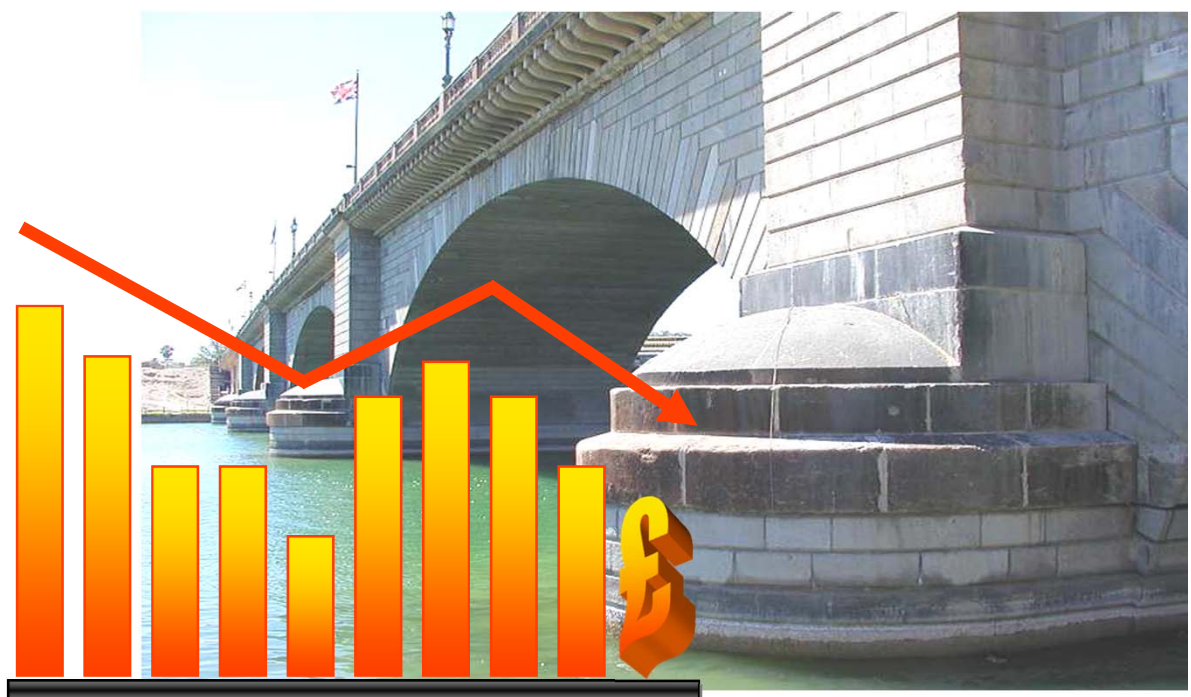


Structures Asset Management Planning Toolkit

Part C: Supporting Information

Version 2.01

March 2015




This document is supported, endorsed and recommended by:

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Disclaimer

This document and the information provided herein represent default rates and factors that facilitate long-term asset management planning and the calculation of Gross Replacement Cost and Depreciated Replacement Cost for highway structures in cases when authorities do not have suitable data of their own.

No responsibility for loss occasioned to any person acting or refraining from acting as a result of any material in this publication can be accepted by the *Department for Transport* or the *UK Bridges Board*.

While every care has been taken in the preparation of this publication, it may contain errors for which the *Department for Transport* and the *UK Bridges Board* cannot be held responsible.

iii. Introduction

iii.1 General

iii.1.1 This document constitutes one part of the Structures Asset Management Planning Toolkit. The custodian of this document is the UK Bridges Board.

iii.1.2 The Structures Asset Management Planning Toolkit comprises:

- Part A: Methodology
- Part C: Supporting Information (this document)

iii.2 Purpose of the Structures Asset Management Planning Toolkit

iii.2.1 The purpose of the Structures Asset Management Planning Toolkit is to support bridge engineers and managers in their management and other related activities, for example, financial planning, prioritisation of needs, lifecycle planning and asset valuation. It is anticipated that the toolkit will enable what-if scenarios to be analysed, which would support the decision maker in identifying the appropriate level of funding required for future maintenance, and in doing so, ensuring that the predefined performance targets for the structures stock are met.

iii.2.2 This version of the toolkit (Version 2.01, March 2015) primarily focuses on long-term asset management and financial planning and asset valuation/depreciation for highway structures.

iii.3 Objectives of the Structures Asset Management Planning Toolkit

iii.3.1 The objectives of the toolkit, and the requirements and principles that underpin it are:

- To clearly explain the overall methodology and supporting rationale;
- To identify the data and supporting information, i.e. rule sets and algorithms, required to support the methodology and functional specification;
- To ensure the methodology is standalone and independent of any computerised tool, thereby enabling the toolkit to be adopted by different commercial software/systems;
- To enable the methodology, where appropriate, to be adopted in part or in whole to suit the functionality of different commercial software/systems;
- To clearly define the minimum requirements of the methodology;
- To enable the methodology to be applied so that the minimum requirements are met by the analysis;
- To enable the methodology to be refined to support evolving practices over time.

iii.4 Background *Asset Management*

iii.4.1 Asset management is accepted good practice for infrastructure assets. In recent years a number of high profile publications have emphasised the importance of adopting an asset management approach for infrastructure assets, including:

- i. Code of Practice on Transport Infrastructure Assets, CIPFA, 2013
- ii. Management of Highway Structures: A Code of Practice, TSO, 2005 (currently under revision)
- iii. Maintaining a Vital Asset, DfT Publications, 2013
- iv. International Infrastructure Management Manual, BSI, 2006.
- v. ISO 55001:2014 Asset Management, BSI, 2014.
- vi. Highway Infrastructure Asset Management Guidance Document, DfT Publications, 2013

iii.4.2 In recognition of this, the UK Bridges Board has developed this toolkit to support asset management activities for highway structures.

Accounting Requirements

- iii.4.3 The UK Government introduced the Whole of Government Accounts (WGA) process to produce a consolidated set of financial statements for the UK public sector. It consolidates around 3,800 bodies, including central government departments, local authorities, devolved administrations, the health service, and public corporations. It is prepared using accounting standards (International Financial Reporting Standards), as adapted and interpreted for the public sector, and is similar in presentation to private sector accounts.
- iii.4.4 The aim of WGA is to enable Parliament and the public better to understand and scrutinise how taxpayers' money is spent. By presenting the public finances in a framework familiar to the commercial and accountancy professions, WGA increases transparency and accessibility of information about public finances.
- iii.4.5 CIPFA, on behalf of HM Government, has produced financial planning and accounting guidance for local authority transport infrastructure. CIPFA's Code of Practice on Transport Infrastructure Assets: Guidance to Support Asset Management, Financial Management and Reporting supports and aligns with recognised good practice in asset management, providing synergy between asset management, financial planning and accounting. The Code moves the valuation of infrastructure assets from a historic cost basis to a depreciated replacement cost valuation which is consistent with the accounting policy adopted for WGA. An updated version of the Code was published in December 2013
- iii.4.6 A new guidance will be published in April 2015 that provides practical guidance and clarity to Local Highways Authorities undertaking asset valuations. This is sought to be achieved through the use of a common terminology for accountancy and engineering professionals and worked examples.
- iii.4.7 The Structures Asset Management Planning Toolkit meets the accounting requirements presented in the CIPFA Code.

iii.5 Purpose of Part C

- iii.5.1 The purpose of this document is to provide default lifecycle planning and financial reporting data, i.e. deterioration rates, intervention triggers and effects, work unit rates, etc., to support the methodology.

iii.6 Layout

- iii.6.1 The layout of this document is summarised in Table C.iii.A.

Table C.iii.A: Document Layout	
Section	Description
0. Assumptions	Provides a list of assumptions relevant to subsequent sections of this document
1. Influencing Factors	Provides classifications and definitions for traffic volume and the exposure environment as the two significant influencers on deterioration rates, service lives of materials and components and on intervention levels and triggers
2. Default Exposure Classification	Provides the rules used in Asset Management Planning module for assigning a default exposure classification based on the structure type, element location, associated element failures, features associated with the structure and the proximity of a structure/element to traffic spray. A simplified calculation is used to determine exposure of structural components in HAMFIG DRC analysis module. Please refer to the paragraph 2.8.5 of the Structures Asset Management Planning Toolkit, Part A: Methodology for more information.
3. Default Deterioration Profiles for Components	Provides set of default deterioration rates/service lives for components, e.g. expansion joints, bearings, etc.
4a. Default Deterioration Profiles for Materials	Provides set of deterioration rates for different materials for use during element level analysis
4b. Default Deterioration Profiles for Groups/Structures	Provides set of deterioration rates for different materials for use during structure level analysis
5. Maintenance Options	Provides a list of different treatment options that are appropriate for different structure types and different elements/components. A distinction is made in relation to the availability of these options for selection, i.e. either through fixed programmes or work or due to deterioration in condition. Further the suggested expenditure type, i.e. capital vs revenue is assigned against each of the options.
6a. Default Intervention Levels and Effects for Materials and Components	Provides default treatment application triggers for materials and components depending on which treatment options are deemed to be appropriate or can be suitably applied based on the construction material, component type, exposure environment and condition threshold. Treatment application also depends on the scenario/strategy being analysed, i.e. do nothing, do minimum, etc.
6b. Default Intervention Levels and Effects for Groups/Structures	Provides default treatment application triggers for structures/groups of structures depending on which treatment options are deemed to be appropriate or can be suitably applied based on the construction material, exposure environment and condition threshold. Treatment application also depends on the scenario/strategy being analysed, i.e. do nothing, do minimum, etc.
7. Default Base Unit Rates	Provides default unit rates used to evaluate works cost
8. Element or Structure Size Formulae	Provides size formulae used to determine the volume of work at element or structure level
9. Add-ons	Provides the algorithms, default rates and uplift factors used to evaluate preliminaries, design costs, etc.
10. Penalties	Provides default traffic delay rates for evaluating the consequences of potential restrictions
11. Prioritisation	Provides the algorithms, default rates and uplift factors used to prioritise maintenance work
12. Gross Replacement Cost	Provides default unit rates and adjustment factors used to evaluate GRC
13. Indexation	Provides guidance on updating the default cost rates

14. Element Codes	Provides a standard list of elements by structure type, and associated element level information, i.e. element importance, element code, etc.
15. List of Required Data	Provides a list of Essential/Desirable data required to support Asset Management Planning Toolkit and Proof-of-concept model purpose and functionality.

0. Assumptions

Table C.0.A: Assumptions	
ID	Assumptions
001	All deterioration rates assume that routine maintenance is undertaken. If routine maintenance is not undertaken, the deterioration rates should be accelerated.
002	For the deterioration rates relating to the material type 'Metal', it has been assumed that the paint or other protective system (e.g. zinc coating, sacrificial thickness, etc.) has failed or is not in place. For example, where a paint system does not exist or is present but has reached condition 4B, it has been assumed that the metalwork underneath starts to deteriorate. Similarly where the protective patina of weathering steel has been compromised, the steel itself would deteriorate. However, if a paint system is present and fully functioning, it has been assumed that the element below does not deteriorate.
003	Elements are treated once they reach a predefined condition trigger as shown in Sections 6a and 6b.
004	Condition after treatment is 2B unless element replacement takes place, in which case the condition is set at 1A.
005	After intervention the deterioration profiles in Sections 3 and 4 are applied.
006	The unit rates include only the works cost.
007	The costs of surfacing, services and lighting works due to waterproofing maintenance/renewal are included in the unit rates for waterproofing works.
008	Bridge elements 1-4 must be done as a package or not done at all. It is assumed that these elements (1-3) would be in similar condition.
009	Only one work pattern - Daytime Working - is utilised.
010	Individual structures must be treated as complete entities. They should not be split into individual spans, even if the structural form of the various spans on the structure is different or if the spans are inspected separately. For both structures and elements on structures, inventory data that represent the 'average' for the structures or for elements on structures, as appropriate, should be provided. For example, if the material type of the primary deck element on 5 spans of a 6-span structure is 'Insitu Reinforced Concrete' and 'Masonry' on the 6th span, then the 'average' material type of the primary deck element is 'Insitu Reinforced Concrete'. Similarly, if there are 7 piers/columns on a structure and they are all in different conditions, the 'average' condition must be specified and all piers/columns analysed as a single entity or group.
011	The element or structure size formulae provided in Section 8 assume that only the minimum component breakdown for asset management planning (i.e. at structure level) is used for cantilever road signs and high mast lighting.
012	Where works on more than one element on a structure take place in the same location (e.g. above the bridge deck) and in the same year, it is assumed that the TM arrangements are combined wherever possible to create an efficient package of works.
013	Where elements or structures are classified as having a finite life it is assumed that replacement (without any other maintenance activity) will take place at the predefined trigger points in '6a. InterventionLevels&Effects' and/or '6b. InterventionLevels&Effects'
014	A simplified calculation is used to determine exposure of structural components in HAMFIG DRC valuation module, where the exposure level defined at year 0 is assumed to be constant thereafter. The calculation considers the following factors: route supported feature, obstacle crossed feature and proximity to the traffic spray zone. However, the simplified calculation does not consider exposure by failures of influencing components. Current Value is no longer affected by future predicted condition of the element.
015	For the purpose of Asset Management Planning analysis, the duration of each required traffic management arrangement is evaluated as the maximum works duration for an individual component on which maintenance is to be carried out under that traffic management arrangement. Where possible, simple traffic management arrangements are combined with more onerous traffic management arrangements. A simplified calculation is used for evaluation of traffic management cost in HAMFIG DRC valuation module, where costs of required traffic management arrangements are added up.

1. Influencing Factors

Table C.1.A: Traffic Category	
Category	Exposure Description
High	<ul style="list-style-type: none"> Structure or Route located at or is adjacent to features (e.g. junctions, interchange, etc.) that frequently impose obstructions to traffic flow (i.e. resulting in queuing/slow moving traffic). Speed limit >40mph, with poor horizontal and vertical alignment (e.g. uneven carriageway, located on/near a bend or gradient, etc.) High Annual Average Daily Traffic (e.g. AADT > 25,000 vehicles) High volume of Commercial Vehicles (e.g. CV > 2,500 vehicles) High volume of Heavy Goods Vehicles
Moderate	<ul style="list-style-type: none"> Structure or route is located at or is adjacent to features (e.g. junctions, interchange, etc.) that occasionally impose obstructions to traffic flow (i.e. resulting in queuing/slow moving traffic). Speed limit >20mph to ≤40mph, with poor horizontal and vertical alignment (e.g. uneven carriageway, located on/near a bend or gradient, etc.) Medium Annual Average Daily Traffic (e.g. AADT > 10,000 to ≤ 25,000 vehicles) Medium volume of Commercial Vehicles (e.g. CV > 1,000 to ≤ 2,500 vehicles) Medium volume of Heavy Goods Vehicles
Low	<ul style="list-style-type: none"> Structure or route or is or adjacent to features do not impose obstructions to traffic flow Speed limit ≤20mph, with good horizontal and vertical alignment (e.g. even carriageway, level and straight stretch route). Low Annual Average Daily Traffic (e.g. AADT ≤ 10,000 vehicles) Low volume of Commercial Vehicles (e.g. CV ≤1,000 vehicles) Low volume of Heavy Goods Vehicles

Note: It is considered that the traffic category would be influenced by the frequency, speed and concentration of traffic flows (especially HGVs) and would be dependant on the location, e.g. rural, urban, etc.

