Bridge Design Requirements
Bridges in Phase 1

- 135 Over bridges (bridges above the HS2 railway line)
- 195 underbridges (bridges under the HS2 railway line)
- 70 Viaducts (30 Km in total)
The Efficiency Challenge Programme’s vision is to set the pace for the UK’s infrastructure industry by delivering global benchmarks for efficient delivery and innovation.

Its mission is to support the delivery of HS2 infrastructure by realising significant cost savings through embedding the right sponsor, client and supply chain behaviours and processes.

The Efficiency Challenge Programme comprises 19 projects (Commercial/Procurement, Skills development, Design strategy...). Two of them are the following:

- Implementation of BIM
- Exploit Offsite prefabrication
Build off site is always ugly/boring?
High Speed 2
BRIDGES DESIGN REQUIREMENTS
December 2015
The document provides guidance and requirements for the design of bridges and associated civil engineering throughout HS2. It defines design principles and best practice to be applied to future design development of the bridges for HS2. The design approach defined here embraces the HS2 vision and reflects the project’s commitment to exemplary design.

- It is a Technical Standard and as such, MANDATORY
- Difficult to specify aesthetics
- Balance between requirements and flexibility
The Bridges Design Requirements are presented in three sections as follows:

**Bridge design vision**

This section presents the bridge design vision for HS2 and shows how this embraces the HS2 Vision and HS2 Design Vision. The bridge design vision aims to demonstrate the highest standards of design and construction, a world class railway that creates a positive lasting legacy and provides a benchmark for the civil engineering design of major infrastructure projects.

**Bridge scenarios**

The bridge scenarios present a range of typical HS2 bridges, illustrating the range of structures that will be required along the route. Drawing from the bridge design vision these demonstrate the design approach required for HS2. Clear design principles, with associated guidance for each type of structure, implement the bridge design vision and thus the HS2 Vision.

**Bridge design library**

The bridge design library contains detailed advice for elements of design that are common across all bridge types. Some key aspects of bridge design (e.g. response to landscape) are covered in more detail in other design guides (e.g. Landscape Design Approach). This document defines how bridge design will be influenced by those key issues.
Bridges design library

Deck structures

Precast concrete deck edge: deck spine beam is cast into shadow, © merseygateway

Cantilevered deck edge: deck spine beam is cast into shadow, © Grimshaw

Exposed crossheads interrupt line of viaduct soffit, Pulandian Bay, China, © Jinzhou New District Information Center
Bridges design library

Piers and bearings

Elegant concrete piers: piers and deck structure designed as one coherent system, © Ferrovial

Pier functions expressed in design: slim integral piers with special piers to resolve braking and bracing forces, © Holger Althaus / SBP
Bridges design library

Parapets

Visual impact of H4a barriers plus pedestrian barrier and additional higher protection above track / OHLE, © Grimshaw

Closer view of H4a barriers plus pedestrian barrier and additional higher protection above track / OHLE, © Grimshaw

Pre-cast concrete parapets have potential to contribute to a line-wide identity for HS2, © Grimshaw
Bridges design library

Abutments and walls

Poor abutment design: substantial concrete abutments and retaining walls, © Grimshaw

Refinement of abutment design: bank seat abutments, visible extent of concrete abutment minimised, © Grimshaw

Secant pile embedded wall: not suitable for walls visible to the public, © Grimshaw
Bridges design library

Materials and maintenance

Concrete finishes: consistent finish used across all structural elements, © Schlaich Bergermann Partner

Precast concrete retaining walls: potential for texture and pattern in pre-cast panels, © Glen Waverley / urban.melbourne

Reinforced earth wall: potential for texture and pattern in pre-cast panels, © Prekast Beton
Bridges design library

Rainwater management

Viaduct rainwater collection: exposed rainwater collection pipes, ©Timothy Reichard / m-plex.com

If simply supported structures are used, fit secondary rainwater collection below joints in deck, © Grimshaw

Pier rainwater routes: pipework recessed into face of pier behind cover plate, © Grimshaw
Bridges design library

Concrete

Pre-cast parapet panels: visible colour mis-match between adjacent panels, © Grimshaw

Pre-cast concrete finishes: buff coloured concrete, acid wash, machine polished raised areas, © Grimshaw

Pre-cast retaining wall panels: poor quality finish visible to rear, © Grimshaw