



Part Three

Defect/ Activity Matrices



**Queensland
Government**

Department of
Main Roads

Table of Contents

1.0	General	3-3
2.0	Defect Treatment.....	3-4
2.1	Bituminous Wearing Surface (10).....	3-4
2.2	Timber Barrier (2T)	3-5
2.3	Steel Barrier (2S).....	3-6
2.4	Guide Posts (2T, 2S)	3-7
2.5	Approach Guardrail (72S)*	3-8
2.6	Timber Kerbs (3T)	3-9
2.7	Concrete Kerbs (3C)	3-10
2.8	Timber Plank Deck (29T)	3-12
2.9	Plywood Sheet Deck (20T)	3-14
2.10	Concrete Slab Deck (20C)*	3-16
2.11	Prestressed Concrete Plank Deck (29P).....	3-17
2.12	Steel Trough Decking (30S)	3-19
2.13	Timber Crossbeams (28T)	3-21
2.14	Steel Crossbeams (28S).....	3-22
2.15	Concrete Overlay Deck (20C)*	3-23
2.16	Stress-Laminated Timber Deck (20T)	3-24
2.17	Footway - Timber Surface - HW Planks (4T)	3-26
2.18	Footway - Timber Surface - Ply Sheets (4T).....	3-27
2.19	Footway - Asphalt Surface - Steel Trough (4O)	3-28
2.20	Timber Spiking Plank (33T)	3-28
2.21	Timber Girders (22T).....	3-29
2.22	Steel Girders (22S)	3-31
2.23	Approved Alternative Girders (22O)	3-32
2.24	Timber Corbels (27T)	3-33
2.25	Concrete Corbels (27C)	3-35
2.26	Timber Headstocks (54T)	3-36
2.27	Steel Headstocks (54S).....	3-38
2.28	Concrete Headstocks (54C)	3-40
2.29	Concrete Packer (54C, 54P)*	3-41
2.30	Timber Piles (56T).....	3-42
2.31	Steel Piles (56C)	3-44
2.32	Concrete Piles (56P).....	3-45
2.33	Timber Wing Piles (60T)	3-46
2.34	Timber Bracing (57T)	3-48
2.35	Steel Bracing (57S).....	3-49
2.36	Timber Sills (59T)	3-50
2.37	Concrete Sills (59C)*	3-51
2.38	Concrete Abutment (50C)*	3-52
2.39	Masonry Abutment (50O)	3-54
2.40	Abutment Sheeting - Timber Planks (52T)	3-55

2.41	Abutment Sheeting - Concrete Planks (52P)	3-56
2.42	Abutment Infill - Concrete (52C)*	3-57
2.43	Abutment Infill - Rock Fill (52O)	3-58
2.44	Abutment Infill - Masonry (52O)	3-59
2.45	Timber Sill Abutment (52T)	3-60
2.46	Wing Walls - Timber Plank (51T)	3-61
2.47	Wing Walls - Concrete Plank (51P)	3-61
2.48	Wing Walls - Concrete (51C)*	3-62
2.49	Wing Walls - Masonry (51O)	3-63

* These give interim Maintenance Activities. Refer to Bridge Maintenance Manual (non-timber) for Maintenance Activities after release.

1.0 General

This section lists recommended repair procedures for various levels of defects in timber bridge components.

The various Condition States listed in Appendix D of the Bridge Inspection Manual are used as the basis for member condition. Appropriate routine and programmed repair activities have been assigned to these various condition states.

Standard Maintenance Activity Numbers corresponding to these operations are given. A detailed description of each of these Activity Numbers is given in Part 4 of this Manual.

As a guide to the most common forms of deterioration found in timber bridges, a 2004 study of BIS data for the full set of timber structures yielded the following percentages of components in Condition State 4:

Comp. No.	Component	Percentage
2T	Timber Barrier	29
3T	Timber Kerb	5
3C	Concrete Kerb	1
29T	Hardwood Decking	10
20T	Plywood Decking (Joint defects only*)	2
30S	Steel Trough Decking	2
33T	Spiking Plank	4
22T	Timber Girders	9
27T	Timber Corbels	6
27C	Concrete Corbels	4
54T	Timber Headstocks	11
54S	Steel Headstocks	1
56T	Timber Piles	12
57T	Timber Bracing	2
57S	Steel Bracing	0
52T	Timber Abutment Sheeting	9
52P	Concrete Slabs – Abutment Sheeting	4

Refer to Appendix A for a schedule of Maintenance Activity Numbers applicable to timber bridge maintenance.

2.0 Defect Treatment

2.1 Bituminous Wearing Surface (10)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
10	Bituminous wearing surface	2,3,4	Scuppers partly to fully blocked	RMPC	Routine bridge servicing (clear blocked scuppers)	100M11
		2,3,4	Grass & weed growth, isolated patches to excessive growth	RMPC	Routine bridge servicing (remove vegetation)	100M11
		2 & 3	Potholes forming, holding water & allowing penetration	Programmed	Patch pot holes with asphalt	105
		3	Rutting holding moisture & allowing penetration	Programmed	Surface correction with Premix or Asphalt	110
		3	Cracking holding water & allowing penetration	Programmed	Fill cracks	120
		3	Severe cracks over buried joints (including ply sheet joints)	Programmed	Excavate & replace asphalt (full depth, localised area) Fill cracks	157120
		4	Severe cracking with loss of sections & debonding, having a marked effect on rideability & drainage	Programmed	Excavate & replace asphalt (full depth)	157
		4	Potholes, rutting, bumps & depressions having a marked effect on rideability	Programmed	Excavate & replace asphalt (full depth)	157
		4	No drainage provision	Programmed	Provide new scuppers	100M6
		4	Large surface depressions	Programmed	Surface correction with Premix or Asphalt	110

Note: If the depth of asphalt wearing surface exceeds the thickness shown on the design drawings by more than 40mm, details should be forwarded to Structures Division to determine the effect on load carrying capacity of the structure. If it is found necessary to reduce the thickness of wearing surface, this may be carried out using RMPC Item 161 Profile Planning.

2.2 Timber Barrier (2T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
2T	Timber Barrier	2	Minor decay, splitting or cracking	Programmed	Apply chemical preservative to timber	100T1
		3	Moderate decay in posts &/or rails	Programmed	Replace timber post &/or Replace timber rail	2T1 2T2
		3	Medium splitting or cracking or cracking of posts or rails	Programmed	Replace timber post Replace timber rail	2T1 2T2
		3	Bolts loose in areas	RMPC or Programmed	Tighten existing bolts	120S1
		3	Some impact damage to posts &/or rails	Programmed	Replace timber post Replace timber rail	2T1 2T2
		3,4	Paint system completely broken down	Programmed	Paint or repaint timber	100T4
		4	Heavy decay – posts &/ or rails	Programmed	Replace timber post & / or Replace timber rail or Replace timber barrier with steel bridge rail*	2T1 2T2 2T3
		4	Heavy splitting, cracking in posts &/or rails	Programmed	Replace timber post & / or Replace timber rail or Replace timber barrier with steel bridge rail*	2T1 2T2 2T3
		4	Bolts quite loose, bolts missing or badly corroded	Programmed	Tighten existing bolts or Replace or install bolts	120S1 120S2
		4	Major impact damage	Programmed	Replace timber post or Replace timber rail or Replace or install bolts or Replace timber barrier with steel bridge rail*	2T1 2T2 120S2 2T3

* Unless already required by District policy, consideration should be given to removing any existing timber barrier and replacing it with a steel barrier.

2.3 Steel Barrier (2S)

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
2S	Steel Barrier	2	Protective system not effective – spot rusting on rails or posts	Programmed	Spot clean & paint steelwork Clean & paint bolts, nuts & washers	100S1 100S2
		3	Protective system broken down	Programmed	Clean & paint steelwork	100S3
		3	Timber posts split	Programmed	Replace timber post	2T1
		3	Some corrosion in steel posts	Programmed	Clean & paint steelwork	100S3
		3	Surface pitting on rails, posts, nuts & bolts	Programmed	Clean & paint steelwork	100S3
		3 & 4	Bolts or anchor bolts loose to very loose	RMPC or Programmed	Tighten existing bolts	120S1
		4	Timber posts severely split or decayed	Programmed	Replace timber post	2T1
		4	Severe corrosion of steel rails &/or posts	Programmed	Replace steel bridge rail &/or Replace steel post	2S1 2S2
		4	Severe accident damage	Programmed	Replace steel rail &/or Replace timber post or Replace steel post Replace anchor bolts (if damaged)	2S1 2T1 2S2 120S3
		4	Rails broken free	Programmed	Relocate steel rail	2S3
		4	Missing or severely corroded bolts & nuts & anchor bolts	Programmed	Replace or install bolts Replace anchor bolts	120S2 120S3
		4	Welds cracked	Programmed	Repair cracked weld	110S1
		4	Insufficient rail height	Programmed	Increase barrier height*	2S4
4	Packers to W-beam rail not installed	Programmed	Place post packer	2S5		

* A completely new barrier may be used as an alternative to achieve required height.