Table C.1.B: Exposure Environment		
Exposure Environ.	Exposure Description	Typical Element Location
Mild	<p>Structure and/or elements of a structure:</p> <ul style="list-style-type: none"> Generally exposed to mild weather conditions, i.e. may be sheltered or in an environment that results in little or no exposure to severe weather conditions; and/or Not exposed to any aggressive agents, e.g. no exposure to road de-icing salts or greater than 8m* away from traffic spray, not exposed to or buried in aggressive soil agents, no exposure to contaminated water, etc.; and/or With no ventilation or condensation problems or where poor ventilation or the level of condensation are unlikely to increase the rate of deterioration. 	<ul style="list-style-type: none"> Elements protected from salt spray with cladding or by a protective enclosure. Deck soffit and piers of integral bridges where the obstacle crossed is not a road, i.e. elements are not subjected to spray from salted road. Tenanted arch bridges. Half-joints or hinge joints overlaid with functional expansion joints.
Moderate	<p>Structure and/or elements of a structure exposed to:</p> <ul style="list-style-type: none"> Moderate (normal) weather conditions, e.g. direct rain, moderate humidity or condensation, some freeze-thaw action etc.; and/or Moderate de-icing salt spray and airborne chlorides; e.g. within 3 to 8m of traffic spray on routes with de-icing salts; and/or Low to moderate river flow. But elements are not exposed to or buried in aggressive soils. 	<ul style="list-style-type: none"> Top of roadside bridge pier or abutment subject to light vehicle spray from salted road. Bridge deck soffit subject to light vehicle spray from salted road.
Severe	<p>Structure and/or elements of a structure exposed to:</p> <ul style="list-style-type: none"> Continuous or regular severe/extreme weather conditions, e.g. hot and cold extremes, high freeze-thaw action, severe humidity or condensation, etc.; and/or Severe de-icing salt spray, e.g. within 3m of traffic spray on routes with de-icing salts; and/or Run-off and/or ponding on routes with de-icing salts; and/or Aggressive soils, i.e. completely or partially buried in aggressive soils that are contaminated with acidic water or water containing sulphates; and/or Marine environment and/or abrasive action of seawater or completely immersed in sea water; and/or Corrosive fumes in industrial areas; and/or Medium to rapid river flow and flooding. 	<ul style="list-style-type: none"> Roadside bridge abutment, parapet upstand or deck edge beam subject to heavy vehicle spray from salted road. Section of bridge deck near a leaking expansion joint or gutter e.g. deck end or crosshead. Half-joints or hinge joints overlaid with non-functional expansion joints.

* The 8m limit is based on DMRB BD 43/03.

2. Default Exposure Classification

Table C.2.A: Default Exposure Classification for Bridge Elements				
Bridge Element Type	Exposure Factor 1: Associated Element Failures	Exposure Factor 2: Route supported by or adjacent to a structure	Exposure Factor 3: Obstacle crossed / proximity to traffic spray zone	Default Exposure Classification
Br01 - Primary deck element Br02 - Transverse beams Br03 - Secondary deck element Br04 - Half joints/Hinge Joints Br05 - Tie beam/rod Br06 - Parapet beam/cantilever Br07 - Deck bracing Br09 - Abutments (incl. arch springing) Br10 - Spandrel wall/head wall Br11 - Pier/column Br12 - Cross-head/capping beam	Waterproofing functioning	-	-	Mild
	Waterproofing failed or not in place	Any Salted Route	-	Severe
		Any Other Route	-	Moderate
Br01 - Primary deck element Br02 - Transverse beams Br03 - Secondary deck element Br04 - Half joints/Hinge Joints Br05 - Tie beam/rod Br06 - Parapet beam/cantilever Br07 - Deck bracing Br09 - Abutments (incl. arch springing) Br10 - Spandrel wall/head wall Br11 - Pier/column Br12 - Cross-head/capping beam Br13 - Bearings Br14 - Bearing plinth/shelf	Expansion joint functioning or not present	-	-	Mild
	Failed expansion joint	Any Salted Route	-	Severe
		Any Other Route	-	Moderate
Br01 - Primary deck element Br02 - Transverse beams Br03 - Secondary deck element (soffit) Br05 - Tie beam/rod Br06 - Parapet beam/cantilever Br07 - Deck bracing	Deck elements finishes (paint) functioning or not present and element type is made of material that does not need to be protected by finishes	-	-	Mild
	Deck elements finishes (paint) not functioning or not present and element type is made of material that needs to be protected by finishes	Any Salted Route	-	Severe
		Any Other Route	Any Salted Route & Element within 3m proximity to spray zone	Severe
Br8 - Foundations [Excluded] Br26 - Invert/river bed Br27 - Aprons	-	-	Any except Watercourse	Mild
	-	-	Watercourse	Severe
Br22 - Access/walkways/gantries	Deck elements finishes (paint) functioning or not present and element type is made of material that does not need to be protected by finishes	-	-	Mild
	Deck elements finishes (paint) not functioning or not present and element type is made of material that needs to be protected by finishes	Any Salted Route	-	Severe
		Any Other Route	Any Salted Route & Element within 3m proximity to spray zone	Severe
			Any Other Route	Moderate

Br09 - Abutments (incl. arch springing); Br11 - Pier/column; Br32 - Retaining walls; Br33 - Embankments	Substructure elements finishes (cladding) functioning or not present and element type is made of material that does not need to be protected by finishes	-	-	Mild	
	Substructure elements finishes (cladding) not functioning or not present and element type is made of material that needs to be protected by finishes	-	Watercourse	Severe	
			Any Salted Route & Element within 3m proximity to spray zone	Severe	
			Any Other Route except Watercourse	Moderate	
	Fenders or river training works or revetments functioning	-	-	Mild	
Fenders and river training works and revetments are either not functioning or not present	-	Watercourse	Severe		
		Any Salted Route & Element within 3m proximity to spray zone	Moderate		
		Any Other Route except Watercourse	Mild		
Br28 - Fenders/cutwaters/collision protection Br29 - River training works Br30 - Revetment/batter paving	-	-	Watercourse	Severe	
			Any Salted Route & Element within 3m proximity to spray zone	Moderate	
			Any Other Route except Watercourse	Mild	
Br31 - Wing walls	Substructure elements finishes (cladding) functioning or not present and element type is made of material that does not need to be protected by finishes	-	-	Mild	
	Substructure elements finishes (cladding) not functioning or not present and element type is made of material that needs to be protected by finishes	-	Any Salted Route & Element within 3m proximity to spray zone	Severe	
			Any Other Route	Moderate	
	Fenders or river training works or revetments functioning	-	-	Mild	
	Fenders and river training works and revetments are either not functioning or not present	-	Watercourse	Severe	
			Any Salted Route & Element within 3m proximity to spray zone	Moderate	
			Any Other Route except Watercourse	Mild	
Drainage functioning	-	-	Mild		
Drainage failed or not present	-	-	Moderate		
Br23 - Handrail/parapets/safety fences Br35 - Approach rails/barriers/walls	Finishes (i.e. B21 - parapets/safety fences) functioning or not present and element type is made of material that does not need to be protected by finishes	-	-	Mild	
	Finishes (i.e. B21 - parapets/safety fences) not functioning or not present and element type is made of material that needs to be protected by finishes	Any Salted Route	-	Severe	
		Any Other Route	-	Moderate	
Br15 - Superstructure drainage Br16 - Substructure drainage Br19 - Finishes: Deck elements Br20 - Finishes: Substructure elements Br21 - Finishes: parapets/safety fences Br25 - Footway/verge/footbridge surfacing [Excluded] Br34 - Machinery [Excluded] Br36 - Signs Br37 - Lighting [Excluded] Br38 - Services [Excluded]	-	-	Watercourse	Severe	
			Any Salted Route	Any except Watercourse	Moderate
			Any Other Route	Any except Watercourse	Mild

Br18 - Expansion Joints Br24 - Carriageway surfacing [Excluded]	Low Traffic	-	-	Mild
	Moderate Traffic	-	-	Moderate
	High Traffic	-	-	Severe
Br17 - Waterproofing		N/A	N/A	N/A

Table C.2.B: Default Exposure Classification for Retaining Wall Elements					
Retaining Wall Element Type	Exposure Factor 1: Associated Element Failures	Exposure Factor 2: Route adjacent to the top of the wall / proximity to traffic spray zone	Exposure Factor 2: Route adjacent to the foot of the wall / proximity to traffic spray zone	Default Exposure Classification	
Rw02 - Primary Element Rw03 - Secondary Element Rw04 - Parapet Beam/Plinth	Finishes: Wall functioning or not present and element type is made of material that does not need to be protected by finishes	-	-	Mild	
	Finishes: Wall not functioning or not present and element type is made of material that needs to be protected by finishes	Any Salted Route & Element within 3m proximity to spray zone	-	Severe	
		Any Other Route	Any Salted Route & Element within 3m proximity to spray zone	Severe	
			Any Other Route	Moderate	
Rw01 - Foundations [Excluded] Rw16 - Invert/river Bed Rw17 - aprons	-	-	Any except Watercourse	Mild	
			Watercourse	Severe	
Rw09 - Handrail/parapets/safety fences	Finishes (RW8 - Finishes: Handrail/Parapet) functioning or not present and element type is made of material that does not need to be protected by finishes	-	-	Mild	
	Finishes (RW8 - Finishes: Handrail/Parapet) not functioning or not present and element type is made of material that needs to be protected by finishes	Any Salted Route & Element within 3m proximity to spray zone	-	Severe	
		Any Other Route	Any Salted Route & Element within 3m proximity to spray zone	Severe	
			Any Other Route	Moderate	
Rw05 - Drainage	-	-	Watercourse	Severe	
			Any Salted Route & Element within 3m proximity to spray zone	Any except Watercourse	Moderate
			Any Other Route	Any except Watercourse	Mild
Rw06 - Movement/Expansion Joints Rw07 - Finishes: Wall Rw08 - Finishes: Handrail/Parapet Rw12 - Footway/verge: Top of Wall [Excluded] Rw13 - Footway/verge: Foot of Wall [Excluded] Rw14 - Embankment: Top of Wall Rw15 - Embankment: Foot of Wall	-	-	Watercourse	Severe	
			Any Salted Route & Element within 3m proximity to spray zone	Any except Watercourse	Moderate
			Any Other Route	Any Salted Route & Element within 3m proximity to spray zone	Moderate
				Any Other Route except Watercourse	Mild
Rw10 - Carriageway: Top of Wall [Excluded] Rw11 - Carriageway: Foot of Wall [Excluded]		Exposure depends on Traffic [See Table C.1.A]			

Table C.2.C: Default Exposure Classification for Sign/Signal Gantry Elements			
Sign/Signal Gantry Element Type	Exposure Factor 1: Associated Element Failures	Exposure Factor 2: Route supported by or adjacent to a structure OR for "Sign/Signal Gantry [spanning]", Route crossed and proximity to traffic spray zone	Default Exposure Classification
Sg02 - Truss/Beams/Cantilevers Sg03 - Transverse Members Sg08 - Access Walkway/Deck Sg09 - Access Ladder	Finishes: truss/beam/cantilever functioning or not present and element type is made of material that does not need to be protected by finishes	-	Mild
	Finishes: truss/beam/cantilever not functioning or not present and element type is made of material that needs to be protected by finishes	Any Salted Route & Element within 3m proximity to spray zone	Severe
		Any Other Route	Moderate
Sg04 - Columns/Supports/Legs Sg12 - Support to longitudinal connection Sg13 - Sign and signal supports	Finishes: Columns/Supports functioning or not present and element type is made of material that does not need to be protected by finishes	-	Mild
	Finishes: Columns/Supports not functioning or not present and element type is made of material that needs to be protected by finishes	Any Salted Route & Element within 3m proximity to spray zone	Severe
		Any Other Route	Moderate
Sg01 - Foundations [Excluded]	-	Any except Watercourse	Mild
		Watercourse	Severe
Sg10 - Handrails	Finishes functioning or not present and element type is made of material that does not need to be protected by finishes (SG7 - Finishes: other elements)	-	Mild
	Finishes not functioning or not present and element type is made of material that needs to be protected by finishes (SG7 - Finishes: other elements)	Any Salted Route & Element within 3m proximity to spray zone	Severe
		Any Other Route	Moderate
Sg05 - Finishes: truss/beam/cant. Sg06 - Finishes: columns/supports Sg07 - Finishes: other elements Sg11 - Base Connections		Any Salted Route & Element within 3m proximity to spray zone	Severe
		Any Other Route	Moderate

Table C.2.D: Default Exposure Classification for Groups/Structures				
Structure Type	Exposure Factor 1: Location	Exposure Factor 2: Route supported by or adjacent to a structure OR for Retaining Walls or Structural Earthworks, Route adjacent to the Top of the Wall or Earthworks OR for "Sign/Signal Gantry [spanning]", Route crossed and Proximity to traffic spray zone	Exposure Factor 3: Obstacle crossed OR for Retaining Walls or Structural Earthworks, Route adjacent to the Top of the Wall or Earthworks and Proximity to traffic spray zone	Default Exposure Classification
Cantilever road sign High Mast Lighting Sign/signal gantry	Rural	-	-	Mild
	Urban	Any Salted Route & Element within 3m proximity to spray zone	-	Moderate
		Any Other Route	-	Mild
Marine/Estuarial	-	-	Severe	
Chamber/cellar/vault	-	-	-	Mild
Culvert Subway: Pipe	-	-	-	Moderate
Retaining Wall Structural earthworks - reinforced/strengthened soil/fill structure	Rural	-	-	Mild
	Urban	Any Salted Route & Element within 3m proximity to spray zone	-	Moderate
		Any Other Route	Any Salted Route & Element within 3m proximity to spray zone	Moderate
	Marine/Estuarial	-	Any Other Route	Mild
				Severe

3. Default Deterioration Profiles for Components

[\[See C.0.A - 001\]](#)

Table C.3.A: Deterioration Profile for Components									
Component Group [Click here to go to tab 'Element code']	Component/Material Type	Influencing Criterion	Influencing Category	Time_1A (yrs)	Time_2B (yrs)	Time_3B (yrs)	Time_4B (yrs)	Time_5B (yrs)	
B118. EXPANSION JOINTS	Buried Joint	Traffic	Severe	0	7	10	12	13	
			Moderate	0	10	15	17	18	
			Mild	0	17	25	28	30	
	Asphaltic Plug Joint	Traffic	Severe	0	2	3	4	5	
			Moderate	0	4	6	7	8	
			Mild	0	8	12	14	15	
	Nosing Joint	Traffic	Severe	0	5	8	10	11	
			Moderate	0	8	12	14	15	
			Mild	0	14	20	23	25	
	Elastomeric/Reinforced Elastomeric Joint	Traffic	Severe	0	7	10	12	13	
			Moderate	0	11	15	17	18	
			Mild	0	20	30	35	37	
	Single Element Elastomeric in Metal Runners	Traffic	Severe	0	11	15	17	18	
			Moderate	0	17	25	28	30	
			Mild	0	20	30	35	37	
	Multi Element Elastomeric in Metal Runners	Traffic	Severe	0	14	20	23	25	
			Moderate	0	17	25	28	30	
			Mild	0	20	30	35	37	
	Cantilever Comb and Tooth Joint	Traffic	Severe	0	14	20	23	25	
			Moderate	0	17	25	28	30	
			Mild	0	20	30	35	37	
	Roller Shutter	Traffic	Severe	0	14	20	23	25	
			Moderate	0	17	25	28	30	
			Mild	0	20	30	35	37	
Sliding Plate	Traffic	Severe	0	14	20	23	25		
		Moderate	0	17	25	28	30		
		Mild	0	20	30	35	37		
Other Expansion Joint	Traffic	Severe	0	10	15	17	18		
		Moderate	0	13	19	22	23		
		Mild	0	18	26	31	32		
B113. BEARINGS	Elastomeric/Rubber	Environment	Severe	0	20	30	35	37	
			Moderate	0	25	40	45	47	
			Mild	0	40	60	70	75	
	Plane Sliding	Environment	Severe	0	17	25	28	30	
			Moderate	0	25	37	43	45	
			Mild	0	30	50	57	60	
	Roller	Environment	Severe	0	20	30	35	37	
			Moderate	0	25	40	45	47	
			Mild	0	30	50	57	60	
	Pot	Environment	Severe	0	14	20	23	24	
			Moderate	0	25	35	38	40	
			Mild	0	30	50	57	60	
	Rocker	Environment	Severe	0	17	25	28	30	
			Moderate	0	25	40	45	47	
			Mild	0	30	50	57	60	
	Spherical	Environment	Severe	0	17	25	28	30	
			Moderate	0	25	40	45	47	
			Mild	0	30	50	57	60	
	Other Bearing	Environment	Severe	0	18	26	30	31	
			Moderate	0	25	39	44	46	
			Mild	0	32	52	59	63	
	B123. PARAPETS, RW09. HANDRAIL/PARAPETS, Sg10. HANDRAILS	Concrete	Environment	Severe	0	14	20	23	24
				Moderate	0	20	30	35	37
				Mild	0	25	40	45	47
Steel		Environment	Severe	0	14	20	23	24	
			Moderate	0	20	30	35	37	
			Mild	0	25	40	45	47	
Aluminium		Environment	Severe	0	25	40	45	47	
			Moderate	0	30	50	57	60	
			Mild	0	40	60	70	75	
Masonry		Environment	Severe	0	25	35	38	40	
			Moderate	0	40	70	85	90	
			Mild	0	80	140	160	170	
Timber (Hardwood not Treated)		Environment	Severe	0	10	15	17	18	
			Moderate	0	14	20	23	24	
			Mild	0	17	25	28	30	
Other Handrail/Parapet/Safety Fence		Environment	Severe	0	18	26	30	31	
			Moderate	0	25	40	47	50	
			Mild	0	37	61	70	74	
B117. WATER-PROOFING	Mastic Asphalt	N/A	N/A	0	40	60	70	75	
	Boarded Systems	N/A	N/A	0	20	30	35	37	
	Sheet Systems	N/A	N/A	0	20	30	35	37	
	Spray Systems	N/A	N/A	0	25	35	38	40	
	Other Waterproofing	N/A	N/A	0	25	35	38	40	
RW06. MOVEMENT/EXPANSION JOINTS	Movement/Expansion Joint	Environment	Severe	0	10	15	17	18	
			Moderate	0	13	19	22	23	
			Mild	0	18	26	31	32	
DRAINAGE (B115, B116, RW05)	Plastic (External)	Environment	Mild	0	15	30	45	60	
			Moderate	0	10	20	30	40	
			Severe	0	8	15	23	30	
	Metal (External) [See C.0.A - 002]	Environment	Mild	0	30	60	90	120	
			Moderate	0	15	30	45	60	
			Severe	0	8	15	23	30	
	Other (External)	Environment	Mild	0	15	30	45	60	
			Moderate	0	10	20	30	40	
			Severe	0	8	15	23	30	
	Internal Drainage System	Environment	Mild	0	30	60	90	120	
			Moderate	0	15	30	45	60	
			Severe	0	8	15	23	30	
	Clay Pipe	Environment	Mild	0	15	30	45	60	
			Moderate	0	10	20	30	40	
			Severe	0	8	15	23	30	
	Concrete Pipe	Environment	Mild	0	60	120	180	240	
			Moderate	0	40	80	110	120	
			Severe	0	30	45	55	60	
	Other Drainage System	Environment	Mild	0	15	30	45	60	
			Moderate	0	10	20	30	40	
			Severe	0	8	15	23	30	

