



# Maintenance & Inspections Strategy:

# Structures

May 2019



Essex County Council

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# Maintenance & Inspections Strategy:

## Structures

### 1.1 Introduction

The Essex County Council approach to Structures Maintenance & Inspections has been fundamentally reviewed with maintenance engineers, inspectors and other practitioners to take account of the recommendations and best practice set out in the October 2016 “Well-managed Highway Infrastructure: A Code of Practice” and those from the Design Manual for Roads and Bridges.

The Code of Practice is designed to promote the adoption of an integrated asset management approach to highway infrastructure based on the establishment of local levels of service through risk-based assessment.

This document supports the overarching Essex County Council Highways Maintenance Policy and describes the service levels relating to the Council’s risk-based approach to managing how it organises, inspects and maintains the Structures that it is responsible for. The document will also set out the service levels and details of its risk based approach.

Alongside this strategy will be supporting documents that detail the processes & procedures to be operated.

This strategy covers the following key areas:

- Network Hierarchies
- Inspections
- Defect Investigatory levels
- Items for Inspection
- Defect Assessments
- Response times.

### 1.2 Network Hierarchies

The Council have produced a tailored, risk-based functional route hierarchy that organised the structures that Essex County Council Highways are responsible for into four hierarchies:

- Structures Priority 1 (STR1)
- Structures Priority 2 (STR2)
- Structures Priority 3 (STR3)
- Structures Priority 4 (STR4).

This hierarchy ensures that all structures on the network are addressed appropriately, based on their unique factors. The hierarchy allows the flexibility for the network to evolve along with the industry, commerce, habits and needs of Essex and the highway user.

Table outlining the Essex Structures Hierarchy.

Structures Hierarchy	Hierarchy Description title	Description
<p><b>STR1</b> - Structures that are the highest priority of the network. The majority of these structures endure a higher amount of usage through frequency of traffic and loads or provide essential links. They are vital to ensure the continued unhindered flow for commerce, goods and people.</p>	<p>All of the PR1 Network</p>	<p>All structures that either support or span a PR1 route are classified as an STR1 structure due to the volume of fast moving, long distance traffic and commercial use of the network. As a result of prioritising the structures on the PR1 routes this will maintain the safety, availability and resilience of the network. This will ensure ECC's robust resilient approach towards prioritising and maintaining free flowing traffic on the Essex network (can include Footbridges.)</p>
	<p>Highways England High and Heavy Routes (Abnormal loads transporting transformers)</p>	<p>Prioritising the availability on selected routes of the network for Abnormal load vehicles and all structures that are on Highways England High and Heavy routes must be safe and sustainable to allow for applicable vehicles to use the network.</p>
	<p>Single access to residential and commercial properties</p>	<p>Structures that are the only available access to properties will be treated as a high priority.</p>
	<p>Critical economic developments (Abnormal load routes)</p>	<p>Keeping selected Abnormal load routes in the county accessible to promote critical industrial and commercial developments.</p>
	<p>Highways England diversion routes</p>	<p>Ensure that Highways England diversion routes are kept available for suitable traffic.</p>
	<p>Access points for Abnormal loads</p>	<p>Maintain access points to known heavy Abnormal loads users. (E.g. Railway Museum, Barracks and boat yards etc.)</p>

	Road over rail	To reduce the risk to road rail incursion and prevent disruption to rail users.
	Non-vehicular access into town/city centre where there is no safe alternative	Pedestrian/cyclist specific structures that provide the only available access to the city/town centre will be treated as a STR1.
	Emergency services	All applicable structures that are necessary for emergency services to gain access in and out of depots will be treated as an STR1 structure.
	Supporting key public services (e.g. Hospitals, Ports, Airports and Bradwell)	All applicable structures that are necessary for key public services to gain access in and out of will be treated as an STR1 structure.
	High-risk structures (materials/construction type)	Due to the unique material properties and construction of cast iron, half-joint and post-tensioned structures they are prioritised as STR1.
	Monitoring List	Structures that are on the monitoring list as an interim protection measure following assessment by a competent officer, are included as STR1. These structures will remain as STR1 until relevant remedial works, interim protection measures, full asset replacement or permanent works have been carried out and the structure has been reassessed and no longer requires monitoring.
<b>STR2</b> - Structures that are of a high importance to ensure the continued unhindered flow for commerce, goods and people.	All PR2 Network + relevant local access structures	Structures on PR2 routes will be part of interconnecting or links with PR1 or further PR2 routes. Relevant local access routes with a structure/ structures will often lead off or onto a PR2 route. This can be the only link between two rural villages.
	Filler beam construction type	Since their last assessment, the codes that the filler beams were assessed to have been re-examined and less conservative assessment methods have been developed.