2.4 Guide Posts (2T, 2S)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
2T, 2S	Guide posts	2	Spot rusting of posts	Programmed	Spot clean & paint steelwork Clean & paint bolts, nuts & washers	100S1 100S2
		3	Protective system broken down	Programmed	Clean & paint steelwork Paint or repaint timber	100S3 100T4
		3	Timber posts split	Programmed	Replace timber post	2T1
		3	Some corrosion in steel posts	Programmed	Clean & paint steelwork	100S3
		3	Surface pitting on posts, nuts & bolts	Programmed	Clean & paint steelwork	100S3
		3 & 4	Anchor bolts loose to very loose	Programmed	Tighten existing bolts	120S1
		4	Timber posts severely split or decayed	Programmed	Replace timber post	2T1
		4	Severe corrosion of steel posts	Programmed	Replace steel post	2S2
		4	Severe accident or debris damage	Programmed	Replace steel post	2S2
		4	Missing or severely corroded bolts, nuts and anchor bolts	Programmed	Replace or install bolts Replace anchor bolts	120S2 120S3

2.5 Approach Guardrail (72S)*

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
72S	Steel Approach Guardrail	3	Moderate impact damage	Programmed	Monitor defect	-
		3	Poorly connected to end post	Programmed	Provide connections to end post or rail	72S4
		3	Heavy rusting	Programmed	Clean & paint steelwork	100S3
		3	Post spacing >1m close to bridge	Programmed	Add posts	72S2
		4	Heavy impact damage or demolished	Programmed	Replace guardrail section	72S1
		4	No connection to end post	Programmed	Provide connections to end post or rail	72S4
		4	Rail rusted through	Programmed	Replace guardrail section	72S1
		4	Insufficient strength – posts > 2 m apart	Programmed	Add posts	72S2
		4	Installation missing	Programmed	Install guardrail	72S3

* These activities are interim. Refer to Bridge Maintenance Manual when completed.

2.6 Timber Kerbs (3T)

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
3T	Timber Kerbs	2	Minor decay	Programmed	Apply chemical preservative to timber	100T1
		2	Minor splits or cracks	Programmed	Paint or repaint timber	100T4
		3	Tightness lost because of loose bolts	RMPC or Programmed	Tighten existing bolts	120S1
		3	Medium decay	Programmed	Apply chemical preservative to timber	100T1
		3	Medium splits or cracks or crushing	Programmed	Paint or repaint timber	100T4
		3	Active termite presence but minimal damage	Programmed	Poison termite nest or trails	110T2
		3, 4	Paint system completely broken down	Programmed	Paint or repaint timber	100T4
		4	Timber loose or missing – bolts very loose	Programmed	Replace kerb in hardwood or Replace kerb in ply or Replace or install bolts	3T1 3T2 120S2
		4	Heavy decay	Programmed	Replace kerb in hardwood or Replace kerb in ply	3T1 3T2
		4	Heavy splits or cracks	Programmed	Replace kerb in hardwood or Replace kerb in ply	3T1 3T2
		4	Heavy crushing	Programmed	Replaced kerb in hardwood or Replace kerb in ply	3T1 3T2
		4	Severe termite damage	Programmed	Replace kerb in hardwood or Replace kerb in ply	3T1 3T2

2.7 Concrete Kerbs (3C)

Defect / Activity Matrix

Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
3C	Concrete Kerbs	2	Bolts to timber girders slightly loose	RMPC or Programmed	Tighten existing bolts	120S1
		3	Moderate cracking due to corrosion of reinforcing (up to 20% loss of steel section)	Programmed	Break back cracked concrete Clean corroded reinforcing Patch concrete	100C1 140S1 100C3
		3	Moderate spalling due to corrosion of steel	Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		3	Moderate spalling due to impact damage	Programmed	Patch concrete	100C3
		3	Moderate cracking due to impact damage	Programmed	Break back cracked concrete Patch concrete	100C1 100C3
		3	Bolts to timber girders loose	Programmed	Tighten existing bolts	120S1
		3	Moderate cracking due to movement restraint or shrinkage	Programmed	Monitor defect	-
		3	Moderate spalling due to movement restraint or shrinkage	Programmed	Patch concrete	100C3
		4	Severe cracking due to movement restraint or shrinkage	Programmed	Replace kerb in concrete or Replace kerb in hardwood or Replace kerb in ply	3C1 3T1 3T2
		4	Severe spalling due to movement restraint or shrinkage	Programmed	Replace kerb in concrete or Replace kerb in hardwood or Replace kerb in ply	3C1 3T1 3T2

Continued

2.7 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
3C	Concrete Kerbs (continued)	4	Severe cracking due to reinforcement corrosion (>20% loss of section)	Programmed	Replace kerb in concrete or Replace kerb in hardwood or Replace kerb in ply	3C1 3T1 3T2
		4	Severe spalling due to reinforcement corrosion (>20% loss of section)	Programmed	Replace kerb in concrete Replace kerb in hardwood Replace kerb in ply	3C1 3T1 3T2
		4	Severe cracking due to impact (unsafe level)	Programmed	Replace kerb in concrete Replace kerb in hardwood Replace kerb in ply	3C1 3T1 3T2
		4	Severe spalling due to impact (unsafe level)	Programmed	Replace kerb in concrete Replace kerb in hardwood Replace kerb in ply	3C1 3T1 3T2
		4	Bolts to timber girders very loose	Programmed	Tighten existing bolts Replace or install bolts	120S1 120S2

* Concrete associated Activities are interim - refer to Bridge Maintenance Manual when completed.

2.8 Timber Plank Deck (29T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
29T	Timber Plank Deck (hardwood)	2	End spiking plank slightly loose	RMPC or Programmed	Tighten existing bolts	120S1
		2	Running & distributor planks slightly loose or held at ends only	RMPC or Programmed	Tighten existing bolts or Replace or install bolts	120S1 120S2
		2	Longitudinal decking - bolted connections slightly loose or held at ends only	RMPC or Programmed	Tighten existing bolts or Replace or install bolts	120S1 120S2
		3	Moderate decay - rotting under kerbs or running planks (minor effect on strength)	Programmed	Apply chemical preservative to timber Apply preservative grease to member ends	100T1 100T2
		3	Planks loose (loss of fixity at kerbs may allow rocking over inner girders, loss of camber)	Programmed	Replace or install bolts or Install distributor planks (HW) or Install distributors (steel) or Recamber girders	120S2 120T1 130S3 100M1
		3	End spiking plank connections loose	Programmed	Replace or install bolts	120S2
		3	Running & distributor planks split, broken sections or bolts loose allowing movement	Programmed	Replace & retighten running planks Replace & retighten distributor planks (HW) Tighten existing bolts or Replace or install bolts	29T31 20T21 20S11 20S2
		3	Steel distributors showing some corrosion and minor pitting	Programmed	Clean and paint steelwork	100S3
		3	Longitudinal decking - bolts loose or only 2 supports	Programmed	Tighten existing bolts Replace or install bolts	120S1 120S2

Continued

2.8 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
29T	Timber Plank Deck (hardwood) (continued)	4	Severe cracking & weathering (effects strength significantly)	Programmed	Replace hardwood deck planks or Replace deck planks in steel or Replace deck planks in ply Replace deck planks in PSC	29T1* 30S3 20T2 29P3
		4	Severe rotting at kerbs, spiking planks & running planks	Programmed	Replace hardwood deck planks or Replace deck planks in steel or Replace deck planks in ply or Replace deck planks in PSC	29T1* 30S3 20T2 29P3
		4	Planks excessively loose - loss of fixity at outer girders, loss of cambering	Programmed	Replace or install bolts Install distributor planks (HW) or Install distributors (steel) Recamber girders	120S2 120T1 130S3 100M1
		4	End spiking plank rotted, connections loosened - excessive movements	Programmed	Replace end spiking plank	29T2
		4	Running & distributor planks split, broken or completely loose	Programmed	Replace & retighten running planks Replace & retighten distributor planks (HW)	29T3 120T2
		4	Steel distributors severely corroded	Programmed	Replace distributors (Steel) Replace or install bolts	130S4 120S2
		4	Longitudinal decking - ends poor due to rot or splitting, bolting very loose	Programmed	Replace longitudinal deck planks in timber or Replace longitudinal deck planks in ply Remove, replace or install bolts	29T4 20T3 120S2
		4	Crossbeams rotted or completely loose	Programmed	Replace crossbeam Replace or install bolts	28T1 120S2



* Timber deck planks should be replaced as a single member. However, there may be cases where this is not practical or timber of sufficient length is not available to cover the deck width. In this case, Item number 29T5 shall be used.

2.9 Plywood Sheet Deck (20T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
20T	Plywood Sheet Deck	2	Support bolts slightly loose	RMPC or Programmed	Tighten existing bolts	120S1
		2	Distributors slightly loose or held at ends only	RMPC or Programmed	Tighten existing bolts or Replace or install bolts	120S1 120S2
		3	Well weathered look (generally exposed ends)	Programmed	Apply end sealant	100T5
		3	Rot pockets forming	Programmed	Apply chemical preservative to timber	100T1
		3	Bolting loose	RMPC or Programmed	Tighten existing bolts*	120S1
		3	Medium cracking in wearing surface at transverse sheet joints due to differential movement, inadequate bolting or joint treatment	Programmed	Fill cracks in WS Install distributor planks (HW) or Install distributors (Steel)	120 120T1 130S3
		3	HW distributors split, broken sections or bolts loose allowing movement	Programmed	Replace and retighten distributors planks (HW) or Replace or install bolts Tighten existing bolts	120T2 120S2 120S1
		3	Steel distributors showing some corrosion and minor pitting	Programmed	Clean and paint steelwork	100S3
		4	Severe weathering (exposed ends)	Programmed	Apply end sealant	100T5
		4	Severe rot - some laminations rotted out	Programmed	Replace ply sheet	20T1
		4	Surface damage to laminations due to wheel abrasion (after DWS failed)	Programmed	Replace ply sheet	20T1

Continued

2.9 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
20T	Plywood sheet Deck (continued)	4	Bolts may be very loose, washers may have punctured ply due to small washers allowing excessive movement	Programmed	Remove, replace or install bolts Install large washers	120S2 120S4
		4	Distributors may be broken or severely corroded or bolts completely loose	Programmed	Replace and retighten distributor planks (HW) or Replace distributors (Steel) Replace or install bolts or Tighten existing bolts	120T2 130S4 120S2 120S1
		4	AC over transverse sheet joints may be breaking up due to differential movement, inadequate jointing or bolt movement	Programmed	Replace or install bolts &/or Install distributor planks (HW) or Install distributors (Steel) Install channel tie-downs Excavate & replace asphalt full depth	120S2 120T1 130S3 130S1 157

* If bolt looseness is caused by crushing of the ply, install larger size washers using 120S4.

