8989 – Timber Bridge Rehabilitation Works

REVISION 18/12/2024

Specific Contract Requirements

Contract Number

XXXX

8989.1 Introduction

This Supplementary Specification covers timber bridge rehabilitation works. This specification shall be read in conjunction with the Project Drawings and Documents, and the reference documents listed herein.

Where there is any conflict determined between the requirements specified herein and the requirements of any referenced Australian Standard, Statutory Authority Standards or otherwise, the requirements specified herein shall apply.

Works under this specification are the results of bridge inspection defect identification and comprises assessment reports and design drawings and documents to repair bridge members and components, bearings, utilities, road approaches and temporary works.

8989.1.1 Definitions of Terms

This section describes any term which are specific to this specification or requires clarification due to an ambiguous understanding.

Term	Definition
ADR	Accepted Development Requirements – Qld State Government accepted development requirements for operational work that is completely or partly within a declared Fish Habitat Area
BAM (Bridge Asset Management) and other DTMR acronyms	Where this is referenced within the TMR specifications it is to be taken as being the MRC Superintendent or representative
M.A.N.	Maintenance Activity Number, relative to the rehabilitation works as referenced within this specification and TMR's Timber Bridge maintenance Manual (TBMM)
LVL	Laminated Veneer Lumber, alternate material to solid timber
SLT	Stress Laminated Timber, laminated timber laid and compressed using high strength bars/rods
Glulam	Glued Laminated Timber, structural engineered wood product constituted by layers of laminated lumber bonded together with durable, moisture-resistant structural adhesives so that all of the grain runs parallel to the longitudinal axis
Fixings	As relates to this specification shall include bolts, rods, connectors, nuts, shims, plates, packers which are utilised for the joining and tightening of components together. Generally, of galvanised steel however some (plates/packers) may be of timber material.
Half cap or Capwale	Refers to the type of open headstock which is notched into each side of the pile. Within this specification unless specifically referred to, they shall be treated the same as a headstock.

Works Procedure	Detail of works and activities proposed this shall be in the form of a schedule detailing clearly the scope of works in order and extent of repairs and the repair methodology for how the repairs will be carried out
"On Maintenance" period	Also known as "Defects/Liability" period or "Works as Executed" period, all being 12 months minimum.
Australian Paint Approval System (APAS)	The Australian Paint Approval Scheme (APAS) is an independent 3rd party conformity and product prequalification scheme that tests and certifies all types of surface coating materials and associated products. All coating systems need to meet this if painted and be certified to Class I conformity.
Sniping	Process of Notching of the timber on bridge components such as corbels/girders at the end support areas which will allow for seating purposes and to create levelness in the top of the structure, including control of the finished level (RL) of the component
Waterproofing Membrane	Specialized materials and treatments applied to the surface of a bridge deck to prevent water and moisture infiltration.
Approach Slab	As applies to this specification to also mean relieving slab
Sill Beam/Log	For the purposes of this specification a concrete or timber beam/log which connects shortened piles to add stability to that pier
FRP	Fibre Reinforced Polymer – Composite construction material manufactured generally from continuous strands of fibre being pulled through resin and then cured in the profile and length required. May be composed of various types of fibres.
PFC	Parallel Flanged Channel ("C" section) composed of steel used to add load bearing strength to a component or to limit the movement of joins, especially on ply decking
Dead Man Anchor	Generally, a mass concrete block behind an abutment and wingwalls connected via tie rods to hold and retain the piling and planks and provide resistance to the load placed by the embankment.

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8989.2 Referenced Documents

All workmanship and materials shall comply with the requirements of the latest relevant Australian Standards (AS), Queensland Department of Transport and Main Roads Technical Specifications (MRTS) and other standards as referenced, in particular this supplementary specification shall be read in conjunction with the following:

- AS 5100.1:2017 Bridge Design – Scope and General principles
- AS 5100.2:2017 Bridge Design – Design Loads
- AS 5100.3:2017 Bridge Design – Foundation and Supporting Structures
- AS 5100.4:2017 Bridge Design – Bearings and Deck Joints
- AS 5100.5:2017 Bridge Design – Concrete
- AS/NZS 5100.6:2017 Amd 1:2024 Bridge Design – Steel and Composite Construction
- AS 5100.7:2017 Bridge Design – Bridge Assessment
- AS5100.8:2017 Bridge Design – Rehabilitation and Strengthening of Existing Bridges
- AS 5100.9:2017 Bridge Design – Timber
- AS 1530.4: 2014 Methods for Fire Tests on Building Materials, Components and Structures
- AS/NZS 2327: 2017 Amd 1: 2020 Composite Structures - Composite Steel-Concrete Construction in Buildings
- AS 4100: 2020 Amd 1: 2021 Steel Structures
- AS/NZS 4600: 2018 – Cold-Formed Steel Structures
- AS 1349: 1986 (Reconfirmed 2018) - Bourdon Tube Pressure and Vacuum Gauges
- AS 1627.4: 2005 (Reconfirmed 2017) - Metal finishing - Preparation and Pretreatment of Surfaces
- AS 1580.108.2: 2004 (Reconfirmed 2019) – Paints and Related Materials – Methods of Test - Dry Film Thickness - Paint Inspection Gauge
- AS 1604.1: 2012 Amd 1: 2017 - Specification for preservative treatment - Sawn and round timber
- AS/NZS 1604.3: 2021 – Preservative Treated Wood based Products – Test Methods
- AS 1720 Timber Structures
- AS 1897: 2016 – Fasteners – Electroplated Coatings
- AS/NZS 1554 (Sub Standards 1,3,5): 2014 Amds 2017) – Structural Steel Welding
- AS/NZS 1214: 2016 - Hot-Dip Galvanized Coatings on Threaded Fasteners (ISO Metric Coarse Thread Series)
- AS/NZS 4671: 2019 – Steel for the Reinforcement of Concrete
- AS/NZS 5131: 2016 Amd 1: 2020 – Structural Steelwork – Fabrication and Erection
- AS/NZS 2269.0: 2012 Amd 1:2015 - Plywood Structural – Specifications
- AS 2159:2009 – Piling – Design and Installation
- AS 4357 (0, 1-4) (current versions) – Structural laminated Veneer Lumber
- AS/NZS 1328.1:1998 Amd 1:2011 – Glued laminated Structural Timber (Performance requirements and minimum production requirements)
- AS 2082 Timber – Hardwood – visually stress graded for structure purposes.
- AS 3660 Termite Management
- AS 3818.1 Timber – Heavy Structural Products – Visually Graded. Part 1: General
- Requirements

- AS 3818.11 Timber – Heavy Structural Products – Visually Graded. Part 11: Utility Poles
- AS 3818.3 Timber – Heavy Structural Products – Visually Graded. Part 3: Piles
- AS/NZS 1148 Timber – Nomenclature – Australian, New Zealand and Imported Species
- AS/NZS 1604.3 Specification for Preservative Treatment. Part 3: Plywood
- AS/NZS 2269 Plywood – Structural
- AS/NZS 4491 Timber – Glossary of Terms in Timber Related Standards
- AS 3610 – Falsework for Concrete
- MRS01 & MRTS01: Introduction to Specifications
- MRS02 & MRTS02: Provision for Traffic
- MRS03 & MRTS03: Drainage Structures, Retaining Structures and Embankment Slope Protections
- MRS04 & MRTS04: General Earthworks
- MRS05 & MRTS05: Unbound Pavements
- MRS11 & MRTS11: Sprayed Bituminous Treatments (Excluding Emulsion)
- MRS14 & MRTS14: Road Furniture
- MRS22 & MRTS22: Supply of Cover Aggregate
- MRS30 & MRTS30: Asphalt Pavements
- MRTS50: Specific Quality System Requirements
- MRS59 & MRTS59: Manufacture of Fibre Reinforced Polymer (FRP) Composite Girders
- MRS60 & MRTS60: Installation of Fibre Reinforced Polymer (FRP) Composite Girders
- MRS66 & MRTS66: Driven Steel Piles
- MRTS59 Manufacture of Fibre Reinforced Polymer (FRP) Composite Girders
- MRTS60 Installation of Fibre Reinforced Polymer (FRP) Composite Girders
- MRS70 & MRTS70: Concrete
- MRS71 & MRTS71: Reinforcing Steel
- MRS76 & MRTS76: Supply and Erection of Streel Girders
- MRS77 & MRTS77: Bridge Deck
- MRS78 & MRTS78: Fabrication of Structural Steelwork
- MRS84 & MRTS84: Deck Wearing Surface
- MRTS84A: Removal of Bridge Deck Wearing Surface
- MRTS85: Repainting Steel Bridges
- MRS87 & MRTS87: Supply of Timber Bridge Materials and Components
- MRS88 & MRTS88: Protective Coating for New Work
- TMR Technical Note – TN144 Paint Systems for MRTS88
- MR2278 & MRTS278: Supply of Structural Fasteners
- DTMR *"Timber Bridge Maintenance Manual Parts 1 - 4"*
- DTMR *"Timber Bridge Maintenance Manual Appendixes A – E"*
- Bridge/Culvert Servicing Manual– Department of Transport and Main Roads – Oct. 2008
- TMR Guideline for Routine Maintenance Guideline Chapter 5
- MRC Supplementary Specification 8987
- National Construction Code (NCC) Volume 1 Specification C1

- Any further documents referenced in this specification.

8989.3 Description of Works Items

Work items incorporated by this supplementary specification are identified in Section 8989.6 and 8989.7 with individual activities/tasks for measurement and payment sourced from the Bill of Quantities and listed in MRC Supplementary Specification Annexure 8989_1 Timber Bridge Rehabilitation Works Section 1

The following list of scope of repair works activities are covered under this specification and is as follows:

- Temporary work design and installation, including jacking/lifting as required.
- Removal of flood debris from the waterway and controlling vegetation
- Defect mapping and reporting.
- Structural rehabilitation of abutments, piles, headstocks, girders, corbels, deck, kerb, and rails
- Protective treatment of timber, steel, and concrete components
- Strengthening of bridge components
- Straightening of steel components
- Replacement of components with like for like materials or substitution with alternative materials
- Concrete crack repair or patch repair
- Approach (relieving) slab repairs, removal and reinstatement, or installation.

The supply of materials, temporary works design, provision of access platforms, surface preparation, crack repairs, inspection, testing, and acceptance criteria shall be in accordance with this specification and manufacturer instructions where specified.

This Supplementary Specification shall be read in conjunction with the Project Drawings and the reference documents listed herein, and those applicable to the activity being carried out.

8989.4 Quality System Requirements

The contractor is to submit a quality plan to the superintendent for review and approval a minimum 4 weeks prior to commencement of works or the prestart. The quality plan shall be compliant to MRTS50 and other reference requirements with as minimum incorporate the following Testing, Inspections, and Tolerances.

MILESTONE

8989.4.1 Std Test Methods (Testing Regime)

8989.4.1.1 Process

The quality assurance testing and acceptance criteria appropriate to confirm acceptable application of the product must be included in the Contractor's Quality Plan for the Superintendent's Representative's approval. This shall include predelivery testing and certification, and testing during or post application/installation.

The repair material manufacturer's specified test programme must be included in the Contractor's Quality Plan.

The Contractor must inform the consulting structural Engineer and Superintendent of all completed repair works and areas one day after final works have taken place for inspection, approval, and acceptance of the works.

Areas where the repairs do not comply with the quality control testing and/or where the repair material is, in the Superintendent's opinion, defective in other ways, must be replaced by the Contractor. Replacement must be carried out to the Superintendent's satisfaction at the Contractor's own cost. Additional quality control testing may be carried out to non-compliant designated areas at the Contractor's own cost.

Upon the consulting Engineers approval and the Superintendent's acceptance that all works have been completed in accordance with this Supplementary Specification, the Contractor must submit drawings or sketches showing the extent and dimensions of repairs and variations.

Additional testing may be included in the quality control section of the Contractor's Work Method Statement.

8989.4.1.2 General

The Contractor shall demonstrate weekly throughout the execution of the Works, that adequate and accurate records are being kept to ensure the ultimate completeness and accuracy of the records.

The Contractor shall produce records and documentation (including completed and signed Inspection and Test Plans) which shall demonstrate that hold and witness points were observed and approved, and results of the testing as completed. These are to be kept on site at all times until they are submitted with the close out of the relevant ITP and "As Constructed" documentation.

8989.4.1.3 Test Methods

Testing shall be carried out as required by the design drawings and documentation, where there is an absence of detail the referenced specification or standard noted within this supplementary specification for that work operation shall apply i.e. AS 1580.108.2 – dry film thickness of coatings or MRTS 04 – General Earthworks

The Contractors quality plan shall lay out the test type, minimum quantity of tests required, timing, and the reference to the test requirements. **No** variation from the approved quality plan shall be permitted unless approved by the Superintendent. Along with the inspection requirements this shall form the basis of the Contractors Inspection and Test Plan.

8987.4.1.4 Test results

The Contractor shall supply for review by the Superintendent a copy of all quality control testing including photographic records as soon as they are available after undertaking such testing. Tests results may be dependent upon the Superintendent granting approval to proceed with works.

These records shall be endorsed by the consulting structural Engineer prior to submission to the Superintendent.

HOLD POINT

8987.4.1.5 Non-conformances

Areas where the repairs do not comply with the specified standards and/or where the repair material is, in the Superintendent's opinion defective in other ways must be removed and replaced by the Contractor in accordance with the requirements of this Specification. For any test batch that fails to meet the specified standards, all repairs to which the test batch relates shall be removed and replaced. Replacement must be carried out to the Superintendent's satisfaction at the Contractor's own cost. Additional testing may be carried out to non-conforming designated areas at the Contractor's own cost.

HOLD POINT

8987.4.2 Milestones and Inspections

The following table identifies the minimum inspection requirements as relates to the various activities of this Specification. Not all may apply, only those relevant to the works activities for the project shall apply

8987.4.2.1 Milestone

Milestone is a point within a project which marks the start or completion of an activity or compliance requirement. Generally associated with provision of records or data for verification with the projects contract and specification.

8987.4.2.2 Hold Points

Hold points are noted on various Sections of this Specification.

"**HOLD POINTS**" are critical stages of the work, which require inspection by the Superintendent (or his nominated representative) and beyond which the Contractor will not be permitted to proceed without the written approval of the Superintendent.

A written "request for inspection" form shall be submitted to the Superintendent at least 48 hours prior to reaching the relevant "**HOLD POINT**". One copy shall be submitted for each inspection. The signed copy will be handed back to the Contractor after the inspection to sanction work to proceed to the next stage or noting what work has to be done prior to re-inspection. This may involve inspection of the works by the Superintendent or approval of test results forwarded to the Superintendent by the Contractor.

8987.4.2.3 Witness Points

Witness points are also important stages of work. However, these are not necessarily as critical work stages as defined by the hold points. Witness points are where the Superintendent (or his/her nominated representative) may review, witness, and inspect the work. The activities however may continue to proceed.

8987.4.2.4 Visual Inspection

All areas of the repaired surfaces must be visually examined for any areas of non-conformance with the specified finishing and surface condition requirements.

Activity	Inspection Type	When	Reference
Program of Works, works procedure/s, and other required documents as per 8989.5	Milestone	4 Weeks prior to works commencing	8989.5.1
Quality Plan submission and approval	Milestone	4 Weeks prior to works commencing	8989.4
Test results	Hold Point	All testing results submitted as soon as available after undertaking testing	8989.4.1.4
Non-Conformances rectification and testing	Hold Point	Where all non-conforming works have been identified and required to be rectified	8989.4.1.5
MATERIALS – PRE-QUALIFICATION, MANUFACTURE, PROPERTIES			**8989.5.2**
Submission of all certificates, data sheets for all materials	Milestone	4 Weeks prior to works commencing	8989.5.2.1

Activity	Inspection Type	When	Reference
Further submissions required to verify materials proposed to be used on sight (as required)	Milestone	Prior to prestart meeting	8989.5.2.1
Submission of works procedures, ITPs, and materials manufacturers specifications	Milestone	Prior to prestart meeting	8989.5.2.1
Inspection of all materials delivered to site	Hold point	At delivery prior to unloading and use on site	8989.5.2.3
Submission of compatible materials coating systems for composite components and maintenance regime	Milestone	4 Weeks prior to works commencing	8989.5.2.3.3
Submission of storage method and location of products	Milestone	4 Weeks prior to works commencing	8989.5.2.4
Submission of temporary works design	Milestone	4 Weeks prior to works commencing	8989.5.5
Submission of works procedure	Milestone	4 Weeks prior to works commencing	8989.5.6
Submission of equipment and plant loads on bridge for activities	Milestone	4 Weeks prior to works commencing	8989.5.6.1
DEFECT SURVEY AND MAPPING			**8989.5.9 & 8989.6.3**
Defect Mapping Variance	Hold Point	Prior to works continuing approval by Superintendent	8989.5.9.2
Defect mapping certification of designs (as required)	Hold Point	After mapping and submission of RPEQ certified designs based on type, location, and extent of repairs	8989.5.9.2
Provision of sketches identifying areas requiring repairs	Hold Point	After cleaning of bridge prior to any repair works commencing	8989.5.9.3
Inspection of defects verifying extent of works required	Hold Point	On completion of removal of debris and sediment	8989.6.3
REMOVAL OF SEDIMENT AND DEBRIS WITHIN AND AT BRIDGES			**8989.6.2**
Extent of material to be removed	Hold Point	Prior to works commencing	8989.6.2.3
Delineation of “no go” zones at work site/s	Witness Point	Prior to works commencing	8989.6.2.3
TEMPORARY WORKS			**8989.6.4**
Installation of temporary works	Hold Point	After installation, compliance with design drawings and approved works procedure/s	8989.6.4

Activity	Inspection Type	When	Reference
Daily inspection prestart at site	Witness Point	Prior to works commencing each day and documented as part of the Contractor's safety plan	8989.6.4
JACKING/LIFTING BRIDGE COMPONENTS			8989.6.5
Structural Engineer Consultant endorsed loading regime including traffic management plan	Hold Point	Prior to commencement of bearing repair works, Approval by Superintendent	8989.6.5.1
Installation of temporary measures to support bridge elements and approval to commence lifting operations	Hold Point	Prior to Jacking system being installed	8989.6.5.1
Approved Lift plan and notification to commence jacking operations	Witness Point	Prior to equipment being set and lifting commencing	8989.6.5.2
Setting up of jack/s and lifting plan checked	Witness Point	Prior to jacking operations	8989.6.5.2
Damage to bridge elements	Hold Point	immediately cease works and notify Superintendent	8989.6.5.2
Monitoring of lifting and lowering	Witness Point	Prior to and during jacking process	8989.6.5.3
Inspection and approval of variation to repairs	Hold Point	During bearing repair works where identified extra repairs need approval	8989.6.5.5
Conjoint Inspection of works	Hold Point	At completion of repair works prior to lowering the bridge elements	8989.6.5.6
Raising and lowering of bridge components by jacking	Witness Point	During jacking activities as required by the design report	8989.6.5.6
Survey of Control Points and removal of jacking system	Hold Point	After lowering has occurred and review of survey results	8989.6.5.6
Certification and submission of "As Constructed" detail	Hold Point	Prior to approval to proceed with the removal of temporary works	8989.6.5.7
SUPPLY AND INSTALLATION OF DRIVEN PILES			**8989.6.6**
Works procedure and plant plan for driving of piles (as required)	Milestone	4 weeks prior to commencement of works	8989.6.6
Pile inspection for damage	Hold Point	At time of delivery prior to unloading	8989.6.6.1
PROTECTIVE TREATMENTS FOR TIMBER COMPONENTS			**8989.6.7**
Application of preservative and protective measures	Witness Point	Where all contact between timber surfaces and other surfaces/components occurs	8989.6.7.1

Activity	Inspection Type	When	Reference
Installation of end caps	Witness Point	As required by design drawings	8989.6.7.1
Use of alternative preservatives and protective measures	Hold Point	Submitted with Contractors works procedure 4 weeks prior to site works commencing	8989.6.7.2
Treatment of bare timber/ sawn ends, and snipes	Witness Point	At all timber surfaces modified or made bare	8989.6.7.2.1
Bored holes for preservative/ antifungal treatment	Witness Point	As required by design drawings or maintenance regime	8989.6.7.2.2
Insertion of coloured plug to cap bored hole	Witness Point	As required, with colour plugs and date recorded	8989.6.7.2.2
Records of preservative treatments, "As Constructed" and marked at abutment 1 headstock	Witness Point	Submitted as part of "As Constructed" data	8989.6.7.2.2
Termite treatment of timber components	Hold Point	As identified and approved by the Superintendent	8989.6.7.3
Termite treatment procedure followed	Witness Point	During termite application activity	8989.6.7.3
Records of preservative treatments, "As Constructed" and marked at abutment 1 headstock	Witness Point	Submitted as part of "As Constructed" data	8989.6.7.3
Identification of termite activity	Hold Point	Notification to Superintendent immediately	8989.6.7.3
PROTECTIVE TREATMENTS FOR STEEL COMPONENTS			**8989.6.8**
Works procedures covering all facets of steel preservation activities	Milestone	Submitted 4 weeks prior to site works commencing	8989.6.8
Containment measures compliant with all permits and site-based work plans are installed for cleaning and removal of existing surfaces	Hold Point	Prior to commencing cleaning works,	8989.6.8.1
Preliminary tests for lead paint	Hold Point	Prior to carrying out removal of existing preservative coatings	8989.6.8.1
Cleaning of existing surfaces and application of steel preservative coating system	Witness Point	During cleaning existing surfaces and application of preservative coatings	8989.6.8.1
Measurement and recording of dry film thickness of coating system, approval of treatment application	Hold Point	At each layer of coating applied to the steel components, approval to proceed after each application.	8989.6.8.1
Submission of process/methodology for	Milestone	Four (4) weeks prior to commencing works	8989.6.8.3

Activity	Inspection Type	When	Reference
verification of coating applications			
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	Prior to works commencing on repairing defective welds	8989.6.8.4
Submission and approval of revised works procedure	Hold Point	Prior to any weld repair works commencing	8989.6.8.4
Application of protective treatment to welds and area affected by welding activities	Hold Point	At the completion of all welding works	8989.6.8.4
PROTECTIVE TREATMENTS FOR CONCRETE COMPONENTS			**8989.6.9**
Concrete crack repair and sealing	Hold Point	As required by Supplementary Specification 8987 Clauses 8987.6.4 and 8987.6.7	8989.6.9.1
Concrete patch repair	Hold Point	As required by Supplementary Specification 8987 Clause 8987.6.5	8989.6.9.2
ABUTMENT AND WINGWALL PROTECTION (ROCK REVETMENT)			**8989.6.10**
Works procedure and quality plan for rock protection	Milestone	Four (4) weeks prior to commencement of site works	8989.6.10
Safe permanent access down and around abutments, wingwalls, and piers	Hold Point	During works to protect abutment, wingwalls and piers	8989.6.10
Inspections, testing, and tolerances	Hold Point	As required by MRTS03	8989.6.10
JOINT REPAIR/REINSTATEMENT			**8989.6.11**
Works procedure for abutment joint repair and installation (as required)	Milestone	Four (4) weeks prior to commencement of site works	8989.6.11
Mark out extent of joint by saw cuts	Hold Point	Prior to works commencing, approval to proceed	8989.6.11.2
Cleaning of joint and associated bridge components	Hold Point	Prior to repair or installation of joint	8989.6.11.2
Submission of endorsed procedure for installation of joint and materials use where design drawings lack detail	Hold Point	Four (4) weeks prior to commencement of site works	8989.6.11.3
Approved joint installation procedure followed	Witness Point	During cleaning and installation activities	8989.6.11.3
Reinstatement of DWS between saw cuts or when DWS is wholly reinstated	Witness Point	At completion of joint installation works and after curing of materials	8989.6.11.3
Works required to road approaches or wing walls	Hold Point	As required by Clause 8989.6.18	8989.6.11.3