<p><b>STR3</b> - Structures located mainly on the local road network.</p>	<p>Remaining Road Structures</p>	<p>All remaining road structures that have not been categorized as being part of the STR1/ STR2 network. All of the remaining road structures will be located on local roads.</p>
<p><b>STR4</b> - The lowest priority structures assets on the network.</p>	<p>Footbridges and PRow</p>	<p>Footbridges and Public Rights of Way will serve as one of many ways to access further Public Rights of Way or Local Road footpaths. These areas will be mostly rural.</p>
	<p>Noise Barriers</p>	<p>Noise Barriers are minor ancillary assets managed by the structures team that reduce noise pollution to nearby properties.</p>

## **1.3 Safety Inspection – Strategy and Service Levels**

### **1.3.1 General Principles for completion of Structures Inspections**

The Council shall carry out structures inspections undertaken by suitably experienced and competent staff in the manner deemed appropriate for the particular inspection site. The safety of the Structures Inspector will be paramount in determining the method of inspection.

Prior to undertaking any inspection, the inspector must review the structure records to familiarise themselves with the characteristics of the structure, any hazards, the condition at the time of the last inspection and any significant maintenance/ modifications since the last inspection.

According to BD 63/17 there are five types of structures inspection that are undertaken;

- Routine Inspections;
  - General Inspection (GI)
  - Principal Inspection (PI)
  
- Reactive Inspections;
  - Safety Inspection
  - Special Inspection
  - Inspection for Assessment

#### **1.3.1.1 Investigatory Levels**

Throughout this document investigatory levels are not referred to. Structures are a complex asset group and similar defects have entirely different consequences on each individual structure. Therefore it is not possible to assign generic investigatory levels. Instead the Structures Inspector/Engineer will determine the appropriate response at the time of inspection.

#### **1.3.1.2 General Inspection (GI)**

The purpose of a General Inspection is to provide information on the physical condition of all visible elements on a highway structure and is scheduled to be undertaken biennially. A GI comprises of the visual inspection of all parts of the structure that can be inspected usually without the need for special access equipment or extensive traffic management arrangements.

#### **1.3.1.3 Principal Inspection (PI)**

The purpose of a Principal Inspection is to provide information on the physical condition of all inspectable parts of a highway structure. A PI is more comprehensive and provides more detailed information than a GI. A PI comprises a close examination, within touching distance of all inspectable parts of a structure. A PI should utilise as necessary suitable inspection techniques such as; access and/or traffic management works.

Suitable inspection techniques that should be considered for a PI include hammer tapping, paint thickness measurements and material testing. Testing is not a requirement for a PI however, will only be undertaken when there is concern regarding; condition, age, current assessment scores or the previous inspection score of the structure.

PIs are required to be undertaken every six years unless an altered inspection interval has been agreed, providing the proposal is supported by a risk assessment. Where a risk assessment has not been approved to increase the PI interval beyond six years, intervals shall remain at six years. PI intervals determined through risk assessment shall not exceed twelve years.

When a General Inspection coincides with a due Principal Inspection only the latter is undertaken.

In the event of conditions that affect business continuity for example, severe weather events, the inspections may be suspended and re-programmed at the decision of the Inspections Manager.

Further details on the methodology and procedures for carrying out safety inspections are set out in supporting documents.