2.10 Concrete Slab Deck (20C)*

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
20C	Concrete Slab Deck	2	Minor spalling with corroding reinforcement visible (<10% loss of section)	Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		3	Moderate spalling with up to 20% loss of reinforcing area due to corrosion	Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		3	Moderate cracking - may be extensive crazed but no differential movement	RMPC	Monitor defect	-
		3	Moderate cracking - may be due to reinforcement corrosion - up to 20% loss of reinforcing area	Programmed	Break back cracked concrete Clean corroded reinforcing Patch concrete	100C1 140S1 100C3
		3	Large patches of dampness & efflorescence with stalactites	Programmed	(Requires improved deck waterproofing) Fill cracks (in WS) or Fill cracks with epoxy	120 100C2
		4	Severe cracking, crazed cracking with differential movement Advanced corrosion of reinforcing over large areas (>20% loss of section)	Programmed	Break back cracked concrete Clean corroded reinforcing Replace reinforcing Patch concrete	100C1 140S1 140S2 100C3
		4	Severe spalling. There may be advanced corrosion of reinforcing over large area (>20% loss of section)	Programmed	Clean corroded reinforcing Replace reinforcing Patch concrete	140S1 140S2 100C3

WS = Wearing surface.

* Activities shown are interim. Refer to Bridge Maintenance Manual when completed.

2.11 Prestressed Concrete Plank Deck (29P)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
29P	Prestressed Concrete Plank Deck	2	Some hold down bolts loose	Programmed	Tighten existing bolts	120S1
		2	Distributors slightly loose or held at ends only	RMPC or Programmed	Tighten existing bolts Replace or install bolts	120S1 120S2
		3	Moderate cracking	Programmed	Monitor defect	-
		3	Up to 20% loss of reinforcing section	Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		3	Corrosion on PS stand	Programmed	Replace PSC plank	29P1
		3	Moderate spalling due to movement	Programmed	Patch concrete	100C3
		3	Moderate edge spalling due to stones	Programmed	Monitor defect	-
		3	Many hold down bolts loose, possibly some missing	Programmed	Replace or install bolts	120S2
		3	Unit moving under load	Programmed	Reseat PSC plank	29P2
		3	Steel distributors showing some corrosion and minor pitting; bolts may be loose, allowing some movements	Programmed	Clean & Paint steelwork* Tighten existing bolts Replace or install bolts	100S3 120S1 120S2
		4	Severe cracking - possibly torsion	Programmed	Replace PSC plank	29P1
		4	Severe cracking kerb/barrier impact	Programmed	Fill cracks with epoxy	100C2
		4	Severe cracking bending/shear failure	Programmed	Replace PSC plank	29P1
		4	Heavy edge spalling or delamination	Programmed	Replace PSC plank	29P1
		4	Corrosion advanced (reinforcement)	Programmed	Replace PSC plank	29P1
		4	Corrosion advanced (PS strand)	Programmed	Replace PSC plank	29P1
4	Bolts very loose or missing	Programmed	Replace or install bolts	120S2		

Continued

2.11 Continued

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
29P	Prestressed Concrete Plank Deck (continued)	4	Excessive movement under load	Programmed	Reseat PSC Plank	29P2
		4	Distributors broken or severely corroded or bolts completely loose	Programmed	Replace distributors (Steel)* Replace or install bolts or Tighten existing bolts	130S4 120S2 120S1

* If distributors are removed for any repair work, traffic speed must be restricted to 20km/hr and no overload vehicles allowed to cross.

2.12 Steel Trough Decking (30S)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
30S	Steel Trough Decking	3	Medium corrosion at joints	Programmed	Excavate & replace asphalt infill (1) or Place reinforced concrete infill (2) & Clean and paint steelwork (at joints)	157 30S4 100S3
		3	Minor cracking at welds	Programmed	(1) or (2) as above and Repair cracked weld	110S1
		3	Tap screws loose or sheared	Programmed	(1) or (2) as above & Replace tap screws	30S5
		3	Plain concrete infill breaking up	Programmed	Break back cracked concrete Place reinforced concrete infill	100C1 30S4
		3	Moderate cracking, rutting, broken areas or potholes in asphalt	Programmed	Fill cracks in ACPatch potholes with asphalt	120 105
		3	Connections to supports slightly loose allowing movements	Programmed	Install channel tie downs or Tighten existing bolts	130S1 120S1
		4	Heavy corrosion of troughing with perforations	Programmed	Remove & replace steel trough decking or Place reinforced concrete slab	30S1 30S6
		4	Many tap screws broken or missing - units separating	Programmed	(1) or (2) as above & Replace tap screws	30S5
		4	Transverse cracking of troughing	Programmed	Strengthen steel troughing or Remove & replace steel trough decking	30S2 30S1
		4	Sagging & buckling of trough	Programmed	Place emergency propping Remove & replace steel trough decking Place reinforced concrete slab	100M9 30S1 30S6

Continued

2.12 Continued

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
30S	Steel Trough Decking (continued)	4	Holes in concrete infill	Programmed	Break back concrete infill Place reinforced concrete infill	100C1 30S4
		4	Asphalt severely cracked, rutted, broken patches or potholes	Programmed	Excavate & replace asphalt infill or Place reinforced concrete infill	157 30S4
		4	Hold down bolts completely loose	Programmed	Install channel tie downs Excavate & replace asphalt (500mm strip) or Tighten existing bolts	130S1 157 120S1
		4	Hold down bolts or channel tie-downs severely corroded	Programmed	Replace or install bolts Replace channel tie downs	120S2 130S2

2.13 Timber Crossbeams (28T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
28T	Timber Crossbeams	2	Minor splits, checks or decay	Programmed	1) Apply chemical preservative to timber 2) Apply preservative grease to member ends	100T1 100T2
		2	Bolted connections slightly loose	Programmed	Tighten existing bolts	120S1
		3	Medium decay	Programmed	(1) & (2) as above	100T1 100T2
		3	Medium cracking due to overloading	Programmed	Place additional crossbeams	28T2
		3	Medium cracking due to ineffective supports	Programmed	Refer to support type for repairs	-
		3	Medium cracking - span too large	Programmed	Place additional crossbeams	28T2
		3	Medium cracking - crossbeam not continuous	Programmed	Replace crossbeam	28T1
		3	Connections loose allowing excessive movement	Programmed	Tighten existing bolts	120S1
		3	Moisture softening, indentations & bulging from deck planks	Programmed	Replace crossbeam	28T1
		4	Heavy splitting - overloading	Programmed	Replace crossbeam Place additional crossbeams	28T1 28T2
		4	Heavy splitting - ineffective support	Programmed	Refer to support type for repairs	-
		4	Heavy splitting - not continuous	Programmed	Replace crossbeam	28T1
		4	Heavy decay & rot	Programmed	Replace crossbeam	28T1
4	Connections very loose - excessive movement under load	Programmed	Remove, replace or install bolts	120S2		

2.14 Steel Crossbeams (28S)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
28S	Steel Cross beams	2	Bolts slightly loose	Routine or Programmed	Tighten existing bolts	120S1
		2	Spot rusting	Programmed	Spot clean & paint steelwork	100S1
		3	Paint system completely broken down - some pitting & minor corrosion	Programmed	Clean & paint steelwork	100S3
		3	Nuts & bolts corroding	Programmed	Replace or install bolts	120S2
		3	Nuts & bolts loose	Programmed	Tighten existing bolts	120S1
		4	Welds cracked	Programmed	Repair cracked weld	110S1
		4	Nuts & bolts heavily corroded	Programmed	Replace or install bolts	120S2
		4	Nuts & bolts very loose	Programmed	Replace or install bolts	120S2
		4	Corrosion well advanced, significant loss of section effecting strength	Programmed	Replace crossbeam	28S1
		4	Excessive deflection or movement under load	Programmed	Replace crossbeam *	28S1
4	Buckling in webs, flanges or stiffeners	Programmed	Replace crossbeam *	28S1		

* Contact Structures Division to determine if additional crossbeams will also be necessary.

2.15 Concrete Overlay Deck (20C)*

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
20C	Concrete Overlay Deck	2,3,4	Scuppers partly to fully blocked	RMPC	Routine bridge servicing (clear blocked scuppers)	100M11
		2,3,4	Grass & weed growth - isolated patches	RMPC	Routine bridge servicing (remove vegetation)	100M11
		3	Moderate to severe shrinkage & plastic settlement cracking. May be crazed crack pattern - cracks holding water and allowing water penetration of overlay	Programmed	Fill cracks with epoxy (severe cracks only)	100C2
		3	Spalling of cover concrete up to 0.5m2 patches due to corroding reinforcement, there may be up to 20% loss of steel section area	Programmed	<ul style="list-style-type: none"> • Temporary pavement repairs • Clean corroded reinforcement • Patch concrete 	142 140S1 100C3
		4	Extensive crazed cracking of overlay with differential movement between sections - cracks allowing water penetration of overlay	Programmed	Remove and replace cracked overlay (full depth) Note 1	20C1
		4	Spalling of cover concrete >1m2 in patches. Some patches of overlay completely missing. There may be >20% loss of steel section	Programmed	<ul style="list-style-type: none"> • Temporary pavement repairs • Clean corroded reinforcing • Replace reinforcing • Patch concrete Note 1	142 140S1 140S2 100C3
		4	No drainage provision	Programmed	Provide new scuppers	100M6
		4	Skid resistance reduced due to surface polishing	Programmed	Apply seal coating (Contact Structures Division to determine if extra mass from surfacing is acceptable or if other procedures available)	118**

* Concrete associated activities are interim. Refer to Bridge Maintenance Manual when completed.