Activity	Inspection Type	When	Reference
Submission of maintenance schedule for renewal of joint	Hold Point	On completion of joint installation works	8989.6.11.4
REPAIR/REPLACE BOLTS, NUTS, THREADED ROD, PLATES, SHIMS, PACKERS			**8989.6.12**
Reuse or replacement of fixings and other steel components	Hold Point	As identified for reuse and as approved for disposal and replacement by the Superintendent	8989.6.12
DISCONNECT, PROTECT, AND REINSTATE UTILITIES (AS REQUIRED)			**8989.6.13**
Utility providers approval of temporary works, and approval to commence site works	Hold Point	Four (4) weeks prior to site works commencement.	8989.6.13
Temporary utilities work compliance inspection	Hold Point	At the completion of temporary works prior to proceeding with bridge rehabilitation activities	8989.6.13
Approval for irrigation system works to and at the bridge structure	Hold Point	Prior to reinstatement after works are completed on the bridge.	8989.6.13
DISMANTLE AND REPLACE/REINSTATE RAILINGS/GUARDRAILS.			**8989.6.14**
Approval of alternative composite materials,	Hold Point	At design stage, no approval will be granted post issue of plans for construction	8989.6.14
Application and curing of Preservation and protection treatments to approved composite materials	Hold Point	Where composite materials are installed against other types of materials and where they are modified on site	8989.6.14
Inspections of works operations in dismantling and reinstatement of railings/guardrails	Witness Point	During work operations associated with this activity.	8989.6.14
DISMANTLING AND REPLACE/REINSTATE KERB			**8989.6.15**
Works procedure for dismantling, replacing, or reinstating of kerb	Milestone	4 weeks prior to commencement of works	8989.6.15
Inspection of all materials for damage, compliance to design drawings, and attached certification	Hold Point	Upon delivery of materials to site	8989.6.15.1
Compatibility of protective coatings to other materials	Hold Point	Prior to work kerb works commencing	8989.6.15.1
Installation of temporary works, and inspection of stability of bridge	Hold Point	Prior to and during disassembling and removing the kerb	8989.6.15.2
Preinstallation inspection of the deck	Hold Point	Prior to installing or reinstating the kerb	8989.6.15.2
Preservative and protective treatments applied	Witness Point	Prior to kerb installation	8989.6.15.2

Activity	Inspection Type	When	Reference
Damp course or felt installation tied into waterproofing membrane installation	Witness Point	During laying of both protective measures	8989.6.15.2
Connectors and bolt holes treated with preservative	Witness Point	During installation of new connectors and/or bolts	8989.6.15.2
Timber sealant application to kerb	Witness Point	After fixing and tightening in place has occurred	8989.6.15.2
Inspection of completed kerb works including reflective markers and paint (as required)	Hold Point	At completion of all works on kerb installation	8989.6.15.2
REPAIR, REMOVE, REINSTATE EXISTING BRIDGE DECK WEARING SURFACE			**8989.6.16**
Inspection and marking repair locations and extent of defects	Hold Point	Prior to commencement of repairs	8989.6.16.1
Compliance inspection of relevant activity to standards	Hold Point	During work operations for relevant activity	8989.6.16.1
Works procedure and plant plan for removal of DWS	Milestone	4 weeks prior to commencement of works	8989.6.16.2
Inspection of prepared deck and approval to proceed with waterproofing membrane	Hold Point	After inspection of deck, approval to proceed with waterproofing membrane activity	8989.6.16.6.1
Variation to design binder application and aggregate spread rate	Hold Point	Approval of variation to waterproofing design	8989.6.16.6.1
Seal operations following approved works procedure and plant plan	Hold Point	During seal operations taking place	8989.6.16.6.3
ROAD APPROACHES REINSTATEMENT			**8989.6.17**
Inspection and proof roll of subgrade	Hold Point	Compliance to MRTS04 and proof roll inspection.	8989.6.17
Geotechnical and Geometric compliance of finished surface and proof roll of unsealed surface	Hold point	At completion of pavement works	8989.6.17
Geotechnical and Geometric compliance of finished surface and proof roll of prior to sealing	Hold Point	At completion of pavement prior to sealing occurring, approval to proceed with seal.	8989.6.17
Submission of test results and inspection of completed works	Hold Point	At completion of works and cleaning up of site	8989.6.17
REPAIR, REMOVE, REPLACE DECK			**8989.6.18**
Revised Works procedure and other plans	Hold Point	As required by changing site conditions dictating alternate works procedure	8989.6.18.1

Activity	Inspection Type	When	Reference
Materials match design drawings and inspect upon delivering to site	Hold Point	Prior to any works commencing on bridge repairs	8989.6.18.1
Submission for approval of works procedure for fixing of distributors to underside of deck	Milestone	Four (4) weeks prior to site works commencing	8997.6.19.2
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	Prior to works commencing on deck strengthening works	8989.6.18.3
Marking of drill holes on deck where PFC sections are to be installed	Witness Point	Prior to drilling connector holes, approval to proceed with drilling	8989.6.18.3
Application of preservative and protective coatings to timber and steel components	Witness Point	During installation procedure of the PFC segments	8989.6.18.3
Installation of PFC segments are as required by the design drawings	Witness Point	During installation of the PFC segments	8989.6.18.3
Inspection of completed PFC installation works	Hold Point	After installation of PFC segments or the deck	8989.6.18.3
Reinstate protective coatings	Witness Point	After approval to proceed has been granted to apply protective coatings	8989.6.18.3
Installation of hardwood timber distributor	Hold Point	As Required by Clause 8989.6.18.3	8989.6.18.4
Community consultation for closure of bridge as per traffic management plan	Hold Point	Prior to closing bridge to carry out dismantling of the deck.	8989.6.18.5
Removal of DWS as per Clause 8989.6.16	Witness Point	After bridge has been closed as per the traffic management plan	8989.6.18.5
Temporary works installed and approved	Hold Point	Prior to disconnecting fixings and connectors	8989.6.18.5
Bridge components dismantled and removed and stored if identified for reuse	Witness Point	Prior to the demolition of the deck commencing and after temporary works have been installed	8989.6.18.5
Revised Works procedure for dismantling the deck submitted for approval	Hold Point	Prior to any demolition works occurring on the deck. Approval to proceed with revised works procedure	8989.6.18.5
Inspection for condition of exposed components	Hold Point	After deck has been dismantled	8989.6.18.5
Defect mapping report submission on new defects	Hold Point	Prior to reinstatement of deck commencing	8989.6.18.5

Activity	Inspection Type	When	Reference
Installation of antifungal and preservative measures to contact surfaces with the decking	Witness Point	Prior to laying plywood sheeting and after any curing periods required for the protective treatments	8989.6.18.5
Installation of plywood decking, location of plywood sheeting relative to other bridge components (girders, cross beams, spiking plank)	Witness Point	During installation compliance to Contractors works procedure	8989.6.18.5
Inspection of completed deck	Hold Point	Prior to applying preservative treatments	8989.6.18.5
Antifungal and preservative treatments to top side of decking	Witness Point	After laying and prior to installation of waterproofing membrane	8989.6.18.5
Inspection of preservative treatments and decking surface	Hold Point	Prior to the approval to proceed with the installation of the waterproofing membrane	8989.6.18.5
Priming of deck	Hold Point	After preservatives have cured and prior to waterproof membrane approval to proceed	8989.6.18.5
Installation process of waterproofing membrane and inspection of completed works	Hold Point	As required by Clause 8989.6.16.6.1 prior to reinstatement of kerbing	8989.6.18.5
Installation of kerb in accordance with design drawings	Hold Point	As required by Clause 8989.6.16 prior to the reinstatement of the DWS	8989.6.18.5
Reinstatement of DWS	Witness Point	As required by Clause 8989.6.16.6	8989.6.18.5
DWS Compliance and approval to proceed with reinstatement of railings and signage	Hold Point	After completion DWS installation works	8989.6.18.5
Site clean-up and removal of debris	Hold Point	At completion of all works reinstating the DWS	8989.6.18.5
BEARING AND PLATE REPAIR OR REPLACEMENT			**8989.6.22**
As required, works procedure and quality requirements shall reflect the requirements of 8987.6.10	Hold Point	Prior to, during and after construction	8989.6.22
REMOVE AND REPLACE/REINSTATE, OR REPAIR GIRDERS			**8989.6.22**
Revised Works procedure and other plans	Hold Point	As required by changing site conditions dictating alternate works procedure	8989.6.22.1
As required, submission required to verify materials proposed to be used meet all legislation and structural requirements	Hold Point	Prior to prestart meeting being held	8989.6.22.1

Activity	Inspection Type	When	Reference
Submission for approval of works procedure for girder strengthening	Milestone	Four (4) weeks prior to site works commencing	8989.6.22.2.1
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	Prior to works commencing on deck strengthening works	8989.6.22.2.1
Marking of girders where holes are to be drilled for antisplitting treatment	Hold Point	Prior to drilling holes commencing	8989.6.22.2.1
Application of preservative and protective coatings to timber and steel components	Witness Point	During installation procedure of the antisplitting bolts and plates or bands	8989.6.22.2.1
Antisplitting bolts and plates fixing compliance	Witness Point	During installation of each antisplitting treatment	8989.6.22.2.1
Completed works compliance	Hold Point	Prior to preservation measures being applied	8989.6.22.2.1
Application of preservative measures	Witness Point	After approval to proceed with application of measures	8989.6.22.2.1
Banding of girders compliance	Hold Point	As required by Clause 8989.6.27.5	8989.6.22.2.2
Defect mapping inspection to verify scope of works is still appropriate,	Hold Point	After removal of debris and sediment, and cleaning of girders and corbels	8989.6.22.2.2
Steel piles inspected for structural adequacy to design class and loss of cross-sectional area	Hold Point	After cleaning of all corrosion and preparation.	8989.6.22.2.2
Application of protective measures compliant with works procedure	Witness Point	Immediately after surface treatment of steel girder/s has been completed	8989.6.22.2.2
Submission for approval of works procedure for girder strengthening	Hold Point	Four (4) weeks prior to site works commencing	8989.6.22.2.2
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	Prior to works commencing on steel girder strengthening works	8989.6.22.2.2
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	Prior to works commencing on strengthening pile	8989.6.22.2.2
Works Inspection of completed works	Hold Point	Completion of installation of measures to strengthen pile	8989.6.22.2.2
Approval to remove temporary works stabilizing the bridge structure	Hold Point	After inspection of completed strengthening works	8989.6.22.2.2

Activity	Inspection Type	When	Reference
Approval of revised welding procedure works	Hold Point	After inspection of defective cracked steel members or welds	8989.6.22.2.2
Inspection of completed welding works	Hold Point	After works are completed and approval to proceed with protection measures of the steel components	8989.6.22.2.2
Submission of endorsed works procedure for straightening of girder	Hold Point	Two (2) weeks prior to straightening procedure commencing	8989.6.22.2.2
Supervision of works and any damage rectification works approval	Hold Point	During the straightening process and where damage to other components has occurred	8989.6.22.2.2
Inspection of straightened girder for compliance to design drawings, tolerances, and load baring capacity testing submission	Hold Point	At the completion of the straightening process prior to application of protective coatings	8989.6.22.2.2
Restoration of damaged protective coatings	Witness Point	After straightening works are complete	8989.6.22.2.2
Repair of FRP girders in compliance with design drawings and specification	Hold Point	As required by Clause 8989.6.24.2.3	8989.6.22.2.3
Repair removed timber girder	Hold Point	As required by Clause 8989.6.22.2.1	8989.6.22.3.1
Removal and reinstatement of timber girder	Hold Point	As required by Clauses 8989.6.22.4.1 and 8989.6.22.5.1	8989.6.22.3.1
Repair removed steel girder	Hold Point	As required by Clause 8989.6.22.2.2	8989.6.22.3.2
Removal and reinstatement of steel girder	Hold Point	As required by Clause 8989.6.22.5.1	8989.6.22.3.2
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	Prior to works commencing on strengthening girder	8989.6.22.4
For approval to proceed with works mark on existing deck the girder/s to be replaced as required by the design drawings	Hold Point	Prior to works commencing, approval to proceed	8989.6.22.4.1
Temporary works carried out as required by approved plan	Hold Point	Prior to any works commencing on removal of identified girder	8989.6.22.4.1
Approval to proceed with removal of all connectors to girder	Hold Point	After approval of temporary works and stabilisation of bridge	8989.6.22.4.1

Activity	Inspection Type	When	Reference
Compliance to lift plan and works procedure, and suitability of crane	Witness Point	Prior to lifting girder out and during lifting activity	8989.6.22.4.1
Application of preservative and protective measures between girder and corbel	Witness Point	Prior to lifting girder into place	8989.6.22.4.1
Cleaning out and sealing of disused bolt/connector holes	Witness Point	During preservation and protective measure applications	8989.6.22.4.1
Installation and method of connecting is approved and compliant with work procedure	Hold Point	During installation of girder	8989.6.22.4.1
Survey compliance of girder installation	Hold Point	After installation and tightening of connectors	8989.6.22.4.1
Installation of steel girder operations, including inspections and testing	Hold Point	As required by Clause 8989.6.22.4.1	8989.6.22.4.2
Certification of FRP girders	Hold Point	Four (4) weeks prior to delivery and then at delivery time	8989.6.22.4.3
Inspection of delivered FRP girders	Hold Point	At time of delivery prior to unloading	8989.6.22.4.3
Installation of FRP girders	Witness Point	As required by MRTS60 and DTMR Standard drawings SD 2280/2281/2285/2286	8989.6.22.4.3
Verification by marking on deck the location of supplementary girder installation	Hold Point	Prior to site works commencing	8989.6.22.5.1
Inspection of delivered girders	Hold Point	At time of delivery prior to unloading	8989.6.22.5.1
Application of preservative and protective coatings to headstock or abutment	Witness Point	Prior to installation of supplementary girder	8989.6.22.5.1
Stability of crane pad, compliance to lift plan and works procedure, and suitability of crane	Hold Point	Prior to installation of girder lifting activity	8989.6.22.5.1
As required, installation of bearings, plates, or mortar pads compliant with design drawings	Hold Point	As required by Supplementary Specification 8987 Clause 8987.6.10	8989.6.22.5.1
Installation and connecting procedure followed	Witness Point	During installation of girder/s	8989.6.22.5.1
Survey locating and level of installed girder in accordance with design drawings	Hold Point	During and after installation of girder	8989.6.22.5.1
Girder in place, aligned correctly, and secured	Hold Point	Prior to removing lifting gear	8989.6.22.5.1

Activity	Inspection Type	When	Reference
Permanently fixing girder, checking no movement of girder has occurred	Hold Point	Seven (7) days after deck has been reinstated	8989.6.22.5.1
REMOVE AND REPLACE/REINSTATE, OR REPAIR CORBELS			**8989.6.23**
Revised Works procedure and other plans	Hold Point	As required by changing site conditions dictating alternate works procedure	8989.6.23.1
As required, submission required to verify materials proposed to be used meet all legislation and structural requirements	Hold Point	Prior to prestart meeting being held	8989.6.23.1
Timber corbel repairs work operations compliance	Hold Point	As required by Clause 8989.6.27.1	8989.6.23.2.1
Defect inspection to verify scope of works is still appropriate,	Hold Point	Prior to works commencing on repairing timber corbel	8989.6.23.2.1
Submission for approval of works procedure for corbel strengthening	Milestone	Four (4) weeks prior to site works commencing	8989.6.23.2.1
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	Prior to works commencing on corbel strengthening	8989.6.24.2.1
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	Prior to works commencing on strengthening corbel	8989.6.23.2.1
Marking of corbels where holes are to be drilled for strengthening treatment	Hold Point	Prior to drilling holes commencing	8989.6.23.2.1
Application of preservative and protective coatings to timber and steel components	Witness Point	During installation procedure of the antisplitting bolts and plates	8989.6.23.2.1
Antisplitting bolts and plates fixing compliance	Witness Point	During installation of each antisplitting treatment	8989.6.23.2.1
Completed works compliance	Hold Point	Prior to preservation measures being applied	8989.6.23.2.1
Application of preservative measures	Witness Point	After approval to proceed with application of measures	8989.6.23.2.1
Installation procedure compliance for banding of corbel	Hold Point	As required by Clause 8989.6.27.5	8989.6.23.2.2
Completed works compliance	Hold Point	Prior to preservation measures being applied	8989.6.23.2.2
For approval to proceed with works mark on existing deck the corbel/s to be replaced as required by the design drawings	Hold Point	Prior to works commencing, approval to proceed	8989.6.23.3

Activity	Inspection Type	When	Reference
Temporary works carried out as required by approved plan	Hold Point	Prior to any works commencing on disassembling connector system of identified corbel	8989.6.23.3
Temporary works carried out as required by approved plan to components to remove load off corbel	Hold Point	During and after jacking has occurred	8989.6.23.3
Compliance to lift plan and works procedure, and suitability of crane	Witness Point	Prior to lifting corbel out and during lifting activity	8989.6.23.3
Sniping and trimming of corbel allows seating of girder along full length of corbel	Witness Point	Prior to permanently lowering girder back in place	8989.6.23.3
Application of preservative and protective coatings to headstock, girder, and corbel	Witness Point	Prior to installation of supplementary girder	8989.6.23.3
Install corbel, as required approval of alternative hold down connecting system	Hold Point	Prior to lowering girder back in place	8989.6.23.3
REMOVE AND REPLACE/REINSTATE, OR REPAIR HEADSTOCKS			**8989.6.24**
Revised Works procedure and other plans	Hold Point	As required by changing site conditions dictating alternate works procedure	8989.6.24.1
As required, submission required to verify materials proposed to be used meet all legislation and structural requirements	Hold Point	Prior to prestart meeting being held	8989.6.24.1
Timber headstock repairs work operations compliance	Hold Point	As required by Clause 8989.6.27.1	8989.6.24.2.1
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	Prior to works commencing on headstock strengthening works	8989.6.24.2.1
Marking of headstocks where holes are to be drilled for PFC sections	Hold Point	Prior to drilling holes commencing	8989.6.24.2.1
Application of preservative and protective coatings to timber and steel components	Witness Point	During installation procedure of the antisplitting bolts and plates or bands	8989.6.24.2.1
Fixing of PFC segments compliant with design drawings	Witness Point	During work operations to install PFC segments	8989.6.24.2.1
Completed works compliance	Hold Point	Prior to preservation measures being applied	8989.6.24.2.1
Application of preservative measures	Witness Point	After approval to proceed with application of measures	8989.6.24.2.1

Activity	Inspection Type	When	Reference
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	Prior to works commencing on splicing the headstock	8989.6.24.2.1
Disconnection of fixings as identified by the design drawings	Hold Point	After temporary works have been installed and approval to proceed granted	8989.6.24.2.1
Jacking activities compliant with works procedure	Hold Point	Refer to Clause 8989.6.5	8989.6.24.2.1
Marking of defective section of headstock to be spliced	Hold Point	Prior to splicing activities commencing	8989.6.24.2.1
Inspection of spliced headstock for compliance to design drawings	Hold Point	At completion of each splicing prior to lowering of corbels and girders into place	8989.6.24.2.1
Alternative splicing methos submission for approval	Hold Point	Two (2) weeks prior to splicing works commencing	8989.6.24.2.1
Application of preservative and protective coatings to timber and steel components	Witness Point	During splicing procedure of the headstock	8989.6.24.2.1
Extent of areas to have steel protection treatment to headstock/s	Hold Point	Agreed to from defect mapping inspection	8989.6.24.2.2
Steel piles inspected for structural adequacy to design class and loss of cross-sectional area	Hold Point	After cleaning of all corrosion and preparation.	8989.6.24.2.2
Protective treatment of steel components	Witness Point	As required by Clause 8989.6.8, and MRTS85	8989.6.24.2.2
Submission for approval of works procedure for girder strengthening	Hold Point	Four (4) weeks prior to site works commencing	8989.6.24.2.2
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	Prior to works commencing on headstock strengthening works	8989.6.24.2.2
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	Prior to works commencing on strengthening headstock	8989.6.24.2.2
Works Inspection of completed works	Hold Point	Completion of installation of measures to strengthen headstock	8989.6.24.2.2
Installation of preservative and protective coatings	Witness Point	After works inspection carried out and approval granted to carry out preservation measures	8989.6.24.2.2

Activity	Inspection Type	When	Reference
Approval to remove temporary works stabilizing the bridge structure	Hold Point	After inspection of completed strengthening works	8989.6.24.2.2
Approval of revised welding procedure works	Hold Point	After inspection of defective cracked steel members or welds	8989.6.24.2.2
Inspection of completed welding works	Hold Point	After works are completed and approval to proceed with protection measures of the steel components	8989.6.24.2.2
Submission for approval of works procedure for FRP headstock repairs	Milestone	Four (4) weeks prior to site works commencing	8989.6.24.2.3
Personnel qualifications and experience	Milestone	Prior to works commencing	8989.6.24.2.3
Minor repair works compliance to design drawings	Witness Point	During repair works activities	8989.6.24.2.3
Major repair works compliance to design drawings	Witness Point	During repair works activities	8989.6.24.2.3
Temporary works carried out as required by approved plan, approval to proceed with removal of headstock	Hold Point	Prior to any works commencing on disassembling connector system of identified headstock	8989.6.24.4
Verification by marking on deck the location of headstock to be removed and replaced installation	Hold Point	Prior to site works commencing	8989.6.24.4.1
Raise corbels and girders as required by lifting plan, further approved temporary works installed	Hold Point	After approval to proceed and during jacking activity	8989.6.24.4.1
Removal of all connector system and approval of new connector system	Hold Point	Prior to removal of defective headstock	8989.6.24.4.1
Compliance to lift plan and works procedure, and suitability of crane	Witness Point	Prior to lifting corbel out and during lifting activity	8989.6.24.4.1
Testing of existing drill holes with connector for fit on pile notch	Hold Point	Prior to predrilling connector holes in headstock	8989.6.24.4.1
Disused drill holes filled and sealed	Witness Point	Prior to headstock being lowered into place	8989.6.24.4.1
Application of preservative and protective coatings to timber and steel components	Witness Point	During installation procedure of the headstock onto the pile seatings	8989.6.24.4.1