#### **1.3.1.4 Routine Inspection Frequency**

The inspection frequency guidance that sits in BD 63/17 is shown on the table below. This shows the best practice guidance for routine inspection frequencies.

Feature	Inspection type	Inspection frequency
Structures	General Inspection Principal Inspection	Every two years Every six years (Can be extended to up to twelve years)

The Council carries out GIs every two years, as per the guidance found above. The PI programme is developed using a risk based approach.

### **1.3.2 Reactive Inspections**

#### **1.3.2.1 Safety Inspection**

The Council receives defect reports and enquiries relating to condition concerns from a number of sources regarding its highway structures. Due to their nature urgent reports cannot be reported online and the website provides the contact number for the customer to call to report anything that in their opinion is urgent.

An ad hoc Safety inspection may be required following notification of a defect by a third party, e.g. Emergency services. Should any Safety Inspection, or other source, reveal a possible defect requiring urgent attention, including defects that may represent a hazard to road, rail and other users, the Council shall immediately take action as is required to safeguard the public and/or sustain structural functionality.

Both the Structures Asset Management Team and Structures Team receive and triage structures related enquiries. If following triage there is believed to be either a public safety concern or structural damage to an asset, a Structures Inspector/Engineer will visit the site to assess the query and carry out a Safety Inspection. An enquiry is not considered to be a defect until it has been assessed as a defect on site by a Structures Inspector/Engineer. Until that time it remains a query from the public. Any enquiry relating to a structure must be passed on to the Structures Team to assess, this includes enquiries received out of hours.

On receipt of the report the unconfirmed defect will be triaged, based on the information received, and assigned one of the following two categories.

Urgent	Urgent enquiries will be assessed the same working day. *
Standard	The aim is to have an average assessment response time of 28 days including site visit if required.

*\*During periods of high demand such as the period following severe weather it may not be possible to comply with these response times.*

### **1.3.2.2 Special Inspection**

Special Inspections are carried out when a need is identified by a competent engineer. The purpose of a Special Inspection is to provide detailed information on a particular part, area or defect that is causing concern. Special Inspections can also be undertaken when the issue is beyond the requirements of the General/Principal Inspection regime. Specific construction forms that may require additional inspections that go over the remit for a GI or PI, and such would have a Special Inspection programmed include;

- Post-tensioned structures
- Cast Iron structures
- Half-joint structures
- Structures with Cathodic Protection

A Special Inspection will be tailored for specific structure type or defect/issue and may require a close visual inspection, testing and/or monitoring. It may involve a tailored one-off inspection, a series of inspections or an ongoing programme of inspections. As such, Special Inspections are tailored to specific needs.

Refer to BD 79/13 for monitoring, associated with the management of substandard structures.

### **1.3.2.3 Inspection for Assessment**

The sole purpose of an Inspection for Assessment is to provide the information that is required to enable a structural assessment. BD 21/01 provides guidance on undertaking an Inspection for Assessment and recommends that these be done in conjunction with a Principal Inspection. Once an Inspection for Assessment has been complete, the Assessment can take place, Assessments are carried out to calculate the load capacity of the structure.

## 1.4 Items to be inspected

The main purpose of a routine inspection is to provide information on the physical condition of all inspectable elements on the structure. Defects that are likely to be a possible source of hazard or of serious inconvenience to the highway user should also be identified. The inspection also identifies non-safety defects that have an impact on long term serviceability and sustainability of the highway asset.

During routine inspections, all defects are recorded, assessed and prioritised and the worst defect present on each element is scored using the severity and extent tables to calculate the structures' BCI score.

All defects that are recorded are assessed by the inspector and prescribed an appropriate works priority code, using their experience, training and engineering judgement. These can be either;

- Urgent: Make Safe Required
- Urgent
- High
- Medium
- Low
- Very Low

Due to the nature and complexity of highway structures any assessment or inspection must be carried out by a competent team member that has experience, sound engineering judgement and has received relevant training in all aspects of the inspection process including thorough understanding of the following five tables.