** Item could be considered to improve level of service, but not mandatory.

Note 1: There is the possibility that failure of the overlay is the result of excessive deterioration of the supporting timber decking. Before any repairs are programmed, an attempt must be made to try and determine decking adequacy. This will entail a visual / striking examination of the soffit together with possible drilling of the decking to determine rotting extent or termite damage.

2.16 Stress-Laminated Timber Deck (20T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenanc e Category	Activities	
No.	Type				Action	No.
20T	Stress Laminated Timber Deck	2	Some rusting visible on exposed stressing bars	Programmed	Clean & paint stressing bars (exposed section)	100S4
		3	Some corrosion visible on exposed bars	Programmed	Check stressing bars Clean & paint stressing bars	20T4 100S4
		3	Kerb attachment bolts & deck anchor bolts showing corrosion <20% loss of section	Programmed	Clean & paint bolts, nuts & washers Sleeve bolts*	100S2 20T5
		3	Some squashing of timber behind anchor plates	Programmed	Monitor - contact Structures Division to check anchorage stresses	-
		3	Minor movement or separation of laminations due to stressing bars losing stress	Programmed	Restress deck	20T6
		3	Rot pockets forming	Programmed	Apply chemical preservative to timber	100T1
		3	Leaching of preservatives	Programmed	Apply chemical preservative to timber	100T1
		3	Anchor bolts loose	Programmed	Tighten existing bolts	120S1
		4	Severe weathering (softwood,HW)	Programmed	Apply chemical preservative to timber	100T1
		4	Severe rot in laminations	Programmed	Replace laminates	20T10
		4	Substantial loss of preservatives	Programmed	Apply chemical preservative to timber	100T1
		4	Anchor bolts very poor, excessive movements, bolts very loose	Programmed	Replace or install bolts Sleeve bolts*	120S2 20T5
		4	Stressing bars severely corroded>10% loss of section	Programmed	Replace stressing bars Sleeve stressing bars	20T70 T8
		4	Substantial squashing of timber behind anchor plates	Programmed	Replace anchor plates	20T9

Continued

2.16 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
20T	Stress Laminated Timber Deck (continued)	4	Severe movement of separation of laminates with consequent excessive deflections	Programmed	Restress deck **	20T6
		4	Severe corrosion of kerb bolts & deck anchor bolts	Programmed	Replace or install bolts Replace anchor bolts Sleeve bolts*	120S2 120S3 20T5

* Where ACZA timber treatment has been applied to the SLT deck.

** Excessively distorted slab decks should be returned as closely as possible to a planar surface by jacking prior to deck restress.

2.17 Footway - Timber Surface - HW Planks (4T)

3

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
4T	Footway (timber surface) Hardwood Planks	2	A few loose planks	Programmed	Tighten footpath fasteners	120S6
		3	Medium decay (danger to pedestrians)	Programmed	Replace timber planks	4T1
		3	Medium splitting or cracking or crushing (danger to pedestrians)	Programmed	Replace timber planks	4T1
		3	Planks generally loose (danger to pedestrians) Fasteners may be corroded	Programmed	Tighten footpath fasteners or Replace footpath fasteners	120S61 20S7
		3	Plank gaps (danger to pedestrians)	Programmed	Reposition / Reseat timber planks	4T2
		3	Uneven surface (danger to pedestrians)	Programmed	Reposition / Reseat timber planks	4T2
		4	Heavy decay	Programmed	Replace timber planks	4T1
		4	Heavy splitting cracking	Programmed	Replace timber planks	4T1
		4	Heavy crushing	Programmed	Replace timber planks	4T1
		4	Planks broken or planks missing or planks very loose (major danger to pedestrian)	Programmed	Replace timber planks or Tighten footpath fasteners or Replace footpath fasteners	4T1 120S6 120S7
		4	Exposed ends of HW decking badly weathered	Programmed	Apply chemical preservative to timber Apply preservative grease to member ends	100T1 100T2

Where a footpath is formed by the continuation of roadway decking, also refer to 2.8 for general repair requirements.

2.18 Footway - Timber Surface - Ply Sheets (4T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
4T	Footway (timber surface) Ply Sheets	2	A few sheets loose	Programmed	Tighten footpath fasteners	120S6
		3	Medium decay (danger to pedestrians)	Programmed	Replace ply sheet	4T3
		3	Sheets generally loose (danger to pedestrians) Fasteners may be corroded	Programmed	Tighten footpath fasteners or Replace footpath fasteners	120S6 120S7
		3	Uneven surface(danger to pedestrians)	Programmed	Reseat ply sheet	4T4
		3	Non-slip surfacingdelaminating	Programmed	Reapply non- slip surfacing	100T6
		4	Heavy decay, some laminations rotted out	Programmed	Replace ply sheet	4T3
		4	Sheets broken or very loose (major danger to pedestrians)	Programmed	Replace ply sheet Tighten footpath fasteners or Replace footpath fasteners	4T3 120S6 120S7
		4	Exposed ends of ply badly weathered	Programmed	Apply end sealant	100T5
		4	Non-slip surfacingmissing in patches	Programmed	Reapply non-slip surfacing	100T6

Where a footpath is formed by the continuation of roadway decking, also refer to 2.9 for general repair requirements.

3

2.19 Footway - Asphalt Surface - Steel Trough (40)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
40	Footway - asphalt surface	3	Small broken up areas & pot holes	Programmed	Patch pot holes with asphalt	105
		3	Moderate corrosion of kerb or edge plate	Programmed	Spot clean & paint steelwork	100S1
		4	Surface heavily cracked	Programmed	Fill cracks in surfacing	120
		4	Surface broken up over large areas	Programmed	Excavate & replace asphalt	157
		4	Severe corrosion & holes in kerb or edge plates	Programmed	Repair corroded plate Clean & paint steel work	110S2 100S3

2.20 Timber Spiking Plank (33T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
33T	Timber Spiking Plank	2 or 3	Minor to medium decay	Programmed	Apply chemical preservative to timber	100T1
		2 or 3	Minor to medium splits & cracks	Programmed	Apply chemical preservative to timber	100T1
		3	Medium crushing	Programmed	Tighten existing bolts & monitor or Replace spiking plank*	120S1 33T1
		4	Heavy decay	Programmed	Replace spiking plank	33T1
		4	Heavy splitting	Programmed	Replace spiking plank	33T1
		4	Heavy crushing	Programmed	Replace spiking plank	33T1

* Where crushing is localised, temporary repair of a short section of the spiking plank may be used pending full replacement.

2.21 Timber Girders (22T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
22T	Timber Girders	2	Girder/corbel/headstock bolts loose	RMPC	Tighten existing bolts	120S1
		2	Active termite evidence	RMPC	Drill & inject termiticide poison into timber	110T1
		2	Minor surface decay (may also be pipe rot or termite damage up to 30% diameter loss at mid span or up to 20% loss at ends) End preservative treatment ineffective	Programmed	Apply chemical preservative to timber	100T1
					Apply preservative grease to girder ends.	100T2
		3	Medium surface decay or fire damage (affecting strength)	Programmed	Apply chemical preservative to timber (check restrictions**)	100T1
		3	Pipe rot or termite damage over 30% and up to 50% diameter loss at mid span or over 20% and up to 35% loss at ends (affecting strength)	Programmed	Monitor girder	-
		3	Active termite evidence	Programmed	Drill & inject termiticide poison into timber	110T1
		3	Large splits or checks (affecting strength)	Programmed	Strengthen split or sniped girder or Place supplementary	22T1 22T3
		3	Crushing near girder end	Programmed	Place supplementary member	22T3
		3	Bolts very loose or corroding	Programmed	Replace or install bolts	120S2
3	Large snipes at the ends of girders causing between 10% and 15% loss of section depth - refer to Figures 8.1 Part 2.	Programmed	Monitor girder	-		

Continued

2.21 Continued

3

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
22T	Timber Girders (continued)	4	Severe surface decay or fire damage & holes (strength severely effected)	Programmed	Replace timber girder or Replace timber girder with steel girder (option*) or Replace girder with approved alternative girder (option*)	22T2 22S4 22O1
		4	Pipe rot or termite damage over 50% and up to 70% diameter loss at mid span or over 35% and up to 50% loss at ends (strength severely effected) If above these limits, seek advice from Structures Division.	Programmed	Replace timber girder or Replace timber girder with steel girder (option*) or Replace girder with approved alternative girder (option)*	22T2 22S4 22O1
		4	Severe splitting (strength severely effected)	Programmed	Replace timber girder or Replace timber girder with steel girder (option*) or Replace girder with approved alternative girder (option*)	22T2 22S4 22O1
		4	Bolt threads & nuts severely corroded &/or very loose	Programmed	Replace or install bolts	120S2
		4	Large snipes at ends of girders causing from 16% up to 30% loss of section depth - refer to Figure 8.1 in Part 2	Programmed	Strengthen split or sniped girder	22T1
		4	Large snipes at the ends of girders causing greater than 30% loss of section depth - refer to Figures 8.1 in Part 2	Programme	Replace timber girder or Replace timber girder with steel girder (option*) or Replace girder with approved alternative girder	22T2 22S4 22O1

* The option to use steel girder replacement would require full span girder and deck replacement. Replacement in timber is the preferred option.

** Where a reduced section girder is to remain in service, advise BAM to determine if load restrictions are required.

Note that alternative girders (22O) are still under development and must be approved by Structures Division before use. Refer to 2.23 for further comment.

