

Maintenance & Inspections Strategy: Structures

2026

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Maintenance & Inspections Strategy: Structures

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, organising, inspecting and maintaining the Structures for which it is responsible. This document also details 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 & Observation Investigatory levels
- Items for Inspection
- Defect & Observation Assessments
- Response times.

1.1 Network Hierarchies

The Council's risk-based functional route hierarchy categorises the Structures for which it is responsible into four hierarchies:

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

The hierarchy ensures that all Structures are managed appropriately, based on their unique characteristics as well as their location within the strategic priorities of the network. It also allows flexibility for the network to evolve with changes in industry

and commerce, as well as with changes in habits and needs of Essex highway users.

Below is a table outlining the Essex Structures Hierarchy.

Structures Hierarchy	Hierarchy Description title	Description
STR1 - 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.	All of the PR1 Network	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 . This will include footbridge and gantries
	National Highways High and Heavy Routes (Abnormal loads transporting transformers)	Prioritising the availability on selected routes of the network for Abnormal load vehicles and all Structures that are on National Highways High and Heavy routes must be safe and sustainable to allow for applicable vehicles to use the network.
	Single access to residential and commercial properties	Structures that are the only available access to properties will be treated as a high priority.
	Critical economic developments (Abnormal load routes)	Keeping selected Abnormal load routes in the county accessible to promote critical industrial and commercial developments.
	National Highways diversion routes	Ensure that National Highways diversion routes are kept available for suitable traffic.
	Access points for Abnormal loads	Maintain access points to known heavy Abnormal loads users. (E.g. Railway Museum, Barracks and boat yards etc.)
	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

Structures Hierarchy	Hierarchy Description title	Description
		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.
STR2 - 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.
STR3 - Structures located mainly on the local road network.	Remaining Road Structures	All remaining road Structures that have not been categorized as being part of

Structures Hierarchy	Hierarchy Description title	Description
		the STR1/ STR2 network. All of the remaining road Structures will be located on local roads.
STR4 - The lowest priority Structures assets on the network.	Footbridges and PRow	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.
	Noise Barriers	Noise Barriers are minor ancillary assets managed by the Structures team that reduce noise pollution to nearby properties.

2. Structures Inspection – Strategy and Service Levels

2.1 General Principles for completion of Structure Inspections

Inspections are undertaken in accordance with the latest version of the relevant codes/standards. The Council shall carry out inspections of Structures using suitably experienced and competent staff in the manner deemed appropriate for the Structure in question and its site. The safety of the Structures Inspector/Engineer will be paramount in determining the method of inspection.

Prior to undertaking any inspection, the Structures Inspector/Engineer must review the records for the Structure to become familiar 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.

There are five types of inspection that are undertaken for Structures;

- Routine Inspections;
 - General Inspection (GI)
 - Principal Inspection (PI)
- Reactive Inspections (refer to section 3);
 - Safety Inspection
 - Special Inspection
 - Inspection for Assessment

2.2 Investigatory Levels

Throughout this document, no reference is made to generic investigatory levels. Structures are a complex asset group and defects of a similar type may pose a different level of risk on each Structure. It is not possible, therefore, to assign generic investigatory levels. Instead, the Structures Inspector/Engineer will determine the appropriate response for the Structure in question at the time of inspection. Refer to section 2.6

2.3 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.

2.4 Principal Inspection (PI)

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

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

PIs are required to be undertaken every six years unless an altered inspection interval has been agreed via 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 may be reduced to four years and 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 or outbreaks of illness, the inspections may be suspended at the decision of the Inspections Manager.

Further details on the methodology and procedures for carrying out safety inspections are set out in latest version of the relevant codes/standards

2.5 Routine Inspection Frequency

The inspection frequency is shown in the table below. This complies with best practice guidance relating to routine inspection frequencies.

