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
(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
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