These tables come from The Inspection Manual for Highway Structures (Volumes 1 and 2) it was commissioned by Highways England and published in May 2007. A Technical Project Board, representing UK highway bridge owners, oversaw the development; the manual is supported, endorsed and recommended by the UK Bridges Board.

The tables show the following;

1. Severity Descriptions
2. Extent Codes
3. Generic Severity Descriptions
4. Permissible Combinations of Severity and Extent
5. Element Importance

**Table 1**  
Severity Descriptions

No	Item	Severity						
			1	2	3	4	5	
1	Metalwork	.1	No signs of rusting or damage	Minor surface rusting	moderate pitting	Deep pits and perforations (localised severe corrosion)	Disintegrated by corrosion mechanisms	
		.2	No loss of section thickness	Minor section loss (penetration less than 5% of section)	moderate section loss causing some reduction in functionality (penetration 5 to 20% of section thickness)	Major section loss causing significant reduction in functionality (penetration more than 20% of section)	Collapsed or collapsing	
		.3	No signs of rusting or damage to bolts, nuts and rivets	Non-structural bolts loose, minor corrosion of nuts and washers	Non-structural bolts missing, moderate corrosion of rivet heads, nuts and washers	Structural bolts missing, rivets loose or missing, crack through bolt	Failure of element due to missed/failed bolts/rivets	
		.4	No corrosion or damage of weld runs	Slight corrosion of weld run	Crack at toe of weld, moderate reduction in size of weld due to corrosion	longitudinally cracked weld, major reduction in size of weld due to corrosion	Weld connection failure (longitudinal crack)	
		.5	<b>Defect category removed</b>					
2	Reinforced Concrete, Prestressed Concrete & Filler Joist	.1	<b>Defect category removed</b>					
		.2	No spalls	Minor localised spalls exposing shear links	Major localised spalls exposing shear links and main bars with general corrosion	Joined up, deep spalls exposing shear links and main bars with general and pitting corrosion	Collapsed	
		.3	Hairline cracks, difficult to detect visually	Cracks and crazing in areas of low flexural behaviour (cracks less than 0.3mm)	Cracks and crazing in areas of high flexure, Cracks approx. 1mm and easily visible	Wide/deep cracks (more than 2mm). Shear cracks.	Element unable to function due to structural cracks	
		.4	No signs of damage to prestressing	Substandard grouting of ducts (may not be visible)	Cracks along line of prestressing duct	Exposed prestressing cables	Failed prestressing cables	

		.5	No signs of delamination	Early signs of delamination e.g. cracks with rust staining	Delamination in areas of low flexural and/or shear action	Delamination in areas of high flexural and/or shear action	Failure due to delaminated bars
		.6	No signs of thaumasite or freeze-thaw attack	Slight cracking caused by thaumasite or freeze-thaw	Major thaumasite or freeze-thaw attack	Moderate thaumasite or freeze-thaw attack	Failure due to thaumasite or freeze-thaw attack
3	Masonry, Brickwork & Mass Concrete	.1	No evidence of deformation	Minor deformation	Moderate deformation	Major deformation	Collapsed
		.2	Pointing sound	Minor depth of pointing deteriorated	Moderate to significant depth of pointing lost, but does not appear to be rapidly disintegrating or crumbling, bricks not easily loosened	Pointing in very poor condition, severely weathered, crumbling to touch and/or significant depth loss, bricks easily loosened	Collapsed
		.3	No arch ring cracking or separation	Arch ring cracks difficult to see	Arch ring separation (gap less than 25mm)	Arch ring separation (gap greater than 25mm)	Disintegrated
		.4	No arch barrel cracks	No diagonal cracks, longitudinal cracks less than 3mm wide, lateral cracks	Diagonal cracks, longitudinal cracks greater than 3mm wide	Diagonal cracks, longitudinal cracks bracing barrel into 1m sections or less	Arch barrel failure
		.5	No cracks	Minor hairline cracks and shallow spalls	Moderate cracks (easily visible, crazing) and deep localised spalls	Major cracks and spalling	Failure due to structural cracks
		.6	No bricks/masonry blocks missing, minor surface weathering	Few bricks/stones missing (no adjacent ones missing), major surface weathering	Moderate loss of bricks/stones	Severe loss of bricks/stones	Failure due to missing bricks/stones
		.7	No bulging, leaning or displacement	Minor bulging, leaning or displacement	Moderate bulging, leaning or displacement	Severe bulging, leaning or displacement	Collapsed or non-functional