Feature	Inspection type	Inspection frequency
Structures	General Inspection Principal Inspection	Every two years (biennially) Every six years (Can be reduced to four or extended to up to twelve years subject to risk assessment)

The Council carries out a GI for each Structure once every two years (biennially), as per above. The PI programme is developed using a risk-based approach

2.6 Items to be inspected

The main purpose of a routine inspection is to provide information on the physical condition of all inspectable structural components and elements on the structure. A report is produced which records identified defects and observations.

Each defect or observation recorded in the inspection report receives a defect code from a standard table (Table 1 Severity Descriptions) and where work is deemed necessary, a prioritised work activity and estimated cost is added.

The Severity Descriptions in Table 1 have been colour coded to reflect which severity descriptions are considered defects and which are observations. The 'Observations' do not receive a work activity or priority within the inspection report. Future routine inspections will monitor and review the changing condition of the observations and defects identified.

All defects are assessed by the Structures Inspector/Engineer using their experience, training and engineering judgement. Where defects are identified requiring a work activity an appropriate priority code is allocated to the work item. The priority code depends on the severity and risk posed by the defect and is selected from;

Code	Description
	Not recorded
L	Low
M	Medium
H	High
V	Very High (Urgent)

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 which are used to describe and score defects and observations.

The tables show the following;

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

Table 1 Severity Descriptions

Cells shaded shall not normally be allocated work items and are termed 'Observations' rather than 'Defects'.

Item	Defect Code		Severity				
			1	2	3	4	5
Metalwork	1	.1	No signs of rusting or damage	Minor surface rusting	Moderate pitting	Deep pits and perforations (localised sever corrosion)	Disintegrating by corrosion mechanisms
	1	.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
	1	.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
	1	.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)
Reinforced Concrete, Prestressed Concrete & Filler Joist	2	.1	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
	2	.2	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
	2	.3	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

Item	Defect Code		Severity				
			1	2	3	4	5
	2	.4	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 flexure and/or shear action	Failure due to delaminated bars
	2	.5	No signs of thaumasite or freeze-thaw attack	Slight cracking caused by thaumasite or freeze-thaw	Moderate thaumasite or freeze-thaw attack	Major thaumasite or freeze-thaw attack	Failure due to thaumasite or freeze-thaw attack
	3	.1	No evidence of deformation	Minor deformation	Moderate deformation	Major deformation	Collapsed
Masonry, Brickwork & Mass Concrete	3	.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	.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
	3	.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 breaking barrel into 1m sections or less	Arch barrel failure
	3	.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
	3	.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 stones/bricks
	3	.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

Item	Defect Code		Severity				
			1	2	3	4	5
Paintwork and Protective Coatings	4	.1	Finish coat sound, slight weathering	Normal weathering of finishing coat	Spot, chips and cracks of the finishing coat, undercoat exposed but sound	Failure of finishing coat and spots, chips and cracks to undercoat/substrate	All coats failed
Vegetation	5	.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 growing on structure	Failure caused by vegetation growth or a tree collapsing on the structure
	5	.2	Slight to no vegetation	Low depth/density of vegetation cover, easily removed	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 rot systems likely to be causing structural damage
Foundations	6	.1	No visible settlement of structure	No visible settlement, but cracks may be due to it	Minor settlement of structure	Major settlement of structure	Collapsed due to settlement
	6	.2	No visible differential movement of structure	No visible movement, but cracks may be due to it	Minor differential movement of structure	Major differential movement of structure	Collapsed due to differential movement
	6	.3	No visible sliding of structure	No visible sliding, but cracks may be due to it	Minor sliding of structure	Major sliding of structure	Collapsed due to sliding
	6	.4	No visible rotation of structure	No visible rotation, but cracks may be due to it	Minor rotation of structure	Major rotation of structure	Collapsed due to rotation
	6	.5	No scour	Minor scour	Moderate scour	Major scour	Dangerous scour or failure

