HS2 Common Design Elements
Architectural Elements within Civil Engineering Works
Planning Forum 25/26 January 2017

ATK EDP
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HS2 CDE Scope

Lineside Noise Barriers

Retaining Structures – Architectural Treatment

Handrails
HS2 CDE Design Vision

People
Design for everyone to benefit and enjoy
1 Design for the needs of our diverse audiences
2 Engage with communities over the life of a project
3 Inspire excellence through creative talent

Place
Design for a sense of place
4 Design places and spaces that support quality of life
5 Celebrate the local within a coherent national narrative
6 Demonstrate commitment to the natural world

Time
Design to stand the test of time
7 Design to adapt for future generations
8 Place a premium on the personal time of the customers
9 Make the most of the time to design
Lineside Noise Barriers
- … the assessment has generally been based on noise barriers having a noise reduction performance equivalent to a noise fence barrier with a top level 3m above the top of the rail, that is acoustically absorbent on the railway side, and located 5m to the side of the outer rail.

- …there is a balance to be struck between the benefits gained by a set of line-wide standard components … against the need for the noise barriers to sit comfortably within their context. There is an opportunity here to consider one adaptable system, a related urban and rural system etc.

- Wherever possible combine security fencing with noise barrier to reduce visual clutter
**Lineside ‘Fence’ Noise Barrier – included in CDE Scope**

11.4km fence barriers on both sides and further 23.2km fence barriers on one side of railway (HB).

**Viaduct Noise Barrier – not included in CDE Scope (part of Viaduct design), but coordination is required**

**Noise mitigation achieved with earthworks – not included in CDE Scope**
1. Diffracted sound over the top and around the ends of barrier
2. Transmitted sound through the barrier
3. Reflected sound from the face of the barrier
Lineside Noise Barriers
Typical Types
HS2 CDE Lineside Noise Barriers – Timber & Metal Hybrid
HS2 CDE Lineside Noise Barriers – Proprietary Metal System
HS2 CDE Lineside Noise Barriers – Gabion Wall
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HS2 CDE Lineside Noise Barriers – Proposed Precast Concrete Wall Module

TRACKSIDE
Acoustic Absorbent Cladding

Materials:
Wood-cement
Expanded Clay

NON-TRACKSIDE
Adaptable Cladding to Suit Urban and Rural Contexts

Materials:
Timber
Coconut Fibres-Climbing Vegetation
Brickwork
Precast Concrete

Precast Concrete
Acoustic Absorbent Cladding
HS2 CDE Lineside Noise Barriers – Noise Absorbent Cladding Facing Track

Wood Cement

Light Expanded Clay Aggregate
HS2 CDE Lineside Noise Barriers – Noise Absorbent Cladding Pattern Options

1

2

3

4
Cladding material to be selected on a case by case basis and in response to local context.

1. Horizontally Laid Timber
2. Precast Concrete Pattern
3. Climbing Vegetation. Natural material. E.G. Coconut
4. Brick Veneer Cast In
HS2 CDE Lineside Noise Barriers – Timber Cladding Option

Cladding material to be selected on a case by case basis and in response to local context.
Cladding material to be selected on a case by case basis and in response to local context.
Retaining Structures
Architectural Treatment
Bridge Design Requirements

- Self-finished materials
- Prevent water staining
- Visible concrete should be Class F3*
- Consider application of texture and patterning

*… smooth and of uniform texture and appearance…
HS2 CDE Retaining Structures – Cuttings, Family of Types

1. Precast Concrete (Typically < 3.0 m)

2. Reinforced Concrete In-situ (Typically < 6.0 m)

3. Embedded with Precast Concrete Lining (Typically < 26.0 m)
HS2 CDE Retaining Structures – Architectural Treatment

- Precast or In-Situ Concrete with Patterned Finish
- Reinforced Concrete In-situ with Patterned Finish to Bottom Panels
- Embedded Wall with Precast Concrete Cladding, Patterned Finish to Bottom Panels
HS2 CDE Retaining Structures with Noise Absorbent Material - Architectural Treatment

- Precast or In-Situ Concrete with Noise Absorbent Cladding
- Reinforced Concrete In-Situ with Noise Absorbent Cladding to Bottom Panels
- Embedded Wall with Noise Absorbent Cladding to Bottom Panels
HS2 CDE Retaining Structures – In Situ Concrete, Architectural Treatment

Patterned Concrete Detailed View

Plan

Section

Patterned Concrete Finish

Ground Level

Rail Level

<60 m

30 m

1.1 m
HS2 CDE Retaining Structures – In Situ Concrete, Architectural Treatment
Reinforced Earth / Soil Wall (Typically < 10.0 m)
HS2 CDE Retaining Structures – Embankments, Reinforced Earth Cladding

- Reinforced Earth Wall typically faces existing NR track

**EMBANKMENTS**

Reinforced Earth Wall with Precast Concrete Facing Panels  Similar Use of Reinforced Earth Wall
Handrails / Guardrails
(Within Civil Works only)
- Kee-Klamp system is considered not acceptable

- Handrails will be within security fences and will not be used by the public

- Fixed to concrete substrate

- Handrails on viaducts are excluded from this package
HS2 CDE Handrails – Typical Locations: Underpass Wing Walls

Noise mitigation achieved with earthworks and planting – not included in CDE Scope.
HS2 CDE Handrails – Typical Locations: Footpaths leading to Footbridges*

*there are 27 footbridges on the route
HS2 CDE Handrails – Typical Locations: Above Tunnel Portals

Handrail CDE

Noise mitigation achieved with earthworks and planting – not included in CDE Scope
HS2 CDE Handrails – Typical Locations: Stairs Adjacent to Bridges

Noise mitigation achieved with earthworks and planting – not included in CDE Scope
HS2 CDE Handrails – Typical Locations: Culvert Headwalls

Noise mitigation achieved with earthworks and planting – not included in CDE Scope
Handrails / Guardrails
Concept Options
Noise mitigation achieved with earthworks and planting – not included in CDE Scope
Noise mitigation achieved with earthworks and planting – not included in CDE Scope.
HS2 CDE Handrails – Concept Option: ‘Ball’ Type Balustrades

Noise mitigation achieved with earthworks and planting – not included in CDE Scope.
HS2 CDE Handrails – Concept Option: Fibre Reinforced Polymer (FRP)
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HS2 CDE Handrails – ‘Front of House’ Application (may be visible to public)

1. Underbridge Wing Walls
2. Underpass Wing Walls
3. Footpaths leading to Footbridges
HS2 CDE Handrails – ‘Front of House’ Application (Underbridge Wing Wall)
HS2 CDE Handrails – ‘Back of House’ Application (unlikely to be visible to public)

1. Above Tunnel Portals
2. Stairs Adjacent to Bridge
3. Culvert Headwalls