4	Paintwork and Protective Coatings	.1	Finishing coat sound, slight weathering	Normal weathering of finishing coat	Spot, chips and cracks of finishing coat, undercoat exposed but sound	Failure of finishing coat and spots, chips and cracks to undercoat/substrate	All coats failed	
		.2	<b>Defect category removed</b>					
		.3	<b>Defect category removed</b>					
5	Vegetation	.1	Slight to no vegetation	Minor vegetation causing no structural damage (surface mosses, small grass and weeds)	Vegetation growth on or near bridge causing structural damage and/or deformation e.g. roots and branches of nearby trees, small tree/plants growing on structure	Vegetation growth on or near bridge causing major structural damage and/or deformation e.g. roots and branches of nearby trees, large tree/plants growing on structure	Failure caused by vegetation growth or tree collapsing on the structure	
		.2	Slight to no vegetation	Low depth/density of vegetation cover, easily removed e.g. moss	Significant depth/density of vegetation, obscuring inspection e.g. ivy	Inspection impossible due to vegetation growth but structural damage due to vegetation unlikely	Inspection of critical structural elements not possible due to density of vegetation and root systems likely to be causing structural damage	
6	Foundations	.1	No visible settlement of structure	No visible settlement, but cracks that may be due to it	Minor settlement of structure	Major settlement of structure	Collapsed due to settlement	
		.2	No visible differential movement of structure	No visible movement, but cracks that may be due to it	Minor differential movement of structure	Major differential movement of structure	Collapsed due to differential movement	
		.3	No visible sliding of structure	No visible sliding, but cracks that may be due to it	Minor sliding of structure	Major sliding of structure	Collapsed due to sliding	
		.4	No visible rotation of structure	No visible rotation, but cracks that may be due to it	Minor rotation of structure	Major rotation of structure	Collapsed due to rotation	
		.5	No scour	Minor scour	Moderate scour	Major scour	Dangerous scour or failure	

		.6	Substructure appears unaffected by foundation faults (assume no foundation faults)	Foundation faults causing minor cracks in substructure	Foundation faults causing moderate cracks in substructure	Foundation faults causing major cracks and deformation in substructure	Failure due to foundation faults
7	Invert, apron & river bed (also see 2 and 3)	.1	No scour	Minor scour	Moderate scour	Major scour	Dangerous scour or failure
		.2	No vegetation growth or silting	Vegetation growth, trapped debris and silting causing slight disruption to flow	Vegetation growth, trapped debris and silting causing significant disruption to flow causing faster flow in areas of the river	Vegetation growth, trapped debris and silting causing severe disruption to flow causing much faster flow in areas of the river	Failure caused by vegetation growth, trapped debris and silting
8	Drainage	.1	In sound condition and fully functional	Mostly functional (less than 25% of cross section blocked)	Part functional (25% to 50% of cross section blocked)	Mostly non-functional (more than 50% of cross section blocked)	Totally blocked/non-functional/broken
		.2	Causing no staining	Causing minor staining	Cleaning of staining required	Urgent cleaning required	Urgent & frequent cleaning
		.3	No structural damage	Causing minor structural damage	Causing structural damage	Causing major structural damage	Causing severe damage to adjacent elements
		.4	No blockage of weep holes, outlets	Minor blockage of weep holes, outlets	Moderate blockage of weep holes, outlets	Major blockage of weep holes, outlets	Non-functioning weep holes
9	Surfacing	.1	Little to no wear and weathering	Minor wear/weathering	Moderate wear/weathering	Major wear/weathering	Dangerous
		.2	No crazing, tracking or fretting	Minor crazing, tracking and/or fretting	Moderate crazing, tracking and/or fretting	Major crazing, tracking and/or fretting	Complete break up
		.3	Dense	Poor texture	Open texture	Very open texture	Dangerous
		.4	Sound	Cracks in top layer	Top layer breached	Deep cracks and potholes	Top layer completely missing
		.5	Not slippery	Starting to become slippery	Definitely becoming slippery	Slippery	Dangerous