4a. Default Deterioration Profiles for Materials

[See C.0.A - 001]

Table C.4.A: Deterioration Profiles for Materials									
Material/ Element Group	CSS Elements [Click here to go to tab 'Element code']	Material Type	Influencing Criterion	Influencing Category	Time_1A (yrs)	Time_2B (yrs)	Time_3B (yrs)	Time_4B (yrs)	Time_5B (yrs)
CONCRETE	Relevant element types include: Br01, Br02, Br03, Br04, Br05, B6, Br08 [Excluded] , Br09, Br10, Br11, Br12, Br14, Br22, Br27, Br28, Br29, Br31, Br32, Br35, Rw01 [Excluded] , Rw02, Rw03, Rw04, Rw17, Sg01 [Excluded] and St02	Insitu Mass Concrete or Precast Plain Concrete	Environment	Mild	0	60	120	180	240
				Moderate	0	40	80	110	120
				Severe	0	30	45	55	60
		Insitu Prestressed Concrete (Post-Tensioned)	Environment	Mild	0	50	75	90	100
				Moderate	0	30	45	55	60
				Severe	0	15	23	28	30
		Insitu Reinforced Concrete	Environment	Mild	0	60	120	180	240
				Moderate	0	35	60	75	80
				Severe	0	15	25	35	40
		Precast Prestressed Concrete (Pre-Tensioned)	Environment	Mild	0	60	120	180	240
				Moderate	0	50	90	110	120
				Severe	0	20	35	45	50
	Precast Reinforced Concrete	Environment	Mild	0	60	120	180	240	
			Moderate	0	70	110	130	140	
			Severe	0	20	35	45	50	
Element Br01, Rw02	Encased Steel	Environment	Mild	0	60	120	180	240	
			Moderate	0	35	60	75	80	
			Severe	0	15	25	35	40	
METAL	Relevant element types include: Br01, Br02, Br03, Br04, Br05, Br06, Br09, Br10, Br11, Br12, Br14, Br22, Br27, Br28, Br29, Br31, Br32, Br35, Rw02, Rw03, Rw04, Rw17, Sg02, Sg03, Sg04, Sg08, Sg09, Sg11.	Cast Iron or Wrought Iron [See C.0.A - 002]	Environment	Mild	0	50	90	110	120
				Moderate	0	30	55	75	80
				Severe	0	15	25	35	40
		Corrugated Rolled Steel [See C.0.A - 002]	Environment	Mild	0	50	90	110	120
				Moderate	0	25	45	55	60
				Severe	0	13	23	28	30
	Weathering Steel [See C.0.A - 002]	Environment	Mild	0	50	90	110	120	
			Moderate	0	25	45	55	60	
			Severe	0	13	23	28	30	
	All of the above and element Br07	Fabricated Steel, Rolled Steel, Steel, or Steel Plate [See C.0.A - 002]	Environment	Mild	0	50	90	110	120
				Moderate	0	30	60	75	80
				Severe	0	15	30	38	40
MASONRY	Relevant element types include: Br01, Br02, Br03, Br04, Br05, Br06, Br08 [Excluded] , Br09, Br10, Br11, Br12, Br14, Br22, Br27, Br28, Br29, Br31, Br32, Br35, Rw01 [Excluded] , Rw02, Rw03, Rw04, Rw17, Sg01 [Excluded] and St02	Blockwork, i.e. Masonry or Stone	Environment	Mild	0	50	150	250	300
				Moderate	0	40	70	90	100
				Severe	0	20	35	45	50
		Brickwork	Environment	Mild	0	50	125	200	250
				Moderate	0	40	70	90	100
				Severe	0	20	35	45	50
OTHER	Relevant element types include: Br01, Br02, Br03, Br04, Br05, Br06, Br07, Br08, Br09, Br10, Br11, Br12, Br14, Br22, Br27, Br28, Br29, Br31, Br32, Br35, Rw01, Rw02, Rw03, Rw04, Rw17, Sg01, Sg02, Sg03, Sg04, Sg08, Sg09, Sg12, Sg13 and St02	Other Material	Environment	Mild	0	40	65	80	90
				Moderate	0	20	35	45	50
				Severe	0	12	25	35	40
INVERT	Element Br26, Rw16	Natural Invert	Environment	Mild	0	50	100	150	200
				Moderate	0	25	50	75	100
				Severe	0	10	20	30	40
		Other Invert Material	Environment	Mild	0	50	100	150	200
				Moderate	0	25	50	75	100
				Severe	0	10	20	30	40

4a. Default Deterioration Profiles for Materials

[See C.0.A - 001]

Table C.4.A: Deterioration Profiles for Materials									
Material/ Element Group	CSS Elements [Click here to go to tab 'Element code']	Material Type	Influencing Criterion	Influencing Category	Time_1A (yrs)	Time_2B (yrs)	Time_3B (yrs)	Time_4B (yrs)	Time_5B (yrs)
FINISHES: DECK ELEMENTS AND SUBSTRUCTURE ELEMENTS	Elements Br19, Br20, Br21, Rw07, Rw08, Sg05, Sg06, Sg07	MIO Phenolic Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Silicone Alkyd Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		MIO High Build Quick Drying Epoxy Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Water Based Epoxy Sheen Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Extended Cure Epoxy MIO Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Vinyl/Vinyl Copolymer MIO Zinc Phosphate Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Vinyl/Vinyl Copolymer Sheen Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Thixotropic Bitumen	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Pitch Epoxy (two-pack) Polyamide Cured Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		High Build Epoxy Hydrocarbon Resin Modified Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Moisture Cured Polyurethane Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
		Moisture Cured Polyurethane Semi-Gloss Finish	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	5	10	15	20
Polyurethane Gloss Finish	Environment	Mild	0	15	30	45	60		
		Moderate	0	10	20	30	40		
		Severe	0	5	10	15	20		
Organic Modified Polysiloxane (two-pack) Gloss Finish	Environment	Mild	0	15	30	45	60		
		Moderate	0	10	20	30	40		
		Severe	0	5	10	15	20		
Grease Paint	Environment	Mild	0	15	30	45	60		
		Moderate	0	10	20	30	40		
		Severe	0	5	10	15	20		
Anti-graffiti paint	Environment	Mild	0	15	30	45	60		
		Moderate	0	10	20	30	40		
		Severe	0	5	10	15	20		
Cladding	Environment	Mild	0	15	30	45	60		
		Moderate	0	10	20	30	40		
		Severe	0	5	10	15	20		
Tiles	Environment	Mild	0	15	30	45	60		
		Moderate	0	10	20	30	40		
		Severe	0	5	10	15	20		
Other/Unknown Finish	Environment	Mild	0	15	30	45	60		
		Moderate	0	10	20	30	40		
		Severe	0	5	10	15	20		
CARRIAGEWAY SURFACING / CARRIAGEWAY: TOP OF WALL, FOOT OF WALL [Exclude]	Element Br24, Rw10, Rw11	Asphalt	Traffic	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30
		Concrete Surfacing	Traffic	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30
		Other Surfacing	Traffic	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30

4a. Default Deterioration Profiles for Materials

[See C.0.A - 001]

Table C.4.A: Deterioration Profiles for Materials									
Material/ Element Group	CSS Elements [Click here to go to tab 'Element code']	Material Type	Influencing Criterion	Influencing Category	Time_1A (yrs)	Time_2B (yrs)	Time_3B (yrs)	Time_4B (yrs)	Time_5B (yrs)
FOOTWAY SURFACING/ FOOTWAY/VERGE: TOP OF WALL, FOOT OF WALL [Exclude]	Element Br25, Rw12, Rw13	Asphalt	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30
		Concrete Surfacing	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30
		Other Surfacing	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30
REVETMENTS	Element Br30	Stone Rip-Rap	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Hand-Placed Stone	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Grouted Stone or Masonry	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Gabion Mesh Mattresses	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Precast Concrete Blocks - Open Jointed or Interlocking	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Cable-Tied Block Mattresses	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Concrete Insitu Slabs	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Grassed Geotextile Mats	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Grout-Filled Synthetic Mattresses	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Stone Asphalt	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Steel Piles	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
		Other Revetment	Environment	Mild	0	45	75	95	107
				Moderate	0	30	45	55	60
				Severe	0	17	25	32	35
EMBANKMENTS / Structural earthworks	Element Br33, Rw14, Rw15 and St07	Reinforced Soil	Environment	Mild	0	35	60	75	80
				Moderate	0	30	45	55	60
				Severe	0	15	25	35	40
		Natural	Environment	Mild	0	35	60	75	80
				Moderate	0	30	45	55	60
				Severe	0	15	25	35	40
		Gabions	Environment	Mild	0	35	60	75	80
				Moderate	0	30	45	55	60
				Severe	0	15	25	35	40
		Other Embankment Material	Environment	Mild	0	35	60	75	80
				Moderate	0	30	45	55	60
				Severe	0	15	25	35	40

4a. Default Deterioration Profiles for Materials

[See C.0.A - 001]

Table C.4.A: Deterioration Profiles for Materials									
Material/ Element Group	CSS Elements [Click here to go to tab 'Element code']	Material Type	Influencing Criterion	Influencing Category	Time_1A (yrs)	Time_2B (yrs)	Time_3B (yrs)	Time_4B (yrs)	Time_5B (yrs)
SIGNS	Element Br36	Regulatory Signs	Environment	Mild	0	8	17	26	36
				Moderate	0	5	10	15	20
				Severe	0	3	6	9	12
		Warning Signs	Environment	Mild	0	8	17	26	36
				Moderate	0	5	10	15	20
				Severe	0	3	6	9	12
		Direction Signs	Environment	Mild	0	8	17	26	36
				Moderate	0	5	10	15	20
				Severe	0	3	6	9	12
		Information Signs	Environment	Mild	0	8	17	26	36
				Moderate	0	5	10	15	20
				Severe	0	3	6	9	12
		Other Sign	Environment	Mild	0	8	17	26	36
				Moderate	0	5	10	15	20
				Severe	0	3	6	9	12
LIGHTING [Exclude]	Element Br37	Street or Highway Lighting	Environment	Mild	0	15	33	52	71
				Moderate	0	10	20	30	40
				Severe	0	6	11	17	23
		Traffic Control Lights	Environment	Mild	0	15	33	52	71
				Moderate	0	10	20	30	40
				Severe	0	6	11	17	23
		Illuminated Traffic Signs	Environment	Mild	0	15	33	52	71
				Moderate	0	10	20	30	40
				Severe	0	6	11	17	23
		Illuminated Traffic Bollards	Environment	Mild	0	15	33	52	71
				Moderate	0	10	20	30	40
				Severe	0	6	11	17	23
		Other Lighting	Environment	Mild	0	15	33	52	71
				Moderate	0	10	20	30	40
				Severe	0	6	11	17	23
SERVICES [Exclude]	Element Br38	Plastic Services	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30
		Concrete Services	Environment	Mild	0	30	60	90	120
				Moderate	0	15	30	45	60
				Severe	0	8	15	23	30
		Other Services	Environment	Mild	0	15	30	45	60
				Moderate	0	10	20	30	40
				Severe	0	8	15	23	30
BASE CONNECTIONS	Element Sg11	Steel	Environment	Mild	0	6	10	14	18
				Moderate	0	4	6	8	10
				Severe	0	2	3	5	6
		Iron	Environment	Mild	0	6	10	14	18
				Moderate	0	4	6	8	10
				Severe	0	2	3	5	6
		Other	Environment	Mild	0	6	10	14	18
				Moderate	0	4	6	8	10
				Severe	0	2	3	5	6

4b. Default Deterioration Profiles for Groups/Structures

[\[See C.0.A - 001\]](#)

Table C.4.B: Deterioration Profiles for Groups/Structures								
Structure Type	Material Type	Influencing Criterion	Influencing Category	Time_1A (yrs)	Time_2B (yrs)	Time_3B (yrs)	Time_4B (yrs)	Time_5B (yrs)
Cantilever road sign [Profile same as signs]	N/A	Environment	Mild	0	8	17	26	36
			Moderate	0	5	10	15	20
			Severe	0	3	6	9	12
Chamber/cellar/vault	See Table C.4.A							
Culvert	See Table C.4.A	Environment	Based on Material Type [See Table C.4.A]					
High Mast Lighting [Profile same as Lighting]	N/A	Environment	Mild	0	15	33	52	71
			Moderate	0	10	20	30	40
			Severe	0	6	11	17	23
Retaining Wall	See Table C.4.A	Environment	Based on Material Type [See Table C.4.A]					
Sign/signal gantry [Profile same as signs]	See Table C.4.A	Environment	Mild	0	9	19	29	40
			Moderate	0	8	15	23	30
			Severe	0	5	10	15	20
Structural earthworks - reinforced/strengthened soil/fill structure	See Table C.4.A							
Subway: Pipe	See Table C.4.A	Environment	Based on Material Type [See Table C.4.A]					