Activity	Inspection Type	When	Reference
Seating of new headstock on pile, aligned horizontally and vertically,	Hold point	After lowering into place, prior to installing connector assembly	8989.24.4.1
Survey locating and level of installed headstock in accordance with design drawings	Hold Point	During and after installation of girder and tightening of connector assembly	8989.6.24.4.1
Replacement of headstock with alternative material, compliance to work procedure, including testing, inspections, and certification	Hold Point	As required and reflective of the contractors approved works procedure and Clause 8989.6.23.4.1	8989.6.24.4.2
REMOVE AND REPLACE/REINSTATE, OR REPAIR ABUTMENTS, WINGS, AND SILLS			**8989.6.25**
Wing pile replacement, stabilizing, or supplementing activities	Hold Point	As Required by Clause 8989.6.28.7	8989.6.25.2
Wing Plank repairs or replacement	Hold Point	As required by Clause 8989.6.26	8989.6.25.2
Concrete and Timber repairs to sill beam activities	Hold Point	As required by Clauses 8989.6.7 and 8989.6.27.1 for timber repairs, and Clauses 8987.6.5 and 8987.6.7 for concrete repairs.	8989.6.25.3.1
Submission of works procedure for replacing timber sill beam	Milestone	Four (4) weeks prior to site works commencing	8989.6.25.3.2
Operational works approval as required	Hold Point	Prior to site works commencing	8989.6.25.3.2
Temporary works in place to stabilize bridge and approved by consulting structural Engineer	Hold Point	Prior to any works commencing to remove connectors to the sill	8989.6.25.3.2
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	After excavation of and around the sill beam and cleaning and clearing of debris and grime, prior to dismantling connector system	8989.6.25.3.2
As required jacking of piles in pier, procedure followed under supervision of the consulting structural Engineer.	Witness Point	As required by Clauses 8989.6.4 and 8989.6.5.	8989.6.25.3.2
Bed preparation for sill beam/log	Hold Point	After existing sill beam has been removed	8989.6.25.3.2
Installation of concrete smoothing layer for new sill beam to be laid	Hold Point	Prior to installation of new sill beam	8989.6.25.3.2
Preservation of timber and contact surfaces between piles and sill, and sill and ground.	Witness Point	Prior to reconnecting piles	8989.6.25.3.2

Activity	Inspection Type	When	Reference
Shaping of sill log to connect piles and installation of connectors	Witness Point	Prior to and during the reinstalling of piles back onto the sill beam	8989.6.25.3.2
Jacking down of pier as required to sit in the notched sill	Hold Point	Approval to proceed with lowering back in place.	8989.6.25.3.2
Reattachment of connectors between piles and sill beam and approval to remove temporary works	Hold Point	Prior to stabilising and backfilling of ground around sill log	8989.6.25.3.2
Backfilling and stabilizing ground around sill beam in accordance with design drawings and permit approvals	Hold Point	At the completion of all works	8989.6.25.3.2
Submission of works procedure for replacing concrete sill beam	Milestone	Four (4) weeks prior to site works commencing	8989.6.25.3.3
Approval to strip formwork	Hold Point	After minimum period has passed as required by MRTS 70	8989.6.25.3.3
Approval to load sill beam	Hold Point	After test results and survey results are submitted verifying test results and allowable tolerances compliance with the design drawings.	8989.6.25.3.3
Sill to Pile connector removal and replacement	Hold Point	As Required by 8989.6.27.6.2	8989.6.26.3.4
REPAIR ABUTMENT AND WINGWALL PLANKS			**8989.6.26**
Timber crack sealing activities	Hold Point	As required by Clauses 8989.6.7 and 8989.6.27.1	8989.6.26.1
Concrete crack treatment activities	Hold Point	As required by Clauses 8987.6.4, 8987.6.5 and/or 8987.6.7	8989.6.26.2
Replace ballast boards, cover boards, and/or backing planks and reinstate embankment, drainage, pavement, and seal	Hold Point	Works to be carried out as required by the design drawings and documents and in accordance with relevant MRTS specification and the approved Contractors work procedure	8989.6.26.2
Inspection of works (repair or replacement)	Hold Point	Ongoing as required during backfilling process	8989.6.26.2
REINFORCE OR REPAIR EXISTING PILE/S, OR INSTAL NEW PILE/S, AND SPLICING			**8989.6.27**
Identify area of treatment of deteriorated timber	Hold Point	Prior to commencement of repairs	8989.6.27.1
Approval to proceed with applying preservatives	Hold Point	After surface cleaning and preparation	8989.6.27.1
Applying wood filler and allowing to dry	Witness Point	After approval to apply treatments	8989.6.27.1

Activity	Inspection Type	When	Reference
Application of protective coating	Hold Point	Approval of preservative or sealer	8989.6.27.1
Submission of works procedure for replacing timber pile/s	Milestone	Four (4) weeks prior to site works commencing	8989.6.27.2
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	After setting up of access system and cleaning and clearing of debris and grime	8989.6.27.2
Revision of legislative permit as required	Hold Point	Prior to any works commencing	8989.6.27.2
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	As approved by the works procedure and prior to any works commencing to remove the pile/s	8989.6.27.2
Location of new pile clear of temporary works	Hold Point	Prior to disconnecting fixings, walings and bracings	8989.6.27.2
Disconnection of wales and bracing, and temporary bracing of piles not being removed	Hold Point	Immediately prior to pile removal, approval to proceed	8989.6.27.2
Pile removal and pile driving procedure approved by the consulting structural Engineer	Hold Point	As required by Clause 8989.6.6	8989.6.27.2
Survey results of driven pile to comply with required tolerances	Hold Point	After pile driving activity before pile driver moves to next location	8989.6.27.2
Application of protective coatings	Witness Point	During application of preservation treatments	8989.6.27.2
Reinstatement of wales and bracing and application of preservative treatments	Witness Point	Prior to the removal of temporary works	8989.6.27.2
Approval to remove temporary works and propping	Hold Point	After all connections have been reinstated	8989.6.27.2
Submission of “As Constructed” data, including any test and survey results	Hold Point	At the completion of pile driving activities	8989.6.27.2
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	As approved by the works procedure and prior to any splicing works commencing on the pile/s	8989.6.27.3
Marking of deteriorated pile section to be spliced	Hold Point	Prior to cutting and removal of the decayed segment	8989.6.27.3
Approval for alternative pile splicing procedure	Hold Point	Two (2) weeks prior to pile splicing occurring	8989.6.27.3
Application of protective coatings	Witness Point	During application of preservation treatments	8989.6.27.3

Activity	Inspection Type	When	Reference
Defect inspection to verify scope of works is still appropriate.	Hold Point	After setting up of access system and cleaning and clearing of debris and grime	8989.6.27.4.1
Temporary works installation approval	Hold Point	Prior to disconnecting the pile from the bridge structure	8989.6.27.4.1
Marking of drill holes for PFC sections installation for inspection and approval	Witness Point	Prior to drilling connector holes, approval to proceed with drilling	8989.6.27.4.1
Preservation of timber and contact surfaces with piles.	Witness Point	Prior to and during installation of PFC sections and tightening fixings	8989.6.27.4.1
PFC segment fixing compliance	Witness Point	At completion of installation of each PFC segment/s	8989.6.27.4.1
Completed works compliance	Hold Point	Prior to preservation measures being applied	8989.6.27.4.1
Application of preservative measures	Witness Point	After approval to proceed with application of measures	8989.6.27.4.1
Submission of works procedure for repairing split timber pile/s	Milestone	Four (4) weeks prior to site works commencing	8989.6.27.5
Defect inspection to verify scope of works is still appropriate.	Hold Point	After setting up of access system and cleaning and clearing of debris and grime	8989.6.27.5
Application of antifungal treatment	Hold Point	Once surface water has cleared from defect area	8989.6.27.5
Application of protective measures and sealants	Witness Point	After antifungal treatment, during application of protection measures	8989.6.27.5
Application of preservatives to bare timber and steel bands	Witness Point	During works to install antisplitting bands to pile/s	8989.6.27.5
Completed works inspection for compliance	Hold Point	Once bands have been tightened and prior to preservation measures being applied	8989.6.27.5
Application of preservative measures	Witness Point	After approval to proceed with application of measures	8989.6.27.5
Temporary works installed as required to prop and stabilize bridge	Hold Point	Prior to disconnecting sill bolts and connectors	8989.6.27.6.2
Inspect sills, piers, connectors for defects	Hold Point	After excavation of materials and cleaning of the area affected	8989.6.27.6.2
Installation and reconnection of connectors, bolts, to piles for quality of connection	Hold Point	After tightening of connectors and bolts has been carried out and preservative measures have been applied	8989.6.27.6.2

Activity	Inspection Type	When	Reference
Removal of temporary works	Hold Point	After approval to proceed from inspection of fixings installed	8989.6.27.6.2
Steel piles inspected for structural adequacy to design class and loss of cross-sectional area	Hold Point	After cleaning of all corrosion and preparation.	8989.6.27.7.1
Application of protective treatments	Witness Point	As required by Clause 8989.6.9	8989.6.27.7.1
Submission of works procedure for strengthening of steel piles	Hold Point	Four (4) weeks prior to any works commencing	8989.6.27.7.2
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	After setting up of access system and cleaning and clearing of debris and grime	8989.6.27.7.2
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	Prior to works commencing on strengthening pile	8989.6.27.7.2
Works Inspection of completed works	Hold Point	Completion of installation of measures to strengthen pile	8989.6.27.7.2
Approval to remove temporary works stabilizing the bridge structure	Hold Point	After inspection of completed strengthening works	8989.6.27.7.2
Approval of revised welding procedure works	Hold Point	After inspection of defective cracked steel members or welds	8989.6.27.7.2
Inspection of completed welding works	Hold Point	After works are completed and approval to proceed with protection measures of the steel components	8989.6.27.7.2
Submission of works procedure for replacing or installing additional steel piles	Hold Point	Four (4) weeks prior to any works commencing	8989.6.27.7.3
Marking by survey of pile to be installed or replaced	Hold Point	Approval to proceed prior to any works commencing demolition of deck.	8989.6.27.7.3
Materials delivered compliant with design drawings	Hold Point	At time of delivery to site	8989.6.27.7.3
Defect inspection to verify scope of works is still appropriate, submission of revised works procedure as required.	Hold Point	After removal of deck and other components to allow removal of pile or ability to install additional pile/s	8989.6.27.7.3
Revision of works procedure as may affect legislative permit, as required	Hold Point	Prior to any pile installation works commencing	8989.6.27.7.3

Activity	Inspection Type	When	Reference
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	Prior to works commencing on strengthening pile	8989.6.27.7.3
Location of new pile clear of temporary works and existing bridge components	Hold Point	Prior to disconnecting fixings, walings and bracings	8989.6.27.7.3
Disconnection of wales and bracing, and temporary bracing of piles not being removed	Hold Point	Immediately prior to pile removal, approval to proceed	8989.6.27.7.3
Pile removal and pile driving procedure approved by the consulting structural Engineer	Hold Point	As required by Clause 8989.6.6	8989.6.27.7.3
Survey compliance of pile installation	Hold Point	After new pile has been driven in place prior to reinstatement of the headstock	8989.6.27.7.3
Preservative treatment application	Witness Point	Prior to headstock reinstatement occurring	8989.6.27.7.3
Reinstatement of bracing and wales and preservative treatments	Witness Point	After headstock is reinstated and during reinstatement of wales and bracing	8989.6.27.7.3
Collation and submission of “As Constructed” data	Hold Point	As required by Clause 8989.7	8989.6.27.7.3
Submission of works procedure for driving new wing pile/s	Milestone	Four (4) weeks prior to site works commencing	8989.6.27.8
Removing and/or installation of new wing pile	Hold Point	As required by Clauses 8989.6.27.2 and 8989.6.27.7	8989.6.27.8
Application of termicide and other preservative treatments	Witness Point	Prior to installing pile and after installation	8989.6.27.8
Temporary works required to stabilise and support wing walls and backing boards/planks	Hold Point	Prior to excavation commencing to expose the dead men anchors	8989.6.27.8
As required removal of approach slab, and reinstatement when works are complete	Hold Point	As required by Clause 8989.6.29	8989.6.27.8
Disconnection, replacement, and reinstatement of threaded rod to dead man anchor	Hold Point	When excavation has exposed rod for inspection and at time of reinstallation	8989.6.27.8
Wing pile repairs or replacement/supplement	Witness Point	As required by clauses 8989.6.27.2 and 8989.6.27.7	8989.6.27.8
Remove and replace concrete dead man. Concrete works comply with MRTS 70	Hold Point	Prepour inspection of set up, as required by the design drawings	8989.6.27.8
Backing boards/planks, repairs/replacement/realignment	Hold Point	As required by Clause 8989.6.26	8989.6.27.8

Activity	Inspection Type	When	Reference
Backfilling embankment, pavement, and seal surfacing	Hold Point	As required by Clause 8989.6.30	8989.6.27.8
Submission of endorsed works procedure for FRP wrapping strengthening of pile/s	Milestone	Four (4) weeks prior to site works commencing	8989.6.27.9
Inspection of materials proposed to be utilised for works	Hold Point	At delivery time to site	8989.6.27.9
Recording of weather and environmental conditions	Witness Point	At time of commencement of mixing and time to discharge	8989.6.27.9
Installation of temporary works and cleaning of identified defective pile	Hold Point	Prior to encasement works commencing	8989.6.27.9
Defect inspection to verify scope of works is still appropriate,	Hold Point	After installation of access, cleaning of identified defected pile/s	8989.6.27.9
As required by a change of scope, submission of revised works procedure.	Hold Point	Prior to any encasement works commencing	8989.6.27.9
Existing pile to have preservation and sealing treatment	Hold Point	Prior to encasement works commencing, as required by Clause 8989.6.28.1 and 8989.6.28.6	8989.6.27.9
Materials used in the encasement is compatible with all other materials used as part of the rehabilitation works	Witness Point	Prior to using the proprietary products on site.	8989.6.27.9
Use of alternate materials submission for approval of use	Hold Point	Two (2) weeks' notice prior to encasement activities commencing	8989.6.27.9
Pre grout inspection of encasement and reinforcing	Hold Point	Approval to proceed, inspection prior to grout being pumped into encasement	8989.6.27.9
Grout mixed and installed within manufacturers timeframe	Witness Point	During grout pumping/pouring activities	8989.6.27.9
Installation and curing of plug	Hold Point	Approval to proceed after time lapse for curing of epoxy plug	8989.6.27.9
Process of filling encasement followed as required by manufacturers installation procedure	Witness Point	During filling of encasement	8989.6.27.9
Installation and curing of top epoxy plug and finished profile	Witness Point	At completion of filling encasement to seal encasement works	8989.6.27.9
Joint sealing between plie and grout	Witness Point	Immediately after curing of the top epoxy plug	8989.6.27.9

Activity	Inspection Type	When	Reference
Existing pile to have preservation and sealing treatment, and capping	Hold Point	At the completion of encasement works, as required by Clauses 8989.6.28.1, 8989.6.28.6, and 8989.6.7	8989.6.27.9
Collation and submission of "As Constructed" data	Hold Point	As required by Clause 8989.7	8989.6.27.9
WALINGS AND BRACES			**8989.6.28**
Revised works procedure approval	Hold Point	Prior to any site works commencing	8989.6.28.1
Submission required to verify materials proposed to be used meet all legislation and structural requirements (as required)	Milestone	Prior to prestart meeting	8989.6.28.1
Repairs to decayed or rotted timber	Hold Point	As required by Clause 8989.6.27.1	8989.6.28.2.1
Defect inspection to verify scope of works is still appropriate	Hold Point	After cleaning and clearing of debris and grime	8989.6.28.2.1
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	As approved by the works procedure and prior to any works commencing to remove the walings and bracing	8989.6.28.2.1
Inspection of existing fixings removed either for reuse or replacement of	Hold Point	After fixings have been removed from the walings and braces	8989.6.28.2.1
Sealing of all existing unusable holes	Witness Point	During preservation and predrilling works for new drill holes	8989.6.28.2.1
Marking of drill holes on PFC sections for inspection and approval	Witness Point	Prior to drilling connector holes, approval to proceed with drilling	8989.6.28.2.1
Preservation of timber and contact surfaces with piles.	Witness Point	Prior to installing walings and bracing and tightening fixings	8989.6.28.2.1
Fixing and protection of connectors	Witness Point	During process of connecting and strengthening with PFC segments	8989.6.28.2.1
Works Inspection	Hold Point	Completion of installation and protection of PFC strengtheners	8989.6.28.2.1
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	As approved by the works procedure and prior to any works commencing to remove the walings and bracing	8989.6.28.2.1
Marking of walings and braces in areas to be spliced	Hold Point	Prior to any splicing works commencing	8989.6.28.2.1
Inspection of spliced walings and bracing	Hold Point	At the completion of each splice for compliance to tolerances and design drawings	8989.6.28.2.1

Activity	Inspection Type	When	Reference
Submission of an alternate splicing method endorsed for consideration and approval	Hold Point	Two (2) weeks prior to splicing activities commence	8989.6.28.2.1
Preservation of timber and contact surfaces with piles.	Witness Point	Prior to installing walings and bracing and tightening fixings	8989.6.28.2.1
Defect inspection to verify scope of works is still appropriate	Hold Point	After cleaning and clearing of debris and grime and defect mapping inspection	8989.6.28.2.2
Inspection for structural design class integrity of steel components	Hold Point	After cleaning, submission of recommendations for approval.	8989.6.28.2.2
Protective treatment of steel elements applied	Witness Point	As required by Clause 8989.6.8	8989.6.28.2.2
Submission of works procedure	Milestone	Four (4) weeks prior to works commencing	8989.6.28.2.2
Defect inspection to verify scope of works is still appropriate	Hold Point	After cleaning and clearing of debris and grime	8989.6.28.2.2
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	As approved by the works procedure and prior to any works commencing to remove the walings and bracing	8989.6.28.2.2
Works Inspection of completed works	Hold Point	Completion of installation and protection strengtheners	8989.6.28.2.2
Approval of revised welding procedure works	Hold Point	After inspection of defective cracked steel members or welds	8989.6.28.2.2
Inspection of completed welding works	Hold Point	After works are completed and approval to proceed with protection measures of the steel components	8989.6.28.2.2
Submission of endorsed works procedure	Hold Point	Two (2) weeks prior to straightening procedure commencing	8989.6.28.2.2
Supervision of works and any damage rectification works approval	Hold Point	During the straightening process and where damage to other components has occurred	8989.6.28.2.2
Inspection of straightened waling or bracing for compliance to design drawings	Hold Point	At the completion of the straightening process prior to application of protective coatings	8989.6.28.2.2
Restoration of damaged protective coatings	Witness Point	After straightening works are complete	8989.6.28.2.2
FRP walings and bracings repair works procedure and repair compliance.	Hold Point	As required by Clause 8989.6.24.3	8989.6.28.2.3

Activity	Inspection Type	When	Reference
Marking of walings and bracing to be removed and replaced	Hold Point	Prior to approval to commence activity	8989.6.28.3.1
Temporary works in place to stabilize bridge, including where jacking may be required	Hold Point	As approved by the works procedure and prior to any works commencing to remove the walings and bracing	8989.6.28.3.1
Inspection of existing fixings removed either for reuse or replacement of	Hold Point	After fixings have been removed from the walings and braces	8989.6.28.3.1
As required if using a crane ensure operations are within its capacity	Witness Point	Prior to first lift and as part of approved lifting Plan.	8989.6.28.3.1
Check existing holes and fixings for fit, if cannot be used an alternative fixing system shall be approved	Hold Point	After removal but prior to installation of new timber of walings and braces	8989.6.28.3.1
Sealing of all existing unusable holes	Witness Point	During preservation and predrilling works for new drill holes	8989.6.28.3.1
Preservation of timber and contact surfaces with piles.	Witness Point	Prior to installing walings and bracing and tightening fixings	8989.6.28.3.1
New timber walings and braces in place for alignment prior to fixing	Hold Point	Prior to connectors being inserted and tightened	8989.6.28.3.1
Compliance inspection of installation of timber walings and braces and removal of temporary works	Hold Point	At the completion of works	8989.6.28.3.1
Marking of walings and bracing to be removed and replaced	Hold Point	Prior to approval to commence activity	8989.6.28.3.2
Inspection and approval of temporary works in accordance with approved works procedure plan	Hold Point	Prior to removing walings and/or bracings	8989.6.28.3.2
Inspection of existing fixings removed either for reuse or replacement of	Hold Point	After fixings have been removed from the walings and braces	8989.6.28.3.2
As required if using a crane ensure operations are within its capacity	Witness Point	Prior to first lift and as part of approved lifting plan.	8989.6.28.3.2
Strengthening plates for PFC walings and braces are sized a required by the design drawings	Hold Point	Prior to lifting in place and welding or bolting	8989.6.28.3.2
New walings and braces in place for alignment prior to fixing	Hold Point	Prior to connectors being inserted and tightened	8989.6.28.3.2
Compliance inspection of installation of PFC walings and	Hold Point	At the completion of works	8989.6.28.3.2

Activity	Inspection Type	When	Reference
braces and removal of temporary works			
Compliance inspection of installation of walings and braces (alternative materials)	Hold Point	At the completion of works	8989.6.28.3.3
APPROACH (RELIEVING) SLAB WORKS			**8989.6.29**
Approval of crack filling and patch repair materials	Milestone	Submitted with works procedure and prior to works commencing	8987.6.29.1
Repair – Concrete crack filling	Hold Point	As per 8987.6.4 and 8987.6.7	8989.6.29.2
Repair – Concrete patch repair	Hold Point	As per 8987.6.5	8989.6.29.2
Works procedure remove and replace approach slab	Milestone	Four (4) weeks prior to works commencing	8989.6.29.3
Defect mapping verification inspection of existing approach slab	Hold Point	After cleaning and prior to works commencing	8989.6.29.3
Revision and approval of works procedure (As required)	Hold Point	Where site conditions require a revision of the existing works procedure	8989.6.29.3
Bridge components inspection not visible prior to excavation	Hold Point	At completion of excavation	8989.6.29.3
Defect mapping report and rehabilitation works proposal for approval (as required)	Hold Point	After inspection of bridge components, for consideration and approve of any further rehabilitation works	8989.6.29.3
Preparation of bed for approach slab pour, approval to proceed	Hold Point	At completion of excavation, filling, and finishing surface	8989.6.29.3
Prepour inspection of formwork and reinforcing	Witness Point	Prior to pouring concrete approach slab	8989.6.29.3
Approval to strip formwork	Hold Point	As required by Clause 15.8 of MRTS70 for formwork stripping	8989.6.29.3
Inspection of stripped slab for compliance	Hold Point	Immediately after stripping of formwork	8989.6.29.3
Installation of abutment joint (as required)	Hold Point	After approach slab has been cured, and as per requirement of 8989.6.11	8989.6.29.3
Submission of new approach slab works procedure for approval	Milestone	4 weeks prior to works commencing	8989.6.29.4
Inspection of completed excavation and bridge components	Hold Point	Prior to setting up for approach slab pour.	8989.6.29.4
POST CONSTRUCTION			**8989.7**

Activity	Inspection Type	When	Reference
"On Maintenance" inspection	Hold Point	At the completion of all works prior to site access measures being removed	8989.7.1
Periodic Inspections and Repair of defects (as required)	Hold Point	During 12 months "On Maintenance" period	8989.7.1
Works Acceptance inspection	Hold Point	At completion of 12 months "On Maintenance" period	8989.7.1
Submission of preliminary As Constructed Detail	Hold Point	At completion of works 4 weeks prior to requesting "On Maintenance" inspection.	8989.7.2
Submission of final As Constructed Detail	Hold Point	Prior to work Acceptance to "On Maintenance" inspection	8989.7.2

8987.4.3 Construction Tolerances

Unless specifically stated within the design drawings and documents or within this supplementary specification all construction tolerances shall comply with the respective Australian Standard or TMR Specification/Manual. **No** departure from these tolerances will be accepted, where works do not comply with the set tolerances the Contractor shall remove the defective work/s and rectify the works at no cost to the Principal.