	Flagged surfacing	.6	No defects	Trips < 5mm	Cracked flags Trips > 5mm and < 10mm	Trips > 10mm and < 20mm	Trips > 20mm
10	Asphaltic Plug	.1	Sound	Minor debonding between plug and road	Moderate debonding between plug and road	Major debonding between plug and road	Dangerous
		.2	Sound	Slight loss of surface binder and aggregate	Loss of aggregate (surface penetration 20 to 50mm)	Loss of material from joint (causing holes > 50mm deep)	Missing
		.3	Sound	Minor tracking and flow of binder	Moderate tracking and flow of binder	Major tracking and flow of binder	Disintegrated
	Nosing Defects	.4	Sound	Minor cracking along nosing	Moderate cracking along nosing, some break-up	Break-up of nosing material	Disintegrated
	Elastomeric and others	.5	Minor signs of wear	One bolt missing at cross section	Numerous bolts missing at cross section	Majority of bolts missing at cross section	Failure due to missing bolts
		.6	Strip sealant sound	Strip sealant loose/poor, compression seal dropped and/or worn	Sealant breached, strip sealant breached	Sealant missing, strip sealant missing/out	Failure
		.7	Sound road surface adjacent to joint	Minor break up of road surface adjacent to joint	Moderate break up of road surface adjacent to joint, some debris in joint seal	Major break up of road surface adjacent to joint, significant debris in joint seal	Joint failure due to deteriorated condition of adjacent road surface
		.8	Sound fixings	Bolt sealer missing	Fixings loose	Fixings missing, plates and angles loose	Failure due to missing fixtures
		.9	Sound components	Initiation of cracking or tearing of components	Crack/tear < 20% of width of component	Crack/tear >20% but < 50% of width of component	Failure of expansion joint components
		Buried Joint (formerly "0" in this list)	.10	Reasonably sound	Minor surfacing cracking	Moderate surface cracking	Major surfacing cracking
	.11		Sealant for induced crack is sound	Minor cracking or break up of sealant for induced crack	Moderate cracking or break up of sealant for induced crack	Major cracking or break up of sealant for induced crack	Disintegrated or missing sealant for induced crack
	Joint leakage	.12	No visible signs of leakage	Minor leakage through joint	Moderate leakage through joint	Major leakage through joint causing structural damage	Open joint causing major structural damage

11	Embankments	.1	Sound No deformation	Minor subsidence Minor deformation	Minor slip/settlement causing slight cracking of carriageway	Major slip/settlement causing major cracking of carriageway	Critical slip/settlement
12	Bearings (also see 1)	.1	Negligible rusting minor Weathering	Minor rusting, moderate weathering	Moderate weathering	Major rusting	Failed or seized due to rusting
		.2	Correct position	Minor offset	Moderate offset/tilt	Dislodged	Off bearing/missing
		.3	Sliding bearing in correct position	Sliding bearing in slightly skewed (off centre) position at normal temp	Sliding bearing at end of travel in normal temperatures	Sliding bearing beyond designed extent of travel at normal temperatures	Sliding bearing failed
		.4	No crazing	External crazing	External breakdown	Major breakdown (PTFE, laminations, rubber etc.)	Complete breakdown
		.5	Sliding plate sound	Minor deformation of sliding plate	Moderate deformation of sliding plate	Major deformation of sliding plate	Bearings seized by sliding plate deformations
		.6	Bearings sound	Minor cracks	Moderate cracks or loose	Spitting and deformation	Disintegrated
13	Impact Damage	.1	No damage	Slight surface scoring, minor displacement of element e.g. marking and chipping of beam faces, several bricks across arch barrel width, slight impact deformation of steelwork	Moderate displacement of element e.g. beam slightly offset on bearings, significant number of bricks knocked out across arch barrel width, moderate impact deformation of steelwork	Severe displacement of element e.g. beam dislodged off bearings, many bricks knocked out across arch barrel width, major impact deformation of steelwork	Knocked down, broken, collapsing
14	Waterproofing (try to exclude leaks through joints)	.1	No visible sign of seepage	Minor seepage through deck/arch etc. (slow dripping)	Moderate seepage through deck/arch etc. (some resistance to seepage)	Major seepage (little resistance) through deck/arch etc. causing structural damage	Non-functional causing critical structural damage
		.2	No visible sign of seepage	Damp surface, slight water stains on soffit	Wet surface, drops of water falling and significant sealing	Very wet surface and stalactites causing structural damage	Major structural damage caused by waterproofing not functioning properly