5. Maintenance Options

Table C.5.A: Maintenance Options				
Maintenance Activities	Rules	Programmes of Works Option?	Condition Based Selection	Expenditure Type
Anti-carbonation coatings [Excluded]	It can be applied to concrete elements every 20 years and up to 2 applications	No	No	Capital
Base Connections: Replacement	Removal, disposal and installation of base connections	Yes	Yes	Capital
Bearings: Replacement	Includes removal disposal and installation of a bearing and jacking	Yes	Yes	Capital
Carriageway Surfacing [Excluded]		No	No	Capital
Cathodic protection (Installation)	Once installed requires annual monitoring; should be captured as annual routine maintenance cost	Yes	No	Capital
Cathodic protection (Maintenance) [Routine Maintenance]	Once installed requires annual monitoring; should be captured as annual routine maintenance cost	No	No	Revenue
Cathodic protection (Monitoring) [Routine Maintenance]	Once installed requires annual monitoring; should be captured as annual routine maintenance cost	No	No	Revenue
Concrete repairs	Covers major, moderate or minor concrete repairs as follows. The volume/type of concrete repairs is determined by the element size, condition: severity/exposure and associated compound unit rate: - Major concrete repairs; major concrete repairs combined with rebar removal and reinstatement; minor concrete repairs and preflexing and crack injection - Moderate repairs, no metalwork - Minor patch repairs over small area, no metalwork	Yes	Yes	Capital
Concrete strengthening measures	Can only be applied to elements that were identified as sub-standard due to deterioration or have failed their structural assessment	Yes	No	Capital
Corrugated culvert: Maintenance	Includes Invert Paving (Refurb), Place Concrete Invert (Preventative), Place Steel/GRP Sheets on wet/dry line (Preventative), Surface Prep (Refurb) and Secondary Coat (Refurb).	Yes	Yes	Capital
Corrugated culvert: Relining (strengthening)		Yes	No	Capital
Drainage: Maintenance	Minor repairs, painting, etc.	Yes	Yes	Capital
Drainage: Replacement	Includes removal, disposal and installation of drainage	Yes	Yes	Capital
Element replacement	Assume like-for-like replacement for materials, e.g. replace concrete with concrete; can be applied to elements that were identified as sub-standard due to design (i.e. change in standards); includes temporary fencing, earthworks, reinstatement of kerbs, footways and paved areas, and fabrication and erection of bridge elements.	Yes	No	Capital
Embankments/Earthworks: Maintenance	Granular replacement, road/internal/slope drainage, regrading and toe berms, etc.	Yes	Yes	Capital
Embankments/Earthworks: Strengthening	Reinforced soil, retaining walls, sheet piles, ground anchor and piles, soil nailing, etc.	Yes	No	Capital
Expansion joint: Replacement	Includes removal disposal and installation of an expansion joint	Yes	Yes	Capital
Expansion joint: Replacement of moving components [Routine Maintenance]	Applies only to Multi Element Elastomeric In Metal Runners, service life of moving parts is 5 years; assume that the moving parts of Multi Element Elastomeric In Metal Runners joints will be replaced every 5 years throughout the service life of this type of joint at which time the entire joint should be replaced	No	No	Revenue
Footway Surfacing [Excluded]		No	No	Capital
Interim Measures	In addition to the strengthening and/or other maintenance activities options that can be applied for structures and/or elements of structures that are considered to be sub-standard either due to design or deterioration, interim measures (e.g. edge protection, monitoring, propping, etc.) can also be included. The preferred option should always be strengthening and/or other suitable maintenance activities, however where there is a budget constraint, interim measures can be employed. Therefore, an interim measure should not be permitted to become a permanent feature and should have a maximum allowable life of three years, at which time maintenance/strengthening becomes compulsory.	Yes	No	Capital
Invert repair	Import and deposition of filling material	Yes	Yes	Capital
Lighting: Maintenance [Excluded]	Includes painting, replacement of connections (bolts, etc.)	No	No	Capital
Lighting: Replacement [Excluded]	Includes removal, disposal and installation of lighting	No	No	Capital
Maintenance/Repair of 'Other/Unknown' Materials		Yes	Yes	Capital
Masonry repairs	Includes replacement of defective masonry and/or re-pointing, replacement of defective masonry	Yes	Yes	Capital
Masonry strengthening measures	Can only be applied to elements that have failed structural assessment	Yes	No	Capital
Metal strengthening measures	Can only be applied to elements that were identified as sub-standard due to deterioration or design, e.g. FRP, steel plate strengthening.	Yes	No	Capital
Metalwork repair	Includes metalwork crack repair (i.e. metalwork stitching and plate welding), weld repair and repair of corroded steelwork sections, bolt/rivet replacement	Yes	Yes	Capital
Movement/Exp Joint: Replacement	Includes removal, disposal and installation of movement/expansion joint	Yes	Yes	Capital
Paint: Application of paint system [Excluded]	Only suitable where there is no existing paint system in place, i.e. first time of paint system application	No	No	Capital
Paint: Re-application on top of existing paint system [Excluded]	Suitable for all metals except Aluminium and Stainless Steel, every 15 years, up to 2 applications then apply 'Paint: Wet/dry surface preparation and re-application of paint system' in 10 years	No	No	Capital
Finishes: Wet/dry surface preparation and re-application of finish	Suitable for all metals except Aluminium and Stainless Steel, e.g. every 25 years. Where the paint system reaches condition 4B assume that the metalwork below starts to deteriorate. If the metalwork underneath reaches condition 3C then 'metalwork repair' should be applied, i.e. this maintenance option is no longer applicable	Yes	Yes	Capital
Parapet: Maintenance	Based on material type as defined in Table C.6.A	Yes	Yes	Capital
Parapet: Protection system installation/replacement		Yes	No	Capital
Parapet: Replacement	Includes removal and disposal of existing parapet, installation of new parapet	Yes	Yes	Capital
Revetments: Maintenance		Yes	Yes	Capital
Revetments: Strengthening		Yes	No	Capital
Scour monitoring [Routine Maintenance]	Mattress, aprons, rip-rap, gabions etc.	No	No	Revenue
Scour or scour hole repair	Mattress, aprons, rip-rap, gabions etc.	Yes	No	Capital
Scour protection measures	Mattress, aprons, rip-rap, gabions etc.	Yes	No	Capital
Services: Maintenance [Excluded]	Routine cleaning, minor repairs, etc.	No	No	Revenue
Services: Replacement [Excluded]	Removal and disposal of existing services, installation of new services	No	No	Capital
Signs: Maintenance	Includes Painting, Replacement of connections (bolts, etc.)	Yes	Yes	Capital
Signs: Replacement	Includes removal, disposal of existing signs and installation of new signs	Yes	Yes	Capital
Strengthening of 'Other/Unknown' Materials		Yes	No	Capital
Structure demolition/decommissioning [Exclude]		No	No	Capital
Structure replacement	Assume like-for-like replacement for materials, e.g. replace concrete with concrete	Yes	No	Capital
TSA protection measures [Excluded]		No	No	Capital
Void grouting [Excluded]	Can be applied to post-tensioned and masonry structures	No	No	Capital
Waterproofing: Application [Excluded]	Only suitable where there is no existing waterproofing system in place, i.e. first time of application	No	No	Capital
Waterproofing: Replacement	Includes removal of existing waterproofing system, deck preparation (including up to 5% concrete repairs to the deck) and application of new waterproofing system; also includes surfacing removal and reinstatement, and reinstatement of kerbs/footways/paved areas and traffic signs and markings	Yes	Yes	Capital

Table C.5.B: Maintenance Options for Groups/Structures				
Maintenance Activities	Rules	Programmes of Works Option?	Condition Based Selection	Expenditure Type
Cantilever road sign: Maintenance	Includes Painting, Replacement of connections (bolts, etc.)	Yes	Yes	Capital
Cantilever road sign: Replacement	Includes removal disposal and installation of a Cantilever Road Sign	Yes	Yes	Capital
Cantilever road sign: Strengthening		Yes	No	Capital
High Mast Lighting: Maintenance	Includes Painting, Replacement of connections (bolts, etc.)	Yes	Yes	Capital
High Mast Lighting: Replacement	Includes removal disposal and installation of a High Mast Lighting	Yes	Yes	Capital
Sign/signal gantry: Maintenance	Includes Painting, Replacement of connections (bolts, etc.)	Yes	Yes	Capital
Sign/signal gantry: Replacement	Includes removal disposal and installation of a Sign/signal gantry	Yes	Yes	Capital
Structure demolition/decommissioning [Exclude]		No	No	Capital

6a. Default Intervention Levels and Effects for Materials and Components

[\[See C.0.A - 001\]](#)

[\[See C.0.A - 016\]](#)

Table C.6.A: Intervention Levels and Effects for Materials and Components											
Material or Component type	Existing Exposure	Maintenance Activity	Applicable to Condition Band	Intervention triggers				Exposure after application	Condition after application [See C.0.A - 007]	Deterioration profile after application [See C.0.A - 008]	
				Planned Preventive [See C.0.A - 003]	Planned Targeted [See C.0.A - 004]	Planned Do minimum [See C.0.A - 005]	Unplanned Re-active [See C.0.A - 006]				
In situ Reinforced Concrete, Precast Reinforced Concrete, In situ Prestressed Concrete (Post-Tensioned), Precast Prestressed Concrete (Pre-Tensioned)	Mild	Anti-carbonation coatings [Excluded]	2B - 2E	-	-	-	-	As per rules in Section 2	2B	As per Section 0	
		Concrete repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Moderate	Concrete repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Severe	Concrete repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
Element replacement		3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0		
In situ Mass Concrete & Precast Plain Concrete	Mild	Concrete repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Moderate	Concrete repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Severe	Concrete repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
Fabricated Steel, Rolled Steel, Steel, Steel Plate	Mild	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Moderate	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Severe	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
Corrugated Rolled Steel	Mild	Corrugated culvert: Maintenance	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Corrugated culvert: Relining (strengthening)	1A - 5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0	
	Moderate	Corrugated culvert: Maintenance	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Corrugated culvert: Relining (strengthening)	1A - 5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0	
	Severe	Corrugated culvert: Maintenance	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Corrugated culvert: Relining (strengthening)	1A - 5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0	
Cast Iron and Wrought Iron	Mild	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Moderate	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Severe	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
Weathering Steel	Mild	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Moderate	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Severe	Metalwork repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
Masonry [Blockwork, Brickwork]	Mild	Masonry repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Moderate	Masonry repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
	Severe	Masonry repairs	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Element replacement	3B - 5E	-	-	-	-	As per rules in Section 2	1A	As per Section 0	
Other / Unknown Material	Mild	Maintenance/Repair of 'Other/Unknown' Materials	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Strengthening of 'Other/Unknown' Materials	3B - 5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0	
	Moderate	Maintenance/Repair of 'Other/Unknown' Materials	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Strengthening of 'Other/Unknown' Materials	3B - 5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0	
	Severe	Maintenance/Repair of 'Other/Unknown' Materials	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
		Strengthening of 'Other/Unknown' Materials	3B - 5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0	
Invert/River Bed	Mild	Invert repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
	Moderate	Invert repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
	Severe	Invert repair	2B - 5E	3C	3C	4D	5B	As per rules in Section 2	2B	As per Section 0	
Drainage	Mild	Drainage: Maintenance	2B - 3E	2C	3C	-	-	As per rules in Section 2	2B	As per Section 0	
		Drainage: Replacement	4B - 5E	4B	4B	-	5B	As per rules in Section 2	1A	As per Section 0	
	Moderate	Drainage: Maintenance	2B - 3E	2C	3C	-	-	As per rules in Section 2	2B	As per Section 0	
		Drainage: Replacement	4B - 5E	4B	4B	-	5B	As per rules in Section 2	1A	As per Section 0	
	Severe	Drainage: Maintenance	2B - 3E	2C	3C	-	-	As per rules in Section 2	2B	As per Section 0	
		Drainage: Replacement	4B - 5E	4B	4B	-	5B	As per rules in Section 2	1A	As per Section 0	
Paint Systems	N/A	Finishes: Wet/dry surface preparation and re-application of finish	2B - 5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0	

6a. Default Intervention Levels and Effects for Materials and Components

[\[See C.0.A - 001\]](#)

[\[See C.0.A - 016\]](#)

Table C.6.A: Intervention Levels and Effects for Materials and Components												
Material or Component type	Existing Exposure	Maintenance Activity	Applicable to Condition Band		Intervention triggers				Exposure after application	Condition after application [See C.0.A - 007]	Deterioration profile after application [See C.0.A - 008]	
					Planned Preventive [See C.0.A - 003]	Planned Targeted [See C.0.A - 004]	Planned Do minimum [See C.0.A - 005]	Unplanned Re-active [See C.0.A - 006]				
Carriageway Surfacing / Carriageway: Top of the Wall, Foot of the Wall [Excluded]	Mild	Carriageway Surfacing	2B	-	5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Carriageway Surfacing	2B	-	5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Carriageway Surfacing	2B	-	5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0
Footway Surfacing / Footway: Top of the Wall, Foot of the Wall [Excluded]	Mild	Footway Surfacing	2B	-	5E	3C	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Footway Surfacing	2B	-	5E	3C	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Footway Surfacing	2B	-	5E	3C	-	-	5B	As per rules in Section 2	1A	As per Section 0
Revetments	Mild	Revetments: Maintenance	2B	-	5E	3C	-	-	5B	As per rules in Section 2	2B	As per Section 0
		Revetments: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
	Moderate	Revetments: Maintenance	2B	-	5E	3C	-	-	5B	As per rules in Section 2	2B	As per Section 0
		Revetments: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
	Severe	Revetments: Maintenance	2B	-	5E	3C	-	-	5B	As per rules in Section 2	2B	As per Section 0
		Revetments: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
Embankments / Structural earthworks	Mild	Embankments/Earthworks: Maintenance	2B	-	5E	3C	-	-	5B	As per rules in Section 2	2B	As per Section 0
		Embankments/Earthworks: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
	Moderate	Embankments/Earthworks: Maintenance	2B	-	5E	3C	-	-	5B	As per rules in Section 2	2B	As per Section 0
		Embankments/Earthworks: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
	Severe	Embankments/Earthworks: Maintenance	2B	-	5E	3C	-	-	5B	As per rules in Section 2	2B	As per Section 0
		Embankments/Earthworks: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
Signs	Mild	Signs: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Signs: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Signs: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Signs: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Signs: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Signs: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
Lighting [Excluded]	Mild	Lighting: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Lighting: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Lighting: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Lighting: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Lighting: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Lighting: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
Services [Excluded]	Mild	Services: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Services: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Services: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Services: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Services: Maintenance	2B	-	3E	2C	-	-	-	As per rules in Section 2	2B	As per Section 0
		Services: Replacement	4B	-	5E	4B	-	-	5B	As per rules in Section 2	1A	As per Section 0
Base Connections	Mild	Base Connections: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Base Connections: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Base Connections: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
Movement / Expansion Joints	Mild	Movement/Exp Joint: Replacement	2B	-	5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Movement/Exp Joint: Replacement	2B	-	5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Movement/Exp Joint: Replacement	2B	-	5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0
Expansion Joints	Mild	Expansion joint: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Expansion joint: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Expansion joint: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
Bearings	Mild	Bearings: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Bearings: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Bearings: Replacement	2B	-	5E	3C	3C	4D	5B	As per rules in Section 2	1A	As per Section 0
Parapets	Mild	Parapet: Maintenance	2B	-	3E	3C	3C	-	-	As per rules in Section 2	2B	As per Section 0
		Parapet: Replacement	4B	-	5E	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
		Parapet: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
	Moderate	Parapet: Maintenance	2B	-	3E	3C	3C	-	-	As per rules in Section 3	2B	As per Section 1
		Parapet: Replacement	4B	-	5E	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
		Parapet: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 4	2B	As per Section 2
Severe	Parapet: Maintenance	2B	-	3E	3C	3C	-	-	As per rules in Section 4	2B	As per Section 2	
	Parapet: Replacement	4B	-	5E	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0	
Water-proofing	N/A	Waterproofing: Replacement	2B	-	5E	3C	3C	-	5B	As per rules in Section 2	1A	As per Section 0

6b. Default Intervention Levels and Effects for Groups/Structures

[\[See C.0.A - 001\]](#)
[\[See C.0.A - 016\]](#)

Table C.6.B: Intervention Levels and Effects for Groups/Structures												
Material or Component type	Existing Exposure	Maintenance Activity	Applicable to Condition Band		Intervention triggers				Exposure after application	Condition after application [See C.0.006]	Deterioration Profile after application [See C.0.007]	
					Planned Preventive [See C.0.A - 003]	Planned Targeted [See C.0.A - 004]	Planned Do minimum [See C.0.A - 005]	Unplanned Re-active [See C.0.A - 006]				
Cantilever road sign	Mild	Cantilever road sign: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		Cantilever road sign: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
		Cantilever road sign: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Cantilever road sign: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		Cantilever road sign: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
		Cantilever road sign: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Cantilever road sign: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		Cantilever road sign: Strengthening	1A	-	5E	-	-	-	-	As per rules in Section 2	2B	As per Section 0
		Cantilever road sign: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
Chamber/cellar/vault	Mild	Based on material types as defined in Table C.6.A										As per Section 0
	Moderate	Based on material types as defined in Table C.6.A										As per Section 0
	Severe	Based on material types as defined in Table C.6.A										As per Section 0
Culvert	Mild	Based on material types as defined in Table C.6.A										As per Section 0
	Moderate	Based on material types as defined in Table C.6.A										As per Section 0
	Severe	Based on material types as defined in Table C.6.A										As per Section 0
High Mast Lighting	Mild	High Mast Lighting: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		High Mast Lighting: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	High Mast Lighting: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		High Mast Lighting: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
	Severe	High Mast Lighting: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		High Mast Lighting: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
Retaining Wall	Mild	Based on material types as defined in Table C.6.A										As per Section 0
	Moderate	Based on material types as defined in Table C.6.A										As per Section 0
	Severe	Based on material types as defined in Table C.6.A										As per Section 0
Sign/signal gantry	Mild	Sign/signal gantry: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		Sign/signal gantry: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
	Moderate	Sign/signal gantry: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		Sign/signal gantry: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
	Severe	Sign/signal gantry: Maintenance	2B	-	3E	2C	3C	3E	-	As per rules in Section 2	2B	As per Section 0
		Sign/signal gantry: Replacement	4B	-	5B	4B	4B	4D	5B	As per rules in Section 2	1A	As per Section 0
Structural earthworks - reinforced/strengthened soil/fill structure	Mild	Based on material types as defined in Table C.6.A										As per Section 0
	Moderate	Based on material types as defined in Table C.6.A										As per Section 0
	Severe	Based on material types as defined in Table C.6.A										As per Section 0
Subway: Pipe	Mild	Based on material types as defined in Table C.6.A										As per Section 0
	Moderate	Based on material types as defined in Table C.6.A										As per Section 0
	Severe	Based on material types as defined in Table C.6.A										As per Section 0