2.22 Steel Girders (22S)

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
22S	Steel Girders	2	Paint or galvanizing no longer effective, spot rusting but no corrosion	Programmed	Spot clean & paint steelwork	100S1
		3	Paint or galvanizing completely broken down, active corrosion in isolated areas, some surface pitting	Programmed	Clean & paint steelwork	100S3
		3	Nuts & bolts corroded but tight rivets sound, may be small plate movement	Programmed	Clean & paint bolts, nuts & washers	100S2
		3	Significant permanent distortion due to impacts	Programmed	Strengthen steel girder*	22S1
		3	Lateral bowing under load to lack of lateral bracing	Programmed	Install top flange restraints*	22S2
		4	Severe corrosion of webs or flanges Loss of section effecting strength	Programmed	Strengthen steel girder* Clean & paint steel work	22S1 100S3
		4	Bolts & rivets severely corroded - not carrying full load (may be loose)	Programmed	Replace or install bolts Replace rivets	120S2 120S5
		4	Welds cracking	Programmed	Repair cracked weld*	110S1
		4	Cracks in flanges or webs	Programmed	Strengthen steel girders*	22S1
		4	Girder bows visibly under traffic due to lack of top flange restraint	Programmed	Install top flange restraints*	22S2
		4	Permanent bowing, buckling or distortion of webs, flanges or stiffeners	Programmed	Straighten steel girder*	22S3
		4	Splice bolts missing	Programmed	Replace or install bolts	120S2
		4	Gross impact distortion of web &/or flanges	Programmed	Replace buckle area*	22S5
		4	Excessive deflection under load	Programmed	Strengthen steel girder* (may require replacement girder)	22S1
		4	Excessive plate movement due to broken or missing rivets	Programmed	Replace rivets	120S5

* For these items, existing girder details are to be submitted to Structures Division for preparation of job details.

2.23 Approved Alternative Girders (220)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
220	Approved Alternative Girders					

This component as been included only because of its extreme importance for future maintenance work.

This component is still being developed and no condition states have been developed as yet for inclusion in the BIM.

2.24 Timber Corbels (27T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
427T	Timber Corbels	2	Bolts slightly loose	RMPC	Tighten existing bolts	120S1
		2	Minor termite attack (active)	RMPC or Programmed	Drill & inject termicide poison into timber (also adjacent areas)	110T1
		2	Minor surface decay. (May also be pipe rot up to 20% of diameter). End preservative treatment ineffective	Programmed	Apply chemical preservative to timber. Apply preservative grease to corbel ends	100T1 100T2
		3	Moderate surface decay. There may be pipe rot over 20% and up to 35% diameter	RMPC or Programmed	Apply chemical preservative to timber	100T1
		3	Moderate splits or checks	Programmed	Strengthen corbel	27T1
		3	Moderate crushing	Programmed	Strengthen corbel	27T1
		3	Moderate termite attack	RMPC or Programmed	Drill & inject termicide poison into timber (also adjacent areas)	110T1
		3	Bolts loose, corbel rocking under load	RMPC or Programmed	Tighten existing bolts or Replace or install bolts	120S1 120S2
		3	Snipe depths are between 10% and 18% of corbel depth	RMPC	Monitor for signs of distress	-
		4	Heavy surface decay (marked effect on strength)	Programmed	Replace timber corbel	27T2
		4	Heavy splitting (marked effect on strength)	Programmed	Replace timber corbel	27T2
		4	Heavy crushing (marked effect on strength)	Programmed	Replace timber corbel	27T2

Continued

2.24 Continued

Defect / Activity Matrix

Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
27T	Timber Corbels(continued)	4	Heavy termite attack (marked effect on strength)	Programmed	Replace timber corbel & Drill & inject termicide poison into adjacent timber (girders & headstocks)	27T2 110T1
		4	Pipe rot over 35% and possibly in excess of 50% diameter loss.	Programmed	Replace timber corbel	27T2
		4	Bolts very loose, corbel rocking under load and bolts may be corroded	Programmed	Tighten existing bolts or Replace or install bolts	120S1 120S2
		4	Snipe depths are between 19% and 25% of the corbel depth.	RMPC	Monitor for signs of distress and make preparations for strengthening or replacement.	-
		4	Snipe depth exceeds 25% of corbel depth	Programmed	Strengthen corbel or Replace timber corbel	27T1 27T2

2.25 Concrete Corbels (27C)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
27C	Concrete Corbels	2	Bolts slightly loose or corroding	RMPC or Programmed	Tighten existing bolts or Clean & paint bolts, nuts & washers	120S1 100S2
		3	Moderate spalling due to edge loading or reinforcing corrosion	Programmed	Patch concrete	100C3
		3	Bolts loose (girders moves under load) may have lost up to 20% of bearing area	Programmed	Tighten existing bolts or Replace or install bolts	120S1 120S2
		3	Significant loss of bearing area	Programmed	Patch concrete	100C3
		4	Severe cracking	Programmed	Break back cracked concrete Clean corroded reinforcing Patch concrete	100C1 140S1 100C3
		4	Severe spalling due to edge loading, reinforcing corrosion and girder contact bearing area is significantly reduced	Programmed	Clean corroded reinforcing &/or Patch concrete	140S1 100C3
		4	Bolts badly corroded >20% loss of section	Programmed	Replace or install bolts	120S2

* Activities shown are interim - Refer to Bridge Maintenance Manual when completed.

2.26 Timber Headstocks (54T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
54T	Timber Headstocks	2 or 3	Minor or moderate weathering, splits, checks or decay. End preservative treatment ineffective	RMPC*	Apply chemical preservative to timber & Apply preservative grease & Replace or provide metal caps to member ends	100T1 100T2 100T3
		2 or 3	Signs of termite infestation with damage varying from insignificant to minor. May be termite nest between members	RMPC*	Drill & inject termiticide poison into timber & Poison termite nest or trails	110T1 110T2
		2 or 3	Headstock to pile bolts slightly loose to loose but only minimal corrosion evident.	RMPC	Tighten existing bolts	120S1
		3	Headstock sagged with minor moment crack (between piles)	Programmed	Place supplementary member	54T1
		3	Existing headstock splice pulling apart	Programmed Temporary repairs	Place supplementary member Reconstruct splice Place emergency propping	54T1 54T2 100M9
		3	Headstocks pulling off piles (see note 1)	Programmed	Relocate headstocks	54T3
		3	Headstocks crushing at pile support (see note 2)	Programmed	Place supplementary member	54T1
		3 & 4	Headstock sagged or moving under load due to pile settlements or loss of toe support (see note 3)	Programmed	Jack girder or headstock to level	54T4

Continued

2.26 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
54T	Timber Headstocks (continued)	4	Heavily decayed, weathered, severely split or cracked, severe termite damage or severe fire damage	Programmed	Replace headstock in timber (1) or Replace timber headstock with steel alternative (2) (see note 4) or Place supplementary member (3)	54T5 54S4 54T1
		4	As above, but over a localized area	Programmed	As above (1), (2), (3), or splice in new headstock section (4) (see note 5)	54T6
		4	Large sags or moment cracks	Programmed Temporary repairs	As above (1), (2), (3), (4) or Place supplementary members (5) or Place emergency propping	54T1 100M9
		4	Existing splice broken apart	Programmed Temporary repairs	As above (1), (2), (3), (4), (5) or Reconstruct Splice or Place emergency propping	54T2 100M9
		4	Headstock to pile bolts very loose, badly corroding or missing	Programmed	Replace or install bolts	120S2
		4	Headstocks fully or almost pulled off pile seating (6) (see note 1)	Programmed	Relocate headstocks	54T3
		4	Headstock crushing at pile support (7) (see note 2)	Programmed	As above (1), (2), (3), (4), (5)	

* May also be included in programmed work.

NoteS

- (1) If seating below headstocks is comprised by pile defects such as splitting & decay, refer to repairs listed under 56T.
- (2) Full or partial replacement of headstock member may also be considered. If cause is related to pile defect, refer also to 56T repairs.
- (3) Cause of pile movements must be investigated in order to determine further actions.
- (4) Use steel alternative only if both members of an open headstock are to be replaced. Replacement in timber is the preferred option.
- (5) Use only timber for new section.

2.27 Steel Headstocks (54S)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
54S	Steel Headstocks	2	Spot rusting on painted or galvanised surfaces	Programmed	Spot clean & paint steelwork	100S1
		2 & 3	Minor rusting to minor corrosion of bolts, nuts & rivets	Programmed	Clean and paint bolts, nuts & washers	100S2
		2 & 3	Headstock to pile bolts slightly loose to loose but only minimal corrosion evident	RMPC or Programmed	Tighten existing bolts	120S1
		3	Paint system or galvanizing breakdown with corrosion & minor pitting or unpainted surfaces show minor pitting	Programmed	Clean & paint steelwork	100S3
		3	Headstock pulling off piles (see note 1)	Programmed	Relocate headstocks	54S1
		3	Minor bows & buckles	Programmed	Replace steel headstock or Strengthen steel headstock	54S2 54S3
		3 & 4	Headstock inadequate to carry loads (6) (see note 2)		Strengthen steel headstock Replace steel headstock	54S3 54S2
		3 & 4	Cracking in welds - faint to severe	Programmed	Repair cracked weld	110S1
		3 & 4	Headstock sagged or moving under load due to pile settlements or loss of toe support (see note 3)	Programmed	Jack girders or headstock to level	54S5
		4	Corrosion of h'tk is severe for painted, galvanised or unpainted surfaces	Programmed	Replace steel headstock or Strengthen steel headstock	54S2 54S3
4	Bolts, nuts & rivets severely corroded, loose, or missing	Programmed	Replace or install bolts	120S2		

Continued

2.27 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
54S	Steel Headstocks (continued)	4	Headstock fully or almost pulled off pile seating (see note 1)	Programmed	Relocate headstocks	54S1
		4	Large bows & buckles in headstock	Programmed	Replace steel headstock. (seek advice from Structures Division)	54S2

Notes:

- (1) If seating below headstocks is comprised by pile defects such as splitting & decay, refer to repairs listed under 56T.
- (2) Headstock is inadequate to carry loads if yielding of metal has occurred or excessive lateral or vertical movements are occurring under traffic loads.
- (3) Cause of pile movements must be investigated in order to determine further actions.