15	Stone slab bridges	.1	Sound, no defects or damage	Minor cracking	Moderate cracking but no visible displacement	Major cracking and/or displacement	Collapsed
16	Timber	.1	No sign of damage	Minor signs of damage	Moderate signs of damage	Major signs of damage	Disintegrated through damage
		.2	No loss of section thickness	Minor section loss (decay less than 5% of section)	Moderate section loss causing some reduction in functionality (decay 5 to 20% of section thickness)	Major section loss causing significant reduction in functionality (decay more than 20% of section)	Collapsed or collapsing
		.3	No visible signs of open joints	Joints/shakes open slightly on surface or cracked coating at joint/shakes	Open joints/shakes < 50% width of beam, in areas of low flexure or < 25% in areas of high flexure	Open joints/shakes > 50% width of beam, in areas of low flexure or > 25% in areas of high flexure	Beam separated into multiple elements
		.4	No signs of rusting or damage to fixings	Non-structural bolts loose, minor corrosion of nuts and washers	Non-structural bolts missing, moderate corrosion of fixings	Structural fixings missing	Failure of element due to missed/failed fixings

**Table 2**

Extent Codes

**Code Description**

<b>A</b>	<b>No significant defect</b>
<b>B</b>	<b>Slight, not more that 5% of surface area/length/number</b>
<b>C</b>	<b>Moderate, 5% - 20% of surface area/length/number</b>
<b>D</b>	<b>Wide: 20% - 50% of surface area/length/number</b>
<b>E</b>	<b>Extensive, more than 50% of surface area/length/number</b>

**Table 3**

Generic Severity Descriptions

**Code Description**

<b>1</b>	<b>As new condition or defect has no significant effect on the element (visually or functionally).</b>
<b>2</b>	<b>Early signs of deterioration, minor defect/damage, no reduction in functionality of element</b>
<b>3</b>	<b>Moderate defect/damage, some loss of functionality could be expected</b>
<b>4</b>	<b>Severe defect/damage, significant loss of functionality and/or is close to failure/collapse</b>
<b>5</b>	<b>The element is non-functional/failed</b>

**Table 4**  
Permissible Combinations of Severity and Extent

	<b>Severity</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>A</b>	<b>1A</b>	-	-	-	-
<b>B</b>	-	<b>2B</b>	<b>3B</b>	<b>4B</b>	<b>5B</b>
<b>C</b>	-	<b>2C</b>	<b>3C</b>	<b>4C</b>	<b>5C</b>
<b>D</b>	-	<b>2D</b>	<b>3D</b>	<b>4D</b>	<b>5D</b>
<b>E</b>	-	<b>2E</b>	<b>3E</b>	<b>4E</b>	<b>5E</b>