7. Default Base Unit Rates

2Q 2010 base rates indexed to 2Q 2015 for 2014/2015 prices

Table C.7.A: Base Unit Rates												
Maintenance Activity	Unit	Maintenance Activity Cost Type	Fixed Rate (£) [See C.0.A - 009]	Constant Unit Rate (£) [See C.0.A - 009]	Variable Unit Rate (£) [See C.0.A - 009]				Work Duration Rate (Unit/hour) [See C.0.A - 012]	Comments	TM Required?	TM Comments
					Severity 2	Severity 3	Severity 4	Severity 5				
Anti-carbonation coatings [Excluded]	m ²	Constant							3.750	Applies to full element area	Feature Dependent	
Base Connections: Replacement	item	Constant		£57					1.000	A plate with 4 connections or less is considered as one item	Yes	
Bearings: Replacement	m	Constant		£1,037					0.350		Feature Dependent	
Cantilever road sign: Maintenance	item	Variable			£25,032	£50,065	£75,097	£100,129	0.265		Yes	
Cantilever road sign: Replacement	item	Constant		£65,084					0.250		Yes	
Cantilever road sign: Strengthening										[User defined]		
Carriageway Surfacing										[Excluded]		
Cathodic protection (Installation)	m ²	Variable			£484				5.000	Can only be applied to elements in Severity 2	Feature Dependent	
Cathodic protection (Maintenance) [Routine Maintenance]	m ²	Constant							2.500	Applied every 25 years where a CP system has been installed	No	
Cathodic protection (Monitoring) [Routine Maintenance]	item/year	Fixed							N/A	Applies where a CP system has been installed	No	
Concrete repairs	m ²	Variable			£346	£1,383	£2,075	£2,685	0.700		Feature Dependent	
Concrete strengthening measures	m ²	Variable			£1,037	£1,280	£1,764	£2,484	0.700		Feature Dependent	
Corrugated Culvert: Maintenance	m ²	Variable			£1,037	£2,075			2.000	Can only be applied to elements in Severity 2 - 3	No	
Corrugated Culvert: Relining (Strengthening)	m ²	Variable			£1,486	£1,851	£2,577	£3,592	1.000		No	
Drainage: Maintenance	m	Variable			£27	£52	£79	£106	5.000		Yes	
Drainage: Replacement	m	Constant		£68					5.000		Yes	
Element replacement										[User defined]		
Embankments/Earthworks: Maintenance	m ²	Variable			£234	£468	£702	£936	0.357	Embankment/Earthworks length = 7m	Yes	
Embankments/Earthworks: Strengthening										[User defined]		
Expansion Joint Replacement: Asphaltic Plug	m	Constant		£259					2.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Buried Joint	m	Constant		£160					2.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Cantilever Comb and Tooth Joint	m	Constant		£5,416					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Elastomeric/Reinforced Elastomeric Joint	m	Constant		£1,247					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Multi Element Elastomeric In Metal Runners	m	Constant		£692					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Nosing Joint	m	Constant		£763					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Other Expansion Joint	m	Constant		£692					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Roller Shutter	m	Constant		£692					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Single Element Elastomeric In Metal Runners	m	Constant		£692					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion Joint Replacement: Sliding Plate	m	Constant		£692					1.000		Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Expansion joint: Replacement of moving components [Routine Maintenance]	item/year	Fixed							N/A	Applies to 'Multi Element Elastomeric In Metal Runners', every 5 years [Routine Maintenance]	Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required (for overbridges and underbridges) depending on the route type. The permissible TM arrangement is 'Lane Closure'.
Footway Surfacing										[Excluded]		
High Mast Lighting: Maintenance	item	Variable			£5,713	£11,425	£17,138	£22,850	0.500		Yes	
High Mast Lighting: Replacement	item	Constant		£14,853					0.125		Yes	
Interim Measures: Edge Protection	m	Constant		£1,315					N/A		Yes	For this type of maintenance activity, TM is always required irrespective of the bridge or route type. The permissible TM arrangement is 'Hardshoulder Closure'.
Interim Measures: Monitoring	item/year	Fixed	£3,458						N/A		No	
Interim Measures: Propping	m ²	Constant		£692					N/A	Applies to the full deck area	Feature Dependent	
Invert Repair	m ²	Constant		£49					1.000		Feature Dependent	
Lighting: Maintenance										[Excluded]		
Lighting: Replacement										[Excluded]		
Maintenance/Repair of 'Other/Unknown' Materials	m ²	Variable			£603	£1,720	£2,572	£3,325	0.567		Feature Dependent	
Masonry repairs	m ²	Variable			£414	£1,660	£2,490	£3,223	0.500		Feature Dependent	
Masonry strengthening measures	m ²	Variable			£1,231	£1,425	£1,812	£2,766	0.500		Feature Dependent	
Metal strengthening measures	m ²	Variable			£1,486	£1,851	£2,577	£3,592	1.000		Feature Dependent	
Metalwork repair	m ²	Variable			£1,049	£2,116	£3,154	£4,069	0.500		Feature Dependent	
Movement/Exp Joint: Replacement	m	Constant		£259					2.000		Yes	
Paint: Application of paint system [Excluded]	m ²	Constant							3.750	Applies to full element area; costs have been included in metalwork repair	Feature Dependent	
Paint: Re-application on top of existing paint system [Excluded]	m ²	Constant							7.500	Applies to full element area	Feature Dependent	
Finishes: Wet/Dry surface preparation and re-application of finish	m ²	Constant		£166					2.250	Applies to full element area	Feature Dependent	
Parapet: Maintenance (Concrete)	m ²	Variable			£346	£1,383	£2,075	£2,685	0.700	Based on standard intervention for material type; assume 100% of area is made up of material	Yes	
Parapet: Maintenance (Steel)	m ²	Variable			£262	£529	£789	£1,018	0.500	Based on standard intervention for material type; assume 25% of area is made up of material (i.e. 75% of area is free space)	Yes	
Parapet: Maintenance (Aluminium)	m ²	Variable			£262	£529	£789	£1,018	0.500	Based on standard intervention for material type; assume 25% of area is made up of material (i.e. 75% of area is free space)	Yes	

7. Default Base Unit Rates

2Q 2010 base rates indexed to 2Q 2015 for 2014/2015 prices

Table C.7.A: Base Unit Rates												
Maintenance Activity	Unit	Maintenance Activity Cost Type	Fixed Rate (£) [See C.0.A - 009]	Constant Unit Rate (£) [See C.0.A - 009]	Variable Unit Rate (£) [See C.0.A - 009]				Work Duration Rate (Unit/hour) [See C.0.A - 012]	Comments	TM Required?	TM Comments
					Severity 2	Severity 3	Severity 4	Severity 5				
Parapet: Maintenance (Masonry)	m ²	Variable			£414	£1,660	£2,490	£3,223	0.500	Based on standard intervention for material type; assume 100% of area is made up of material	Yes	
Parapet: Maintenance (Timber)	m ²	Variable			£341	£1,190	£1,784	£2,309	0.567		Yes	
Parapet: Maintenance (Other)	m ²	Variable			£341	£1,190	£1,784	£2,309	0.567		Yes	
Parapet: Protection System Installation/Replacement	m ²	Constant		£876					1.000		Yes	For this type of maintenance activity, TM is always required irrespective of the bridge or route type. The permissible TM arrangement is 'Hardshoulder Closure'.
Parapet: Replacement	m ²	Constant		£393					1.000		Yes	For this type of maintenance activity, TM is always required irrespective of the bridge or route type. The permissible TM arrangement is 'Hardshoulder Closure'.
Revetments: Maintenance (Stone Rip-Rap)	m ²	Variable			£414	£1,660	£2,490	£3,223	0.500		Yes	
Revetments: Maintenance (Hand-Placed Stone)	m ²	Variable			£414	£1,660	£2,490	£3,223	0.500		Yes	
Revetments: Maintenance (Grouted Stone or Masonry)	m ²	Variable			£414	£1,660	£2,490	£3,223	0.500		Yes	
Revetments: Maintenance (Gabion Mesh Mattresses)	m ²	Variable			£414	£1,660	£2,490	£3,223	0.500		Yes	
Revetments: Maintenance (Precast Concrete Blocks - Open Jointed or Interlocking)	m ²	Variable							0.700		Yes	
Revetments: Maintenance (Cable-Tied Block Mattresses)	m ²	Variable			£346	£1,383	£2,075	£2,685	0.700		Yes	
Revetments: Maintenance (Concrete Insitu Slabs)	m ²	Variable			£346	£1,383	£2,075	£2,685	0.700		Yes	
Revetments: Maintenance (Grassed Geotextile Mats)	m ²	Variable			£603	£1,720	£2,572	£3,325	0.567		Yes	
Revetments: Maintenance (Grout-Filled Synthetic Mattresses)	m ²	Variable			£603	£1,720	£2,572	£3,325	0.567		Yes	
Revetments: Maintenance (Stone Asphalt)	m ²	Variable			£414	£1,660	£2,490	£3,223	0.500		Yes	
Revetments: Maintenance (Steel Piles)	m ²	Variable			£1,049	£2,116	£3,154	£4,069	0.500		Yes	
Revetments: Maintenance (Other Revetment)	m ²	Variable			£603	£1,720	£2,572	£3,325	0.567		Yes	
Revetments: Strengthening										[User defined]		
Scour monitoring [Routine Maintenance]	item/year	Fixed							N/A	Applies to scour susceptible structures	No	
Scour or scour hole repair	item/structure	Fixed	£34,576						N/A	Applied at a specific point in time if scour defects are present	No	
Scour protection measures	item/structure	Fixed	£13,830						N/A	Applied at a specific point in time if scour defects are present	No	
Services: Maintenance										[Excluded]		
Services: Replacement										[Excluded]		
Sign/signal gantry: Maintenance	m	Variable			£1,990	£3,980	£5,970	£7,960	1.667		Yes	
Sign/signal gantry: Replacement	m	Constant		£5,174					2.500		Yes	
Signs: Maintenance	item	Variable			£2,456	£2,231	£3,347	£4,462	0.250		Yes	
Signs: Replacement	item	Constant		£2,901					0.125		Yes	
Strengthening of 'Other/Unknown' Materials										[User defined]		
Structure replacement										[User defined]		
TSA protection measures [Excluded]	m ²	Constant							0.500	Applies to full element area	Feature Dependent	
Void Grouting [Excluded]	m ²	Variable									[Excluded]	
Waterproofing: Application [Excluded] [See C.0.A - 010]	m ²	Constant									[Excluded]	
Waterproofing: Replacement [See C.0.A - 010]	m ²	Constant		£449					3.750	Includes removal of existing waterproofing system, deck preparation (including up-to 5% concrete repairs to the deck) and application of new waterproofing system. Also includes surfacing removal and reinstatement and reinstatement of kerbs/footways/paved areas and traffic signs and markings.	Yes	For this type of maintenance activity, except where the bridge is a footbridge, TM is always required depending on the route type. The permissible TM arrangement is 'Contraflow'.

8. Element or Structure Size Formulae

[See C.0.A - 014]

Table C.8.A: Size Formulae for Bridge Elements			
CSS Elements List	Element Size Formulae	Units	Assumptions
01 - Primary deck element	Length x Average Width x (Number of Structures in the Group)	m ²	Length in this context means: Length of the whole bridge/structure
02 - Transverse Beams	Length x Average Width x (Number of Structures in the Group) x 0.25	m ²	Length in this context means: Length of the whole bridge/structure
03 - Secondary deck element	Length x Average Width x (Number of Structures in the Group)	m ²	Length in this context means: Length of the whole bridge/structure
04 - Half joints/Hinge Joints	Average Width x 1 x 2 x (Number of Structures in the Group)	m ²	Length in this context means: Length of the whole bridge/structure; assume element width = 1.0m
05 - Tie beam/rod	Length x Average Width x (Number of Structures in the Group) x 0.1 x 2	m ²	Length in this context means: Length of the whole bridge/structure
06 - Parapet beam or cantilever	Length x (Number of Structures in the Group) x 0.7 x 2	m ²	Assume width = 0.7m; Length in this context means: Length of the whole bridge/structure
07 - Deck bracing	Length x Average Width x (Number of Structures in the Group) x 0.1 x 2	m ²	Length in this context means: Length of the whole bridge/structure
08 - Foundations [Excluded]	Length x Average Width x (Number of Structures in the Group) x 0.3	m ²	Average depth of maintenance = 2m; Length in this context means: Length of the whole bridge/structure
09 - Abutments (incl. arch springing)	Average Critical Headroom x Average Width x (Number of Structures in the Group) x 2	m ²	
10 - Spandrel wall/head wall	Average Critical Headroom x Length x (Number of Structures in the Group) x 2/3	m ²	Length in this context means: Length of the whole bridge/structure
11 - Pier/column	Average Critical Headroom x Average Width x (Number of Spans - 1) x (Number of Structures in the Group)	m ²	Average depth of maintenance ≤ 0.1m
12 - Cross-head/capping beam	Average Width x 0.7 x (Number of Spans - 1) x (Number of Structures in the Group)	m ²	Depth of cross-head/capping beam = 0.7m
13 - Bearings	Average Width x (Number of Spans + 1) x (Number of Structures in the Group)	m	
14 - Bearing plinth/shelf	Average Width x 0.7 x (Number of Spans + 1) x (Number of Structures in the Group)	m ²	Width of bearing plinth/shelf = 0.7m
15 - Superstructure drainage	Length x (Number of Structures in the Group) x 2	m	Length in this context means: Length of the whole bridge/structure
16 - Substructure drainage	Critical Headroom x (Number of Structures in the Group) x 2	m	
17 - Waterproofing	Length x Average Width x (Number of Structures in the Group)	m ²	Length in this context means: Length of the whole bridge/structure
18 - Expansion joints	Average Width x (Number of Spans + 1) x (Number of Structures in the Group)	m	
19 - Finishes: deck elements	Length x Average Width x (Number of Structures in the Group)	m ²	Length in this context means: Length of the whole bridge/structure
20 - Finishes: substructure elements	Average Critical Headroom x Average Width x (Number of Spans + 1) x (Number of Structures in the Group)	m ²	
21 - Finishes: parapets/safety fences	Length x (Number of Structures in the Group) x 1.5 x 2	m ²	Assume height = 1.5m; parapets/safety fences on both sides of the bridge; Length in this context means: Length of the whole bridge/structure
22 - Access/walkways/gantries	Length x (Number of Structures in the Group) x 0.8 x 2	m ²	Length in this context means: Length of the whole bridge/structure; element height = 0.8m; access/walkways/gantries on both sides of the bridge
23 - Handrail/parapets/safety fences	Length x (Number of Structures in the Group) x 1.5 x 2	m ²	Assume height = 1.5m; parapets/safety fences on both sides of the bridge; Length in this context means: Length of the whole bridge/structure
24 - Carriageway surfacing [Excluded]	Length x (Average Width - 3) x (Number of Structures in the Group)	m ²	Assume a 1.5m wide footpath on each side of the bridge; Length in this context means: Length of the whole bridge/structure
25 - Footway/verge/footbridge surfacing [Excluded]	Length x (Number of Structures in the Group) x 1.5 x 2	m ²	Assume width = 1.5m; footways on both sides of the bridge; Length in this context means: Length of the whole bridge/structure
26 - Invert/river bed	Length x Average Width x (Number of Structures in the Group) x 0.1 x 2	m ²	Assume element height = 0.1m; Length in this context means: Length of the whole bridge/structure
27 - Aprons	Average Width x (Number of Structures in the Group) x Average Critical Headroom x 2/3 x 5 ^{1/2} x 2	m ²	Slope of 1 vertical and 2 horizontal -> sloping length is 5 ^{1/2} ; vertical height is Average Critical Headroom x 2/3; aprons on both sides of the bridge
28 - Fenders/cutwaters/collision protection	Average Width x (Number of Structures in the Group) x 3 x 2	m ²	Assume element height = 3.0m
29 - River training works	Average Width x (Number of Structures in the Group) x 2 x 2	m ²	Assume element height = 2.0m
30 - Revetment/batter paving	Average Width x Average Critical Headroom x (Number of Structures in the Group) x 5 ^{1/2} x 2	m ²	Assume slope of 2 vertical and 1 horizontal, the sloping length is 5 ^{1/2} ; revetment/batter paving on both sides of the bridge
31 - Wing walls	Average Critical Headroom x (Number of Structures in the Group) x 5 x 4	m ²	Wing wall length = 5m
32 - Retaining walls	Average Critical Headroom x (Number of Structures in the Group) x 3 x 4	m ²	Retaining wall length = 3m
33 - Embankments	Average Critical Headroom x (Number of Structures in the Group) x Length x 0.2 x 1/2 x 2	m ²	Assume length = 20% of the span length; Length in this context means: Length of the whole bridge/structure; triangular area with sides of element length and Average Critical Headroom; embankments on both sides of the bridge
34 - Machinery		[Excluded]	
35 - Approach rails/barriers/walls	Length x (Number of Structures in the Group) x 0.2 x 1.5 x 2	m ²	Assume length = 20% of the span length; Length in this context means: Length of the whole bridge/structure; assume height = 1.5m; approach rails/barriers/walls on both sides of the bridge
36 - Signs	(Number of Spans + 1) x (Number of Structures in the Group) x 2	item	
37 - Lighting		[Excluded]	
38 - Services		[Excluded]	