8989.5 Preliminary

8989.5.1 Submissions

The Contractor is to submit the following documentation and any other listed for submission throughout this specification prior to works commencing 4 weeks prior to commencing work or a prestart is conducted.:

- Material Safety and Technical Data sheets for nominated products and materials
- Prequalification of materials
- Proposed storage method and location of products and materials
- Survey and Defect Mapping sketch of each element identifying the components requiring repair and type of repair proposed.
- Works schedule and procedure/s for all activities which clearly defines the scope and extent of the works, including plant/machinery operations plan.
- Deck Wearing Surface removal and reinstallation plan, including plant/machinery listing, proposed use, and impact on the bridge, to be endorsed by a suitably qualified pavement engineer
- Temporary work design drawings and certification, including jacking/lift plan (as required)
- Design details and certification for any falsework used to support the structure during construction.
- Program and sequence for the Works.
- Permits from Government bodies approving the proposed works and the methodology of the works.

Other preliminary requirements unique to the project will be listed in the MRC Supplementary Specification Annexure 8989_1 Timber Bridge Rehabilitation Works.

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The contractor is to ensure their construction activities are based on the design drawing and documentation requirements. Alternate construction materials and procedures are not acceptable unless site conditions dictate and at the Superintendents approval.

8989.5.2 Materials

8989.5.2.1 Pre-Qualification of Materials

Four weeks prior to the commencement of the works, the contractor must submit to the Superintendent, product identification, technical data sheets and test certificates detailing the quality of all materials and performance of all products proposed for use in the Works.

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The submissions must provide information of the product compliance with relevant performance criteria detailed in the design drawings and documents, this Specification, associated Specifications, and/or Australian Standards. The product/s shall be a DTMR-approved product, unless stated otherwise, or if listed products do not meet the requirements of this Supplementary Specification current test certificates supplied by the manufacturers or suppliers may be accepted.

Where in the opinion of the Superintendent insufficient data is available, the Contractors must execute sufficient additional tests certified by their Structural Engineer to prove the suitability and adequacy of such material to meet the design criteria, at the contractor's expense, to the Superintendent's satisfaction.

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The Contractor must submit for the Superintendent's approval a Contractor's Work Procedure and Inspection and Test Plans (ITP's) detailing all testing and performance requirements and witness/hold points and detail preparation, application, and curing techniques to be used, inclusive of all repair material manufacturer's specifications and in accordance with this Specification.

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8989.5.2.2 Design Service Life

The intended minimum service life to be afforded by the repairs is:

- Replacement of timber planks and timber kerbs: 20 years
- Structural rehabilitation of abutments by adding steel UB piles: 30 years.
- Strengthening the wingwall piles by adding PFC sections: 20 years
- Treatments of corroded steel elements: 20 years
- Treatment of timber girders, corbels, and timber piles: 20 years
- Concrete crack repair of planks at abutments: 20 years
- Decking: 20 years
- Deck wearing surface: 15 years.
- Whaling and braces: 20 years
- Strengthening piles with RFP wrap – 20 years

The end of a structure's service life is defined to occur when:

- Deterioration progresses to a level that makes the structure unsafe or unserviceable.

- The level of maintenance necessary to maintain the functionality of the structure becomes uneconomical.

8989.5.2.3 Materials, Design & Manufacture

Repair, protection and strengthening methods of timber bridge components shall be selected based on the type, extent and rate of deterioration or deficiency identified, the reason for deterioration, the required life expectancy of the structure and future maintenance requirements.

Work to timber bridges falls under three basic categories:

a) The first is remedial or temporary repairs (including emergency repairs)

b) The second is protection works.

c) The third is major rehabilitation, strengthening or full component replacement.

Where major rehabilitation works are proposed all timber components shall be ordered by specifying size, strength grade, seasoning requirements (green, 12 months air-dried or kiln-dried) and durability class. If unseasoned or air-dried timber is ordered, then a large size shall be specified to cover shrinkage of the timber as it seasons with time.

The Contractor shall ensure the size of the timber procured (especially unseasoned) is of the size, class, and structural grade as required by the design drawings and documents, non-conforming components will **not** be accepted.

All timber materials shall comply with the requirements of MRTS87 unless otherwise specified within the design drawings and documents.

Supply of all materials to site is the responsibility of the Contractor at their cost, where items are Principal supplied the nominated storage site shall be obtained from MRC Supplementary Specification Annexure 8989_1 Timber Bridge Rehabilitation Works Section 3 and shall be the point of supply. It is the responsibility of the Contractor to inspect products supplied by the Principal prior to transporting to site or installation.

Where items are to be salvaged and stored for reused this shall be obtained from MRC Supplementary Specification Annexure 8989_1 Timber Bridge Rehabilitation Works Section 4 and shall be included within the Contractors Works Procedure.

Materials supplied and transported to site shall be inspected by the Contractor prior to unloading, any materials which are damaged or do not comply with this Specification and design drawings and documents shall be returned to the manufacturer or supplier.

HOLD POINT

All steel components including restraints shall be procured in the lengths, dimensions, structural grade/s, and with compliant protection/painting system shown on the design drawings. Structural steel components shall comply with MRTS 76 and MRTS 78 dependent on the component type and use. Restraint fastening bolts, nuts and washers shall be supplied and fabricated in accordance with MRTS 278, unless as otherwise shown on the design drawings. Prior to procurement it is the responsibility of the Contractor to ensure lengths and dimensions as shown on the design drawings are correct prior to dismantling works commencing.

Alternative materials to timber which may be considered shall be compliant with the design drawings and documents, shall also only be utilised as approved for the bridge component nominated, meet the design criteria/s for the proposed component, and it's use be endorsed by the consulting RPEQ Structural Engineer, these include but not limited to;

- Steel
- Fibre reinforced polymer composites (FRP)

- Laminated Timber – Glulam, LVL, SLT
- Plywood – Laminated, Structural

Other materials supplied as nominated or approved shall be compatible with all other products and meet relevant Australian Standards, MRTS specifications, and be used/applied as specified by the manufacturer, these materials include but not limited to:

1) Grease/Epoxy/Sealants
2) Grout/s
3) Painting Systems (Australian Paint Approval System (APAS) and be certified to Class I conformity)
4) Preservatives (fungicides/termicides)
5) Joint materials
6) Bolts, connectors etc

Civil materials shall comply with the relevant MRTS Specification for the use proposed;

1) Concrete (MRTS70)
2) Reinforcing (MRTS71)
3) Backfill against abutments (MRTS03 and MRTS04)
4) Gravel pavement (MRTS05)
5) Waterproofing membrane (bitumen/emulsion, geofabric, bitumen impregnated sheeting, damp course)
6) Asphalt (MRTS30)
7) Bitumen Seal (Relevant MRTS specification for the seal design approved)

8989.5.2.3.1 Fire Resistance Level (FRL) Timber, Steel, Concrete, Composite Materials

The design shall specify materials which provide the minimum FRL not less than 30/30/30 when tested against the standard (cellulosic) fire curve of AS 1530.4 for all elements, components, and members. The fire resistance is measured in time, this being **not** < 30 minutes for each of the below properties as relates to this Specification. The three components of fire resistance are:

I. **Structural Adequacy -** This aspect measures the ability of a construction element to maintain its load-bearing capacity during a fire. It ensures that the structure remains stable and secure, allowing occupants to evacuate safely.

II. **Integrity** - Integrity focuses on preventing the passage of flames and hot gases through the construction elements (deck), limiting the spread of fire to adjacent areas.

III. **Insulation -** Insulation relates to the element's ability to resist the transfer of heat during a fire. It helps in protecting the non-fire side of the construction element (deck), minimizing the risk of fire spread and providing a safer environment for evacuation.

8989.5.2.3.2 Fire Resistance Level (FRL) Other Materials

Fire resistance of other materials (including composite materials) used in the rehabilitation works of bridges shall be based on the period of structural adequacy (PSA) of the existing components/members, and shall be as specified in AS/NZS 2327, AS 4100 and AS/NZS 4600 and comply with NCC Volume 1 Specification C1 for all members, componentry, and fixings.

8989.5.2.3.3 Ultraviolet (UV) Protection of Composite Materials

The aim is to prolong the useful life of the structure through limiting loss of mechanical properties, surface degradation, and fibre blooming from exposure to UV light. The composite components must be

protected and unless specified otherwise in the Contract documents, the protective system must include the following at a minimum:

a) A UV stabiliser added to the resin mix;

b) A suitable pigment be added to the exterior layer; and

c) A physical barrier comprising of paint or gel coat applied in accordance with the manufacturer's instructions.

Any additives to the resin system that influence processing or curing, such as fillers, promoters, accelerators, inhibitors, UV agents, fire retardants, and pigments must be compatible with the fibre and resin system.

The designer must specify the asset life in the design drawings and documents and require the manufacturer to submit their technical notes including manufacturing testing results to meet this requirement including inspection and maintenance regimes (reapplying protective coating systems) to be compliant with the designated asset life expectancy.

All testing shall be carried out on the full range A,B, and C type UV light.

Four weeks prior to works commencing the manufacturer shall submit a compatible protective materials coating system for the proposed composite components based on the above requirement, this system shall detail material type/name and application process, any minimum thicknesses, curing times and processes, any testing of the applied layers to enable verification of its UV protection effectiveness, and any materials safety data requirements needed for their use. The submission shall also include future maintenance applications required and timing.

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8989.5.2.4 Handling and Storage of Material on Site

Repair materials and components must be stored in accordance with the manufacturer's requirements including:

- In dry conditions not exposed to direct sunlight, not in contact with a damp floor or ground.
- Within the specified maximum and minimum temperature range
- In their original, sealed moisture resistant bags or containers.

All materials and components shall be brought to site in the original sealed bags or unopened containers clearly labelled with the appropriate manufacturer's name, product type, reference number and batch number. Materials and components that have deteriorated in any way or that have been stored beyond the manufacturer's recommended shelf life shall be discarded.

The following information shall be provided for each batch of repair material:

- Manufacturer's name and address
- Product reference
- Batch number of identification
- Quantity manufactured in the batch.
- Certificate of date of manufacture.
- Test results and clear identification to the materials tested.

Where timber is procured for repair works, upon delivery it shall be stacked off the ground on suitable bedlogs which shall be spaced such as to prevent permanent warping. Sawn timber shall be stacked so that there is a minimum clear air space of 25mm between pieces of timber to allow for proper ventilation and seasoning. The contractor shall be responsible for the storage on site of materials and their

acceptance for the intended repair works, the Superintendent shall have the right to reject any materials that are deemed unfit or unsuitable for the intended repair works.

Where proprietary materials are used, they must be stored strictly in accordance with the instructions and recommendations of the manufacturers.

Repair material must be demonstrated to be compatible with all other products used in the remediation works.

Four (4) weeks prior to site works commencing the Contractor shall submit to the Superintendent the proposed storage method and location of products and materials on site, this is to be compliant with manufacturers requirements and Environmental legislation.

MILESTONE

8989.5.3 Water

All water used for cleaning or other work must be potable.

8989.5.4 Care of Services

The Contractor shall take care to avoid damage to or interference with any services and shall be liable for the immediate repair or reinstatement of any such damage or for interference caused directly or arising indirectly from anything done or omitted to be done. The Contractor shall carry out all temporary work necessary to adequately support and protect such services.

8989.5.5 Temporary Works Design

Where temporary works are required to carry out the works or stabilize the bridge structure and members a suitably qualified and experienced professional engineer (RPEQ) shall undertake all aspects of the design of any temporary works required.

The design shall comply with all relevant requirements of:

- All Reference and Source Documents listed in section 8989.2.
- Any relevant Australian Standard
- Any Development Approval conditions relevant to the design, and
- Any specific relevant and reasonable request provided by Council in writing.

The RPEQ shall sign all plans and documentation associated with the project, certifying that the temporary works design complies with this clause 8989.5.5. and submit them for review 4 weeks prior to site works commencing.

MILESTONE

8989.5.6 Works Procedure

The Contractor shall prepare a works procedure for all activities required under this specification which also address WH&S specific requirements for the site, this shall include but not be limited to the following;

i. Site setup, including traffic management and public consultation.
ii. Identification of underground utilities and road furniture which impact the works and the proposed treatment to address the impacts.
iii. Permits required, (inclusion of approval for works if already available)
iv. Bridge repair activities, repair methodologies, sequence of works (including temporary works)
v. Details of bridge components and materials transportation and site storage methods
vi. Prepare and submit an Equipment Operational Plan that details the proposed vehicles, plant and equipment that will be used on the bridge.

vii. Detail measures to be incorporated into the operations where bridge components inhibit activities being carried out i.e. pile driving and conflict with headstock and girder locations.
viii. Listing of all materials to be used on site, storage methods, and inclusion of testing and/or certification for use with the identified work operation/activity
ix. Methods to address painting systems, both existing and new
x. Erosion control and protective measures
xi. Pavement and formation approach works.
xii. Collection of "As Constructed" data.

The works procedure shall be submitted to the Superintendent for approval four (4) weeks prior to construction commencing.

MILESTONE

8989.5.6.1 Vehicle Equipment and Plant-Induced Loads on Bridge

The Contractor shall prepare and submit an Equipment Operational Plan with their works procedure that details the proposed vehicles, plant and equipment that will be used on the bridge. The Equipment Operational Plan shall include:

a) A list of all vehicles, plants and equipment that will load the bridge.

b) The gross mass of all individual vehicles, plant and equipment in tonnes, including any incidental mass, fuel and any attachments on vehicles, plant and equipment.

c) Vibrating frequency (Hz) and nominal amplitude (mm) of vibrating rollers. Preference shall be given to oscillating drum rollers.

d) Rotational speed (rpm), milling depth range and number of teeth on the cutter drum of the cold milling machine drum if proposed to be used in removal of the existing DWS.

e) Combinations of vehicles, plant and equipment for the purpose of evaluating the load distribution on the bridge during bridge work.

f) Any additional details requested by the Superintendent.

g) RPEQ Certification by a Transport and Main Roads BD2 minimum prequalified Engineering Consultant that the existing bridge is structurally adequate to support the operational equipment and plant, including dynamic effects.

h) The sequence and staging of construction including considering loads and dynamic effects of the equipment and plant shall be specified by the RPEQ.

MILESTONE

8989.5.7 Vegetation Removal within waterway and for access

While vegetation removal within the road reserve is exempt under the Vegetation Management Act the Contractor shall note and take necessary action to meet the requirements of the relevant ADR referenced in relation to the following matters in relation to both the works to be undertaken and access to the waterway bed level:

- Minimise disturbance to the instream bed and banks e.g. use geofabric as a work base or construct a work platform above the substrate.
- If it is necessary to remove vegetation, aim to cut vegetation no lower than ground level and leave the root in the ground to aid in stabilisation. If deep excavation is required during construction the roots may only be removed within the construction footprint area.
- Minimise the area of land disturbed or compacted e.g. construct a work platform above the substrate.

- Ensure the least volume of soil or sediment is disturbed.
- Limit the use of machinery within waterways.
- Use machinery no greater than the capacity required for the purpose.
- Implement sediment and erosion protection measures.

Any works undertaken to facilitate access to the bridge level shall take note of accepted Development Requirements applicable and must as part of the works be fully restored to preconstruction line and level and the surface fully revegetated.

8987.5.8 Permits for Work

The Contractor must ensure applicable permits for the various work activities are completed and approval issued by the statutory body for those works, all requirements for submission, completion, and obtaining permits shall be at the Contractors cost.

8989.5.9 Defect Survey and Mapping

8989.5.9.1 Purpose

Prior to undertaking the repair works, the full extent of defects to the bridge needs to be determined to confirm the extent of each type of repair. Level 2 or 3 inspections undertaken on the structures are appended; however, defect mapping may have not been produced as part of the inspection. Areas that may have deteriorated further, if present, need to be identified and incorporated into the works.

8989.5.9.2 Method

Identification of the defects to all components must be carried out by visual inspection, as a minimum. Areas identified for repair must be marked out using a waterproof marker and calculation of the quantity of the repair made. Any variances from the Schedule shall be reported to the Superintendent for approval prior to any works commencing.

HOLD POINT

No works shall commence prior to the Superintendent's approval of the type, location and extent of repairs. The defect mapping will be required to be supported by RPEQ certified designs (drawings/documentation) as required. Upon approval of the submitted variations that include the type, location, and extent of repairs, they shall be signed by the Superintendent's Representative. The original must be kept by the Superintendent and the duplicate by the Contractor and will be used as a record for the purpose of measuring the work.

HOLD POINT

8989.5.9.3 Defect Mapping

After initial defect mapping and site-based review by the contractor and Superintendent and agreement to variances the Contractor must provide the Superintendent with certified marked out sketches of each element identifying the areas requiring repair, correlated to MRC bridge component naming convention and the design drawings. These shall include elevations, sections and/or plan views as appropriate to best identify and record the defects and design report as required.

HOLD POINT

8989.6 Construction

This section lays out the works operations with more detail based on specific requirements of this supplementary specification. Some activities may appear to include items which are stated within other specifications, the purpose is to reinforce that requirement specific to this supplementary specification.

8989.6.1 Work Operations

Work operations incorporated in this item are those included in Clause 2.1.5 of MRS01 "Introduction to Standard Specifications' and the following work scope activities and associated sub activities;

8989.6.1.1 Work Scope

The scope of repair works (including all associated sub activities) covered under this specification is as follows:

- Defect survey and mapping.
- Temporary works to stabilise the bridge structure.
- Jacking/Lifting of bridge.
- Ecology assessment and management
- Supply and installation of piles.
- Protective treatments for timber, steel, concrete
- Removal of sediment and debris within and at bridges
- Removal of existing deck wearing surface
- Abutment wing wall protection
- Joint repair/reinstatement
- Dismantling of bridge components and protection of utilities
- Removal, repair, and replacement of railings, kerbing
- Concrete patch repairs
- Concrete crack repairs
- Bridge deck repairs, replacement
- Bridge deck joint repairs (Transverse)
- Bridge deck joint repairs (Longitudinal)
- Bearing and plate replacement
- Sealing of gaps between bridge components
- Repair of cracks on bridge deck wearing surface
- Replacement of bridge deck wearing surface
- Reinstatement of bridge approaches
- Remove, replace, repair corbels, girders, headstocks, piles.
- Remove, replace, repair abutments, wings, sills, abutment planks.
- Remove, replace, repair walings and bracing.
- Remove, replace, repair approach (relieving) slab.
- Pile strengthening with FRP material wraps.
- Preparation and submission of QA documentation.

8989.6.2 Removal of Sediment & Debris within and at Bridges

8989.6.2.1 Ecology Management

Prior to any cleaning works, removal of sediment or debris at and around the bridge site the Contractor shall ensure all requirements of managing flora and fauna as outlined in the Ecology report has been implemented. Approval to commence any site works shall be approved by the Ecologist and the Superintendent.

HOLD POINT

8989.6.2.2 Purpose and Location

This activity applies to the removal of sediment and debris at bridges. The works shall be carried out as detailed and shall be read in conjunction with all referenced documents and any required operational works permits which may be approved for the activity.

8989.6.2.3 Preparation and Removal

Prior to works commencing, the extent of material to be removed from the bridge shall be approved by the Superintendent, this shall include consideration of activities such as pile driving and future possible fire risk to the bridge structure. Any foreign material that is impeding the free flow of water shall be removed. Generally the extent of clearing within the watercourse beyond the bridge extents are as follows:

- Maximum of 5m beyond the end of the bridge piers/abutments; or,
- Road reserve boundary or fence line; or,
- Sufficient width to provide vehicle access/equipment access to the base of the watercourse; or,
- The shortest length of any of the above.
- In accordance with ADR requirements

HOLD POINT

Removed sediment and debris shall be disposed of in accordance with the provisions of Clause 11 of MRTS04 *General Earthworks*.

The Contractor shall take all reasonable measures to ensure that removal of sediment and debris does not result in any additional damage to the existing bridge, this includes selection of plant/machinery which may impact the bridge during operations. Damage attributable to the Contractor's operations shall be rectified to the satisfaction of the Superintendent at the Contractor's expense.

The Contractor shall note and comply with the requirements of Section 8989.6.2.1

Any temporary bunding installed during repair works shall take into account the relevant time restrictions referred for declared waterway categories in the Accepted Development Requirements for Operational Work that is constructing or raising waterway barrier works.

Similarly, restrictions exist for vegetation removal for maintenance action under the Accepted Development Requirements for Operational Work that is constructing or raising waterway barrier works. The Contractor must acquaint themselves with the areas to which such works can be undertaken and ensure no works are undertaken outside of such zones. Prior to works commencing "no go" zones shall be clearly identified on site and delineated as such.

WITNESS POINT

8989.6.2.4 Calculation of Quantities

Actual quantities of sediment and debris removed shall be determined based on truck tallies or other method of measure appropriate to the method adopted for removal of sediment and debris as agreed between the Contractor and Superintendent.

8989.6.3 Defect Survey and Mapping

On completion of the removal of debris and any sediment the Contractor shall arrange for the Structural Engineer and the Superintendent to inspect the bridge for the purpose of verifying defects identified in the design drawings and documents. Access shall be installed by the Contractor in order to carry out this inspection, any variations in the defects identified shall be noted and included in the scope of works **only** at the approval of the Superintendent, refer to clause 8989.5.9.

HOLD POINT

8989.6.4 Temporary Works

Prior to any works commencing on the bridge repairs the Contractor shall supply all materials, labour, and plant required for the temporary works and install all temporary works/measures as set out in the design drawings and contractors works procedure/s certified by the RPEQ structural Engineer. Upon installation the Contractor shall request the Certifying Engineer to inspect the temporary works for compliance to the design and the requirements of clause 8989.5.5. This applies to all activities where dismantling, propping, and/or jacking is required to be carried out.

HOLD POINT

It is the responsibility of the Contractor to inspect all temporary works every day prior to commencing works to ensure the safety of the site personnel and the bridge, this shall be documented for the Certifying Engineer and the Superintendent to view at any time.

WITNESS POINT

8989.6.5 Jacking/lifting Bridge Components

All equipment used to lift bridge components, support them, and then lower back into place shall comply with those stated in the Contractors work procedure, the Contractor shall ensure all jacking and lowering works follows the approved lift plan.

8989.6.5.1 Implement Measures to Maintain Structural Integrity of Bridge

The Contractor shall ensure an approved Loading Regime is in place for the proposed repairs, this shall be endorsed by the contractors Structural Engineer and approved by the Superintendent and shall be reflected in the Traffic Management Plan.

HOLD POINT

As required by the design drawings and defect mapping report the Contractor shall install temporary measures such as packing plates and shims, shoring, and bracing to protect the integrity of the bridge during repair works. These measures shall be secured in place and installed as required by the relevant manufacturer's instructions or certified design for use at the individual site or location. The Contractor is to ensure the Structural Engineer inspects and approves all shoring and bracing installation, and packing plates, shims, or similar are secured to prevent dislodgement. The Superintendent is to be notified of the outcome of this inspection and any approval granted to commence lifting operations.

HOLD POINT

8989.6.5.2 Jacking and Lifting System

The Contractor shall ensure all equipment to be used for lifting the bridge elements has been certified for use and install all jacks at the locations approved in the lift plan.

As part of the repair works a lift plan shall be part of this approval. The Contractor shall ensure the lift plan is still applicable, approval to set jacks and commence lifting from the Structural Engineer shall be submitted to the Superintendent.

WITNESS POINT

Jacks shall be set on base plates and only used as per the manufacturer's instructions, with only vertical or horizontal forces applied with axials loads only applied in the direction of the ram. Where multiple jack lifting operations are required they are to be synchronised and be identical.