Item	Defect Code		Severity				
			1	2	3	4	5
	6	.6	Substructure appears unaffected by foundation faults (assume no foundation faults)	Foundation faults causing minor cracks in substructure	Foundation faults causing moderate cracking in substructure	Foundation faults causing major cracks and deformation in substructure	Failure due to foundation faults
Invert, apron & river bed (also see 2 and 3)	7	.1	No scour	Minor scour	Moderate scour	Major scour	Dangerous scour or failure
	7	.2	No vegetation growth or silting	Vegetation growth, trapped debris and silting causing slight disruption to flow	Vegetation growth, trapped debris and silting, significant disruption to flow causing faster flow in areas of river	Vegetation growth, trapped debris and silting severe disruption to flow causing much flow in areas of the river	Failure caused by vegetation growth, trapped debris and silting
Drainage	8	.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
	8	.2	Causing no staining	Causing minor staining	Cleaning of staining required	Urgent cleaning required	Urgent & frequent cleaning
	8	.3	No structural damage	Causing minor structural damage	Causing structural damage	Causing major structural damage	Causing severe damage to adjacent elements
	8	.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
Surfacing	9	.1	Little to no wear and weathering	Minor wear/weathering	Moderate wear/weathering	Major wear/weathering	Dangerous
	9	.2	No crazing, tracking or fretting	Minor crazing, tracking and/or fretting	Moderate crazing, tracking and/or fretting	Major cracks, tracking and/or fretting	Complete break up
	9	.3	Dense	Poor texture	Open texture	Very open texture	Dangerous
	9	.4	Sound	Cracks in top layer	Top layer breached	Deep cracks and potholes	Top layer completely missing
	9	.5	Not slippery	Starting to become slippery	Definitely becoming slippery	Slippery	Dangerous

Item	Defect Code		Severity				
			1	2	3	4	5
Flagged Surfacing	9	.6	No defects	Trips <5mm	Cracked flags Trips > 5mm and <10mm	Trips > 10mm and <20mm	Trips > 20mm
Not used, replaced by 17							
Embankments	11	.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
Bearings (also see 1)	12	.1	Negligible rusting, minor weathering	Minor rusting, moderate weathering	Moderate rusting	Major rusting	Failed or seized due to rusting
	12	.2	Correct position	Minor offset	Moderate offset/tilt	Dislodged	Off bearing/missing
	12	.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
	12	.4	No crazing	External crazing	External breakdown	Major breakdown (PTFE, laminations, rubber etc.)	Complete breakdown
	12	.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
	12	.6	Bearings sound	Minor cracks	Moderate cracks or loose	Splitting and deformation	Disintegrated
Impact damage	13	.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

Item	Defect Code		Severity				
			1	2	3	4	5
Waterproofing (try to exclude leaks through joints)	14	.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
	14	.2	No visible sign of seepage	Damp surface, slight water stains on soffit	Wet surface, drops of water falling and significant staining	Very wet surface and stalactites causing structural damage	Major structural damage caused by waterproofing not functioning properly
Stone Slab Bridges	15	.1	Sound, no defects or damage	Minor cracking	Moderate cracking but no visible displacement	Major cracking and/or displacement	Collapsed
Timber	16	.1	No sign of damage	Minor signs of damage	Moderate signs of damage	Major signs of damage	Disintegrated through damage
	16	.2	No loss of section	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 thickness)	Collapsed or collapsing
	16	.3	No visible signs of open joints	Joints/shakes open slightly on surface or cracked coating at joints/shakes	Open joints/shakes < 50% width beam, in areas of low flexure or < 25% in areas of high flexure	Open joints/shakes < 50% width beam, in areas of low flexure or < 25% in areas of high flexure	Beam separated into multiple elements