Table C.8.B: Size Formulae for Retaining Wall Elements			
Element Type	Element Size Formulae	Units	Assumptions
1. Foundations [Excluded]		[Excluded]	
2. Primary Element	Length x Height x (Number of Structures in the Group)	m ²	Where the height of the wall is not available assume = 3m; Height in this context is the height of retaining wall above ground [See Figure 8.1]
3. Secondary Element	Length x Height x (Number of Structures in the Group)	m ²	Where the height of the wall is not available assume = 3m; Height in this context is the height of retaining wall above ground [See Figure 8.1]
4. Parapet beam/plinth	Length x (Number of Structures in the Group) x 0.7	m ²	Assume width = 0.7m
5. Drainage	Length x (Number of Structures in the Group)	m	
6. Movement/Expansion Joints	Height x (Number of Structures in the Group)	m	Height in this context is the height of retaining wall above ground [See Figure 8.1]
7. Finishes: Wall	Length x Height x (Number of Structures in the Group)	m ²	Where the height of the wall is not available assume = 3m; Height in this context is the height of retaining wall above ground [See Figure 8.1]
8. Finishes: Handrail/Parapet	Length x Number of Structures in the Group x 1.5	m ²	Assume height = 1.5m
9. Handrail/Parapets/Safety Fences	Length x Number of Structures in the Group x 1.5	m ²	Assume height = 1.5m
10. Carriageway: Top of Wall [Exclude]		[Excluded]	
11. Carriageway: Foot of Wall [Exclude]		[Excluded]	
12. Footway/verge: Top of Wall [Exclude]		[Excluded]	
13. Footway/verge: Foot of Wall [Exclude]		[Excluded]	
14. Embankment: Top of Wall	Length x Number of Structures in the Group x Height x 1/3 x 1/2 x 5 ^{1/2}	m ²	Assume element size = 1/2 x size of embankment at foot of wall
15. Embankment: Foot of Wall	Length x Number of Structures in the Group x Height x 1/3 x 5 ^{1/2}	m ²	Assume slope of 1 vertical and 2 horizontal -> sloping length is 5 ^{1/2} ; vertical height is Height x 1/3; Where the height of the wall is not available assume = 3m; Height in this context is the height of retaining wall above ground [See Figure 8.1]
16. Invert/river bed	Length x Number of Structures in the Group x 2 x 5 ^{1/2}	m ²	Assume slope of 1 vertical and 2 horizontal -> sloping length is 5 ^{1/2} ; vertical height is 2.0m
17. Aprons	Length x Number of Structures in the Group x Height x 1/3 x 5 ^{1/2}	m ²	Assume slope of 1 vertical and 2 horizontal -> sloping length is 5 ^{1/2} ; vertical height is Height x 1/3; Where the height of the wall is not available assume = 3m; Height in this context is the height of retaining wall above ground [See Figure 8.1]

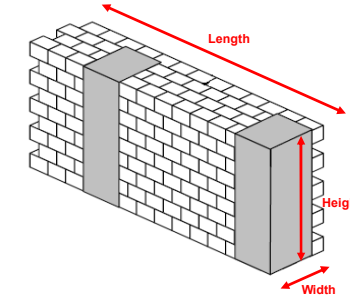


Figure 8.1: Retaining Wall Dimensions

Table C.8.C: Size Formulae for Sign / Signal Gantry Elements			
Element Type	Element Size Formulae	Units	Assumptions
1. Foundations [Excluded]	Length x Width x Number of Structures in the Group x 0.3	m ²	Average depth of maintenance = 2m
2. Truss/Beams/Cantilevers	Length x Width x Number of Structures in the Group x 0.25	m ²	Assume it crosses a single lane dual carriageway, i.e. assumed width 7m
3. Transverse Members	Length x Width x Number of Structures in the Group x 0.25	m ²	Assume it crosses a single lane dual carriageway, i.e. assumed width 7m
4. Columns/Supports/Legs	Height x Number of Structures in the Group x 0.3 x 4	m ²	4 columns. Column width = 0.3m; Assume it crosses a single lane dual carriageway, i.e. assumed width 7m; Where the height of the sign/signal gantry is not available, assume height is at least equal to the standard required headroom for bridges = 6m.
5. Finishes: truss/beam/cant.	Length x Width x Number of Structures in the Group x 0.25	m ²	Assume it crosses a single lane dual carriageway, i.e. assumed width 7m
6. Finishes: columns/supports	Height x Number of Structures in the Group x 0.3 x 4	m ²	4 columns. Column width = 0.3m; Assume it crosses a single lane dual carriageway, i.e. assumed width 7m; Where the height of the sign/signal gantry is not available, assume height is at least equal to the standard required headroom for bridges = 6m.
7. Finishes: other elements	Length x Width x Number of Structures in the Group x 0.25	m ²	Assume it crosses a single lane dual carriageway, i.e. assumed width 7m
8. Access walkway/deck	Length x Number of Structures in the Group x 0.8	m ²	Assume width = 0.8m
9. Access Ladder	Height x Number of Structures in the Group x 2 x 0.8 x 0.5	m ²	Where the height of the sign/signal gantry is not available, assume height is at least equal to the standard required headroom for bridges = 6m; element width = 0.8m; assume 50% of area is made up of material (i.e. 50% of area is free space)
10. Handrails	Length x Number of Structures in the Group x 1.5	m ²	Assume Height = 1.5m
11. Base Connections	(Number of Spans + 1) x Number of Structures in the Group	item	Assume number of spans = 1
12. Support to longitudinal connection	Number of Structures in the Group x 0.4 x 0.4 x 4	m ²	4 columns; each support is a square plate with sides of 0.4m
13. Sign and signal supports	Width x Height x Number of Structures in the Group x 0.1	m ²	10% of the total height

Table C.8.D: Size Formulae for Groups/Structures			
Structure Type	Structure Size Formulae	Units	Assumptions
Cantilever road sign	Number of Structures in the Group	item	
Chamber/cellar/vault	Length x Average Width x Number of Structures in the Group	m ²	
Culvert	Length x Average Width x Number of Structures in the Group	m ²	
High Mast Lighting	Number of Structures in the Group	item	
Retaining Wall	Length x Height x Number of Structures in the Group	m ²	
Sign/signal gantry	Length x Number of Structures in the Group	m	
Structural earthworks - reinforced/strengthened soil/fill structure	Length x Average Width x Number of Structures in the Group	m ²	
Subway Pipe	Length x Average Width x Number of Structures in the Group	m ²	

9. Add-ons

2Q 2010 base rates indexed to 2Q 2015 for 2014/2015 prices

$$SC = \sum WC + TMC + PC + DC + OC$$

SC = Scheme cost

$\sum WC$ = Total works cost, i.e. the sum of all individual maintenance activities works cost for a structure calculated as described in the previous section.

TMC = Traffic Management Cost

PC = Preliminaries Cost

OC = Other Costs

DC = Design Cost

Table C.9.A: Preliminaries Cost		PC = $f_p \times \sum WC$
Works Cost	f_p (Factor for Preliminaries Cost)	
< £50k	0.2	
≥ £50k and < £250k	0.15	
≥ £250k and < £1m	0.125	
≥ £1m	0.1	

Table C.9.B: Other Costs		OC = $f_o \times \sum WC$
Works Cost	f_o (Factor for Other Costs)	
< £50k	0.2	
≥ £50k and < £250k	0.15	
≥ £250k and < £1m	0.125	
≥ £1m	0.1	

Table C.9.C: Traffic Management Cost		TMC = WD x TMR
TM Arrangement Description	TM Rate (£/hour)	
Shuttle Working / Lane Closure	£259	
Contraflow	£519	
Hardshoulder Closure	£138	
Waterway Possession	£305	
Railway Possession	£864	
Retaining Wall TM	£417	

WD = Works Duration, See Equation 6 in Part A: Methodology

Table C.9.D: Design Cost		DC = $f_D (\sum WC + TMC + PC + OC)$
Works Cost + TM + Prelims + Other Costs	f_D (Factor for Design Cost)	
< £50k	0.4	
≥ £50k and < £250k	0.2	
≥ £250k and < £1m	0.15	
≥ £1m	0.12	

Table C.9.E: Bridge - Works Location and TM Arrangements						
CSS Elements List	Works Location	Permissible TM Arrangement				
		Shuttle Working / Lane Closure	Contraflow	Hardshoulder Closure	Waterway Possession	Railway Possession
Br01 - Primary deck element	Below Deck	✓			✓	✓
Br02 - Transverse Beams	Below Deck	✓			✓	✓
Br03 - Secondary deck element	Below Deck	✓			✓	✓
Br04 - Half Joints/Hinge Joints	Below Deck	✓			✓	✓
Br05 - Tie beam/rod	Below Deck	✓			✓	✓
Br06 - Parapet beam or cantilever	Below Deck	✓			✓	✓
Br07 - Deck bracing	Below Deck	✓			✓	✓
Br08 - Foundations	Exclude	✓			✓	✓
Br09 - Abutments (incl. arch springing)	Below Deck			✓	✓	✓
Br10 - Spandrel wall/head wall	Below Deck	✓			✓	✓
Br11 - Pier/column	Below Deck	✓			✓	✓
Br12 - Cross-head/capping beam	Below Deck	✓			✓	✓
Br13 - Bearings	Below Deck		✓		✓	✓
Br14 - Bearing plinth/shelf	Below Deck	✓			✓	✓
Br15 - Superstructure drainage	Above Deck	✓				
Br16 - Substructure drainage	Below Deck	✓			✓	✓
Br17 - Waterproofing	Above Deck		✓			
Br18 - Expansion joints	Above Deck	✓				
Br19 - Finishes: deck elements	Below Deck	✓			✓	✓
Br20 - Finishes: substructure elements	Below Deck	✓			✓	✓
Br21 - Finishes: parapets/safety fences	Above Deck			✓		
Br22 - Access/walkways/gantries	Below Deck	✓			✓	✓
Br23 - Handrail/parapets/safety fences	Above Deck			✓		
B24 - Carriageway surfacing	Exclude					
Br25 - Footway/verge/footbridge surfacing	Exclude					
Br26 - Invert/river bed	Below Deck				✓	
Br27 - Aprons	Below Deck			✓	✓	✓
Br28 - Fenders/cutwaters/collision protection	Below Deck	✓			✓	
Br29 - River training works	Below Deck				✓	
Br30 - Revetment/batter paving	Below Deck				✓	
Br31 - Wing walls	Below Deck			✓	✓	✓
Br32 - Retaining walls	Below Deck	✓			✓	✓
Br33 - Embankments	Below Deck					
Br34 - Machinery	Exclude					
Br35 - Approach rails/barriers/walls	Above Deck					
Br36 - Signs	Above Deck			✓		
Br37 - Lighting	Exclude					
Br38 - Services	Exclude					

Table C.9.F: Retaining Wall - Works Location and TM Arrangements					
Element Type	Works Location	Permissible TM Arrangement			
		Retaining Wall TM	Hardshoulder Closure	Waterway Possession	Railway Possession
Rw01 - Foundations	Exclude	✓			
Rw02 - Primary Element	Adjacent	✓			
Rw03 - Secondary Element	Adjacent	✓			
Rw04 - Parapet beam/plinth	Adjacent	✓			
Rw05 - Drainage	Adjacent		✓	✓	✓
Rw06 - Movement/Expansion Joints	Adjacent	✓			
Rw07 - Finishes: Wall	Adjacent		✓	✓	✓
Rw08 - Finishes: Handrail/Parapet	Adjacent	✓			
Rw09 - Handrail/Parapets/Safety Fences	Adjacent	✓			
Rw10 - Carriageway: Top of Wall			Exclude		
Rw11 - Carriageway: Foot of Wall			Exclude		
Rw12 - Footway/verge: Top of Wall			Exclude		
Rw13 - Footway/verge: Foot of Wall			Exclude		
Rw14 - Embankment: Top of Wall	Adjacent	✓			
Rw15 - Embankment: Foot of Wall	Adjacent		✓	✓	✓
Rw16 - Invert/river bed	Adjacent			✓	
Rw17 - Aprons	Adjacent		✓	✓	✓

Table C.9.G: Sign/Signal Gantry - Works Location and TM Arrangements			
Element Type	Works Location	Permissible TM Arrangement	
		Shuttle Working / Lane Closure	Hardshoulder Closure
Sg01 - Foundations	Exclude	✓	
Sg02 - Truss/Beams/Cantilevers	Below gantry	✓	
Sg03 - Transverse Members	Below gantry	✓	
Sg04 - Columns/Supports/Legs	Below gantry	✓	
Sg05 - Finishes: truss/beam/cant.	Below gantry	✓	
Sg06 - Finishes: columns/supports	Below gantry	✓	
Sg07 - Finishes: other elements	Below gantry	✓	
Sg08 - Access walkway/deck	Below gantry	✓	
Sg09 - Access Ladder	Below gantry	✓	
Sg10 - Handrails	Below gantry	✓	
Sg11 - Base Connections	Below gantry		✓
Sg12 - Support to longitudinal connection	Below gantry	✓	
Sg13 - Sign and signal supports	Below gantry	✓	

Table C.9.H: Groups/Structures - Works Location and TM Arrangements

Element Type	Works Location	Permissible TM Arrangement					
		Shuttle Working / Lane Closure	Contraflow	Hardshoulder Closure	Waterway Possession	Railway Possession	Retaining Wall TM
St01 - Cantilever road sign	Adjacent			✓			
St02 - Chamber/cellar/vault	Within						
St03 - Culvert	Within						
St04 - High Mast Lighting	Adjacent			✓			
St05 - Retaining Wall	Adjacent						✓
St06 - Sign/signal gantry	Below gantry			✓			
St07 - Structural earthworks - reinforced/strengthened soil/fill structure	Adjacent						✓
St08 - Subway: Pipe	Within						

10. Penalties

2Q 2010 base rates indexed to 2Q 2015 for 2014/2015 prices

Table C.10.A: Traffic Restrictions			
ECS [At least one Element of "Very High" Importance]	Traffic Restriction	Structure Length (l)	Time over which the Traffic Restriction Applies [Days]
4.0 ≤ ECS < 5.0	One lane closed in each direction	l ≤ 10m	5
		10m < l ≤ 20m	10
		l > 20m	15
ECS ≥ 5.0	Entire bridge closed	N/A	30

Table C.10.B: Traffic Delay Costs	
<u>Category of Traffic Volume</u> [See Table C.1.A: Traffic Volume]	Daily Traffic Delay Rates (£/Day)
High	£996
Moderate	£695
Low	£301

11. Prioritisation

Priority = $f_1(ECl) + f_2(Rf + Tf + OBSf) + f_3(STf)$	
f_1	1.00
f_2	0.25
f_3	0.50