2.28 Concrete Headstocks (54C)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
54C	Concrete Headstocks	3	Medium cracking due to shrinkage	RMPC	Monitor defect	-
		3	Medium cracking due to reinforcing corrosion	Programmed	<ul style="list-style-type: none"> • Break back cracked concrete • Clean corroded reinforcing • Patch Concrete 	100C1 140S1 100C3
		3	Medium spalling, reinforcing exposed up to 20% loss of section; possible delamination	Programmed	<ul style="list-style-type: none"> • Clean corroded reinforcing • Patch concrete spall 	140S1 100C3
		3	Medium moment cracks	RMPC	Monitor defect	-
		3	Fine shear cracks	RMPC	Monitor defect	-
		4	Severe cracking due to shrinkage	Programmed	Fill cracks with epoxy	100C2
		4	Severe cracking due to heavily corroded reinforcing (>20% loss of section)	Programmed	<ul style="list-style-type: none"> • Break back cracked concrete • Replace reinforcing • Patch concrete 	100C1 140S2 100C3
		4	Severe spalling due to heavily corroded reinforcing; large delamination	Programmed	<ul style="list-style-type: none"> • Replace reinforcing • Patch concrete 	140S2 100C3
		4	Severe spalling at girder support	Programmed	Strengthen bearing area Patch concrete	100C4 100C3
		4	Heavy movement cracks	Programmed	Strengthen headstock	54C1
		4	Medium shear cracks	Programmed	Strengthen headstock	54C1
		4	Severe spalling due to impact	Programmed	Patch concrete	100C3

* Activities are interim. Refer to Bridge Maintenance Manual when completed.

2.29 Concrete Packer (54C, 54P)*

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
54C 54P	Concrete Packer	3	Medium cracking in RC insitu concrete or moderate cracking in precast concrete due to shrinkage	RMPC	Monitor defect	-
		3	Medium cracking in RC insitu concrete or moderate cracking in precast concrete due to reinforcing corrosion	Programmed	<ul style="list-style-type: none"> • Break back cracked concrete • Clean corroded reinforcing • Patch concrete 	100C1 140S1 100C3
		3	Medium spalling in RC insitu concrete or moderate spalling in precast concrete due to reinforcing corrosion (up to 20% loss of section)	Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		4	Severe cracking due to shrinkage	Programmed	Fill cracks with epoxy	100C2
		4	Severe cracking due to heavily corroded reinforcing (>20% loss of section)	Programmed	Break back cracked concrete Replace reinforcing Patch concrete	100C1 140S2 100C3
		4	Severe spalling due to heavily corroded reinforcing (>20% loss of section)	Programmed	Replace reinforcing Patch concrete	140S2 100C3
		4	Severe spalling at girder support area	Programmed	Strengthen bearing area & Patch concrete	100C4 100C3
		4	Severe spalling due for impact damage	Programmed	Patch concrete	100C3

* Activities are interim. Refer to Bridge Maintenance Manual when completed.

2.30 Timber Piles (56T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
56T	Timber Piles	2	Medium surface decay or with pipe rot up to 20% loss of diameter Top preservative treatment ineffective	RMPC	Apply chemical preservative to timber Apply preservative grease & replace or provide metal cap to pile tops	100T1 100T2 100T3
		2	Medium termite attack - on surface or up to 20% central loss of diameter	RMPC or Programmed	Drill & inject termiticide poison into timber	110T1
		2	Relieving props poorly braced or settling slightly	RMPC or Programmed	Place / reinstate relieving props	100M10
		2	Piles have ineffective bracing & connections slightly loose	Programmed	Replace braces / wales &/or Tighten existing bolts	57T1 120S1
		3	Heavy surface decay or with pipe rot over 20% and up to 35% loss of diameter (reduction in strength)	Programmed	Place supplementary member	56T3
		3	Heavy termite attack - on surface or over 20% loss of diameter and up to 35% central loss of diameter	Programmed	Place supplementary member	56T3
		3	Large splits especially under h'tk seating	Programmed	Provide banding	56T3
		3	Relieving props completely unbraced settled or easily dislodged	Programmed	Place / reinstate relieving props	100M10
		3	Bracing connections reasonably loose or heavily corroded	Programmed	Tighten existing bolts or Replace on install bolts	120S1 120S2

Continued

2.30 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
56T	Timber Piles (continued)	4	Severe surface decay effecting strength	Programmed	Replace timber pile (1) or Splice timber pile (2) or Place new steel pile (3)	56T1 56T2 56S2
		4	Heavy pipe rot over 35% loss of diameter and up to 50% loss of diameter	Programmed	As for (1), (2) or (3) above	56T1 56T2 56S2
		4	Severe termite attack on surface or over 35% central loss of diameter and up to 50% loss of diameter.	Programmed	As for (1), (2) or (3) above Drill & inject termiticide poison into timber h'tk	56T1 56T2 56S2 110T1
		4	Severe splitting affecting strength	Programmed	As for (1), (2) or (3) Above	56T1 56T2 56S2
		4	Relieving props completely ineffective	Programmed	Place / reinstate relieving props	100M10
		4	Bracing connections very loose, missing or completely ineffective	Programmed	Replace or install bolts	120S2

Where piles are replaced or spliced, removal and re-assembly of braces and wales will be covered by 57T3.

2.31 Steel Piles (56C)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
56S	Steel Piles	2	Connections slightly loose or corroded	Programmed	Tighten existing bolts Clean & paint bolts, nuts & washers	120S1 100S2
		3	Paint or galvanizing system completely failed, medium corrosion surface pitting <10% loss of section	Programmed	Clean & paint steelwork	100S3
		3	Unpainted surface moderately rusted, surface pitting <10% loss of section	Programmed	Clean & paint steelwork	100S3
		3	Connections heavily corroded or loose	Programmed	Replace or install bolts	120S2
		3	Bracing ineffective or missing (timber bridges only)	Programmed	Add new braces / wales - timber or Add new braces / wales - steel	57T2 57S2
		4	Bracing totally ineffective or missing (timber bridges only)	Programmed	Add new braces / wales - timber or Add new braces / wales - steel	57T2 57S2
		4	Connections very loose or severely corroded	Programmed	Replace or install bolts	120S2
		4	Severe corrosion of painted, galvanised or unpainted surfaces, up to 20% loss of section	Programmed	Strengthen steel pile Clean & paint steelwork	56S1 100S3

For steel wing piles requiring stabilisation, item 60T2 may be used.

2.32 Concrete Piles (56P)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
56P	Concrete Piles (Reinforced concrete, driven piles)	3	Moderate cracking due to reinforcing corrosion (up to 20% loss of section)	Programmed	<ul style="list-style-type: none"> • Break back cracked concrete • Clean corroded reinforcing • Patch concrete 	100C1 140S1 100C3
		3	Moderate spalling due to reinforcing corrosion (up to 20% loss of section)	Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		3	Medium flexural cracking	Programmed	Fill cracks with epoxy	100C2
		4	Severe cracking due to reinforcing corrosion (advanced)	Programmed	<ul style="list-style-type: none"> • Break back cracked concrete • Replace reinforcing • Patch concrete or • Place concrete encasement 	100C1 140S2 100C3 56P1
		4	Severe spalling due to advanced reinforcing corrosion	Programmed	<ul style="list-style-type: none"> • Replace reinforcing • Patch concrete or • Place concrete encasement 	140S2 100C3 56P1
		4	Heavy flexural cracking	Programmed	Place concrete encasement	56P1
		4	Heavy spalling due to impact	Programmed	Patch concrete	100C3

* This matrix is interim - refer to Bridge Maintenance Manual when completed for possible additional items.

Note: For components in Condition State 4 advice should be sought from Structures Division in order confirm appropriate repair procedures and methods.

2.33 Timber Wing Piles (60T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
60T	Timber Wing Piles	2	Medium surface decay, or with pipe rot up to 20% loss of diameter Top preservative treatment ineffective	RMPC	Apply chemical preservative to timber Apply preservative grease & replace or provide metal cap to pile tops	100T1 100T2 100T3
		2	Medium termite attack - on surface or up to 20% central loss of diameter	RMPC or Programmed	Drill & inject termicide poison into timber	110T1
		3	Heavy surface decay, or with pipe rot over 20% loss of diameter up to 35% loss of diameter (reduction in strength)	Programmed	Place supplementary member	56T3
		3	Heavy termite attack - on surface or over 20% central loss of diameter up to 35% loss of diameter	Programmed	Place supplementary member	56T3
		3	Large splits possibly reducing strength	Programmed	Place supplementary member	56T3
		3	Localised scour holes 2 to 4m depth	Programmed	Repair scour	100M3
		4	Severe surface decay effecting strength	Programmed	Replace timber wing pile (1) or Splice timber pile (2) or Place new steel pile (3)	60T1 56T2 56S2
		4	Heavy pipe rot over 35% loss of diameter and up to 50% loss of diameter	Programmed	As for (1), (2), or (3) above	60T1 56T2 56S2

Continued

2.33 Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
60T	Timber Wing Piles (continued)	4	Severe termite attack on surface or over 35% central loss of diameter and up to 50% loss of diameter.	Programmed	As for (1), (2), or (3) Above Drill & inject termicide poison into timber h'tk	60T1 56T2 56S2 110T1
		4	Severe splitting affecting strength	Programmed	As for (1), (2), or (3) Above	60T1 56T2 56S2
		4	Wing wall piles leaning forward excessively (> 40mm forward movement)	Programmed	Stabilise wing pile*seek structural advice on stabilising procedure from Structures Division	60T2
		4	Localised scour holes over 4m in depth.	Programmed	Repair scour	100M3



Where piles are replaced or spliced, removal and re-assembly of braces and wales will be covered by 57T3.