Item	Defect Code		Severity				
			1	2	3	4	5
	16	.4	No signs of rusting or damage to fixings	Non structural bolts loose, minor corrosion of fixings	Non structural bolts missing, moderate corrosion of fixings	Structural fixings missing	Failure of element due to missed/failed fixings
All Joint Types							
Joint leakage	17	.1	The area below the expansion joint shows no sign of water or water staining. This includes the underside of the deck, the bearing shelf and the abutment wall.	Small amounts of water appear to be leaking from the expansion joint. There is no apparent damage to other parts of the structure.	Noticeable volumes of water are passing through the expansion joint, and there is now a reasonable expectation that durability of the structure will be affected. Damage is occurring to protective systems such as the paint system.	High volumes of water are draining through the expansion joint, causing some minor structural damage including minor corrosion to the bearings or bearing shelf.	The expansion joint is open and water is freely passing from the carriageway through the expansion gap. Corrosion is significant to the bearings, bearing shelf or abutment.
Joint sub-surface drainage	17	.2	Joint drainage appears to be functioning correctly There are no signs of ponding adjacent to the expansion joint. Outlets for the drainage are clear.	The outlets to the drainage are slightly blocked, but there is no obvious sign of ponding on the carriageway by the expansion joint.	There are signs of ponding on the carriageway by the expansion joint, but they are not extensive. The outlets are partially blocked.	Surface water on the carriageway is significant. The drainage outlets are almost fully blocked (>75%).	Joint drainage is completely non-functional Ponding is severe. The drainage outlets appear blocked.
Adjacent road surfacing	17	.3	The road surfacing adjacent to the joint is in as-new condition, with no cracks, tracking or rutting.	There is some cracking, but this is not affecting the ride quality, or exposing any part of the joint.	The road surfacing is significantly cracked, but there are no pot-holes, nor is any part of the joint exposed.	The cracking is such that pot-holes are expected to form shortly. The joint or nosing is becoming exposed.	The surfacing has disintegrated, exposing the nosing or the joint component. There may be leakage

Item	Defect Code		Severity				
			1	2	3	4	5
Fixtures	17	.4	All plates and cover plates are in good condition, securely attached.	A plate is slightly defective, either bent or loose, but it is not causing any loss of functionality or a hazard.	A plate is significantly loose or heavily damaged, but is generally functional and is not causing a hazard.	A plate is missing, but not causing a significant hazard but may affect durability in the long term.	A plate is missing or sufficiently loose to cause a significant hazard.
Joint vegetation	17	.5	There is no vegetation growing from any part of the expansion joint, either in the carriageway, verge, reserve or from underneath.	Small, insignificant amount of vegetation are growing from the joint, and are causing no hazard or not affecting functionality.	Small amounts of vegetation are growing from the joint, and are causing a limited inconvenience, for example to pedestrians.	Vegetation is present in the joint and is fairly widespread, causing inconvenience and reduced durability of the joint.	There is a significant amount of vegetation growing from the expansion joint, causing corrosion to the joint.
Buried Joint							
Surfacing over buried joint	17	.6	The presence of the joint is not obvious from the surface (except for the sealed saw-cut, if present). There are no defects to the carriageway surfacing or verges/ footways /reserve over the joint	There are some cracks in the surfacing over the joint, but these cracks are very narrow and shallow (max depth 25mm).	The cracks are clearly visible, up to but not exceeding 5mm in width at the extreme. The depth of the crack is less than 50mm. There is no evidence of water leakage.	Cracks have developed, up to 25mm in width at the extreme. The depth of the crack is less than the depth of the surfacing.	The width of the crack is greater than 25mm and the depth is similar to the depth of the surfacing. The surfacing around the cracks is breaking up. There is evidence of leakage.
Crack inducer sealant	17	.7	The sealant in the saw-cut is fully present, fully bonded to each side of the crack and is not raised above the surfacing level.	The seal has some cracks, which are hairline and short and do not affect the integrity of the seal. The seal has not been pushed upwards to any noticeable degree.	The cracks are clearly visible, or some of the seal is unbonded. Generally, it is still functional.	There is major cracking of break up of the sealant, so it can no longer be considered fully functional.	The seal is completely missing at some point causing break up of the adjacent but unsupported surfacing.
Asphaltic plug joint							
Plug debonding	17	.8	The plug/ surfacing interface is bonded, with no gap evident, at any point across the carriageway, verge, reserve or footway.	The plug has debonded from the surfacing at some point across the carriageway, but the gap is still narrow (12mm). The depth of the debonded area is maximum 25mm. The adjacent road surface remains in good condition.	The debonded gap is now significant. The adjacent road surfacing is unsupported in the affected areas and has potential to start breaking up under traffic loading. The gap is around 5mm wide and the depth is less than 50mm.	The debonded gap is now greater, there are visible signs of the adjacent surface breaking up because it is now clearly unsupported. The gap is greater than 5mm wide but the depth is less than the depth of	The joint is now sufficiently debonded that the adjacent surfacing is breaking up due to lack of support. The plug material is also damaged as the leading edge is unprotected. The debonded area is to the