Traffic	Tf
High	1.0
Low	0.2
Moderate	0.5

Obstacle Crossed	OBSf	Associated Traffic Management Arrangements?					
		Contraflow	Hardshoulder Closure	Railway Possession	Retaining Wall TM	Shuttle Working / Lane Closure	Waterway Possession
Motorway	6.00	YES	YES	NO	NO	YES	NO
Local Road - A class	4.00	YES	YES	NO	NO	YES	NO
Local Road - B class	3.00	YES	YES	NO	NO	YES	NO
Local Road - C class	2.50	YES	YES	NO	NO	YES	NO
Local Road - unclassified	1.50	YES	YES	NO	NO	YES	NO
Pedestrian subway	1.00	NO	NO	NO	NO	NO	NO
Footway/cycleway	0.50	NO	NO	NO	NO	NO	NO
Watercourse - Navigable	1.00	NO	NO	NO	NO	NO	YES
Watercourse - Non Navigable	0.10	NO	NO	NO	NO	NO	NO
Bridle path	0.20	NO	NO	NO	NO	NO	NO
Farmland/Disused	0.00	NO	NO	NO	NO	NO	NO
Railway: Freight	1.00	NO	NO	YES	NO	NO	NO
Railway: Inter-City Line	9.00	NO	NO	YES	NO	NO	NO
Railway: Suburban, Tram, Underground	5.00	NO	NO	YES	NO	NO	NO
Business and Community Premises	5.00	NO	NO	NO	NO	NO	NO
Residential Premises	2.50	NO	NO	NO	NO	NO	NO
Other	2.00	NO	NO	NO	NO	NO	NO

Route Supported	Rf	Associated Traffic Management Arrangements?					
		Contraflow	Hardshoulder Closure	Railway Possession	Retaining Wall TM	Shuttle Working / Lane Closure	Waterway Possession
Motorway	6.00	YES	YES	NO	YES	YES	NO
Local Road - A class	4.00	YES	YES	NO	YES	YES	NO
Local Road - B class	3.00	YES	YES	NO	YES	YES	NO
Local Road - C class	2.50	YES	YES	NO	YES	YES	NO
Local Road - unclassified	1.50	YES	YES	NO	YES	YES	NO
Footbridge	0.50	NO	NO	NO	NO	NO	NO
Aqueduct	0.20	NO	NO	NO	NO	NO	NO
Bridleway	0.20	NO	NO	NO	NO	NO	NO
Livestock bridge	0.50	NO	NO	NO	NO	NO	NO
Other	2.00	NO	NO	NO	NO	NO	NO

Structure Type	Sub-Group Criterion	STf (scale of 1 to 10)	Traffic Management Required?	AVF Structure Type	
				AVF Structure Type	Structure Size Formula
Bridge: Vehicular	Single span	6	YES	Bridge	Number x Length x Average Width
	2 and 3 span	8	YES	Bridge	Number x Length x Average Width
	4 and more span	10	YES	Bridge	Number x Length x Average Width
Bridge: Pedestrian/cycle	Single span	4	NO	Bridge	Number x Length x Average Width
	Multi span	6	NO	Bridge	Number x Length x Average Width
Cantilever Road Sign [Same as cantilever sign/signal gantry]	N/A	4	YES		Number
Chamber/cellar/vault	N/A	6	NO		Number
Culvert	Single cell	6	NO	Small Culvert	Number x Length x Average Width
	Multi cell	10	NO	Small Culvert	Number x Length x Average Width
	Depth of Fill > 1m [Exclude]	-	-	-	-
High Mast Lighting (>20m)	Depth of Fill ≤ 1m [Exclude]	-	-	-	-
	N/A	2	YES	High Mast	Number
Retaining Wall	Height > 3m	6	YES	Retaining Wall	Number x Length x Average Height
	Height ≤ 3m	4	YES	Retaining Wall	Number x Length x Average Height
Sign/signal gantry	Cantilever	4	YES	Sign/Signal Gantry	Number x Length
	Spanning	4	YES	Sign/Signal Gantry	Number x Length
Structural earthworks - reinforced/strengthened soil/fill structure	Height ≤ 3m	4	YES	-	-
	Height > 3m	6	YES	-	-
Subway: Pipe	N/A	4	NO	-	-
Tunnel	Bored	10	YES	Tunnel	Number x Length x Average Width
	Cut and Cover	10	YES	Tunnel	Number x Length x Average Width
Underpass (or subway): Pedestrian	N/A	4	NO	-	-
Underpass: Vehicular	N/A	6	YES	Tunnel	Number x Length x Average Width
Special structure	N/A [Exclude]	-	-	-	-

Extent	Severity				
	1	2	3	4	5
A	1				
B		2	3	4	
C		2.1	3.1	4.1	
D		2.3	3.3	4.3	
E		2.7	3.7	4.7	

Element Condition Factor (ECF)	
Very High	ECF = 0.0
High	ECF = 0.3 - [(ECS - 1) x 0.3 / 4]
Medium	ECF = 0.6 - [(ECS - 1) x 0.6 / 4]
Low	ECF = 1.2 - [(ECS - 1) x 1.2 / 4]

ECI = ECS - ECF but is always ≥ 1

12. Gross Replacement Cost

2Q 2010 base rates indexed to 2Q 2015 for 2014/2015 prices

Table C.12.A: Replacement Unit Rates					
Structure Type/Group	Sub Groups	Replacement Unit Rate	Sample Size	Rationale	Structure Size Formulae
Bridge: Vehicular	Single span	£6,382/m ²	14	Based on scheme data and engineering judgement	Number x Length x Average Width
	2 and 3 span	£4,577/m ²	1	Based on scheme data and engineering judgement	Number x Length x Average Width
	4 and more span	£3,266/m ²	1	Based on scheme data and engineering judgement	Number x Length x Average Width
Bridge: Pedestrian/cycle	Single span	£3,887/m ²	7	Based on scheme data and engineering judgement	Number x Length x Average Width
	Multi span	£2,333/m ²	0	Based on engineering judgement	Number x Length x Average Width
Cantilever Road Sign [Same as cantilever sign/signal gantry]	-	£88,564 per unit	0	Based on engineering judgement	Number
Chamber/cellar/vault	-	£4,428/m ²	0	Same as pipe subway	Number x Length x Average Width
Culvert	Single cell	£4,564/m ²	3	Based on scheme data and engineering judgement	Number x Length x Average Width
	Multi cell	£2,283/m ²	0	Based on engineering judgement	Number x Length x Average Width
	Depth of Fill > 1m	-	-	-	-
	Depth of Fill ≤ 1m	-	-	-	-
High Mast Lighting (>20m)	-	£26,569 per unit	1	Based on scheme data and engineering judgement	Number
Retaining Wall	Height > 3m	£2,167/m	1	Based on scheme data and engineering judgement	Number x Length
	Height ≤ 3m	£1,625/m	0	Based on engineering judgement	Number x Length
Sign/signal gantry	Cantilever	£8,856/m	0	Based on engineering judgement	Number x Length
	Spanning	£8,856/m	0	Based on engineering judgement	Number x Length
Structural earthworks - reinforced/strengthened soil/fill structure [Same as retaining wall]	Height ≤ 3m	£793/m ²	0	Based on engineering judgement	Number x Length x Average Width
	Height > 3m	£1061/m ²	0	Based on engineering judgement	Number x Length x Average Width
Subway: Pipe	-	£4,428/m ²	0	Based on engineering judgement	Number x Length x Average Width
Tunnel	Bored	£19,927/m ²	0	Based on engineering judgement	Number x Length x Average Width
	Cut and Cover	£13,285/m ²	0	Based on engineering judgement	Number x Length x Average Width
Underpass (or subway): Pedestrian	-	£4,299/m ²	0	Based on engineering judgement	Number x Length x Average Width
Underpass: Vehicular	-	£7,971/m ²	0	Based on engineering judgement	Number x Length x Average Width
Special structure	-	Structure specific	-	As required for the specific structure	-

Table C.12.B: Adjustment Factors				
ID	Factors	Value	Rationale	
1	Heritage	2.00	This is an indicative factor. Heritage and Special Structures are those that due to a combination of their size, construction and/or character are not suitable to be valued using standardised Unit Rates (e.g. the Jubilee Bridge). They should be valued individually using the principles given in the Transport Infrastructure Assets Code, including the concept of Modern Equivalent Asset. In many cases, this information is unlikely to be available therefore Heritage/Special Structure Unit Rates can be either: - MEA Unit Rates adjusted by an appropriate factor, either the default factor provided or a locally derived/agreed factor; or - Unit Rates derived using engineering judgement and experience (and advice sought from a Quantity Surveyor if appropriate).	
2	Replica Heritage	-	Based on engineering judgement	
	Conservation area	1.25		
3	Environmentally sensitive	1.40	Based on engineering judgement	
4	Route Supported	A, B or C	1.00	Based on scheme data
5		Unclassified	0.80	Based on scheme data
6	Obstacle crossed	Highway	1.00	Based on scheme data
7		Railway	2.00	Based on scheme data
8		Watercourse - Nav	1.00	Based on scheme data
9		Watercourse - Non-nav	0.90	Based on scheme data
10		Footway/cycleway	0.75	Based on engineering judgement
11		Tenant/business	1.10	Based on engineering judgement
12		Land/disused	0.90	Based on scheme data
13		Substandard Structures	0.85	Based on engineering judgement
14	Location	Urban	1.00	All schemes used were urban
15		Rural	0.70	Based on comparison with Surrey CC
16	River Wall	1.60	Based on engineering judgement	
17	Tunnel (150 – 400m)	1.00	Based on engineering judgement	
18	Tunnel (> 400m)	1.25	Based on engineering judgement	

13. Indexation

Gross Replacement Cost (GRC)

Unit Costs for Structure Sub-Groups and Additional Costs

The default unit costs for structure sub-groups and additional costs provided in the '12. GRC' worksheet are indicative values only.

Authorities are encouraged to derive their own unit rates and adjustment factors to suit the structures for which they are responsible. For transparency and auditability, it is important that the rationale for defined local unit rates and adjustment factors is fully documented.

Indexation

The ROADCON Index (Tender Price Index of Road Construction) has been used, rather than the Baxter Index, to adjust prices to reflect present day prices. The ROADCON index is factored by a number of criteria to calculate the ROAD PROJECT INDEX as follows:

Road Project Index = ROADCON Index × Location Factor × Type Factor × Value Factor

The ROADCON Index and associated factors are based on the second quarter (2Q) values from the previous financial year. These figures are published on the Building Cost Information Service (BCIS) Online (www.service.bcis.co.uk).

The unit rates in the '12. GRC' worksheet are based on (i) past structure construction costs that have been indexed to 2Q 2010 using the Road Project Index; and (ii) engineering judgement. The 2Q 2010 indexed unit rates are taken as the base unit rates to be indexed for future valuations. **(Note:** If new construction cost information becomes available post 2Q 2010, then the Unit Rates will be updated and re-set to a new base quarter.) In lieu of any re-basing using new scheme information, the rules described in the table below are adopted for indexation.

Reporting GRC in...	Indexation Rule	Factor Rules
2011/12	2Q 2010 base rates from the '12. GRC' worksheet used	N/A
2012/13	2Q 2010 base rates indexed to 2Q 2011 using the Road Project Index	Location Factor = as appropriate (e.g. London) Type Factor = New Construction Value Factor = £1m
2013/14	2Q 2010 base rates indexed to 2Q 2012 using the Road Project Index	
2014/15	2Q 2010 base rates indexed to 2Q 2013 using the Road Project Index	
etc.	...and so on	

The 2Q figures of the previous year are used to index unit rates because these values will be 'firm' at the time of valuation reporting (likely to be 2Q of the current year); there is a high likelihood that more recent values will still be 'provisional'.

Costs of Maintenance/Renewal Works

Unit Costs

The default unit costs for maintenance/renewal works provided in the '7. Base Unit Rates' worksheet are indicative values only.

Authorities are encouraged to derive their own unit rates to suit the structures for which they are responsible. For transparency and auditability, it is important that the rationale for defined local unit rates is fully documented.

Indexation

The ROADCON Index (Tender Price Index of Road Construction) has been used, rather than the Baxter Index, to adjust prices to reflect present day prices. The ROADCON index is factored by a number of criteria to calculate the ROAD PROJECT INDEX as follows:

Road Project Index = ROADCON Index × Location Factor × Type Factor × Value Factor

The ROADCON Index and associated factors are based on the second quarter (2Q) values from the previous financial year. These figures are published on the Building Cost Information Service (BCIS) Online (www.service.bcis.co.uk).

The unit rates in the '7. Base Unit Rates' worksheet are based on (i) past structure construction costs that have been indexed to 2Q 2010 using the Road Project Index; and (ii) engineering judgement. The 2Q 2010 indexed unit rates are taken as the base unit rates to be indexed for future valuations. **(Note:** If new cost information becomes available post 2Q 2010, then the Unit Rates will be updated and re-set to a new base quarter.) In lieu of any re-basing using new scheme information, the rules described in the table below are adopted for indexation.

Reporting GRC in...	Indexation Rule	Factor Rules
2011/12	2Q 2010 base rates from the '7. Base Unit Rates' worksheet used	N/A
2012/13	2Q 2010 base rates indexed to 2Q 2011 using the Road Project Index	Location Factor = as appropriate (e.g. London) Type Factor = Major Maintenance Value Factor = £1m
2013/14	2Q 2010 base rates indexed to 2Q 2012 using the Road Project Index	
2014/15	2Q 2010 base rates indexed to 2Q 2013 using the Road Project Index	
etc.	...and so on	

The 2Q figures of the previous year are used to index unit rates because these values will be 'firm' at the time of valuation reporting (likely to be 2Q of the current year); there is a high likelihood that more recent values will still be 'provisional'.

Indexation Example

Consider a scheme, that took place in London in 2003 (the quarter is unknown). At the time, the scheme cost £229k for a deck area of 5.90 m x 12.65 m = 74.64 m² (i.e. £3,068/m²). Since the quarter in which the scheme took place is unknown, use mean values for 2003 (i.e. the mean of the 1Q, 2Q, 3Q and 4Q values) when evaluating the Road Project Index:

$$\begin{aligned} \text{Road Project Index for Scheme Date and Scheme Location} &= \text{Mean ROADCON Tender Price Index of Road Construction for 2003} \\ &\quad \times \text{Mean ROADCON Location Factor for London for 2003} \\ &\quad \times \text{Mean ROADCON Type Factor for New Construction for 2003} \\ &\quad \times \text{Mean ROADCON Value Factor for £1m for 2003} \\ &= 120.5 \times 1.075 \times 0.9825 \times 1.0025 \\ &= \mathbf{127.6} \end{aligned}$$

$$\begin{aligned} \text{Road Project Index for Present Day and 'Average' Location} &= \text{ROADCON Tender Price Index of Road Construction for 2Q 2010} \\ &\quad \times \text{Mean ROADCON Location Factor for East, Midlands, North, London, South East, South West, Wales and Scotland (where figures are available)} \\ &\quad \quad \quad \text{for 2Q 2010} \\ &\quad \times \text{ROADCON Type Factor for New Construction for 2Q 2010} \\ &\quad \quad \times \text{ROADCON Value Factor for £1m for 2Q 2010} \\ &= 163 \times 1.072 \times 1.02 \times 1.02 \\ &= \mathbf{181.8} \end{aligned}$$

$$\begin{aligned} \text{Scheme Cost at Scheme Date and in Scheme Location} &= \mathbf{£3,068/m^2} \\ \text{Scheme Cost at Present Day and in 'Average' Location} &= £3,068/m^2 \times 181.8 \div 127.6 \end{aligned}$$

14. Element Codes

The following codes have been used in Section
[4a_Deterioration_Materials\(EI\)](#)
[\[See C.0.A - 013\]](#)