**Table 5**  
Element Importance

Set	Item No.	Element Description		Element Importance
<b>Deck Elements</b>	1	Primary Deck Element		Very High
	2	Secondary Deck Element/s	Transverse Beams	Very High
	3		Element from Table 2 of Ref. 3	Very High
	4	Half Joints		Very High
	5	Tie beam/rod		Very High
	6	Parapet beam or cantilever		Very High
	7	Deck bracing		High
<b>Load-Bearing Substructure</b>	8	Foundations		High
	9	Abutments (incl. arch springing)		High
	10	Spandrel wall/head wall		High
	11	Pier/column		Very High
	12	Cross-head/capping beam		Very High
	13	Bearings		High
	14	Bearing plinth/shelf		Medium
<b>Durability Elements</b>	15	Superstructure drainage		Medium
	16	Substructure drainage		Medium
	17	Water proofing		Medium
	18	Movement/expansion joints		High
	19	Painting: deck elements		Medium
	20	Painting: substructure elements		Medium
	21	Painting: parapets/safety fences		Medium
<b>Safety Elements</b>	22	Access/walkways/gantries		Medium
	23	Handrail/parapets/safety fences		High
	24	Carriageway surfacing		Medium
	25	Footway/verge/footbridge surfacing		Low
<b>Other Bridge Elements</b>	26	Invert/river bed		Medium
	27	Aprons		Medium
	28	Fenders/cutwaters/collision protection		Medium
	29	River training works		Medium
	30	Revetment/batter paving		Low
	31	Wing walls		High
	32	Retaining walls		Medium
	33	Embankments		Low
34	Machinery		Medium	
<b>Ancillary Elements</b>	35	Approach rails/barriers/walls		Elements not used in BCI evaluation, thus importance not required
	36	Signs		
	37	Lighting		
	38	Services		

### **1.4.1 Defect response times**

All defects that are recorded are assessed by the inspector and prescribed an appropriate works priority code, using their experience, training and engineering judgement. These can be either:

Urgent: Make Safe Required  
Urgent  
High  
Medium  
Low  
Very Low

#### **Urgent - Make Safe Required:**

These defects are those that require an urgent prioritised repair or to be made safe within a 2 hour response time to ensure the safety of the highway user following risk assessment by a competent officer. A make safe can be the protection and/or closure to part or all of the asset or just the defective section and will be site specific.

Once the site has been temporarily made safe, the defect shall then be re-assessed by a competent officer to determine the priority of remedial works.

#### **All other priority codes:**

All other priority defects (urgent, high, medium, low, very low) are those that following a risk assessment are of lower risk of causing harm, and considered to be defects that may impact long term serviceability and sustainability of the highway asset. Due to the lead-ins associated with mobilisation for structures repairs a time scale is not provided, these defects will be addressed in a planned manner as resources permit.

### **1.4.2 Exceptions**

There will be occasions where the inspector will be faced with exceptional situations or when having completed the defect assessment the Inspector feels a higher priority is warranted. In such situations the inspector may use their discretion to increase the priority of a defect.

In these cases the inspector will record this increase on the notes relevant to the defect summarising their reasoning. Supporting evidence in the form of extra photographs, etc., may be linked or attached within the asset management system.

### **1.4.3 Recording of inspections and defects**

All routine inspections are to be electronically recorded with the following information.

- Date and time of inspection
- Identity of the lead inspector
- Weather conditions and highway surface state
- Type of inspection

- Identity of secondary inspector (if applicable)
- Notes of any issues or concerns noted by the inspector.
- General photographs of all elements inspected.

Defects will be recorded with the following information.

- Date and time that the defect was recorded
- Identity of the inspector
- Description of the defect (including any measurements)
- Location of the defect
- The Severity/Extent scores
- The defect priority
- Linked photographs

#### **1.4.4 Performance Management**

The following measures and indicators will be recorded in order to assess and manage the delivery

1. Monitoring and reporting each year on the number of complete inspections by type
2. Monitoring and reporting each month the number of defects being recorded split by priority

These reports shall be maintained and presented as Safety Inspection Performance Measures

#### **1.4.5 Key roles and Competencies**

There is a dedicated team whose key role is to undertake Structures Routine Inspections and reactive Inspections in accordance with this Strategy. All members of the team will be assessed against the Structures Inspections Competency Framework to ensure they meet the required standards for their role. The Competency Framework will set out the expected knowledge level against the relevant tasks or requirements for each role in the team.

This information is issued by:  
**Highways & Transportation**

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The information contained in this document can be translated, and/or made available in alternative formats, on request.

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