Item	Defect Code		Severity				
			1	2	3	4	5
						the surfacing. There is some leakage evident.	full depth of the surfacing. The joint is leaking as a result.
Loss of plug material	17	.9	The plug is 100% intact with no missing material.	A small amount of material is missing, with shallow holes in the plug (<20mm penetration). There is very little effect on ride quality or very little noise produced.	There is significant loss of material, with penetration up to 50mm. Ride quality is affected and noise is produced	There is a serious loss of material, with holes deeper than 50mm. There is some leakage evident.	Some of the joint is missing to the full depth of the plug, or the plug is broken up as a result of missing material. The joint is leaking.
Tracking and flow of material	17	.10	The plug follows the alignment of the adjacent surfacing, which is untracked, with no flow of plug material onto it.	Slight depressions in the plug are visible on inspection, but are not significant, or some plug material has flowed beyond the boundary. The effect is purely aesthetic	Tracking is clearly visible or a significant amount of binder has flowed onto the adjacent surfacing. Where tracking has occurred, there are small mounds of displaced material at the edges of the carriageway.	A very large amount of binder has flowed, or tracking is serious, generating significant mounds at the edges of the carriageway.	The tracking or flow of material has occurred to such an extent that the joint has disintegrated. The joint is leaking
Nosing defects		Reinforced elastomeric					
	17	.11	The transition strip is in an as-new condition, and is completely bonded to the joint and adjacent surfacing and is completely uncracked.	Cracks in the transition strip are visible on close inspection, but are having no effect on joint functionality	The cracking is extensive, leading to some break up of the material or the transition strip is no longer fully bonded to the surfacing or joint.	Cracking has developed sufficiently that the transition strip has broken up, with some material missing from the strip. The joint component is becoming exposed.	The nosing material is beyond isolated break up – it has disintegrated, leaving other elements of the joint exposed. The joint is leaking.
		Elastomeric in metal runners (resin-encapsulated)					
	17		The resin strip is in as new-condition (see above).	Cracks are visible on close inspection, but there is no effect on joint functionality.	Cracking of the strip is fairly extensive. Some functionality remains – the surfacing is generally supported and the rails are generally protected.	Isolated areas of the resin have broken up, leaving parts of the rails unprotected and some of the adjacent surfacing unsupported.	The resin has disintegrated sufficiently to expose the reinforcement embedded in the resin, as well as leaving the rails and adjacent surfacing unprotected. The joint is leaking.
Missing or loose bolts	17	.12	No bolts are missing or loose. There is no more than minor wear to the bolts.	A maximum of one bolt is missing/loose at any cross section of the joint, and this	More than one bolt is missing/loose and up to half are missing/loose at a	At any particular cross section of the joint, more than half of	The joint has failed due to missing/loose bolts, regardless of how many are missing/loose