BRIDGE			
CSS Elements List [See C.0.A - 011]	Element Importance	Finite or Indefinite? [See C.0.A - 016]	Code
1 - Primary deck element	Very High	Indefinite	Br01
2 - Transverse Beams	Very High	Indefinite	Br02
3 - Secondary deck element	Very High	Indefinite	Br03
4 - Half Joints/Hinge Joints	Very High	Indefinite	Br04
5 - Tie beam/rod	Very High	Indefinite	Br05
6 - Parapet beam or cantilever	Very High	Indefinite	Br06
7 - Deck bracing	High	Indefinite	Br07
8 - Foundations [Exclude]	High	Indefinite	Br08
9 - Abutments (incl. arch springing)	High	Indefinite	Br09
10 - Spandrel wall/head wall	High	Indefinite	Br10
11 - Pier/column	Very High	Indefinite	Br11
12 - Cross-head/capping beam	Very High	Indefinite	Br12
13 - Bearings	High	Finite	Br13
14 - Bearing plinth/shelf	Medium	Finite or Indefinite	Br14
15 - Superstructure drainage	Medium	Finite or Indefinite	Br15
16 - Substructure drainage	Medium	Finite or Indefinite	Br16
17 - Waterproofing	Medium	Finite	Br17
18 - Expansion joints	High	Finite	Br18
19 - Finishes: deck elements	Medium	Finite or Indefinite	Br19
20 - Finishes: substructure elements	Medium	Finite or Indefinite	Br20
21 - Finishes: parapets/safety fences	Medium	Finite or Indefinite	Br21
22 - Access/walkways/gantries	Medium	Indefinite	Br22
23 - Handrail/parapets/safety fences	High	Finite or Indefinite	Br23
24 - Carriageway surfacing [Exclude]	Medium	Finite	Br24
25 - Footway/verge/footbridge surfacing [Exclude]	Low	Finite	Br25
26 - Invert/river bed	Medium	Indefinite	Br26
27 - Aprons	Medium	Indefinite	Br27
28 - Fenders/cutwaters/collision protection	Medium	Indefinite	Br28
29 - River training works	Medium	Indefinite	Br29
30 - Revetment/batter paving	Low	Indefinite	Br30
31 - Wing walls	High	Indefinite	Br31
32 - Retaining walls	Medium	Indefinite	Br32
33 - Embankments	Low	Indefinite	Br33
34 - Machinery [Exclude]	Medium	[Exclude]	Br34
35 - Approach rails/barriers/walls	-	Finite or Indefinite	Br35
36 - Signs	-	Finite	Br36
37 - Lighting [Exclude]	-	[Exclude]	Br37
38 - Services [Exclude]	-	[Exclude]	Br38

RETAINING WALL			
Element Type	Element Importance	Finite or Indefinite? [See C.0.A - 016]	Code
1. Foundations [Exclude]	High	Indefinite	Rw01
2. Primary Element	Very High	Indefinite	Rw02
3. Secondary Element	Very High	Indefinite	Rw03
4. Parapet beam/plinth	High	Indefinite	Rw04
5. Drainage	Medium	Indefinite	Rw05
6. Movement/Expansion Joints	Medium	Finite	Rw06
7. Finishes: Wall	Medium	Finite or Indefinite	Rw07
8. Finishes: Handrail/Parapet	Medium	Finite or Indefinite	Rw08
9. Handrail/Parapets/Safety Fences	High	Finite or Indefinite	Rw09
10. Carriageway: Top of Wall [Exclude]	Low	[Exclude]	Rw10
11. Carriageway: Foot of Wall [Exclude]	Low	[Exclude]	Rw11
12. Footway/verge: Top of Wall [Exclude]	Low	[Exclude]	Rw12
13. Footway/verge: Foot of Wall [Exclude]	Low	[Exclude]	Rw13
14. Embankment: Top of Wall	Low	Indefinite	Rw14
15. Embankment: Foot of Wall	Low	Indefinite	Rw15
16. Invert/river bed	Medium	Indefinite	Rw16
17. Aprons	Medium	Indefinite	Rw17

SIGN GANTRY			
Element Type	Element Importance	Finite or Indefinite? [See C.0.A - 016]	Code
1. Foundations [Exclude]	High	Indefinite	Sg01
2. Truss/Beams/Cantilevers	Very High	Indefinite	Sg02
3. Transverse Members	Very High	Indefinite	Sg03
4. Columns/Supports/Legs	Very High	Indefinite	Sg04
5. Finishes: truss/beam/cant.	Medium	Finite	Sg05
6. Finishes: columns/supports	Medium	Finite	Sg06
7. Finishes: other elements	Low	Finite	Sg07
8. Access walkway/deck	High	Indefinite	Sg08
9. Access Ladder	High	Indefinite	Sg09
10. Handrails	High	Indefinite	Sg10
11. Base Connections	Very High	Indefinite	Sg11
12. Support to longitudinal connection	Very High	Indefinite	Sg12
13. Sign and signal supports	Medium	Finite	Sg13

GROUPS/STRUCTURES			
Structure Type	Element Importance	Finite or Indefinite?	Code
Cantilever road sign	Very High	Finite	SI01
Chamber/cellar/vault	Very High	Indefinite	SI02
Culvert	Very High	Indefinite	SI03
High Mast Lighting	Very High	Finite	SI04
Retaining Wall	Very High	Indefinite	SI05
Sign/signal gantry	Very High	Finite	SI06
Structural earthworks - reinforced/strengthened soil/fill structure	Very High	Indefinite	SI07
Subway: Pipe	Very High	Finite	SI08

List of Data Required to Support the Structures Asset Management Planning Methodology

Note:
 Data is classified in the table below as essential and desirable where:
 > **Essential** - must be entered to support the analysis
 > **Desirable** - not essential for the calculation but would be useful to have
 Cells to be completed by the user are highlighted as:
 tan if Essential
 blue if Desirable

No.	Data Family	Data Group	Data Type	Essential/Desirable	Default Values Provided?	Description	Process
1	Network	Investment Planning	Authority Type <i>[select from drop-down menu]</i>	Essential	Yes	The type of authority, e.g. local authority or trunk road authority	- Determines the Asset Value Factors (AVF) used to calculate condition indicators
2	Asset Specific	Inventory	Identifier of Structure or Group of Structures <i>[must be unique in the model]</i>	Essential	No	A unique identifier of the structure or group of structures	- Enables the model to refer to the appropriate structure or group of structures in the calculations
3	Asset Specific	Inventory	Reference of Structure or Group of Structures	Desirable	No	The unique structure reference number or structures group identifier; may be sourced from the Structure Management System	- Enables ease of reference to other models and systems
4	Asset Specific	Inventory	Name or Description of Structure or Group of Structures	Essential	No	An identifier or description of the structure or group of structures	- Enables the model to refer to the appropriate structure or group of structures in the calculations
5	Asset Specific	Inventory	Structure Type for Modern Equivalent Asset of Structure or Group of Structures <i>[select from drop-down menu]</i>	Essential	No	The structure type for the Modern Equivalent Asset, e.g. Bridge: Vehicular (single span), Retaining Wall (height > 3m), Culvert (single cell), etc.	- Prompts the appropriate list of elements in the Element Database - Determines the appropriate unit rate for Gross Replacement Cost (Part C: Supporting Information, Section 12) - Determines the appropriate traffic management arrangements (Part C: Supporting Information, Section 11) - Used in the prioritisation algorithm (Part C: Supporting Information, Section 11)
6	Asset Specific	Inventory	Number of Structures in the Group of Structures	Essential	No	The number of structures in the specified group of similar structures; the minimum value is 1	- Used to calculate the Gross Replacement Cost (Part C: Supporting Information, Section 12) - Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate the cost of condition-triggered maintenance works - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10) - Used to calculate the average and critical Structure Stock Condition Indicators
7	Asset Specific	Inventory	Length (m) of Whole Structure or Whole Representative Structure for the Group	Essential <i>[except for cantilever road signs and high mast lighting]</i>	No	The total length of a structure or - if a group of structures has been specified - of the representative structure for the group	- Used to calculate the Gross Replacement Cost (Part C: Supporting Information, Section 12) - Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate the cost of condition-triggered maintenance works - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10) - Used to calculate the average and critical Structure Stock Condition Indicators
8	Asset Specific	Inventory	Average Width (m) of Structure or Representative Structure for the Group	Essential <i>[except for cantilever road signs, high mast lighting and retaining walls]</i>	No <i>[except: if not known for sign/signal gantries, then assume average width is 7m]</i>	The average width of a structure or - if a group of structures has been specified - of the representative structure for the group	- Used to calculate the Gross Replacement Cost (Part C: Supporting Information, Section 12) - Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate the cost of condition-triggered maintenance works - Used to calculate the average and critical Structure Stock Condition Indicators
9	Asset Specific	Inventory	Average Critical Headroom (m) of Structure or Representative Structure for the Group OR For Cantilever Road Signs, High Mast Lighting, Retaining Walls, Sign/Signal Gantries or Structural Earthworks, Average Height (m) of Structure or Representative Structure for the Group	Essential <i>[except for cantilever road signs, high mast lighting or structural earthworks]</i>	No <i>[except: if not known for bridges, vehicular underpasses or tunnels, then assume average critical headroom is 6m; if not known for chambers/cellars/vaults, then assume average critical headroom is 3m; if not known for culverts or pedestrian underpasses/subways, then assume average critical headroom is 3m; if not known for retaining walls, then assume average height is 3m; if not known for sign/signal gantries, then assume average height is 6m; if not known for pipe subways, then assume average height is 2m]</i>	The average critical headroom or the average height of a structure or - if a group of structures has been specified - of the representative structure for the group	- Used to calculate the Gross Replacement Cost (Part C: Supporting Information, Section 12) - Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate the cost of condition-triggered maintenance works - Used to calculate the average and critical Structure Stock Condition Indicators
10	Asset Specific	Inventory	Number of Spans of Structure or Representative Structure for the Group	Essential <i>[except for cantilever road signs, high mast lighting, retaining walls, sign/signal gantries or structural earthworks]</i>	No	The number of spans of a structure or - if a group of structures has been specified - of the representative structure for the group	- Used to calculate the Gross Replacement Cost (Part C: Supporting Information, Section 12) - Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate the cost of condition-triggered maintenance works - Used to calculate the average and critical Structure Stock Condition Indicators
11	Asset Specific	Inventory	Location of Structure or Group of Structures	Essential	No	The location where the structure is situated, i.e. Rural, Urban or Marine/Estuary	- Determines the exposure environment (Part C: Supporting Information, Section 2)
12	Asset Specific	Inventory	Route Type Supported by or Adjacent to the Structure(s) OR For Retaining Walls / Structural Earthworks, Route Type Adjacent to the Top of the Wall/Earthworks OR For Spanning Sign/Signal Gantries, Route Type Crossed	Essential	No	The route type supported by, adjacent to (the top of) or crossed by the structure or group of structures, as appropriate; examples include motorway, local road - A/B/C class, etc.	- Determines the exposure environment (Part C: Supporting Information, Section 2) - Used in the prioritisation algorithm (Part C: Supporting Information, Section 11)
13	Asset Specific	Inventory	Is the Route Type Supported by or Adjacent to the Structure(s) OR For Retaining Walls / Structural Earthworks, Route Type Adjacent to the Top of the Wall/Earthworks OR For Spanning Sign/Signal Gantries, Route Type Crossed salted?	Essential	No	Is the route type supported by, adjacent to (the top of) or crossed by the structure or group of structures, as appropriate, salted?	- Determines the exposure environment (Part C: Supporting Information, Section 2)

14	Asset Specific	Inventory	Traffic of Route Supported by or Adjacent to the Structure(s) OR For Retaining Walls / Structural Earthworks, Traffic of Route Adjacent to the Top or Foot of the Wall/Earthworks, Whichever is More Onerous OR For Spanning Sign/Signal Gantries, Traffic of Route Crossed	Essential	No	The traffic category (high, moderate or low) of the route type supported by, adjacent to (the top of) or crossed by the structure or group of structures, as appropriate	- Determines the exposure environment (Part C: Supporting Information, Section 2) - Used in the prioritisation algorithm (Part C: Supporting Information, Section 11) - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10)
15	Asset Specific	Inventory	Obstacle Crossed, if appropriate OR For Retaining Walls / Structural Earthworks, Route Type Adjacent to the Foot of the Wall/Earthworks	Essential <i>[except for cantilever road signs, high mast lighting and sign/signal gantries]</i>	No	The obstacle crossed by or adjacent to the foot of the structure or group of structures, as appropriate; examples include motorway, local road - A/B/C class, watercourse, etc.	- Determines the exposure environment (Part C: Supporting Information, Section 2) - Used in the prioritisation algorithm (Part C: Supporting Information, Section 11)
16	Asset Specific	Inventory	Is the Obstacle Crossed, if appropriate OR For Retaining Walls / Structural Earthworks, Route Type Adjacent to the Foot of the Wall/Earthworks salted?	Essential	No	Is the obstacle crossed by or adjacent to the foot of the structure or group of structures, as appropriate, salted?	- Determines the exposure environment (Part C: Supporting Information, Section 2)
17	Asset Specific	Inventory	Do the defined adjustment factors for Gross Replacement Cost apply to the structure or group of structures?	Essential	No	Do the defined adjustment factors for Gross Replacement Cost apply to the structure or group of structures?	- Used to calculate the Gross Replacement Cost (Part C: Supporting Information, Section 12)
18	Asset Specific	Inventory	Full Name of Element	Essential	No	Full name of element, based on the CSS Structure Inspection Elements	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate the cost of condition-triggered maintenance works - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10) - Used to calculate the average and critical Structure Stock Condition Indicators
19	Asset Specific	Inventory	Component/Material Type of Element	Essential	No	The component type or material type of the element	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate condition deterioration and the need and cost of condition-triggered maintenance works
20	Asset Specific	Inventory	Year of Last Inspection	Essential	No	The year when the element was last inspected	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate condition deterioration and the need and cost of condition-triggered maintenance works - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10) - Used to calculate the average and critical Structure Stock Condition Indicators
21	Asset Specific	Inventory	Element Condition at Last Inspection	Essential	No	The condition - in terms of Severity (on a scale of 1 to 5) and Extent (on a scale of A to E) of defect - recorded for the element when it was last inspected	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate condition deterioration and the need and cost of condition-triggered maintenance works - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10) - Used to calculate the average and critical Structure Stock Condition Indicators
22	Asset Specific	Inventory	Proximity to Traffic Spray Zone	Essential <i>[except for chambers/cellars/vaults, this is not applicable]</i>	No	The proximity of the element to the traffic spray zone <i>[for bridges/culverts/underpasses/subways/tunnels, this relates to traffic on the obstacle crossed; for cantilever road signs / cantilever sign/signal gantries / high mast lighting, this relates to traffic on the route adjacent to the structure; for retaining walls / structural earthworks, this relates to traffic on the routes adjacent to the top or foot of the wall/earthworks; for spanning sign/signal gantries, this relates to traffic on the route crossed]</i>	- Determines the exposure environment (Part C: Supporting Information, Section 2)
23	Asset Specific	Intervention Strategies	Maintenance/Renewal Strategies	Essential	No	The maintenance/renewal strategy that is to be applied to the element, i.e. Planned Preventive, Planned Targeted, Planned Do Minimum, and Unplanned Reactive	- Used to calculate the need for condition-triggered maintenance works
24	Asset Specific	Programmes of Work	Year of Work	Essential	No	The year in which a programme of work is scheduled to take place on an element; a value greater than or equal to 1 should be entered. Year 0 is 'today' when the essential data in the 'Structure Database' and 'Element Database' worksheets are up-to-date	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation
25	Asset Specific	Programmes of Work	Maintenance Action	Desirable	No	The name of the maintenance action that forms the programme of work scheduled to take place on an element	- Enables ease of reference and creates an audit trail
26	Asset Specific	Programmes of Work	Total Cost of Improvement Works	Essential	No	The total cost of the works scheduled to take place on an element as part of the programme of works, including costs for Traffic Management, Preliminaries, Design and Other	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation
27	Asset Specific	Programmes of Work	Condition after ALL Work on the Element is Completed in the Year	Essential	No	The condition - in terms of Severity (on a scale of 1 to 5) and Extent (on a scale of A to E) of defect - after ALL programmed work on an element is completed in the year	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate condition deterioration and the need and cost of condition-triggered maintenance works - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10) - Used to calculate the average and critical Structure Stock Condition Indicators
28	Network	Regular Maintenance	Expenditure on Routine Maintenance	Essential	No	Planned future expenditure on routine maintenance for the entire structure stock	- Used to calculate the overall expenditure on the structure stock
29	Network	Regular Maintenance	Expenditure on General Inspections	Essential	No	Planned future expenditure on General Inspections for the entire structure stock	- Used to calculate the overall expenditure on the structure stock
30	Network	Regular Maintenance	Expenditure on Principal Inspections	Essential	No	Planned future expenditure on Principal Inspections for the entire structure stock	- Used to calculate the overall expenditure on the structure stock
31	Network	Regular Maintenance	Expenditure on Structural Assessments	Essential	No	Planned future expenditure on Structural Assessments for the entire structure stock	- Used to calculate the overall expenditure on the structure stock
32	Network	Regular Maintenance	Expenditure on Other Regular Maintenance	Essential	No	Planned future expenditure on other regular maintenance for the entire structure stock	- Used to calculate the overall expenditure on the structure stock
33	Network	Investment Planning	Available Budget	Essential	No	The budget available over the investment period	- Used to calculate the Depreciated Replacement Cost - Used to calculate Accumulated Depreciation - Used to calculate condition deterioration and the need and cost of condition-triggered maintenance works - Used to calculate traffic delay costs (Part C: Supporting Information, Section 10) - Used to calculate the average and critical Structure Stock Condition Indicators