2.34 Timber Bracing (57T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
57T	Timber Bracing	2	A few bolts slightly loose	RMPC	Tighten existing bolts	120S1
		3	Moderate weathering, splits, checks & decay - minor effect on strength	Programmed	Apply chemical preservative to timber	100T1
		3	End preservative treatment ineffective (wales)	Programmed	Apply preservative grease to ends of wales & Replace or provide metal caps to wale ends	100T2 100T3
		3	Bolted connections loose allowing excessive movement	Programmed	Replace or install bolts	120S2
		3	Cracks due to overloading or ineffective bolted connections	Programmed	Replace or install bolts	120S2
		4	Severe splitting, cracking or decay with significant loss of strength	Programmed	Replace braces / wales*	57T1
		4	Bolts very loose, excessive member movement	Programmed	Replace or install bolts	120S2
		4	Bracing missing (& necessary) or broken loose	Programmed	Add new braces / wales* or Add new steel braces / wales Replace braces / wales*	57T2 57S2 57T1

* Wales may be spliced (57T4) if insufficient timber length is available for one piece replacement.

Note: Timber struts and fenders at piers may be treated generally as for timber bracing, using Item 57T5 for replacement of these members.

2.35 Steel Bracing (57S)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
57S	Steel Bracing	2	Minor rusting of nuts & bolts	Programmed	Clean & paint bolts, nuts & washers	100S2
		2	A few bolts slightly loose	RMPC	Tighten existing bolts	120S1
		3	Paint or galvanising broken down, corrosion & pitting	Programmed	Clean & paint steelwork	100S3
		3	Unpainted surface, moderate rusting, corrosion & pitting	Programmed	Clean & paint steelwork	100S3
		3	Welds - cracked (minor loss of capacity)	Programmed	Repair cracked weld	110S1
		4	Bolts - some missing, severe corrosion	Programmed	Replace or install bolts	120S2
		4	Rivets - some missing, severe corrosion	Programmed	Replace rivets	120S5
		4	Member corrosion well advanced - effecting strength	Programmed	Replace steel braces / wales	57S1
		4	Bracing broken loose or missing (& necessary)	Programmed	Replace steel braces / wales or Add new steel braces / wales	57S1 57S2

2.36 Timber Sills (59T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
59T	Timber sill	3	Large splits or checks reducing strength & causing crushing-also softening from water ingress	Programmed	Place /reinstate relieving props	100M10
		4	Excessive pipe rot or decay effecting strength	Programmed	Replace sill in timber (1) Replace sill in concrete (2) Partially replace sill in timber (3) Partially replace sill in concrete (4)	59T1 59C1 59T2 59C2
		4	Excessive splitting effecting strength	Programmed	As above (1), (2), (3), (4) (Options)	59T1 59C1 59T2 59C2
		4	Severe crushing at pile support area, causing structure settlement	Programmed	As above (1), (2), (3), (3) (Options)	59T1 59C1 59T2 59C2
		4	Undermining by scour causing structure settlement	Programmed	Repair scour	100M3
		4	Connections to U/S & D/S pile severely corroded	Programmed	Replace pile connections	59T3

2.37 Concrete Sills (59C)*

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
59C	Concrete Sill (Timber Bridges)	3	Moderate cracking due to reinforcing corrosion (up to 20% loss of section)	Programmed	Break back cracked concrete Clean corroded reinforcing Patch concrete	100C1 140S1 100C3
		3	Moderate cracking due to log impact	RMPC	Monitor defect	-
		3	Moderate cracking due to differential settlement	RMPC	Monitor defect	-
		3	Moderate spalling due to reinforcing corrosion (up to 20% loss of section)	Programmed	Clean corroded reinforcing Patch Concrete	140S1 100C3
		3	Moderate spalling due to log impact	Programmed	Patch concrete	100C3
		3	Moderate spalling due to differential settlement	Programmed	Patch concrete	100C3
		4	Heavy cracking due to reinforcing corrosion (may be >20% loss of section)	Programmed	Break back cracked concrete Clean corroded reinforcing Patch concrete	100C1 140S1 100C3
		4	Heavy cracking due to log impact	Programmed	Fill cracks with epoxy	100C2
		4	Heavy cracking due to differential settlement	Programmed	Fill cracks with epoxy	100C2
		4	Heavy spalling due to reinforcing corrosion (may be > 20% loss of section)	Programmed	Replace reinforcing & / or Patch concrete	140S2 100C3
		4	Heavy spalling due to log impact	Programmed	Patch concrete	100C3
		4	Heavy spalling due to differential settlement	Programmed	Patch concrete	100C3
		4	Footing undercut by scour, with possible settlement	Programmed	Repair scour	100M3
		4	Connections to U/S & D/S Piles severely corroded	Programmed	Replace pile connections	59C3

* Activities are interim. Refer to Bridge Maintenance Manual when completed.

2.38 Concrete Abutment (50C)*

3

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
50C	Concrete Abutment (Timber Bridges)	3	Moderate cracking due to corroding reinforcing (up to 20% loss of section)	Programmed	Break back cracked concrete Clean corroded reinforcing Patch concrete	100C1 140S1 100C3
		3	Moderate cracking due to edge loading	Programmed	Fill cracks with epoxy	100C2
		3	Moderate cracking due to differential movement	RMPC or Programmed	Monitor defect or Fill cracks with epoxy	100C2
		3	Moderate spalling due to corroding reinforcing (up to 20% loss of section)	RMPC or Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		3	Moderate spalling due to edge loading	RMPC or Programmed	Strengthen bearing area Patch concrete	100C4 100C3
		3	Moderate spalling due to differential movement	RMPC	Monitor defect	-
		3	Medium movement cracking in headstock	RMPC	Monitor defect	-
		3	Fine shear cracks in headstock	RMPC	Monitor defects & advise BAM to determine restriction on permit traffic	-
		3	Ballast wall severely cracked or spalled	Programmed (RMPC)	Fill cracks with epoxy (monitor spalls)	100C2
		3	H'tk top damp - no staining	RMPC	Monitor defect	-
		3	Noticeable subsidence behind abutment	Programmed	Reinstate backfill	100M2
		3	10 to 20 mm forward movement of abutment	RMPC	Monitor defect	-
		4	Severe cracking due to corroded reinforcing (>20% loss of section)	Programmed	Break back cracked concrete Replace reinforcing Patch concrete	100C1 140S2 100C3
		4	Severe cracking due to edge loading	Programmed	Strengthen bearing area Patch concrete	100C4 100C3

Continued

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
50C	Concrete Abutment (Timber Bridges) (continued)	4	Severe cracking due to differential movement	Programmed	Fill cracks with epoxy	100C2
		4	Severe spalling due to corroded reinforcing (>20% loss of section)	Programmed	Replace reinforcing Patch concrete	140S2 100C3
		4	Severe spalling due to edge loading	Programmed	Strengthen bearing area Patch concrete	100C4 100C3
		4	Severe spalling due to differential movement	Programmed	Patch concrete	100C3
		4	Severe moment cracking in headstock	Programmed	Strengthen headstock. Seek structural advice on repair methods.	54C1
		4	Moderate shear cracks	Programmed	Strengthen headstock. Seek structural advice on repair methods	54C1
		4	Ballast wall severely cracked or spalled, failed and with loss of embankment fill	Programmed	Reconstruct ballast wall	50C1
		4	Excessive water & staining of headstock top	Programmed	Determine source of defect & repair appropriate elements	
		4	Severe subsidence behind abutments	Programmed	Reinstate back fill	100M2
		4	Forward movement of abutment >20mm	RMPC	Monitor defect & seek structural advice on containment procedures	
4	Base undercut by scour	Programmed	Repair scour	100M3		

* This matrix is interim - refer to Bridge Maintenance Manual when completed for possible additional items.

2.39 Masonry Abutment (500)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
500	Masonry Abutment	3	Moderate cracking in mortar	Programmed	Repair mortar	50O1
		3	Moderate cracking due to differential settlement	Programmed	Repair mortar	50O1
		3	Moderate loss of mortar due to water wash (minor below sill cap)	Programmed	Repair mortar	50O1
		4	Severe cracking in mortar	Programmed	Repair mortar	50O1
		4	Severe cracking due to differential settlements	Programmed	Repair mortar*	50O1
		4	Heavy loss of mortar due to water wash (medium below sill cap)	Programmed	Repair mortar	50O1
		4	Moderate subsidence	Programmed	Reinstate backfill	100M2
		4	Base undercut by scour with possible settlement	Programmed	Repair scour	100M3

Where a concrete sill cap is used, refer to Article 2.28 for repair options.

* Seek structural advice. There may be instability problems and a rebuild may be required.