Item	Defect Code		Severity				
			1	2	3	4	5
				one missing bolt is not causing failure.	particular cross section. This severity class will only apply where there are more than two bolts at any cross section of the joint.	the bolts are missing/loose, but this is not causing failure.	
Seal	17	.13	The seal appears in good condition, with no breaches, cracks or tears. It is securely attached on both sides. No debris is present in the seal.	The seal has some cracks, or very minor tears or breaches, but is still able to function to a large extent. The defects require close inspection to see. There is a small amount of debris in the seal.	The seal is visibly breached, allowing some water through the joint. There is a small amount of debris in the seal.	The seal is missing or significantly breached at least at some point across the joint. It does, however, retain some functionality. There is evidence of water leakage. The seal is holding a significant amount of debris.	The seal is missing or sufficiently disintegrated to allow large amounts of water to flow through the joint. The seal is full of debris.
Components	17	.14	Reinforced elastomeric				
			All joint components are in good condition, with no visible signs of defects. There are no cracks or tears visible.	Cracks or tears are visible. They are hairline, and require careful inspection to detect.	Cracks or tears are easily visible, but the joint is still able to function.	Cracks or tears are significant, but there remains some limited functionality. The steel in the plates is exposed. Complete failure is expected shortly.	A component has completely failed. Part of it has detached or is missing. A steel plate is loose or missing.
			Elastomeric in metal runners				
			The rails are in good condition. They are straight, level and flush with adjacent surfacing. There are no cracks in the rails.	The rails are generally in good condition, but on close inspection there are very slight deformities in the rails, but no vertical deflection.	A rail is clearly deformed, but is still able to function safely. There is no vertical deflection of the rail.	There has been some limited vertical deflection of the rail, or there are short hairline cracks in the rail.	A rail has completely cracked, is missing, has dropped due to failure of the supporting mechanism below or there has been significant vertical upward deflection of the rail, which is now likely to be pulled up by passing vehicles.
			Steel comb/tooth				
			The comb components are in good condition, with no corrosion or cracks. There is no deformation of teeth.	The teeth are showing minor signs of corrosion, but no cracks are visible. Any loss of section is unidentifiable and there is no deformation of any teeth.	The teeth are moderately corroded with very minor loss of section (<5%). There is no limitation of movement and there are no signs of cracks or deformation of the teeth.	The teeth are severely corroded with significant loss of section (<20%), or there is some deformation but not to the extent where movement is restrained or traffic is affected.	At least one tooth has fractured, or the teeth are sufficiently misaligned so that movement will cause interference, or there is a crack in the metalwork. Corrosion

Item	Defect Code		Severity				
			1	2	3	4	5
							has caused a serious loss of section of a tooth (>20%).
Movement/ construction joints		.1	Seal is well bonded, uncracked, non-protruding and fully present along the whole length of the joint.	Seal is unbonded, cracked, or has been pushed out, but the joint retains a significant amount of functionality.	Joint displacement which is not in the designed plane of movement. Joint has not lost its functionality.	Significant amount of joint displacement which is not in the designed plane of movement. Joint approaching failure.	Extreme 'out of plane' displacement. Joint failed/non functional.
Graffiti		.1	No graffiti	Non offensive graffiti out of sight of the general public	Low levels of non offensive graffiti within public view	High levels of non offensive graffiti within public view	Offensive Graffiti
Aesthetic Issues (possibly affecting long term durability eg. algae, lichen, moss, leachate, efflorescence, water staining, general staining, etc)		.1	None, Low or Medium levels of aesthetic issues not visible to the public. Not significant to long term durability.	High levels of aesthetic issues not visible to public and/or low levels visible to the public. Not significant to long term durability.	High levels of aesthetic issues in areas with low to moderate foot-fall. Affecting long term durability.	High levels of aesthetic issues in areas of high public footfall. Affecting long term durability.	Extreme levels of aesthetic issues which should be removed immediately.
Pigeon proofing/ Guano		.1	None, insignificant defect to the pigeon proofing, insignificant deposits of guano	Missing spikes, small breaks in the mesh/netting or gaps at connections. Guano build up not noticeable by public but could affect durability of element.	Missing spikes and evidence of guano, breaks in netting large enough to allow avian access. Guano build up noticeable by the public.	Missing spikes and evidence of large volumes of guano affecting aesthetics and operative H&S. Large gaps in netting. Guano aesthetically affecting area accessed by public.	Issue of pigeon proofing likely to cause complaint from the public or Health and Safety concern (Cat 1). Large scale failure of netting. Guano which is causing H&S issues.