The lifting plan should be followed at all times by the Contractor ensuring;

a) All traffic is stopped during the lifting process and repair works, including pedestrians as applicable.

b) Restraints are in place to prevent unplanned lateral or longitudinal movements.

c) The rate of lifting is as documented in the lifting plan, drawings and design report.

d) Packers and shims are to be inserted during jacking with every lift not exceeding 10mm's before inserting further packing. All proposed members to be lifted shall be done in tandem, and not in isolation full height lift.

e) Survey monitoring the movement of the lifts.

f) Jacking forces and lift heights do not exceed the maximum specified in the bearing repair drawings and report.

g) Longitudinal movement is controlled to keep joint displacements within design requirements.

h) Planned lateral movement is controlled and in line with the lift plan with safety measures in place such as anchors or brakes to halt excessive movement.

WITNESS POINT

Jacking activities and lifting of bridge components shall not cause damage to the bridge, if this occurs the Contractor shall cease works, inform both the Structural Engineer and the Superintendent. The extent of the damage shall be assessed, and further direction issued to rectify or ensure no further damage is caused. The Contractor shall be responsible for rectification works required at no cost to the Principal.

HOLD POINT

Unless otherwise approved by the Structural Engineer and agreed to by the Superintendent no bridge members are to be temporarily supported by the jacking system outside of working hours or open to traffic use.

Traffic is to be strictly controlled while the bridge members are lifted as required by the Traffic Management Plan. This includes but not limited to speed and weight restrictions as may apply.

8989.6.5.3 Survey Monitoring of Jacking

The Contractor shall be responsible for survey monitoring of the lifting of the bridge elements. This shall be carried out by a registered surveyor. Initially prior to commencement of repairs a Bridge Survey Control Plan shall be put in place and submitted to the Superintendent for their consideration.

During the repair works the Contractor shall ensure their Surveyor carries out monitoring as required by the lift plan and at a frequency required by the Structural Engineer, this includes controlling the design jacking height for each lift, also includes monitoring when jacking down into place.

WITNESS POINT

8989.6.5.4 Component Repairs (including removal and replacement as needed)

Identified works as being required to be repaired shall be cleared and cleaned through wet sponging/wiping with repairs (including replacement) carried out as required by the design drawings and any further agreed actions identified after the components have been cleared and cleaned.

Survey monitoring of the location of the repair work, repaired or new shall be captured for the purposes of "As Constructed" documentation for compliance to the design drawings and documents.

The Contractor shall apply protective treatments to components and fixings as required by the design repair drawings and documents and the manufacturers requirements.

8989.6.5.5 Repairs to Other Components

At the completion of the bridge repairs or replacement other repair works identified shall be carried out as specified by the structural Engineer in the design drawings and documents for the bridge.

Replace all loose, disconnected or missing bolts, nuts, screws and washers with new ones.

Where repair works have been identified and are a variation to the design drawings and documents the

Contractor shall notify the Structural Engineer and arrange a conjoint inspection with the Superintendent. These works shall only be carried out with the approval of the Superintendent.

HOLD POINT

8989.6.5.6 Removal of jacking System

Prior to the removal of the jacking system the Structural Engineer and the Superintendent shall carry out a conjoint inspection of the works, this shall form part of the works compliance process. The Contractor is also to capture "AS Constructed" information prior to removal of the jacking system.

HOLD POINT

The Contractor shall follow the cyclic jacking up and letting down as documented in the design report noting the maximum allowed letting down height for each cyclic jacking action, removing plates/shims and any other temporary bridge supports as they lower the bridge back into its designed location, the Structural Engineer shall supervise the process to ensure no damage to the bridge structure occurs.

WITNESS POINT

The Contractor shall arrange for their surveyor to check the final location of the control points for vertical level compliance and horizontal displacement as required by the bearing design drawings and report, the Contractor shall also inform the Superintendent to arrange for Councils Surveyor to also carry out a survey on the control points for compliance to the design drawings.

With survey compliance and approval from the Superintendent the Contractor shall then remove the jacking system.

HOLD POINT

8989.6.5.7 Removal of bracing and shoring and other temporary measures

Upon survey compliance, certification of the repairs, "As Constructed" detail being submitted, and Superintendents acceptance of the repair documentation the Contractor shall remove all bracing and shoring when the works are complete. The location/site shall also be cleaned and returned to its natural state.

HOLD POINT

8989.6.6 Supply and installation of driven piles

Where the design drawings require new piles to be driven the Contractor shall include all activities of supply, delivery to site, driving, and finishing to height of piles included in their work operations.

This works activity relates to the supply, delivery, storage, removal and installation of piles, all works shall be carried out in accordance with the design drawings and documents, including supply and storage of all materials to site. The Contractor shall include the relevant activity in their works procedure and quality plan, be endorsed by the consulting structural Engineer, and submit to the Superintendent for approval 4 weeks prior to site works commencing.

MILESTONE

The Contractor shall also note where a pile is to be driven the location may be inhibited by other components of the bridge such as headstocks, girders, whaling and bracing. The submitted work procedure shall be reflective of the requirements of Clause 8989.5.6 and also include measures to address components which impact the pile driving (including the pile driving rig).

8989.6.6.1 Manufacture, supply, transport, unloading and storage at site of piles

All piles shall be in compliance with the design drawings and documentation. Procurement of piles may have a long lead time; the Contractor shall allow for this in their construction plan.

The piles shall be manufactured to the requirements of the design drawings and any relevant Australian

Standard, and shall be of the materials specified, the structural requirements for each pile for the specific location, and in individual lengths as required for each pile site.

Piles shall be of the materials designated and comply to the following specification;

i. Timber – MRTS87

ii. Steel – MRTS66

iii. Concrete – MRTS65

iv. Fibre Reinforced Composite – MRTS59

All manufactured piles shall carry certification from the manufacturer attached to the pile including pile reference to the design drawings pile numbering system, and in the delivery documentation, and shall form the basis of predelivery product acceptance on site. Supply, transporting, and unloading at site is the Contractors responsibility unless otherwise noted in the design drawings and documentation. Transporting and unloading, placing on ground/storage shall be carried out in accordance with the manufacturer's requirements.

The contractor shall ensure the designated storage site is of sufficient area to unload and store the piles and when stored are in planned order of pile driving such that transferring to pile site does not require moving of other piles in storage.

All delivered piles shall be inspected for damage prior to unloading and checked for type and quantity against the delivery docket, procurement order, and bill of quantities. Any items which are damaged or not manufactured as required by the design drawings are not to be used and are to be returned to the supplier.

HOLD POINT

If materials are Principal supplied the nominated storage site shall be obtained from MRC Supplementary Specification Annexure 8989_1 Timber Bridge Rehabilitation Works Section 3 and shall be the point of supply.

8989.6.7 Protective Treatments for Timber Components

The works operations covered by this section relates to the provision and application of protective treatments of timber components. Alternative approved materials for use as protective treatments shall be nominated in the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 3.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 17.7, and Part 4 Section 2.15 and the relevant activity as applies to the identified works from the design plans and documentation.

Preservative Treatments

- Apply chemical preservative to timber – TBMM Part 4 Activity 100T1 and TBMM Part 2 Clause 17.7
- Apply preservative grease to timber - TBMM Part 4 Activity 100T2 and TBMM Part 2 Clause 17.7
- Replace or provide metal caps to members ends – TBMM Part 4 Activity 100T3 and TBMM Part 1 Clause 7.7.2
- Paint or repaint timber – TBMM Part 4 Activity 100T4 and TBMM Part 2 Clause 17.10
- Apply end sealant - TBMM Part 4 Activity 100T5 and TBMM Part 2 Clause 17.7
- Place bituminous felt – TBMM Part 4 Activity 100T7 and TBMM Part 2 Clause 17.7

Termite Poisoning

- Drill & inject termicide poison into timber - TBMM Part 4 Activity 110T1 and TBMM Part 2 Clause

17.8

- Poison termite nest or trails – TBMM Part 4 Activity 110T2 and TBMM Part 2 Clause 17.8

During repair or replacement works of components the Contractor shall ensure that all required protective treatment systems are installed/painted as works progress with protective measures complying with the design drawings and documents and respective standards and references.

8989.6.7.1 Timber Protection

Where contact surfaces between timber components and/or other composite materials occurs these shall be treated by the use of an approved preservative then covered by grease and a layer of bitumen impregnated compressible material/bituminous felt being installed and shall cover the full area of contact with the compressible material/felt overhanging and shaped to shed water away from the components.

WITNESS POINT

Where the requirement for end caps or flashing is required, the contractor shall follow the design drawings and documents, where there is a lack of detail DTMR TBMM Part1 Clause 7.7.2 shall apply.

WITNESS POINT

8989.6.7.2 Timber Preservation

Preservation of timber components used in bridges whether existing or newly installed shall be protected against decay (fungi from moisture) and insect infestation.

The type of preservation comes in the form of chemical preservative or grease, and in protection form such as end caps, flashing, and bitumen impregnated felt.

The Contractor shall supply all materials, labour and plant and equipment to carry out application of preservative treatments as required by the design drawings and documents or referenced specifications.

The applicable allowable preservatives are as detailed in DTMR TBMM Part 2 Figure 17.7 (a) and (b), if the Contractor proposes an alternative they shall submit the details of the proposed preservative, life span (maintenance requirements), environmental sensitivities (i.e. to flora, fauna and watercourses), and its MSDS for consideration and approval. This shall be submitted as part of the Contractors works procedure 4 weeks prior to any works commencing on site.

HOLD POINT

8989.6.7.2.1 Bare timber preservation, sawn ends, snipes

An antifungal treatment shall be applied (brushed) into all bare and exposed timber, drilled bolt holes, and surfaces where other components are in contact with the timber shall be by the use of an approved preservative then covered by a preservative gel or grease, and a bitumen impregnated compressible material/bituminous felt laid and shaped to shed water away from the timber component, the Contractor shall ensure the preservative used and the method of application complies with the design drawings and documents.

WITNESS POINT

The end grain of walings and bracings, headstocks, deck planks, ply decking, kerbing, and any other element that could be subject to regular wetting should be treated with preservative and then sealed to stop the absorption of moisture.

Protection of kerbs and railings shall be carried out as required by the design drawings and documents, and where stated due to illumination and safety issues white paint shall be applied, refer to Clause 8989.6.16 for details.

8989.6.7.2.2 Bored Boron hole

The injection of Blue 7 mix fluorine, copper, and boron injection into angled holes drilled into the piles to intersect the core of the timber shall be used to preserve the timber component. Following injection, the mix diffuses into the timber slowly and protects against pipe rot. The holes are filled and capped with a plastic plug with retreatment approximately every 4 to 5 years.

A similar treatment is to use an anti-fungal treatment of boron, in the form of Disodium Octaborate inserted into drilled holes at the ends of girders and the tops and bottoms of piles where the moisture content is sufficiently high for fungal attack. The mix diffuses into the timber and protects against further pipe rot. The holes are filled and capped with a plastic plug and a retreatment is undertaken every three to five years.

WITNESS POINT

The Contractor shall use the following table for identifying the coloured plug required to be inserted to seal the drill hole which will represent the year of treatment and be used as a quick reference during bridge inspections to identify when retreatment shall occur.

WITNESS POINT

Colour	Grey	Red	Blue	Yellow	Green	White	Purple
Year	2024	2025	2026	2027	2028	2029	2030
	2031	2032	2033	2034	2035	2036	2037
	2038	2039	2040	2041	2042	2043	2044
	2045	2046	2047	2048	2049	2050	2051

The Contractor shall ensure all treatments are recorded and submitted to the Superintendent as part of the "As Constructed" records and all treatments recording the date, month and year that the structure was treated with preservative clearly marked at the abutment 1 headstock.

WITNESS POINT

8989.6.7.2.3 Sealing Timber Endgrain

Exposure of the end of a timber member to the weather permits entry of moisture, repeated wetting and drying and deterioration of the timber through rotting. This rotting will progress along the centre of the timber component, generally pile/headstock, girder, or corbel leading to a loss of strength. The timber endgrain should be sealed to keep out moisture to prevent further weathering.

Maintenance Method

1. Seal the endgrain of the timber by filling the cavities to block out the moisture droplets. This is best done in summer when the timber has been allowed to dry out.
2. The sealant can be a preservative such as copper naphthenate or more commonly hot petroleum jelly.
3. A galvanized metal cap may also be considered as an additional or alternative form of protection for the timber to prevent further weathering in accordance with Installation of Flashing.

8989.6.7.3 Termite Treatment

The Contractor shall review any documentation which details the last treatment at the site, either in the design drawings or at abutment 1. If no details are available, the Contractor shall notify the Superintendent. The Superintendent shall determine the extent of termite preventative treatment for the site.

HOLD POINT

Works to be carried out for preventative measures against termites shall be carried out as required by the

design drawings and documents, where there is a lack of detail the following steps shall apply and be in accordance with DTMR TBMM Part t Clause 7.2 and Part 2 Clause 17.8;

a) Drill holes into the heart of the member,

b) Inject the approved termicide poison.

c) Once completed the drill hole/s shall be capped with a removable colour plastic plug as above.

WITNESS POINT

The Contractor shall ensure all treatments are recorded and submitted to the Superintendent as part of the "As Constructed" records and all treatments recording the date, month and year that the structure was poisoned clearly marked at the abutment 1 headstock.

WITNESS POINT

Covered termite trails shall be treated with arsenic trioxide dust applied by a hand puffer as noted in DTMR TBMM Part 1 Section 7.2.

Where termite damage and/or presence has been detected the Contractor shall inform the Superintendent immediately in order to carry out treatment as soon as practical to limit damage.

HOLD POINT

The Contractor shall follow all required safety precautions required of the manufacturers MSDS when using the various preventative and protective treatments.

Storage of all protective treatments shall be in accordance with Clause 8989.5.2.4, care shall be taken to ensure materials stored are compatible with each other otherwise they must be stored separately.

8989.6.8 Protective Treatments for Steel Components

The works operations covered by this section relates to the protective treatments of steel components. All protective paint systems shall comply with MRTS78, MRTS88, and TMR Technical Note TN144 and be compatible with the existing paint system..

Alternative approved materials for use as protective treatments shall be nominated in the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 3.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 17.10, and Part 4 Section 2.17 and the relevant activity as applies to the identified works from the design plans and documentation;

- Spot clean and paint steelwork – TBMM Part 4 Activity 100S1 and TBMM Part 2 Clause 17.10
- Clean and paint bolts, nuts, & washers – TBMM Part 4 Activity 100S2 and TBMM Part 2 Clause 17.10
- Clean and paint steelwork - TBMM Part 4 Activity 100S3, TBMM Part 2 Clause 17.10, and MRTS 11.85
- Clean and paint stressing bars – TBMM Part 4 Activity 100S4 and TBMM Part 2 Clause 17.10

The Contractor shall prepare documented procedures for all construction, environmental, safety, paint removal and paint application processes in accordance with the design drawings and documents and MRTS85 and submit them 4 weeks prior to works commencing.

MILESTONE

8989.6.8.1 Corrosion/Protection Treatment

Steel components shall have protective treatment/s applied to retain or restore its condition and prevent further deterioration. The following works operations shall be carried out:

i. Install containment/collection apparatus as required by the Contractors approved Environmental plan and any conditions of the Accepted Development Requirements (ADR) as applicable to the site.

HOLD POINT

ii. Carry out preliminary tests to determine if the existing protective system contains lead. Any lead paint removal shall be performed by specialist personnel.

HOLD POINT

iii. The Contractor shall make provision within their works procedure to address removal of lead paint through their WH&S Plan detailing items such as suitable work suits, breathing apparatus and wash down areas for workers, as well as vacuum extraction and filtering facilities to collect the paint dust and flakes generated by the blasting process. Refer to *AS4361.1* for details of testing and containment requirements.

iv. Prepare the surface by cleaning back to bare metal the area to be treated. All exposed corroded steelwork must be cleaned by wet grit blasting with potable water to a standard equivalent to AS 1627.4: 2005 Class Sa 2½. Care must be taken to protect adjacent sensitive materials from damage and all debris, paint dust and flakes collected in the containment set up. All areas of corrosion must be cleaned back to bare steel.

v. After wet grit blasting, the steel must be high-pressure washed with clean potable water to remove corrosion products from pits and imperfections within the surface.

vi. Corroded materials shall be removed using one or more of several methods, from wire brushing to abrasive blasting. Care should be taken to ensure that the surrounding intact paint, the system should not be damaged during the process. Remove all loose, scaly, or flaky paint with a wire brush.

vii. Water and dirt may be removed by air-blasting and wiping.

viii. Grease-like contaminants may be removed by wiping down with a solvent. Surfaces shall be cleaned by mechanical means, steam, pressure washing with clean water, grit blasting, or a combination to achieve a satisfactory finish. Any remaining dust or loose material shall be removed by blowing with oil-free clean compressed air.

ix. All prepared surfaces shall be sound, clean, and free from dust, laitance, plaster, oil, curing compounds, paint, grease, corrosion deposits, laitance, organic growth, and any other deleterious substance.

x. Newly galvanised surfaces shall be etched locally around defects to allow an overlap of the new coating.

xi. Existing galvanised coated surfaces shall be whip blasted to remove the oxide film and surface contamination with minimal reduction in the galvanising coating thickness

xii. Prior to removing the containment/collection apparatus the existing substrate profile shall be measured in accordance with AS 1627.4, approval to proceed with the primer coat by the painting inspector shall be the compliance to the approved paint system technical specification.

xiii. Clean down the area and remove the containment/collection apparatus (if utilised).

xiv. The coating system shall be compatible with the existing coating and suited to the climatic conditions. Use surface tolerant epoxy mastic paint. All paints must be chosen from the same manufacturer, and no paint should have exceeded the expiry date.

xv. Follow manufacturer's recommendations on the coating application procedure and the curing time between coats. Further, wet film thicknesses should be checked to ensure that they do not exceed the allowable thickness as this may cause paint to run, de-bond or craze on drying.

xvi. Apply the approved paint system compliant with TMR Technical Note TN144 as nominated in the design drawings and documents, and be suitability for the precise application intended, or an equivalent product approved by the superintendent can be used to the affected area. This should be done on the same day as the completion of the surface preparation.

WITNESS POINT

xvii. The number of coats is dependent on the environment, the design drawings and documents and Annexure 8989_1 Section 5.2 shall state whether a further topcoat is required.

xviii. The Contractor shall measure the dry film thickness of each coat with an appropriate Digital Electronic Coating Thickness Guage which shall be calibrated in accordance with AS 1580.108.2 using non-magnetic shims on polished steel. The Contractor shall also ensure records are kept of the dry film thickness tests for each applied painting coat and submit to the Superintendent for approval.

HOLD POINT

8989.6.8.2 Protective Treatment Application Constraints

If the following climatic/substrate conditions are present the protective treatment shall not be applied:

- Relative humidity above 85%
- Substrate temperature less than 3°C above the dewpoint
- Ambient air temperature below 10°C or above 35°C
- Surface to be coated is wet or damp.
- Full prime coat application must be carried out within 4 hours after surface preparation before the specified cleanliness of the surface deteriorates.

8989.6.8.3 Verification

The Contractor shall submit a methodology to the Superintendent 4 weeks prior to commencing works detailing the actions required to verify the coating application including inspection and test plans.

MILESTONE

8989.6.8.4 Repairs to Cracked Welds

This works activity relates to the identification of cracked weld/s on existing steel members. The design drawings and documents shall list the severity of the cracking, treatment of the weld/s and reinstatement of the protective treatment. The Contractor shall inspect the cracked weld/s in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

Welding works shall be carried out as required by MRTS 76 and AS/NZS 1554 (respective sub standards). All works required as a result of this inspection shall be endorsed by the consulting Structural Engineer and approved by the Superintendent, the contractor shall revise their works procedure, have it endorsed by the structural Engineer before submitting it to the Superintendent.

HOLD POINT

The Contractors personnel to carry out the welding works shall be an accredited welding operator of minimum 10 years' experience as a tradesman. When the welding operations are complete, the consulting Structural Engineer and the Superintendent shall inspect the repairs, with approval of the repairs the Contractor shall carry out protective treatment of the area in accordance with Clause 8989.6.9.1 and associated clauses for constraints and verification.

HOLD POINT

8989.6.9 Protective Treatments for Concrete Components

Works operations covered under this section applies to any concrete component and is a result of the defect inspection and mapping report, refer to Clauses 8989.6.3 and 8989.5.9 and details identified within the design drawings and documentation.

8989.6.9.1 Crack Repair and Sealing

Items covered by this activity shall be carried out in accordance with Clause 8987.6.4 and 8987.6.7 of MRC Supplementary Specification 8987 as required by the defect survey and mapping report, and the design drawings and documentation.

HOLD POINT

8989.6.9.2 Concrete Patch Repair

Items covered by this activity shall be carried out in accordance with Clause 8987.6.5 of MRC Supplementary Specification 8987 as required by the defect survey and mapping report, and the design drawings and documentation.

HOLD POINT

8989.6.10 Abutment and Wingwall Protection

This works activity relates to the rock (and concrete) protection of the bridge abutment and wingwalls, and piers, all works shall be carried out in accordance with MRTS03 and the design drawings and documents, including supply of all materials to site. The Contractor shall include the relevant activity in their works procedure and quality plan and submit to the Superintendent for approval 4 weeks prior to site works commencing.

MILESTONE

Works operations shall include installation of safe access down to and around the abutment and wingwalls and to piers as required for future maintenance and inspection access in accordance with statutory body permits and the design drawings and documents. The Contractor shall be responsible for this as part of their site access requirements and ensure controlled works carried out are permanent, non-eroding, and not detrimental to the bridge and its associated structures to the approval of the Superintendent and any issued operational permit.

HOLD POINT

Unless otherwise documented in 8989_1 Timber Bridge Rehabilitation Works Annexure inspections, testing, and tolerances shall be in accordance with MRTS03 for the protection type (1-8) nominated.

HOLD POINT

8989.6.11 Joint Repair/Reinstatement

Works operations covered under this activity includes repair or install deck joints at abutments with or without approach slab, for plywood decking joins and other deck joins refer to Clause 8989.6.18. For the installation, replacement, or repair of approach slab refer to Clause 8989.6.29, and for reinstatement of road approaches refer to 8989.6.17.

The Contractor shall submit as part of their works procedure the proposed works operations, materials proposed, and planned timing of this activity for approval by the Superintendent 4 weeks prior to works commencing on site.

MILESTONE

8989.6.11.1 Materials

All materials shall be procured and supplied by the contractor, storage on site shall be as required by the manufacturer's requirements.

8989.6.11.2 Preparation

Preparation of the joint shall comply with the approved sealant manufacturers specification. The preparation for the repair includes the following steps:

i. The contractor shall mark out the line and extent of the saw cuts, the Superintendent shall inspect and give approval to proceed.

HOLD POINT

ii. Sawcut the DWS along the marked extents (kerb to kerb) to remove the existing DWS, all saw cuts shall be vertical, perpendicular to the end of the deck, and to the full depth required, noting that the area of the DWS to be cut shall be of sufficient width to carry out sealing of the joint and comply with the approved sealant manufacturers requirements.

iii. Remove the DWS to expose the joint, top of the ballast wall or approach slab and any materials from the existing abutment joint seal identified as requiring replacement.

iv. The exposed joint and associated bridge components shall be made dry and free from dirt, dust, oil, loose material and contamination in accordance with manufactures requirements. This may be completed by mechanical means, wire brush, scraper or blower.

