requirements
  - Tendering
  - Detailed design and approval

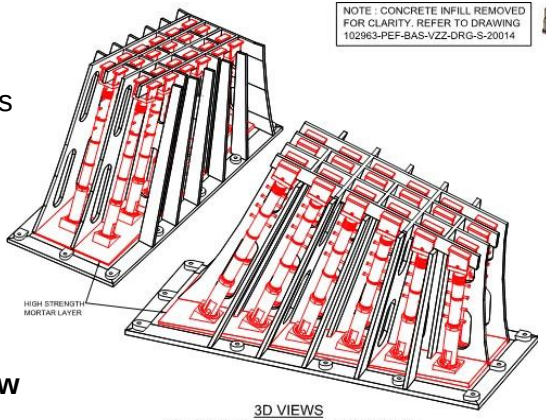
- Site works would include:
  - Installation of steel props and concrete to pedestals
  - Replacement of seized bearings on all 4 pedestals and both towers
  - Strengthening to both towers

- **Overall Duration** - 21 months
- **Cost** - £32m
- **All subject to detailed design and cost and programme review**



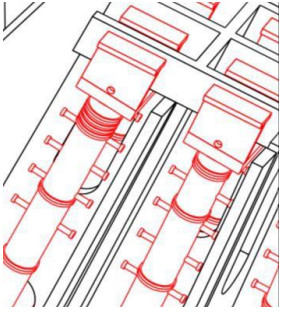



NOTE : CONCRETE INFILL REMOVED FOR CLARITY, REFER TO DRAWING 102963-PEF-BAS-VZZ-DRG-S-20014




3D VIEWS

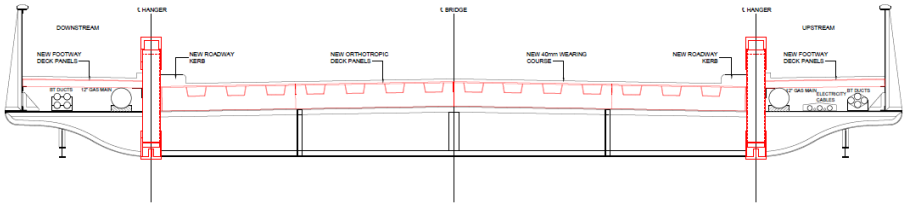
SOME PORTIONS OF CAST IRON PEDESTAL NOT SHOWN FOR CLARITY
N.T.S.



# (WP3) Phase 3 Strengthening

# Strengthening to previous vehicle loading

- Prior to works commencing on site we would need to complete:
  - Detailed Design and approvals
  - Planning permission
  - Legal Requirements
  - Procurement




- Site works would include:
  - Replacement of all 172 hangers and strengthening to hanger plates
  - Stiffening Girder replacement
  - Replacement of carriageway and footway decks
  - Chain Strengthening
  - Corrosion protection

- **Overall Duration** - 30 months
- **Estimated Cost** - £80m
- **All subject to detailed design and cost and programme review**

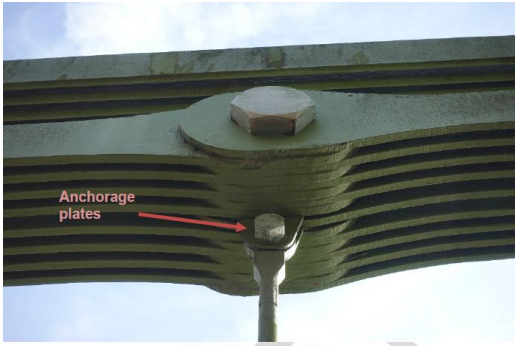
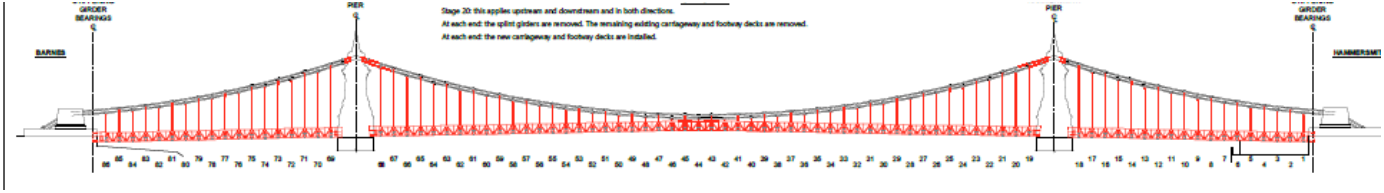



Figure 6 – Hanger plate



## Summary - timeline

- 66 working days to start of ferry contract – service commencement targeted for spring.
- 4 months to understand condition of all pedestals – possible controlled opening to pedestrians & cyclists
- 7 months emergency stabilisation – open to pedestrians & cyclists for limited period
- 21 months permanent stabilisation – open to pedestrians & cyclists
- 30 months strengthening – open to previous traffic loading