2.40 Abutment Sheeting - Timber Planks (52T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
52T	Abutment sheeting (timber planks & ballast boards)	2	Moderate decay in planks	Programmed	Apply chemical preservatives to timber	100T
		3	Heavy decay, planks rotted out	Programmed	Replace sheeting planks	52T1
		3	Heavy decay, localised area in one bay	Programmed	Replace sheeting planks or Splice sheeting planks	52T1 52T2
		3	Heavy termite attack	Programmed	Replace sheeting planks	52T1
		3	Heavy termite attack, localised are in one bay	Programmed	Replace sheeting planks or Splice sheeting planks	52T1 52T2
		3	Settlement of planks	Programmed	Reposition sheeting	52T3
		3	Loss of fill due to water wash or rotting	Programmed	Check plank condition, Reinstate backfill	100M2
		3	Some road subsidence	Programmed	Check plank condition, Reinstate backfill	100M2
		4	Severe decay whole areas rotted out	Programmed	Replace sheeting planks	52T1
		4	Severe termite attack - whole areas eaten out	Programmed	Replace sheeting planks	52T1
		4	Loss of embankment wingwall fill due to earth pressure or water wash	Programmed	Check plank condition, Reinstate backfill	100M2
		4	Severe road subsidence	Programmed	Check plank condition, Reinstate backfill	100M2

2.41 Abutment Sheeting - Concrete Planks (52P)

3

Defect / Activity Matrix						
No.	Component Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
52P	Abutment sheeting - Concrete planks	3	Medium cracking due to corroding reinforcing	RMPC	Monitor defect	-
		3	Medium cracking due to earth pressure	RMPC	Monitor defect	-
		3	Medium spalling due to corroding reinforcing	RMPC	Monitor defect	-
		3	Moderate settlement	RMPC	Monitor defect	-
		3	Moderate separation of planks - medium loss of fill	Programmed	Reposition concrete planks	52P2
		3	Noticeable settlement behind abutment	Programmed	Check plank condition, Reinstate backfill	100M2
		4	Severe cracking due to corroding reinforcing	Programmed	Replace concrete planks	52P1
		4	Severe spalling due to corroded reinforcing	Programmed	Replace concrete planks	52P1
		4	Excessive settlement of planks	Programmed	Reposition concrete planks	52P2
		4	Excessive separation of planks - heavy loss of fill	Programmed	Reposition concrete planks	52P2
		4	Excessive bulging	Programmed	Replace concrete planks	52P1
		4	Severe subsidence behind abutment	Programmed	Check plank condition, Reinstate backfill	100M2

2.42 Abutment Infill - Concrete (52C)*

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
52C	Abutment Infill- Concrete	3	Moderate cracking at joint interfaces	RMPC	Monitor defect	-
		3	Moderate spalling at joint interfaces	RMPC	Monitor defect	-
		3	Gaps up to 25 mm wide - some loss of fill	Programmed	Seal gaps - concrete	52C1
		3	Significant settlement (up to 25mm)	Programmed	Seal gaps - concrete	52C1
		3	Significant forward rotation (earth pressure or foundation overstress) Up to 40mm forward movement at top.	RMPC	Monitor defect	52C1
		3	Weepholes blocked or inadequate	Programmed	Clean out weepholes or Provide weepholes	100M5 100M4
		3	Moderate subsidence behind abutment	Programmed	Reinstate backfill	100M2
		4	Severe cracking at joint interfaces	Programmed	Break back cracked concrete Patch concrete	100C1 100C3
		4	Severe spalling at joint interfaces	Programmed	Patch concrete	100C3
		4	Gaps >25mm wide, loss of fill	Programmed	Seal gaps - concrete	52C1
		4	Excessive settlement of wall(> 25mm)	RMPCProgrammed	Monitor defect & Stabilise wall**	- 52C2
		4	Excessive forward rotation with top movement > 40mm	RMPCProgrammed	Monitor defect & Stabilise wall**	- 52C2
		4	No weepholes or blocked	Programmed	Provide weepholes or cleanout weepholes	100M4 100M5
		4	Significant settlement behind abutment	Programmed	Reinstate backfill	100M2
		4	Undercutting of toe due to scour	Programmed	Repair scour	100M3

* This matrix is interim - refer to Bridge Maintenance manual when completed.

** Seek structural advice from Structures Division for stabilising procedures.

There may be a need to rebuild component.

2.43 Abutment Infill - Rock Fill (520)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
520	Abutment Infill - Rock Fill	3	Moderate cracking (grouted surface)	RMPC	Monitor defect	-
		3	Moderate settlement - medium loss of fill	Programmed	Place additional rock fill	5201
		3	Moderate bulging due to earth pressure *	RMPC	Monitor defect	-
		3	Medium subsidence behind abutment	Programmed	Reinstate backfill	100M2
		4	Severe cracking (grouted surface)	Programmed	Patch ground surface	5202
		4	Spalling & erosion of grouted surface	Programmed	Patch grouted surface	5202
		4	Excessive settlement - heavy loss of fill	Programmed	Place additional rock fill	5201
		4	Excessive bulging due to earth pressure *	RMPC or Programmed	Monitor or place additional rock fill	5201
		4	Severe subsidence behind abutment	Programmed	Reinstate backfill	100M2
4	Undercutting of toe due to scour	Programmed	Repair scour	100M3		

* Note that there should not be any bulging of fill as this indicates instability of the fill.

2.44 Abutment Infill - Masonry (520)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
520	Abutment Infill - Masonry	3 & 4	Use defect / activities as for Abutment Infill-Concrete (Article 2.42); in addition the following should also be considered:			
		3	Moderate cracking in mortar	Programmed	Repair mortar	5001
		3	Moderate loss of mortar due to water wash	Programmed	Repair mortar	5001
		4	Severe cracking in mortar	Programmed	Repair mortar	5001
		4	Heavy loss of mortar due to water wash	Programmed	Repair mortar	5001

2.45 Timber Sill Abutment (52T)

3

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
52T	Timber Sill Abutment	2	Moderate decay in logs	Programmed	Apply chemical preservatives to timber	100T1
		3	Heavy decay in logs	Programmed	Replace abutment log*	52T4
		3	Heavy termite attack in logs	Programmed	Replace abutment log*	52T4
		3	Settlement of logs	Programmed	Place / replace relieving props	100M10
		3	Loss of fill due to water wash or rotting	Programmed	Reinstate backfill	100M2
		3	Some road subsidence	Programmed	Reinstate backfill	100M2
		4	Severe decay in logs	Programmed	Replace abutment logs*	52T4
		4	Severe termite attack	Programmed	Replace abutment logs*	52T4
		4	Loss of embankment fill due to water wash or rotting	Programmed	Reinstate backfill	100M2
		4	Severe road subsidence	Programmed	Reinstate backfill	100M2

* Consideration may be given to fully replacing the log abutment with a concrete substitute. Contact Structures Division for advice on this matter.

2.46 Wing Walls - Timber Plank (51T)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
51T	Wing Walls - Timber planks	3 & 4	Use defect / activities as for Abutment Sheeting - Timber Planks (Article 2.40).In addition, the following should be considered:-			
		3	Up to 40 mm forward movement from abutment - some loss of fill	Programmed	Monitor	-
		4	>40mm forward movement from abutment	Programmed	Stabilise wing pile	*60T2

Refer to Article 2.33 for the timber pile components of this wing.

* Seek structural advice from Structures Division for stabilising procedures.

2.47 Wing Walls - Concrete Plank (51P)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
51P	Wing walls - Concrete plank	3 & 4	Use defect / activities as for Abutment Sheeting - Concrete Planks (Article 2.41)In addition, the following should be considered:-			
		3	Up to 40 mm forward movement from abutment - some loss of fill	Programmed	Monitor	-
		4	>40 mm forward movement from abutment.	Programmed	Stabilise wing piles*Seek structural advice on stabilising procedure for wing wall	60T2

Refer to Article 2.33 for the timber pile components of wing wall.

2.48 Wing Walls - Concrete (51C)*

Defect / Activity Matrix						
Component No.	Type	Condit. State	Defect	Maintenance Category	Activities	
					Action	No.
51C	Wing Walls - Concrete	3	Moderate cracking due to corroding reinforcing	RMPC	Monitor defect	-
		3	Moderate cracking due to earth pressure	RMPC	Monitor defect	-
		3	Moderate spalling due to corroding reinforcing	RMPC	Monitor defect	-
		3	Movement up to 40mm from abutment (independent wing) - some loss of fill	Programmed	Seal gaps - concrete	52C1
		3	Edges of joint at abutment cracked & spalled	RMPC	Monitor defect	-
		4	Heavy cracking due to corroding reinforcing	Programmed	Break back cracked concrete Patch concrete	100C1 100C3
		4	Heavy cracking due to earth pressure	Programmed	Break back cracked concrete Patch concrete	100C1 100C3
		4	Heavy spalling due to corroding reinforcing	Programmed	Clean corroded reinforcing Patch concrete	140S1 100C3
		4	Movement >40 mm from abutment (independent wing) - excessive loss of fill	Programmed	Seal gaps - concrete Stabilize wall	52C1 **52C2
		4	Edges of joint at abutment cracked & badly spalled- fill escaping	Programmed	Break back spalled concrete Patch Concrete Seal Gaps - concrete	100C1 100C3 52C1
		4	Undercutting of toe due to scour	Programmed	Repair scour	100M3

* Activities are interim. Refer to bridge Maintenance Manual when completed.

** Seek advice from Structures Division for stabilising procedures.

2.49 Wing Walls - Masonry (510)

Defect / Activity Matrix						
Component		Condit. State	Defect	Maintenance Category	Activities	
No.	Type				Action	No.
510	Wing Walls - Masonry	3	Moderate cracking of mortar	Programmed	Repair mortar	50O1
		3	Moderate cracking due to differential settlement	Programmed	Repair mortar	50O1
		3	Moderate loss of mortar	Programmed	Repair mortar	50O1
		3	Forward movement up to 40 mm from abutment - some loss of fill	Programmed	Seal gaps - concrete	52C1
		4	Severe cracking of mortar	Programmed	Repair mortar	50O1
		4	Severe cracking due to differential settlement	Programmed	Repair mortar	50O1
		4	Severe loss of mortar	Programmed	Repair mortar	50O1
		4	Edges of joint at abutment cracked & badly spalled - fill escaping	Programmed	Break back cracked concrete Patch concrete Seal gaps - concrete	100C1 100C3 52C1
		4	Forward movement > 40 mm	Programmed	Seal gaps in concrete Stabilise wall	52C1* 52C2
		4	Undercutting of toe due to scour	Programmed	Repair scour	100M3

* Seek advice from Structures Division for stabilising procedures.

3