HOLD POINT

8989.6.11.3 Installation

The following installation process shall be included in the Contractors approved works procedure;

i. The type of joint filler and sealant shall be as indicated in the design drawings and documents, if there is a lack of detail the Contractor shall submit a proposal and installation procedure compliant with the manufacturers specification to the consulting structural Engineer and Superintendent for approval, this shall be submitted with their works procedure 4 weeks prior to works commencing.

HOLD POINT

ii. Upon approval to proceed the Contractor shall carry out works to seal the abutment joint as required by the design drawings and documents, the type of joint filler and sealant installed in accordance with the manufacturer's specifications.

iii. The Superintendent shall carry out site inspections with the Contractor during the installation process of the joint sealing to ensure compliance with the manufacturer's requirements and the design drawings and documents.

WITNESS POINT

iv. The deck wearing surface between the saw cuts shall be reinstated as required by the design drawings and documents and in accordance with the requirements of Clause 8989.6.16. The materials are to match like for like to the existing DWS and approach surfacing.

WITNESS POINT

v. The surface profile and drainage crossfall is to be profiled to existing surface levels on the bridge and approaches ensuring smooth transition from the road to bridge interface. as required by the design drawings unless otherwise directed by the Superintendent.

vi. Where the road approaches are required to be reinstated due to other identified works to or behind the backing boards or wing walls the Contractor shall carry out these works in accordance with Clause 8989.6.18, this includes testing, inspections and construction tolerances.

HOLD POINT

8989.6.11.4 Follow up maintenance.

The contractor shall supply the Superintendent with a maintenance schedule and installation guideline for renewal of the joint based on the product approved and installed. This shall be submitted with "As Constructed" data required for this activity at the conclusion of works.

HOLD POINT

8989.6.12 Repair/replace bolts, nuts, threaded rod, plates, shims, packers.

Work operations covered under this activity should be read in conjunction with all work operations which require the use of fixings such as bolts, connectors, nuts, washers, shims, plates, packers which when used in unison ensure tight joining of differing components.

Dimensions of all fixings and installation setup shall be as per the design drawings and documents. The Contractor is responsible for the procurement of all fixings as designated in the design drawings and documents or as required on site to carry out the works being performed. Bolts, nuts, washers, spacers, connectors shall be supplied compliant to MRTS 278, and Clause 8.2 of AS/NZS 5131. Materials not covered by these specifications shall be hot dipped galvanised.

Timber plates, shims and packers shall be compliant with MRTS 87.

Any loosening or removal of fixings shall **NOT** occur without the approval of the consulting structural Engineer and the Superintendent, this has been clearly identified within the various works operations and may align with requiring temporary works to stabilize the bridge structure.

Where other work operations require loosening and removal of nuts, bolts, connectors the Contractor shall inspect the fittings for their condition;

i. Where they can be reused the Contractor shall clen all fixings ensuring any corrosion is removed, protecting the fixings by recoating with cold galvanizing, or relevant preservative for timber fixings.

ii. Where they cannot be reused due to corrosion, being bent, no longer fit the drilled hole, or are of the required dimensions the Superintendent shall be notified for approval of replacement fixings.

HOLD POINT

iii. Fixings and steel components identified and approved for disposal shall be disposed of as required by the Contractors works procedure.

Timber contact surfaces including bolt holes, and fixings shall be treated to comply with Clause 8989.6.7, during the installation all bolts and connectors shall be coated with grease to provide protection to the timber components. Once in place the Contractor shall coat areas damaged from the tightening process with cold galvanising.

8989.6.13 Disconnect, protect, and reinstate utilities (as required)

Where the project requires protection of electrical, telecommunication, or water reticulation which impact the repair works the Contractor shall carry out all required temporary works to protect the various utilities as required by the utility owner. All works shall be carried out in accordance with the relevant legislation for the respective utility type, including permits.

The Contractor shall submit the utility providers approved temporary works as part of their works procedure 4 weeks prior to commencing works on site. Works shall **NOT** commence unless the provisions of the above have been satisfied and approved by the Superintendent.

HOLD POINT

All utilities which have been the subject of temporary works shall be inspected for compliance by the

relevant utility owner and the Superintendent. Any non-compliance shall be rectified by the Contractor at their cost.

HOLD POINT

Where previous approval has been obtained for irrigation to be attached to the bridge the Contractor shall liaise with the relevant owner of the irrigation system to disconnect and reinstate at the completion of works at the owner's cost. If no previous approval has been granted the owner of the irrigation system will require approval through a Minor Works Permit approval and be responsible for all costs. The reinstatement must be accompanied by a letter of approval by Council and subject to approval by the Superintendent before reinstatement works commence.

HOLD POINT

8989.6.14 Dismantle and replace/reinstate railings/guardrails.

The works operations covered by this section relates to the disconnecting, replacing, and reinstating of railings, guardrails, and guideposts. Alternative approved materials for use as railing or guideposts shall be nominated in the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 5.2.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 3.0, and Part 4 Section 2.2 and the relevant activity as applies to the identified works from the design plans and documentation;

Bridge Rails and Posts

- Replace timber post – TBMM Part 4 Activity 2T1 and TBMM Part 2 Clause 3.1
- Replace timber rail - TBMM Part 4 Activity 2T2 and TBMM Part 2 Clause 3.1
- Replace timber barrier with steel bridge rail - TBMM Part 4 Activity 2T3 and TBMM Part 2 Clause 3.1
- Replace steel bridge rail – TBMM Part 4 Activity 2S1 and TBMM Part 2 Clause 3.2
- Replace steel post - TBMM Part 4 Activity 2S2 and TBMM Part 2 Clause 3.2
- Relocate steel rail - TBMM Part 4 Activity 2S3 and TBMM Part 2 Clause 3.2
- Increase barrier height – TBMM Part 4 Activity 2S4 and TBMM Part 2 Clause 3.2
- Place post packer - TBMM Part 4 Activity 2S5M and TBMM Part 2 Clause 3.2
- Replace guidepost - TBMM Part 4 Activity 2T1 or 2S2 as applicable and TBMM Part 2 Clause 3.3

Approach Guardrails

- Relocate guardrail section - TBMM Part 4 Activity 72S1 and TBMM Part 2 Clause 3.4
- Add Posts – TBMM Part 4 Activity 72S2 and TBMM Part 2 Clause 3.4
- Install guardrail - TBMM Part 4 Activity 72S3M and TBMM Part 2 Clause 3.4
- Provide connection to end post or rail - TBMM Part 4 Activity 72S4 and TBMM Part 2 Clause 3.4

All of the above listed activities should be carried out with reference to MRS14 & MRTS14, and MRS80 and MRTS80 with these specifications taking precedence where there is any conflict in requirements and compliance.

Prior to any works commencing the Contractor shall carry out dismantling of the Bridge components (posts, railings, guardrails) which may be damaged by lifting or jacking and in areas where the deck is to be removed. Dismantled components are to be placed in storage for reuse or disposed of in accordance with the design drawings and the Contractors Environmental Plan.

The use of composite materials (fibre or laminates) as replacement for the bridge posts or railings shall be approved during the design phase and be certified by the Consulting Structural Engineer for the proposed use. **No** variation of materials shall be considered during the construction phase.

HOLD POINT

The removal, reinstatement or replacement of barriers shall be carried out as the above activities for timber and steel barriers (posts, railings, guardrails), the Contractor shall reflect these work operations in their works procedure.

Where alternative composite materials have been approved this item covers all work operations and materials associated with replacement of timber barrier components as follows;

i. The Contractor shall supply all composite materials and fixings (bolts, nuts, washers, brackets) as required to install the replacement barrier components. The dimensions of new posts and rails shall correspond to these of the rails to be replaced or as required by the design drawings and documentation.

ii. Work operations covered include removal of defective post and railing components, supply of all materials, cutting & assembly of new posts and railing/s, removal & replacement of bolts, and sealing of all new barrier system material.

iii. All materials including fixings shall be installed and comply with the composite material manufacturers requirements. Where bolts are reusable and are suitable for reuse with the composite material they shall be removed and replaced to the requirements of TMR TBMM Activity 120S2. Where new bolts are required, supply shall be covered by TMR TBMM Activity 120S8. The Contractor shall carry out the necessary drilling and fixing of new connection points for the post and railings as required.

iv. Modification of Composite materials shall be carried out as per manufacturers procedure/s and supplied Material Safety Data Sheet (MSDS). The Contractor shall be responsible for the work procedure of modifying the material/s including sealing of exposed/cut ends and holes.

v. During installation any modified materials or joints or protrusions shall be sealed with a protective coating as recommended or approved by the manufacturer of the composite material and allowed to cure in accordance with the supplier/manufacturer's requirements.

HOLD POINT

vi. All contact surfaces between rail & posts with existing timber shall be sealed and treated with an anti-fungal preservative (TMR TBMM Activity 100T1) & a preservative grease (TMR TBMM Activity 100T2), joints and connections in the composite materials shall be treated with a preservative as required by the manufacturers specification.

vii. Where painting of the finished post and rail barriers is required the painting system shall be compatible with the composite material to the requirements of TMR TBMM Activity 100T4.

The contractor shall ensure the Consulting RPEQ carries out inspections of the works at various stages as it is installed to enable certification of the works, Council's Superintendent is also required to conjointly inspect the works.

WITNESS POINT

8989.6.15 Dismantling and replace/reinstate kerb.

This section covers the dismantling, removal, repair, reinstatement or installation, protection, and repainting of timber bridge kerb. The kerb repair works shall be as required by the design drawings and documents. Alternative approved kerb materials shall be nominated in the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 5.2.

The Contractor shall prepare a works procedure for the removal and reinstatement of kerb, this shall be

endorsed by the Consulting structural Engineer and submitted to the Superintendent for approval 4 weeks prior to works commencing on site.

MILESTONE

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 4.0, and Part 4 Section 2.3 and the relevant activity as applies to the identified works from the design plans and documentation;

- Replace kerb in hardwood – TBMM Part 4 Activity 3T1 and TBMM Part 2 Clause 4.1
- Replace kerb in ply - TBMM Part 4 Activity 3T2 and TBMM Part 2 Clause 4.1
- Replace kerb in concrete - TBMM Part 4 Activity 3C1 and TBMM Part 2 Clause 4.2

For alternative materials such as composite fibre the Contractor shall comply with the manufacturer's specifications and the requirements of Clause 8989.6.17.2 for dismantling the existing and replacing with new kerb.

Plywood kerbs - All plywood components shall be preservative treated to the requirements of AS 1604.3 and Clauses 6.6.5 to 6.6.6 of MRTS87 and Section 3 of AS/NZS 2269.

8989.6.15.1 Materials

Kerbs shall be of hardwood grade F17 Hardwood, Group S2, and Durability Class 2 in accordance with MRTS 87 or approved alternative materials as required by the design drawings and documents. It is the responsibility of the Contractor to supply all new kerb materials including but not limited to bolts, nuts, washers, tie downs, and painting/preservative systems.

Upon delivery all materials shall be inspected for quality, defects, and compliance to the material requirements, any damaged or non-conforming materials shall be returned and replaced. All materials are to be accompanied by their certification of conformance to the design plans and documents requirements.

HOLD POINT

Protective coatings for the respective kerb and joins, connection to the bridge deck shall be supplied by the Contractor. The protective system shall be referenced in the design plans and documents, if there is a lack of detail the Contractor shall submit their proposals for the following;

- Protective coating – Timber (Rot, Insects, Climate) including drilled holes, Steel (Preventative, Corrosion), Concrete (Sealing/painting), Composite fibre (Sealants as required by the manufacturer), Plywood (Rot, Climate, Sealants as required by the manufacturer)
- Painting system – Exposed surfaces to environment
- Joins – Sealing
- Fixings (including threaded rod/bolts/nuts/washers/spikes) – Protection.

All protective coatings must be compatible to the surrounding differing materials, the contractor shall submit evidence of this requirement prior to kerb works commencing.

HOLD POINT

8989.6.15.2 Repair/Replace Kerb Works

Prior to commencing to undo the restraining system of the kerb to the deck the Contractor shall ensure the bridge deck is stable and safe for personnel to work upon. Temporary works required to stabilise the deck shall be in accordance with the Contractors approved work procedure.

The Consulting Structural Engineer shall carry out an inspection to verify the stability of the deck during the kerb is removal. The Contractor shall carry out any further temporary stabilization works as required

by the Consulting Structural Engineer at no cost to the Principal.

HOLD POINT

During the kerb removal by the Contractor all components identified for reuse shall be numbered and identified to its position on the bridge, storage shall ensure no damage to the kerb. Dispose of all kerb and fixings identified as requiring replacement.

Works to other components including the deck identified within the design drawings and documents shall be carried out prior to reinstallation of kerb. Prior to works commencing on reinstatement of the kerb/s the Structural Engineer shall approve of the underlying works to the deck

HOLD POINT

The following process shall be followed in reinstating the kerb;

Prepare the kerb/s from the specified material (timber, concrete, or composite fibre) and those identified for reuse, ensuring they are cut to the required size and shape for installation including allowing for drainage holes (scuppers) as per the structural design drawings.

i. Timber decking shall be dressed in the contact area to reduce high spots and allow the kerb to be pulled down tight. Clean the deck surface to remove any debris or dirt.

ii. All contact surfaces should be treated with an antifungal preservative and preservative grease applied as noted in the design drawings. Application shall be as required by the manufacturer's directions. In order to remove any remaining air gaps, a bituminous felt should also be laid over the contact area or approved suitable damp course. (Where a kerb is formed from 2 layers of hardwood timber, the internal contact area shall be similarly treated). The end grain of kerb timbers shall be treated before assembly because of small end gaps.

WITNESS POINT

iii. Prior to the installation of the kerb the Contractor shall ensure the scuppers are located as shown on the plan and any form of protective material is installed to ensure water runoff is directed over the side of the deck clear of all bridge components, this shall be as required by the design drawings or at the direction of the Superintendent.

iv. The installation of the bituminous felt or damp course and kerb shall take into account the deck wearing surface proposed and overlap with the waterproof membrane and surface seal design to form a waterproof seal which will direct water runoff to the scuppers.

WITNESS POINT

v. Existing kerb attachment bolts may be used for the new kerb, unless corrosion of the bolts has occurred in which case galvanised replacement bolts as noted in the design drawings and documents shall be used. Where bolts can't be extracted or a new girder is also installed, attachment bolt sizes and spacings as shown in the design drawings shall be used.

vi. Where new connection holes are needed the Contractor shall follow the manufacturers requirements including the type of fixings (bolts/nuts/washers), the old drilled connection holes shall be filled and sealed with an approved epoxy, refer to Clauses 8989.6.7.

vii. As required install the kerb/s along the edges of the timber deck according to the design drawings and documents. Secure the kerb/s using appropriate bolts, nuts, and washers to connect the kerb/s to the bridge deck. Refer to the design drawings for details.

viii. All bolt holes through kerbs shall be treated with a preservative and a grease or petroleum jelly applied to the bolt shank before insertion in order to improve water tightness.

WITNESS POINT

ix. Apply a sealant or protective coating to the timber kerb/s to enhance durability and weather

resistance, the sealant product (Bondall Monocel all-purpose sealer or equivalent) shall be approved by the superintendent for use.

WITNESS POINT

x. After installation, inspection of the installed kerb/s to ensure they are securely attached and function as intended. The Contractor shall install road reflective permanent markers as required in accordance with the design drawings and clean up the construction site as needed.

HOLD POINT

Only as required by the design drawings and documents shall the kerb/s be painted white in order to provide enhanced protection to the timber and also extra delineation for traffic, this shall comply with MRTS 88.

8989.6.16 Repair, Remove and Reinstate Deck Wearing Surface (DWS)

This section covers the repair, removal, and replace, of timber bridge deck wearing surface (DWS). The DWS repair works shall be as required by the design drawings and documents, this supplementary specification and annexure 8989_1 Timber Bridge Rehabilitation Works Section 5.2.

Unless otherwise stated in the design drawings and documents all deck wearing surfaces shall be of asphalt treatment in accordance with MRTS84, with the asphalt complying with MRTS30.

Prior to any repair works commencing the Contractor shall inspect the DWS and mark out the identified defect/s, the Superintendent shall inspect with the Contractor and verify the extent of repair works as documented in Annexure 8989_1 Timber Bridge Rehabilitation Works Section 5.2.

HOLD POINT

8989.6.16.1 Materials and Resources

All deck wearing surface materials shall be supplied by the Contractor and be compliant with the requirements as specified in the design drawings and documents for the type of surfacing specified.

Plant and labour required to carry out the seal/asphalt works shall also be supplied by the Contractor as documented in their approved DWS works procedure. **No** variation to the approved works procedure shall occur unless site conditions dictate an alternative method, this must be endorsed by the Contractors pavement Engineer and approved by the Superintendent prior to works being planned and commencing.

HOLD POINT

The following materials shall be used within this specification and tested for compliance to the respective specification:

- Waterproof membrane shall be a 10mm seal with bitumen binder S25E in accordance with TMR MRTS84 Deck Wearing Surface
- For the plywood deck CRS60 primer shall be applied, the spray rate shall be compliant with the seal/asphalt design.
- Asphalt corrector course shall be a dense graded asphalt (AC10H with A25E binder) in accordance with TMR MRTS30
- The asphalt wearing surface shall be 50mm AC10H using A25E binder in accordance with TMR MRTS30.

Alternate materials nominated for use as or with a waterproof membrane (primarily to protect and seal joints in the deck) shall be nominated in the design drawings and documents and annexure 8989.1 Timber Bridge Rehabilitation Works Section 5.2.

8989.6.16.2 Installation of Deck Wearing Surface

The installation of a deck wearing system whether it be full deck or to sections removed for repair works is for the purpose of ensuring a non-skid surface and the underlying deck and joints are waterproofed and protecting the bridge deck and structure.

The Contractor shall submit a works procedure endorsed by the structural Engineer for the installation of the deck wearing surface, including priming of the plywood timber surface as required and the installation of a waterproof membrane a minimum 4 weeks prior to commencement of works.

MILESTONE

8989.6.16.2.1 Application of Waterproofing Membrane

The deck wearing surface and waterproofing membrane layers will vary based on the decking material and the performance requirements required for the waterproofing, surface finish of the DWS, and the dead loads applied to the structure.

i. Ensure all works are complete on the bridge as required by the design drawings and documents, all as constructed detail has been collected, and the consulting structural Engineer and the Superintendent have granted written approval to proceed with laying the new DWS.

ii. The Contractor shall prepare the timber deck for applying new wearing surface, ensure the timber deck is clean and free of debris, including any pre-existing residual deck wearing surface.

iii. Prior to commencing installation or applying the waterproof membrane the Contractor shall ensure all end joints have been filled and sealed with an epoxy sealant, and the timber deck has been treated with preservative and allowed to dry before applying the primer and waterproof membrane.

iv. The prepared deck shall be inspected by the Consulting Engineer and Superintendent prior to approval to proceed being granted.

HOLD POINT

v. Upon approval to proceed the Contractor shall carry out priming of the timber deck, once this has been cured. The type of waterproof membrane to be applied/installed shall be as required by the design drawings and documents unless otherwise directed by the Superintendent due to site conditions.

vi. The Contractor shall ensure the waterproofing membrane is applied to the bare plywood ends and edges adjacent to abutments.

Where sprayed bitumen and aggregate is used as the waterproof membrane the Contractor shall comply with the design binder application and aggregate spread rates endorsed by the consulting RPEQ Engineer and submitted to the Superintendent for approval. Any variation shall require endorsement by the consulting RPEQ Engineer and approval by the Superintendent.

HOLD POINT

The binder and cover aggregate used for the waterproofing membrane shall be applied in accordance with the requirements of TMR MRTS11 *Sprayed Bituminous Surfacing Treatments (Excluding Emulsion)*.

Overlays placed on the waterproofing membrane shall not occur until after the appropriate “curing” time period for the binder used has passed.

Where alternate waterproofing membranes are proposed these shall be proprietary products approved by DTMR or TfNSW for application to timber decks and applied as per the manufacturer’s specifications and requirements.

8989.6.16.2.3 Bitumen Seal Deck Wearing Surface (DWS)

Only where included within the design drawings or documentation shall work operations incorporate the supply of bitumen and aggregate to carry out a two-coat bitumen seal of the deck. The Contractor shall carry

out all works as required by the design drawings and documents and comply with the relevant MRTS specification as applicable.

HOLD POINT

8989.6.17 Reinstate Road Approaches

This works operations relates to the reinstatement of the road surface leading up to each end of the bridge or approach slab (if in place) as required by the design drawings and documents.

Where backfilling against the abutment ballast boards, cover boards or wingwall planks is required these activities shall be carried out in accordance with MRTS03, and the design drawings and documents.

The earthworks subgrade layer shall comply with MRTS04, the contractor is responsible for all work activities to reinstate compliant materials, supply, mix, lay, compact, test (geotechnical and geometric), and proof roll. The Superintendent shall attend the proof roll and issue approval to proceed when all earthworks' tests and the proof roll are compliant and within specification tolerances and endorsed by the RPEQ Consulting Engineer.

HOLD POINT

On unsealed roads the pavement shall be a minimum 150mm deep type 2.2 road base compliant with MRTS05, the contractor is responsible for supplying, carting, mixing, laying, compacting, and trimming of the pavement materials in accordance with MRTS05.

The finished surface shall not be greater than +/- 5% grade leading to or from the bridge, be trimmed to 5% crossfall as soon as practical away from the end of the bridge, transition smoothly to the existing pavement and formation. The pavement shall have a tolerance of -0mm / +5mm finished level with the bridge deck wearing surface or relieving slab. A proof roll inspection shall be carried out by the consulting Engineer and the Superintendent on the unsealed surface.

HOLD POINT

Where the design drawings show a bitumen sealed surface this shall be carried out in accordance with MRTS11 and MRTS22, and asphalt as per MRTS30, if there is a lack of detail on the plans the sealed surface shall either connect to the existing bitumen or the existing unsealed formation is sealed for the length of any guardrail protection or for a minimum of 10m from the bridge abutment. The surface shall be inspected, and proof rolled prior to sealing by the consulting Engineer and the Superintendent. All pavement test results shall be submitted for review prior to this inspection.

HOLD POINT

The completed road approaches shall be swept, cleaned of all debris and inspected by the consulting Engineer and Superintendent for compliance to the requirements of the design drawings and documents, all resting results shall also be submitted for approval prior to inspection.

HOLD POINT

Signage and line marking shall be reinstated as required by the design drawings and documentation and shall comply with MRTS14, the contractor shall be responsible for all activities and materials required associated with the removal, storage and reinstatement of road furniture, including the supply of any new furniture.

8989.6.18 Repair, Remove and Replace Deck

This section covers the repair, removal, and replacement, of timber bridge deck. The deck repair works shall be as required by the design drawings and documents, this supplementary specification and annexure 8989_1 Timber Bridge Rehabilitation Works Section 5.2.

For general works operations other than ply sheet decking (replacement or repair) refer to TMR Timber Bridge Maintenance Manual Part 2 Section 5.0, and Part 4 Section 2.4. Where proposed works are not

included below as identified in the bridge inspection reports the asset owner shall communicate their requirements and specification inclusion requirements.