Table 2 Generic Severity Descriptions

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

Table 3 Generic Extent Codes

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

Table 4 Permissible Combinations of Severity and Extent

Extent	Severity				
	1	2	3	4	5
A	1A	-	-	-	-
B	-	2B	3B	4B	5B
C	-	2C	3C	4C	5C
D	-	2D	3D	4D	5D
E	-	2E	3E	4E	5E

Table 5 Element Importance

Set	Item No.	Element Description		Element Importance
Deck Elements	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
Load-Bearing Substructure	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
Durability Elements	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
Safety Elements	22	Access/walkways/gantries		Medium
	23	Handrail/parapets/safety fences		High
	24	Carriageway surfacing		Medium
	25	Footway/verge/footbridge surfacing		Low
Other Bridge Elements	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
Ancillary Elements	35	Approach rails/barriers/walls		Elements not used in BCI evaluation, thus importance not required
	36	Signs		
	37	Lighting		
	38	Services		

3. Reactive Inspections

3.1 Safety Inspection

The Council receives reports of condition concerns - defects, observations and other enquiries - for its highway Structures through a variety of sources as well as a variety of means, including online. There may be times, however, when a customer identifies a condition concern which in their opinion poses such a risk that it requires an urgent risk assessment by a Structures Inspector/Engineer. In these cases, the customer is advised to telephone to make their report, via the contact number on the Essex Highways website, rather than make the report online which might create inappropriate delay.

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

The Structures Team receive and triage enquiries relating to Structures, and any enquiry relating to a Structure must be passed on to the Structures Team to assess, this includes enquiries received out of normal working hours. If following triage there is believed to be either a concern for public safety or for structural damage to an asset, a Structures Inspector/Engineer will visit the site to assess the enquiry and carry out a Safety Inspection. An enquiry is not considered to be a defect or observation until it has been risk-assessed on site by a Structures Inspector/Engineer. Until that time, it remains an enquiry from the public.

On receipt of the report of the enquiry, the unconfirmed defect or observation 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 as received. *
Standard	Standard enquiries will be assessed within 30 working days from the day received, 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.*

3.2 Special Inspection

Special Inspections are carried out when a need is identified by a competent Structures Engineer. The purpose of a Special Inspection is to provide detailed information on a particular part or area that is causing concern, from which a defect or observation may subsequently be identified. Special Inspections can also be undertaken when the issue is beyond the requirements of the General Inspection or

Principal Inspection regimes. The types of specific forms of Structures construction that may require additional inspections that go over the remit for a GI or PI, and would therefore require 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 types or defect/observation/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.

For monitoring associated with the management of substandard Structures, refer to the latest codes/standards.

3.3 Inspection for Assessment

Assessments are undertaken on Structures to determine their load bearing capacity. The sole purpose of an Inspection for Assessment is to provide the information that is required to enable a structural assessment to be undertaken. It is recommended that Inspections for Assessment are undertaken in conjunction with a Principal Inspection. Refer to the latest codes/standards for guidance on undertaking an Inspection for Assessment.

Assessments are necessary because many Structures were built during an era when their use by current heavy goods vehicles, specialist construction equipment, as well as heavy items and machinery being transported via the network, could not have been envisaged. The load bearing capacity of a Structure will influence the routes that can be taken by heavy loads. Avoiding inappropriate loading of a Structure will address the risk of sudden structural failure through overloading as well as avoidance of accelerated asset condition decline.

4. Defect response times and Maintenance

4.1 Defects

Following risk assessment by a competent officer with relevant professional qualifications and training, using their experience and engineering judgement, defects subsequently identified as requiring remedial work shall have a work item allocated. These work items shall be prioritised using the following list:

Code	Description
	Not recorded
L	Low
M	Medium
H	High
V	Very High (Urgent)

Defects will observe the following process.

