

## Designing for health - Guidance for designers

Bridges				Ref No. DfH008_18
Potential health impacts to be considered by the designer:		Concept Stage <input type="checkbox"/>	Scheme Design Stage <input type="checkbox"/>	Detailed design Stage <input type="checkbox"/>
Design Element	Health Hazard	Considerations	Possible Solutions	Linked to Ref No.
Inspection of existing structures	Biological hazards (such as <i>C. psittaci</i> , aspergillus, e-coli and meningitis)	<p>Hazards resulting from the presence of bird droppings present a range of potential health effects. Check out HSE guidance on biological hazards.</p> <p>But remember also that nature needs to be worked with not forcibly eliminated.</p> <p>Hazard(s) may be present in horizontal</p>	<p>Design to prevent roosting opportunity by, for example, use of smooth surfaces, enclosure, proprietary anti-roosting devices or nettings.</p> <p>If considering deterrents such as anti-roosting devices check with organisations such as the RSPB and</p>	

		exposed surfaces externally and possibly internally, depending upon the state of the structure.	Bat Conservation Trust beforehand.  Reduce the frequency of inspection required by selecting 'long life' products. Ensure that the elements that need inspecting have intrinsic protection from sun, precipitation and wind.	
	Elements of nature.	Working externally exposes workers to elements of nature environment, such as high wind, excessive heat, extreme cold, heavy rain, which may be true of any bridge in an exposed location: estuaries, coastal, etc.	Design areas where inspections will need to be carried out to avoid wind funnelling/ strong wind eddies.	
	Biological hazards (such as viruses, bacteria from faecal matter and sludge, fungi, or mold). Potential presence of leptospirosis bacteria in confined spaces.  Other health hazards may exist, such as toxic fumes, lack of oxygen	This is a problem in, among other areas, inside box-girders  Hazards resulting from the presence of animal (birds, bats, rats etc.) droppings (faeces and/ or urine) present a range of potential health effects. Check out HSE guidance on biological hazards.  But remember also that nature needs to be worked with not forcibly eliminated.	Design to avoid the creation of spaces that are or might become confined spaces by considering open structures, regular vents to promote air flow and simple access to assist deployment of confined space 'control measures' and emergency evacuation.  Where it is necessary to create such spaces consider the location of these spaces in relation to engine exhausts, heavier than air gas. Prioritise designing for passive ventilation over specifying active ventilation.	

			Also consider ease of access and egress.	
Painting	Cold/ hypothermia including wind-chill, heat exhaustion, sunburn	Working in exposed environments	Consider material selection that avoids the need for painting e.g. self-finish concrete (can be coloured), non-corroding metals in bridge elements or components e.g. 'Corten' or similar steel, stainless steel, phosphor bronze as means of avoiding the need for on-site application or reapplication	
	Exposure to hazardous chemicals	There is particular concern where ventilation is poor – high enclosed spaces (fumes tend to be lighter than air). High winds can result in paint splashes on skin/in eyes and possible ingestion		
	Work-related Upper Limb Disorders (WRULD) and musculoskeletal disorders (MSD)	Try to avoid need for working with awkward postures. Consider, where painting is to be specified, in difficult to reach places, whether painting is needed.	Consider enhanced paint specification to increase durability and reduce maintenance needs	Consider water run off etc. to reduce the risk of salt water running over materials
			Consider the ergonomics of future inspection or maintenance activities in relation to the space provided e.g.	

			<p>access adjacent to bearings.</p> <p>Detail steel following good practice which minimises water and dirt traps (the main causes of deterioration)</p>	
Components	<p>Weight, shape and manoeuvrability</p> <p>WRULD</p>	<p>Handling heavy and/ or awkward shapes (exposes workers to poor posture for prolonged periods. Health issues include:</p> <ol style="list-style-type: none"> <li>1. Lifting, carrying and laying small components such as bracing members</li> <li>2. Access between the beams or around the bearing shelf</li> <li>3. Repetitive actions.</li> </ol>	<p>Not usually an issue on bridges, however consider whether the weights of components: can be reduced (or even increased) to avoid manual handling issues.</p> <p>Design to allow maximum use of mechanical lifting aids and partial assemblies.</p> <p>Take advice from manufacturers.</p> <p>Allow sufficient space for installing, commissioning and maintenance activities.</p> <p>Also see above for reference to hazards in confined spaces.</p>	
		<p>Frequency of access</p>	<p>Select components that have long service life to reduce the frequency of component servicing and changing.</p>	

			Design to ensure that harmful components are protected from water and corrosive run-offs e.g. de-icing salts and compounds	
Surfacing materials	Asphalt/ Bitumen fume	Hot bitumen work releases fumes containing polyaromatic hydrocarbons (PAHs)/particulate, which, when inhaled, can cause irritation of the respiratory tract and possibly lung cancer.	Check the MSDS and specify the solvent and isocyanate free products.	
Sealants and nosings	Chemical properties of products	Some products can cause skin irritation or are toxic in nature.	Avoid specifying sealants and nosings that have significant health impacts (see MSDS) and/or require site batching e.g. 2 part epoxies.	
Cleaning	Cold/ hypothermia including wind-chill.		Design sub-structure to accommodate the weight of sheeted platforms, which provide protection from the weather, and provide anchor points for slung platforms	
	Heat exhaustion, sunburn			
	Chemical properties of products	Some cleaning products can cause skin irritation or are toxic in nature.  Cleaning run off staining and algae growth.  Removal of plant growth.	Avoid specifying additives or grout types that have significant health impacts (see MSDS) and/ or require site batching.  Detail the bridge structure to channel run off so that it does not create unsightly staining.	

			Detail the bridge so that there are not places for vegetation to take root.	
<b>Information to go to contractor:</b>				
<b>Information to go to H&amp;S File:</b>				
Use <input type="checkbox"/> Maintenance <input type="checkbox"/> Demolition <input type="checkbox"/>				
Identify in Health and Safety File where inspection creates significant exposure to the elements and identify the benefits of creating inspection programmes that focus the work at times of the year when less harmful weather can be expected. Identify known confined spaces.				
<b>Further Information:</b>				
Biological Hazards (HSE Guidance): <a href="http://www.hse.gov.uk/construction/faq-biological.htm">http://www.hse.gov.uk/construction/faq-biological.htm</a>				
<b>Research</b> – None known at this time.				