This specification details works to transverse plywood sheet decking, and the relevant activity for repairing, or removal and replacement of the deck as applies to the identified works from the design plans and documentation;

- Replace ply sheet – TBMM Part 4 Activity 20T1 and TBMM Part 2 Clause 5.2
- Replace deck planks in ply – TBMM Part 4 Activity 20T2 and TBMM Part 2 Clause 5.2
- Replace longitudinal deck planks in ply - TBMM Part 4 Activity 20T3 and TBMM Part 2 Clause 5.2
- Install distributor planks (HW) – TBMM Part 4 Activity 120T1 and TBMM Part 2 Clause 17.3
- Replace and retighten distributor planks – TBMM Part 4 Activity 120T2 and TBMM Part 2 Clause 17.3
- Install distributors (steel) – TBMM Part 4 Activity 120S3 and TBMM Part 2 Clause 17.3
- Replace distributors (Steel) – TBMM Part 4 Activity 120S4 and TBMM Part 2 Clause 17.3

8989.6.18.1 Materials and Resources

All plant, materials, and labour required to carry out ply sheet deck repairs or replacement works shall be supplied by the Contractor as documented in their approved works procedure. **No** variation to the approved works procedure shall occur unless site conditions dictate an alternative method, this must be endorsed by the Contractors Structural Engineer and approved by the Superintendent prior to works being planned and commences, including procurement of materials.

HOLD POINT

Where materials are being replaced the new components shall be of the same dimensions and/or as shown on the design drawings and documents. **No** alternative materials shall be considered which are not included in the approved design drawings and documents. All materials are to be inspected at the time of delivery.

HOLD POINT

8989.6.18.1.1 Timber

All timber procured and supplied shall be compliant to the requirements of MRTS 87 and Clause 8989.5.2 of this specification.

Plywood sheeting shall comply with the structural requirements of the design drawings and AS 2269.0, all plywood delivered to site shall carry certification of its structural properties and compliance.

8989.6.18.1.2 Steel

All steel elements and/or components procured and supplied shall be compliant to the requirements of MRTS78, and Clause 8989.5.2 of this specification.

Bolts, nuts, washers shall be supplied compliant to MRTS 278, and Clause 8.2 of AS/NZS 5131.

Unless noted otherwise on the Engineering Drawings, all fasteners shall be hot-dipped galvanised in accordance with AS/NZS 1214 or electroplated in accordance with AS 1897.

8989.6.18.2 Fixing of Distributor/s

The fixing of distributors shall be included in the Contractors works procedure submitted 4 weeks prior to site works commencing and be endorsed by the consulting structural Engineer. It is preferred the distributor fixing bolts do not penetrate through the ply deck but can be secured from underneath and not work lose due to movement of the ply decking.

MILESTONE

8989.6.18.3 Strengthen by Replacing or Adding Steel Distributer Sections

The purpose of this activity is to strengthen the ply deck using PFC sections to reinforce the join between ply sheeting limiting prevent differential edge deflections in the sheets.

The following operations cover as a minimum but not all activities and shall be reflective in the Contractors works procedure for carrying out these strengthening works;

i. Access to the identified area shall be maintained to allow safe operations during repair works, transporting equipment to the specific site, including drills and materials.

ii. Where existing distributers need to be removed the Contractor shall carry out works to remove the existing bolts and remove the existing distributor. The bolts and PFC sections or plate/s shall be inspected for defects, refer to Clause 8989.6.12.

iii. Where it is approved to reuse the existing bolts, PFC sections or plate/s these shall be stored to avoid damage, those deemed not suitable for reuse shall be disposed of as required by the Contractors environmental plan.

iv. The existing area and any new locations shall be cleaned of all debris, grime, grease, oil, and mould. Where existing bolt/connector holes are not to be reused they shall be cleaned of all dirt, grime, and wood rot, treated with a preservative then sealed with wood filler and epoxy sealant, refer to Clause 8989.6.7. Cleaning shall be carried out as required by the Contractors approved Environmental Plan with measures installed to capture waste materials and debris.

v. The Contractor shall inspect the site/s in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

vi. The Contractor shall mark the ply sheeting where the bolt holes are to be drilled where PFC is to be installed at the designated centres between girders and correct dimension from the edge of the ply sheeting as required by the design drawings and documents. Upon approval by the Structural Engineer the Contractor shall commence installation of the PFC sections. All drilled bolt holes shall be as shown on the design drawings.

WITNESS POINT

vii. Where bolt holes are drilled an antifungal treatment shall be applied (brushed) into the exposed timber, the Contractor shall ensure the preservative used and the method of application complies with the design drawings and documents.

Treatment of bare timber, drilled bolt holes, and surfaces where PFC segments are in contact with the timber of the ply sheeting shall be by the use of an approved antifungal preservative then covered by a preservative gel or grease, in accordance with Clause 8989.6.8

All steel fixings shall be treated with a protective coating of grease during installation and after tightening in accordance with Clause 8989.6.13.

The Contractor shall follow the manufacturers specifications requirements for curing/drying of all preservatives applied.

WITNESS POINT

viii. The method of fixing the PFC segments (as required) including drilling of holes and applying cold galvanising protection to the bare steel shall be carried out at the location/s as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.

WITNESS POINT

ix. The Contractor shall ensure when the bolts have been tightened the PFC section sits flush with the ply sheeting for its full length.

x. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

xi. On approval to proceed the Contractor shall reinstate the protective coating/s as required by the design drawings and documents, and the site shall be cleaned.

WITNESS POINT

8989.6.18.4 Strengthen by Replacing or Adding Timber Distributer Planks

The purpose of this activity is to strengthen the ply deck using timber distributer planks to reinforce the join between ply sheeting limiting prevent differential edge deflections in the sheets. Dimensions and locations shall be as required by the design drawings and documents, where there is a lack of detail new timber distributer planks shall have at least the same dimensions as the existing timber distributer plates, this includes the fixings.

Works operations shall be as per Clause 8989.6.18.3, where steel distributor plate/s or PFC sections is referenced, this shall be taken as being hard wood timber distributor.

HOLD POINT

8989.6.18.5 Replace Ply Sheeting Deck (Transversely)

This item covers all work operations, and materials associated with the replacement of existing decking with new ply deck sheeting.

The Contractor is responsible for the provision of all materials to site, including certification of timber materials and steel components manufactured for their specified use as required by the design plans and drawings.

Prior to commencing the demolition of the existing deck, the Contractor shall inform the Superintendent of their proposed commencement date and provide evidence of communication of affected road users, bus companies, and emergency services, and compliance to their approved traffic management plan.

HOLD POINT

The following activities shall be included in the Contractors works procedure as a minimum and other relevant plan as required and shall be approved by the consulting structural Engineer, and submitted to the Superintendent for approval 4 weeks prior to works commencing;

i. Demolition and Removal of Bridge Components

The removal and demolition of the existing deck surface shall be carried out as required by the design drawings and Clause 8989.6.16.

Where it has been identified only individual deck sheeting shall be replaced the Contractor shall take extreme care during removal of wearing surface from the existing ply decks to prevent accidental damage to the softwood sheets and fixings.

WITNESS POINT

The Contractor shall be responsible for any temporary works required to stabilise the bridge structure prior to undoing any fixings and connectors, and distributors as required by the works procedure and to the approval of the consulting structural Engineer.

HOLD POINT

Remove rails, kerb as required by the design drawings and documentation. Components and fixings identified to be reused shall be stored safely and securely to prevent damage or loss.

WITNESS POINT

ii. Demolition and Removal of Existing Deck

Extreme care shall be exercised during removal of wearing surface from the existing ply decks to prevent accidental damage to the existing decking.

Works shall be carried out as documented by the Contractors approved works procedure unless site conditions dictate a revised works procedure is required. The consulting structural Engineer shall approve of the change and submit to the Superintendent for approval.

HOLD POINT

Disposal of the deck wearing surface, decking material and other materials identified as not being reusable shall comply with the Contractors Environmental Plan.

iii. Condition – Girders, Headstocks, Spiking Plank, and Crossbeams

Once demolition and removal has occurred the Contractor shall arrange for the consulting structural Engineer and Superintendent to inspect the condition of all exposed components.

HOLD POINT

Depending on the findings the consulting structural Engineer shall submit a defect mapping report to the Superintendent for approval. This report shall contain rehabilitation works which were not able to be identified from the original inspection report.

HOLD POINT

iv. Works to Other Components Prior to Preparation Works for Installation of Deck

Identified works requiring and approved for rehabilitation shall be carried out as required by the specific works activities of this specification, i.e. Girders – Clause 8989.6.22

v. Installation of New Ply Decking

Prior to the installation of the plywood decking system the Contractor shall install antifungal and preservative treatments on all contact surfaces under the deck and to the underside of the plywood, these shall be carried out as required by Clause 8989.6.7 for timber on timber contact and Clause 8989.6.8 for steel on timber contact.

WITNESS POINT

The plywood sheets shall be laid perpendicular to the girder arrangement unless otherwise specified in the design drawings and documents. For a skewed bridge, the ply sheets shall be supplied with the ends cut to the correct skew in order to reduce the need for site cutting. Special care needs to be exercised when cutting ply decking on site due to the embedded metal screws.

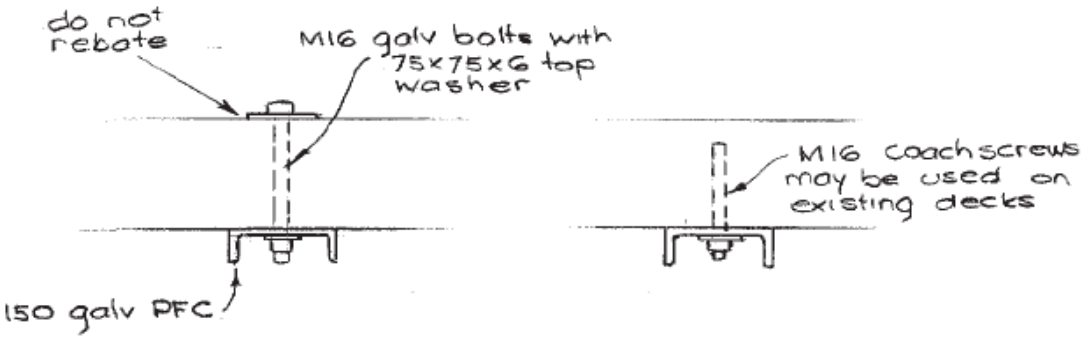
The plywood sheets shall be installed to form a uniform top surface without any discontinuities. Sheets may require to be packed with CCA treated timber to provide a uniform surface.

A maximum of 5mm gap shall not be exceeded along joins between ply sheets which shall be sealed with a polyurethane elastomer joint filler or equivalent.

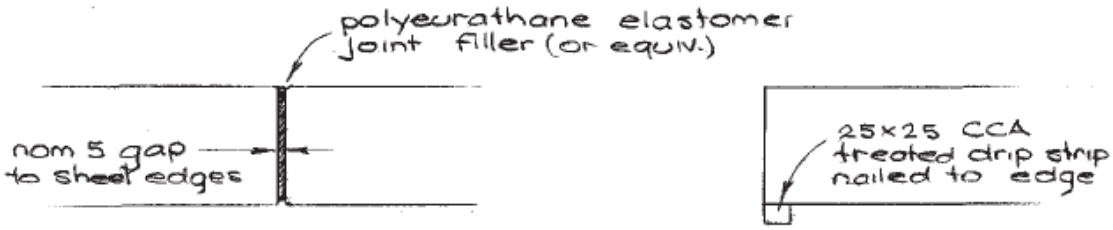
The abutment joints shall be installed as required by the design drawings and documents or as directed by the consulting structural Engineer.

Large size washers shall be used for bolts where nuts or heads bear on the upper ply surface - refer Figure 5.2(a) TMR TBMM Part 2.

At the joins of all ply sheeting distributors shall be installed centrally between girders, the preferred treatment is the use of coach screws with no upper penetration of the deck. Refer to TMR TBMM Part2 Section 17.3 and Part 4 activities 120T1 and 130S3.



A timber drip strip shall be attached to the outer soffit edge of sheets - refer to Figure 5.2(b).

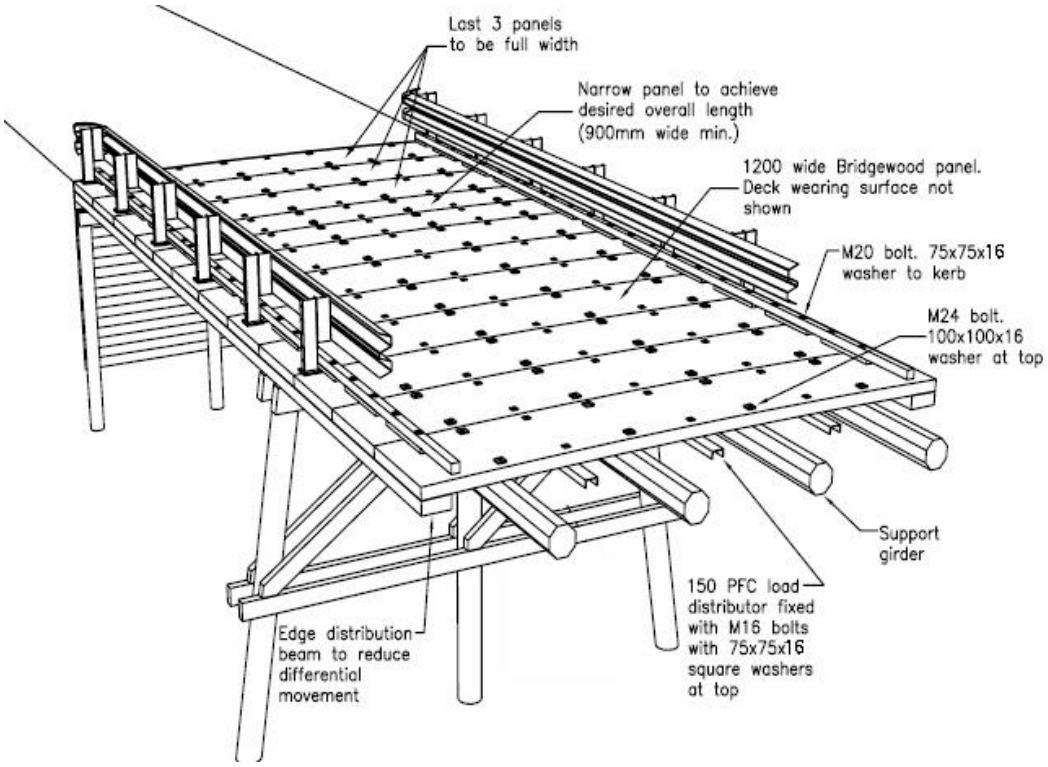


An end distributor shall be installed on the end of the ply deck for greater stability of the deck, this shall run the full length of the bridge deck with butt joints in the centre of a ply sheet as required by the design drawings and documents. Where the skew of the bridge deck prevents the installation of a single end distributor the consulting structural Engineer shall provide an alternative method for tying the ply sheeting ends together for stability.

On bridges with crossbeams the lengths of ply sheets shall be detailed so that transverse joints fall over these cross-beams. Some movement of cross-beams may also be required to achieve end support.

WITNESS POINT

If recambering of the deck is required this shall be carried out as required by the design drawings and documents, where there is a lack of detail refer to TMR TBMM Part 2 Section 17.9.



Example of timber bridge with ply deck and distributors fixed in place.

The Contractor shall arrange for the consulting structural Engineer and Superintendent to inspect the completed laid deck prior to proceeding with preservative applications.

HOLD POINT

vi. Antifungal Treatment

Anti-fungal preservative and preservative treatments shall be applied to all contact surfaces between the ply sheets and kerb as required to protect all timber elements. A bituminous felt shall also be placed at those contact surfaces. The upper surface of the plywood decking shall also be treated with antifungal and preservative treatments and allowed to cure prior to the installation of a waterproof membrane.

All treatments shall be carried out as required by Clause 8989.6.7 for timber on timber contact and Clause 8989.6.8 for steel on timber contact.

WITNESS POINT

The exposed ends (including join ends) of the new ply sheets shall be coated with an end sealant.

vii. Installation of Waterproof Membrane

Before replacement of wearing surface over new sheets, the Contractor shall ensure all preservatives have cured and the surface dry, the consulting structural Engineer and Superintendent shall inspect the deck installation works and if completed as required by the design drawings shall grant approval to proceed with the installation of the waterproof membrane.

HOLD POINT

The waterproof membrane shall be supplied and installed as required by MRTS84. Prior to the installation of the waterproof membrane the plywood decking shall have a primer coat of CRS60 primer applied, the spray rate shall be compliant with the seal/asphalt design.

HOLD POINT

The waterproofing membrane works operations shall be installed generally in accordance with Clause 8989.6.16.6.1. The Contractor shall ensure the consulting structural Engineer and the Superintendent inspect the completed waterproofing membrane prior to granting approval to proceed with the installation of the DWS.

HOLD POINT

viii. Reinstallation of Deck Wearing Surface, kerbs, and Railings and Signage

Prior to reinstating the deck wearing surface the Contractor shall reinstate the kerb as required by the design drawings and documents, this shall be carried out in compliance with Clause 8989.6.16, including any testing, inspections, and tolerances. At the completion of laying the DWS the Contractor shall paint the kerb as required by the design drawings.

HOLD POINT

The consulting Engineer and Superintendent shall inspect the deck and kerb for compliance to the design drawings and give approval to reinstate the deck wearing surface. The reinstatement of the DWS shall be carried out as detailed in Clause 8989.6.16.6 and associated clauses. The Contractor shall follow their approved works procedure plan and the approved plant plan.

WITNESS POINT

The Contractor shall arrange for the consulting Engineer and the Superintendent to inspect the deck wearing surface after completion. If the works are compliant with the design drawings and documentation approval to proceed with reinstatement of railings and signage as required by the design drawings

HOLD POINT

ix. Site Clean Up

The site shall be cleaned, and any temporary works shall be removed, disposal of any debris shall be as required by the Contractors Environmental Plan.

8989.6.19 Remove and replace/reinstate, or repair decking.

Where decks are not of ply sheeting work operations shall be carried out generally according to TMR TBMM Part 2 Sections 5, 6,7, 17.2, and 17.4 – 17.6 and Part 4 Section 2.4 and 2.5

The design drawings and documents shall ensure this Supplementary Specification is revised where alternative decks are to be repaired or replaced in materials other than ply sheeting.

8989.6.20 Remove and replace/reinstate, or repair stressing bars.

Work operations under by this activity covers the stressing bars, anchorage system, and laminates associated with stress laminated timber (SLT) decks, and includes repairing, removing and reinstating or replacing. The extent of works shall be included in the design drawings and documents as identified in the defect inspection and mapping report.

Where decks are not ply sheeting works operations shall be carried out generally in accordance with TMR TBMM Part 2 Section 5.9, and Part 4 Section 2.4 and the relevant activity as applies to the identified works from the design plans and documentation.

The design drawings and documents shall ensure this Supplementary Specification is revised where alternative decks using stressing bars are to be repaired or replaced.

8989.6.21 Remove, replace, repair bearings/plates.

Where the timber bridge has existing bearings and/or plates installed due to the varying material types mix of components or required to be installed, work operations shall be carried out as required by the design drawings and documents and Clause 8987.6.10 of MRC Supplementary Specification 8987 Concrete

Bridge Rehabilitation Works. The Contractors works procedure shall be reflective of this, including inspections, testing, and tolerances.

HOLD POINT

8989.6.22 Remove and Replace/Reinstate, or Repair Girders

The works operations covered by this section relates to new installation, the reinforcing, removal and replacing, or repair of girders. Alternative approved materials for use as girders shall be nominated in the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 3.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 8.0, and Part 4 Section 2.7 and the relevant activity as applies to the identified works from the design plans and documentation;

Timber Girders

- Strengthen split or sniped girder – TBMM Part 4 Activity 22T1 and TBMM Part 2 Clause 8.1
- Replace timber girder – TBMM Part 4 Activity 22T2 and TBMM Part 2 Clause 8.1
- Place supplementary member (additional girder) – TBMM Part 4 Activity 22T3 and TBMM Part 2 Clause 8.1

Steel Girders

- Strengthening steel girder – TBMM Part 4 Activity 22S1 and TBMM Part 2 Clause 8.2
- Install top flange restraints – TBMM Part 4 Activity 22S2 and TBMM Part 2 Clause 8.2
- Straighten steel girder – TBMM Part 4 Activity 22S3 and TBMM Part 2 Clause 8.2
- Replace timber girder with steel girder – TBMM Part 4 Activity 22S4 and TBMM Part 2 Clause 8.2
- Replace buckle area – TBMM Part 4 Activity 22S5 and TBMM Part 2 Clause 8.2

Approved alternative Girders.

- Replace existing girder with approved alternative girder – TBMM Part 4 Activity 22O4 and TBMM Part 2 Clause 8.3

8989.6.22.1 Materials and Resources

All plant, materials, and labour required to carry out girder rehabilitation or replacement works shall be supplied by the Contractor as documented in their approved works procedure. **No** variation to the approved works procedure shall occur unless site conditions dictate an alternative method, this must be endorsed by the Contractors Structural Engineer and approved by the Superintendent prior to works being planned and commencing, including procurement of materials.

HOLD POINT

It is the Contractor's responsibility to guarantee and, if requested, submit evidence that the product/s shall be satisfactory, structurally adequate, and durable for the intended purpose and also complies with all relevant federal, state and local government regulations, and Australian Standards (as applicable).

In particular, the Contractor shall be responsible for ensuring that any structural (or load bearing) component or product has been designed by a practising RPEQ Structural Engineer to accommodate all the loadings, and that the component / product has been constructed in accordance with that design. A full set of auditable design calculations shall be made available for perusal if requested by the Superintendent prior to the prestart meeting being held.

HOLD POINT

Where alternative materials to timber or steel is proposed the design drawings and documents shall detail

these materials and the Contractor shall ensure their respective work procedures and safety plans are compliant with relevant MRTS Specifications, Manufacturers Specifications, and this Supplementary Specification for the procurement. supply, and installation of these alternative materials.

No alternative materials shall be considered which are not included in the approved design drawings and documents.

8989.6.22.1.1 Timber

All timber procured and supplied shall be compliant to the requirements of MRTS 87 and Clause 8989.5.2 of this specification.

8989.6.22.1.2 Steel

All steel elements and/or components procured and supplied shall be compliant to the requirements of MRTS78, and Clause 8989.5.2 of this specification.

Bolts, nuts, washers shall be supplied compliant to MRTS 278, and Clause 8.2 of AS/NZS 5131.

Unless noted otherwise on the Engineering Drawings, all fasteners shall be hot-dipped galvanised in accordance with AS/NZS 1214 or electroplated in accordance with AS 1897.

8989.6.22.1.3 Composite Materials

All girders manufactured of composite materials (FRP) and procured and supplied shall be compliant with MRTS59 and/or the design drawings and documents and all requirements of Clause 8989.5.2.

8989.6.22.2 Repair Existing Girder/s (in place)

Work operations covered under this Clause apply to carrying out repairs of existing girders in place, refer to other Clauses for removal and replacement of girders.

8989.6.22.2.1 Repair Existing Timber Girders

Decayed or Rotten Timber

Timber girders where there is minor to moderate deterioration shall be repaired to restore condition and ensure structural integrity, works operations shall be incorporated into the Contractors works procedure and reflect Clause 8989.6.27.1 Treatment of Timber Piles Operations, including any inspection and tests requirements.

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment, refer to Clause 8989.6.3.

Strengthening Split or Sniped Girder

Where strengthening is proposed to be carried out with the girder in place work operations shall include but not limited to;

- Temporary works to stabilise the bridge and it's components.
- Jacking of components (if specified)
- Cleaning of components, removal and disposal of rotted timber material, removal and disposal of coatings in repair or strengthening areas
- Protection of other components of the bridge during repair activities,
- Drilling and installation of bolts and other components as needed, placing and fixing of repair components.
- Application of protective coating/s.