Defect notified to structures

For urgent enquiries notified to structures, the area of interest shall be inspected within two hours and if required a make safe determined which would be executed within 24 hours.

Once the site has been temporarily made safe, the defect shall then be re-assessed by a competent team member with the relevant professional qualifications and training, using their experience and engineering judgement, to determine the priority of remedial works.

Work items identified through routine inspections (Very High (Urgent))

For urgent defects identified through routine inspection the defect shall be risk assessed on site by Inspector, during which a request for make safe shall be made to the structures office, if required. Make safe shall be executed within 24 hours.

Work items identified through routine inspections (High, Medium and Low)

For defects identified through routine inspection that require a works item but are not considered to require a more immediate response, a priority of High, Medium or Low will be added to the works item.

These work items may include the following:

- Vegetation obscuring inspection
- Minor damage to a parapet railing
- Long standing defects to structural elements (concrete spalls, corroding of steel members)

Works under this category will be prioritised and executed once funding is available. At this point efficiencies will be made by taking the opportunity to address other lesser priority work items.

4.2 Observations

Where defects are considered to fall into the Observation descriptions within Table 1 Severity Descriptions, which therefore will only have impact for long term serviceability of the highway asset, these will only be considered for repair in the event they coincide with other planned works, or where works are facilitated through available resources.

4.3 Exceptions

There will be occasions where the Inspector/Engineer will be faced with exceptional situations or when having completed the initial defect assessment the Inspector feels a higher priority work item is warranted.

In such situations the Inspector/Engineer may use their discretion to increase the priority of a work item. This could change the status from Observation to Defect, or include new work items not initially identified at inspection. In these cases, the Structures Inspector/Engineer shall write an explanatory summary of their reasoning within the Inspector or Engineer comments within the inspection report. Supporting evidence in the form of extra photographs, etc. may be linked or attached.

4.4 Maintenance

Work items identified through routine inspections

Where defect items are identified in important structural elements (as shown in table 5) the underlying defect shall be evaluated for risk and hazard. If there is significant concern that the structures continued safe use is at risk, management of substandard structure protocols will be implemented. Measures may include, monitoring for the defect or overall asset performance, installation of the weight restriction, traffic management eg. single lane traffic to avoid loading on element of concern, propping or closure. Any measures introduced as a consequence of managing the substandard structure shall remain in place until further investigation work or improvements are undertaken which remove the need.

Such works may include special inspections, structural review and assessment. Following completion of above works the asset will be prioritised and will be added to the main maintenance programme of works. For major schemes such as replacement, strengthening and upgrading of components, priority of works will be given based on hierarchy and budget availability. Due to the lead-ins (time) associated with prioritisation of schemes, available resource, planning and budget, a time scale is not provided.

Budget is also allocated for preventative maintenance of defects. This is the case for those defects that are identified to medium or low in high importance elements eg cracks in arches and in non flexural zones of reinforced concrete; and high and very

high priority work items in medium or low importance elements such as painting of steel work in footbridges and parapets. The undertaking of such works will minimise whole life maintenance costs and extend asset serviceable life.

4.5 Recording of inspections, defects & observations

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 & Observations will be recorded with the following information.

- Description of the defect or observation (including any measurements)
- Location of the defect or observation.
- The Severity/Extent scores
- The requirement for work activities along with Priority.
- Linked photographs

5. Performance Management

The following measures and indicators will be recorded in order to assess and manage the delivery of this Strategy:

1. Monitoring and reporting each year on the number of complete inspections by type
2. Monitoring each month the number of Defects and Observations being recorded, and reporting yearly each split by sub-categories of risk severity priority

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

6. Key roles and Competencies

There are dedicated teams whose role is to undertake Routine Inspections and to undertake Reactive Inspections of Structures in accordance with this Strategy. All members of these team will be assessed for competence to ensure they meet the required standards for their role. An aspirational target shall be the adoption of the

Competency Framework which sets out the expected knowledge level against the relevant tasks or requirements for each role in the team.

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