Prior to any site works commencing the Contractor shall submit their works procedure for the strengthening activities, this shall include the proposed fixing methodology, welding or bolting of the strengthening plate in place, this shall be submitted 4 weeks prior to site works commencing.

MILESTONE

This item covers all work operations and materials associated with the strengthening of timber girders with the use of anti-splitting bolts and plates or banding as required by the design drawings and documents.

The method of strengthening shall be carried out as required by the design drawings and documents, where longitudinal decking or cross beams is used, banding of the girder may be feasible in lieu of anti-splitter bolts.

The following operations as a minimum shall be reflective in the Contractors works procedure;

i. Access to the identified area shall be maintained to allow safe operations during repair works, transporting equipment to the specific site, including drills and materials.

ii. Clean identified area as required by Clause 8989.6.27.1 (i - iv).

iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the girder during repair works.

v. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

vi. The Contractor shall mark the girder where the bolt holes are to be drilled and where the drilled hole shall exit the girder, and upon approval by the Structural Engineer carry out drilling bolt holes for installation of the anti-splitting bolts. All drilled bolt holes shall be perpendicular to the alignment of the split timber or as shown on the design drawings, see examples below and anti-splitting treatment of corbels.

HOLD POINT

vii. An antifungal treatment shall be applied (brushed) into the split of the exposed timber (including internal to the split), the Contractor shall ensure the preservative used and the method of application complies with the design drawings and documents.

Treatment of bare timber, drilled bolt holes, and surfaces where plates are in contact with the timber of the girder by the use of an approved preservative then covered by a preservative gel or grease.

A protective coating shall be applied by coating the repaired areas with a protective sealant or wood preservative to prevent future damage, if a second coat is required the Contractor shall allow the first coat to cure/dry prior to application of the second coat. Use Bunnings Boondall Monocel all-purpose timber sealer or any equivalent product approved by the superintendent.

All steel fixings shall be treated with a protective coating of grease during installation and after tightening,

Where a preservative is required to be applied to drilled holes, bare timber, or steel fixings, the Contractor shall follow the manufacturers specifications requirements for curing/drying.

WITNESS POINT

viii. The method of fixing the splitter bolts and plates (as required) including drilling of holes shall be carried out at the location/s as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.

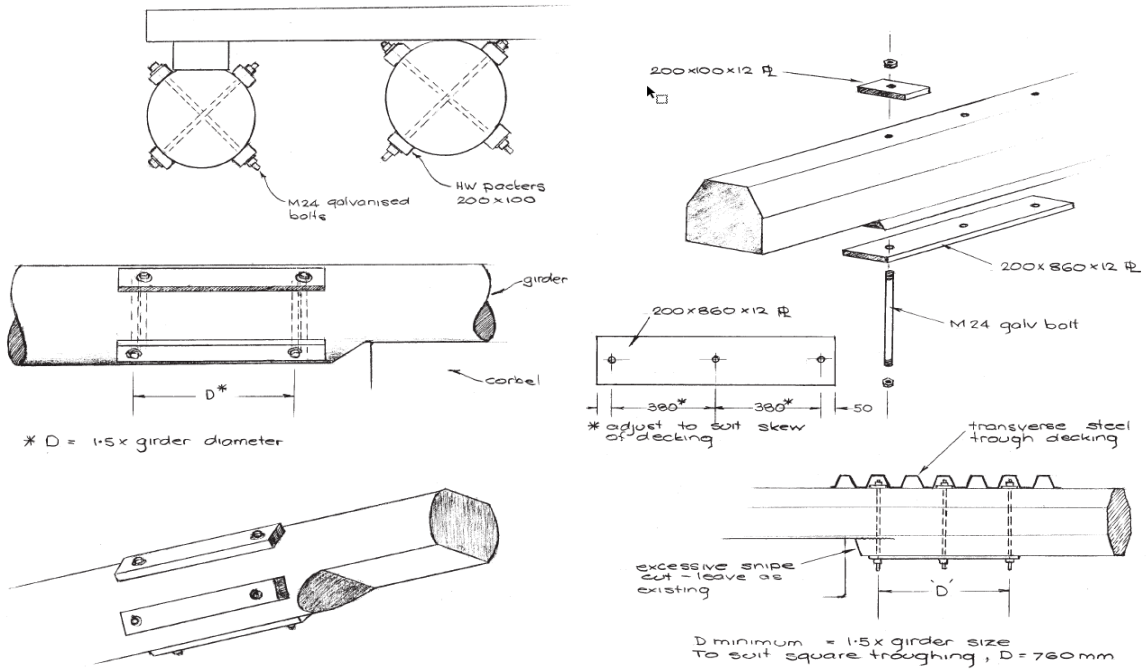
WITNESS POINT

ix. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

x. On approval to proceed the Contractor shall reinstate the protective coating/s as required by the design drawings and documents. The site shall then be cleaned, and the temporary works shall be removed.

WITNESS POINT



Where banding has been designated as the repair method, preparation of the split timber girder shall be as above, this shall include the preservation treatment of the timber and the band/s. No drilling is required, the band shall be manufactured to fit the specific girder and location on that girder. Installation shall be the same as for banding of piles, refer to Clause 8989.6.27.5.

HOLD POINT

Once in place the Contractor shall tighten the band to close the split section of girder.

8989.6.22.2.2 Steel Girders

Steel Component Protection Treatment

Steel girders where there is minor to moderate deterioration shall be repaired to restore condition and structural integrity, and prevent further deterioration, works operations shall be incorporated into the Contractors works procedure and be consistent with Clause 8989.6.8.1

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment and cleaning of girders and corbels, refer to Clause 8989.6.3.

HOLD POINT

The existing corrosion shall be cleaned and made ready to have its protective coatings reapplied. Prior to recoating, the Contractor shall ensure the Structural Engineer inspects all affected areas for severity of corrosion and reduction of cross-sectional area of the steel members.

Where the cross-section has been reduced the Structural Engineer shall assess the existing member/s for

structural design class for that bridges load carrying capacity (generally T44) with the findings and any recommendations submitted to the Superintendent for approval. This also includes cracking found within the steel member/s and welds, bolts, connectors, and fixings.

HOLD POINT

Protective treatment of steel elements shall follow the requirements of Clause 8989.6.8 and be applied to the agreed areas identified. This shall be carried out on the same day as soon after surface preparation has been completed, preferably as each bridge span is cleaned. All works shall comply with MRTS85.

WITNESS POINT

Strengthening of Steel Girders

Works to strengthen steel girders shall comply with AS 5100.8, Section 4.6 and the design drawings and documents. Manufacture and supply of materials to be used for the strengthening of steel girders shall be to the requirements of MRS 11.78.

Where strengthening is proposed to be carried out with the girder in place work operations shall include but not limited to, temporary works, jacking of components (if specified), removal and disposal of corrosion material, removal and disposal of coatings in repair or strengthening areas, protection of other components of the bridge during repair activities, placing and fixing of repair components, and application of protective coating.

Prior to any works commencing the Contractor shall submit their works procedure for the strengthening activities, this shall include the proposed fixing methodology, welding or bolting of the strengthening plate in place, this shall be submitted 4 weeks prior to works commencing.

HOLD POINT

The following operations as a minimum shall be reflective in the Contractors works procedure;

i. Access to the identified area shall be maintained to allow safe operations during welding, transporting equipment to the specific site, including welding equipment.
ii. Clean identified area as required by Clause 8989.6.8.1 (1-9)
iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the girder during repair works.

HOLD POINT

v. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.
vi. Where a protective coating is damaged during the preparation process the area shall be treated with a cold galvanising process prior to the strengthening plate being put in place.
vii. The method of fixing the plate shall be carried out as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.
viii. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

ix. On approval to proceed the Contractor shall reinstate the protective coating/s as required by Clause 8989.6.8.1
x. The site shall be cleaned and the temporary works shall be removed.

HOLD POINT

Where the design drawings and documents identify welding as the method for fixing the plates to strengthen the girder, they shall also list the weld requirements, strengthening plate/member dimensions.

Any required welding works shall be carried out as required by MRTS 76 and AS 1554 (and respective sub standards). All works required as a result of this inspection shall be endorsed by the consulting Structural Engineer and approved by the Superintendent, the contractor shall revise their works procedure, have it endorsed by the structural Engineer before submitting it to the Superintendent,

HOLD POINT

The Contractors personnel to carry out the welding works shall be an accredited welding operator of minimum 10 years' experience as a tradesman. When the welding operations are complete, the consulting Structural Engineer and the Superintendent shall inspect the repairs, with approval of the repairs the Contractor shall carry out protective treatment of the area in accordance with Clause 8989.6.8.1 and associated clauses for constraints and verification.

HOLD POINT

Straightening of Steel Girders

In place straightening of girders shall only take place with the approval of the consulting RPEQ Structural Engineer who shall endorse all activities carried out, and endorse the Contractors works when completed. The girder/s must be able to be straightened to its original shape and position within the bridge structural or else be replaced.

The Contractor shall submit to the Superintendent for approval an RPEQ structural Engineers endorsed works procedure for in place straightening of the girder/s. This must be followed at all times.

HOLD POINT

The process of applying heat to the steel girder and using lateral forces to straighten shall be supervised by the Structural Engineer and be carried out by experienced steel fabricators.

The Contractor shall not cause damage to other components of the bridge, where this occurs the Structural Engineer shall inspect and assess the damaged components and compile a report for the Superintendents review. Approval to carry out these rectification works shall only be granted by the Superintendent and will be at the cost of the Contractor.

HOLD POINT

Work operations covered include temporary works, jacking of the superstructure to remove load from the girder, heating and straightening, release of load on to the girder, and reinstatement of protective coating. Components in the affected area shall be dismantled, separated, and lifted/removed to allow access to and the girder straightening activities to occur.

The structural Engineer shall ensure when the straightening works are complete the following tolerances to the repaired girder/s when verified against design drawings and documents applies;

- Vertical - +/- 00 mm from straight edge along the full length of girder (both edges)
- Horizontal - +/- 3 mm's from straight edge along full length of girder
- Nil twist in full length of girder/s

The structural Engineer shall also verify the load bearing capacity of the girder/s, otherwise carry out testing on the girder/s to verify, and submit the findings in a report to the Superintendent for approval.

HOLD POINT

Where a protective coating is damaged during the heating process, it shall be reinstated in accordance with Clause 8989.6.8.1.

WITNESS POINT

Once all works have been completed and approved the contractor shall reinstate all disassembled components, including deck and deck wearing surface. These works shall be carried out compliant with the relevant clause requirements of this supplementary specification for the activity.

Cracked Welds

Work operations shall be carried out as required by Clause 8989.6.8.4 and the design drawings and documents.

8989.6.22.2.3 Composite (FRP) Girders

This section applies to the repairing of FRP girders in place as required by the design drawings and documents. The Contractor shall base their works procedure to comply with Clause 8989.6.24.4.2. This includes all inspection and testing requirements.

HOLD POINT

8989.6.22.3 Repair (Removal and Reinstate)

Work operations involve removing, repairing, and reinstating of girders. Repair activities have been reviewed and assessed as not being able to be carried out when the girder/s is in place.

Works operations shall take into account dismantling the bridge to access the girder/s, temporary works to stabilise the bridge, jacking operations, the girder/s requiring lifting, removal, and locating to a suitable area to carry out the repairs, the full woks operations shall be included in the Contractors works procedure.

8989.6.22.3.1 Timber Girder Repairs

Repairs to timber girder/s shall be carried out as required by Clause 8989.6.22.2.1, refer to the respective repair works activities for timber girders. Inspection and testing requirements shall be carried out as referenced in the associated clauses.

HOLD POINT

Removal and reinstatement work operations shall be carried out as reflected by Clause 8989.6.22.4.1 and Clause 8989.6.22.5.1, inspection and testing requirements shall be carried out as referenced in the associated clauses.

HOLD POINT

8989.6.22.3.2 Steel Girder Repairs

Protection treatment and Strengthening Removal and Reinstatement

Repairs to steel girder/s shall be carried out as required by Clause 8989.6.22.2.2, refer to the respective repair works activities for Protection Treatment, Strengthening, or Straightening of steel girder/s. Inspection and testing requirements shall be carried out as referenced in the associated clauses.

HOLD POINT

Removal and reinstatement work operations shall be carried out as required by Clause 8989.6.22.5.1, inspection and testing requirements shall be carried out as referenced in the associated clauses.

HOLD POINT

8989.6.22.4 Remove and Replace Girder/s.

Work operations involving removal and replacement of girder/s shall be carried out in accordance with the Contractors works procedure, WH&S plan, required jacking/lifting plan, and crane lifting plan.

Prior to any works occurring on removal of bridge components to access the defective girders the Contractor shall ensure the bridge has been stabilized, all jacking of components, and temporary works (including plant load impacts) are carried out under the supervision of the consulting structural Engineer.

HOLD POINT

8989.6.22.4.1 Timber Girder Remove and Replace

Replacement girders shall comply with the requirements of MRTS87 for acceptable species and properties and shall be supplied as required by the design drawings and documentation as either;

a) Naturally round timber with the sapwood removed.

b) Octagonal sawn members

Works operations to replace timber girders shall incorporate (but not be limited to) the following, refer to TBMM 27T2 Part 2 for further detail and requirements;

a) Prior to demolition works commencing mark on the existing deck the girder/s that will be removed and replaced, upon site inspection the Superintendent shall approve works to commence.

HOLD POINT

b) Remove rails, kerb, deck wearing surface, and deck as required by the design drawings and documentation to access the specified girder/s.

c) Carry out temporary works to maintain the stability and integrity of the bridge structure, the consulting structural Engineer shall give approval of the temporary works being compliant with the endorsed plan, including propping/restraining underlying corbel to ensure stability and the corbel does not move.

HOLD POINT

d) Remove all connections (bolts/nuts/washers) between corbel and girder and headstock, reusing existing connections as identified to be in good condition, where existing connectors, bolts, washers, or nuts cannot be reused the Contractor shall notify the Superintendent who will authorise a new connection system shall be utilised, refer to MRTS TBMM Part 4 - 120S2 and 120S7.

HOLD POINT

e) Remove by crane lifting identified defective girder/s and dispose of as required by the Contractors environmental plan. The Contractor shall ensure the crane operates within its rated capacity and works are carried out in accordance with the Contractors approved lift plan and works procedure.

WITNESS POINT

f) Prepare contact surfaces and girder;

I. Girder/s supplied with pre-existing pipes are to be plugged with either a hard wood plug or an epoxy sealant approved by the Superintendent.

II. Have the ends neatly trimmed and chamfered, with protective measures installed to the girder as required by the design drawings and documents.

III. Carry out sniping to the girder and/or trimming of surfaces to reduce bearing stress and to ensure the top of the girder sits at the required level, sniping only to be carried out as required by the design drawings and documentation.

IV. Prior to lifting in place, a timber preservative and a thick grease applied to the girder, the preservative shall comply with AS1604.1 and comply with Clause 6.5.7 of MRTS87.

V. The surface of the girder and corbel be cleaned and all contact surfaces between the girder and other components be treated with a preservative, grease, and a bituminous felt be placed and shaped to train water away from the structure, refer to Clause 8989.6.8, all materials to be approved by the Superintendent, the preservative shall comply with AS1604.1 and comply with Clause 6.5.7 of MRTS87.

WITNESS POINT

VI. Where existing bolt/connector holes are not to be reused they shall be cleaned of all dirt, grime, and wood rot then sealed with wood filler and epoxy sealant.

WITNESS POINT

g) Install the rehabilitated girder including drilling for new bolt assembly (connectors). Where existing bolt holes cannot be used an alternative hold down method shall be proposed by the consulting structural Engineer for approval by the Superintendent. Where the girder previously had an end plate this shall be reinstated prior to installation of the girder.

HOLD POINT

h) New drill holes shall be coated with a preservative coating and allowed to cure as required by the manufacturer's recommendation.

i) Prior to lowering the girders back into place, the connector bolts shall be aligned through the drill holes, once the connectors are in place lower the girder and tighten the bolt assembly.

j) Check via survey to ensure the top of the girder level complies with the design drawings.

HOLD POINT

Reinstate the deck, remove any temporary works, reinstate the kerb and deck wearing surface as required by the design drawings and documentation in compliance with this Supplementary Specification.

8989.6.22.4.2 Steel Girder Remove and Replace

Replacement of existing timber girder or steel girder with a steel girder shall be carried out as required by the design drawings and documents, the works operations shall be documented in the Contractor works procedure and reflect the operations listed in Clause 8989.6.22.4.1

All inspections and testing shall be carried out as required by Clause 8989.6.22.4.1

HOLD POINT

8989.6.22.4.3 Manufacture, Supply, and Installation of Composite Girders

Use of alternative materials to timber or steel as girders shall be as designated in the design drawings and documents, these include girders of reinforced polymer composite (FRP or FRC). Manufacture of FRP girders shall be in accordance with MRTS59, certification of the product shall be submitted to the Superintendent 4 weeks prior to delivery and upon delivery.

HOLD POINT

The contractor shall ensure supply and storage of the girders is carried out as required by MRTS60, upon delivery to site prior to offloading the Contractor and Structural Engineer shall inspect the delivered product/s for defects and compliance.

HOLD POINT

All installation operations shall be carried out as required by the design drawings and documents, in accordance with MRTS60, and DTMR Standard drawings SD 2280/2281/2285/2286, unless otherwise documented in MRC Supplementary Specification Annexure 8989_1 Section 5.2. The Contractors works procedure shall reflect MRTS60 and the above DTMR Standard Drawings.

WITNESS POINT

8989.6.22.5 Supply and Installation of Additional Girder/s

The works operations covered by this section relates to the supply and installation of additional girders of timber or steel to help restore the load carrying capacity and enhance the stability and integrity of the

bridge.

Additional girders shall be designed to carry the correct load distribution, this may require additional girders to be installed both sides of the defective existing girder, the consulting Structural Engineer shall include this in their design report and drawings.

Alternative approved materials for use as girders shall be nominated in the design drawings and the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 3.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 8.0, and Part 4 Section 2.7 and the relevant activity as applies to the identified works from the design plans and documentation;

Work operations also covered include supply and installation of support components and connections, drilling, assembly and bolting.

Supply of timber components shall follow the requirements of MRS 11.87.

Supply of steel components shall be to the requirements of MRS 11.78.

Supply of galvanised bolts, nuts and washers shall be to the MRTS 278.

Anti-fungal preservative, preservative grease, and bituminous compressible packing or felt shall be applied to all contact surfaces between existing components and support members.

8989.6.22.5.1 Girder Installation Work Operations

All works associated with the demolition of existing bridge components, the lifting in place and installation of the additional girder/s shall be carried out as per the approved and RPEQ endorsed works procedure, the following operations shall be included as a minimum;

i. The contractor shall identify the location/s of the supplementary girder placements prior to commencing demolition of the deck. This shall be carried out by survey and be marked on the deck for the Structural Engineer and Superintendent to verify the site location complies with the design drawings and documents.

   The Superintendent shall grant approval to proceed if the location is compliant with design drawings and documentation.

HOLD POINT

ii. All materials supplied and transported to site shall be inspected for damage by the Contractor prior to unloading and storing. This inspection shall include protective coatings/paint systems.

HOLD POINT

iii. Storing of materials shall comply with Clause 8989.5.2.4 and the Contractors works procedure, Clause 8989.5.2.6.

iv. Upon approval, and arrival and safe storage of girder/s and components the contractor shall remove the existing wearing surface, deck, and any other bridge component to allow the installation of the additional girder in accordance with the design drawings.

v. The headstock or abutment shall be cleaned and repainted (preservatives, grease, felt) prior to the installation of the girder in accordance with this specification and the design drawings and documents.

WITNESS POINT

vi. Where the use of a crane is required, it shall be located on a flat stable surface to lift the girder/s and install them on the specific location as required by the design drawings and documents. The Contractor shall ensure the location of the crane shall ensure safe operations are well within its designated load and reach capacity.

HOLD POINT

vii. The supply and installation of bearings, plates, or mortar pads shall be in accordance with the design drawings and documents, the procedure shall follow Clause 8987.6.10. The location of the bearings and/or plates shall be surveyed prior to installation.

HOLD POINT

viii. During lifting and placement, measures shall be implemented for the prevention of overturning or sliding of the girder before releasing the load from the lifting gear, this may include such measures as independent bracing or restraints.

ix. The type of lifting gear used, and method of restraint shall not damage the protective paint system on the girder. The Contractor shall be responsible for any requirements to rectify damage to the girder.

x. Install girder/s onto headstocks at abutments and at the piers as required, ensuring connection details are in accordance with project drawings and this specification.

WITNESS POINT

xi. The Contractor shall use a survey to verify the exact location and height of the girder. Refer to the design drawings for the exact location and arrangement of steel girder/s.

HOLD POINT

xii. Positioning shall only be at the bearing points, and as required by the design drawings and documents ensure that the holes in the girders align with the corresponding holes in the support. The fixed end of the girders shall be lowered slightly ahead of the expansion end to ensure that the hole in the girder aligns with the corresponding holes in the support. All nuts shall be securely tightened before removing the load from the lifting gear.

HOLD POINT

xiii. As required by the design drawings and documents the girder shall be permanently fixed after seven days after reinstatement of the bridge deck. If the bridge is located on a vertical grade, care shall be taken to ensure that no shear deflection is induced in bearings, deck and girders do not move downhill during the above operations.

HOLD POINT

8989.6.23 Remove and Replace/Reinstate, or Repair Corbels

The works operations covered by this section relates to the reinforcing, replacing, or repair of corbels. Alternative approved materials for use as corbels shall be nominated in the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 5.2.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 8.0, and Part 4 Section 2.7 and the relevant activity as applies to the identified works from the design plans and documentation;

Timber Corbels

- Strengthen corbel – TBMM Part 4 Activity 27T1 and TBMM Part 2 Clause 9.1
- Replace timber corbel – TBMM Part 4 Activity 27T2 and TBMM Part 2 Clause 9.1

8989.6.23.1 Materials and Resources

All plant, materials, and labour required to carry out corbel rehabilitation or replacement works shall be supplied by the Contractor as documented in their approved works procedure. **No** variation to the approved works procedure shall occur unless site conditions dictate an alternative method, this must be endorsed by the Contractors Structural Engineer and approved by the Superintendent prior to works being

planned and commencing, including procurement of materials.

HOLD POINT

It is the Contractor's responsibility to guarantee and, if requested, submit evidence that the product/s shall be satisfactory, structurally adequate, and durable for the intended purpose and also complies with all relevant federal, state and local government regulations, and Australian Standards (as applicable).

In particular, the Contractor shall be responsible for ensuring that any structural (or load bearing) component or product has been designed by a practising RPEQ Structural Engineer to accommodate all the loadings, and that the component / product has been constructed in accordance with that design. A full set of auditable design calculations shall be made available for perusal if requested by the Superintendent.

HOLD POINT

No alternative materials shall be considered which are not included in the approved design drawings and documents.

8989.6.23.1.1 Timber

All timber procured and supplied shall be compliant to the requirements of MRTS 87 and Clause 8989.5.2 of this specification.

8989.6.23.2 Repair Existing Corbels (in place)

Work operations covered under this Clause apply to carrying out repairs of existing corbels in place, refer to other Clauses for removal and replacement of corbels.

8989.6.23.2.1 Repair Existing Timber Corbels

Decayed or Rotten Timber

Timber corbels where there is minor to moderate deterioration shall be repaired to restore condition and ensure structural integrity, works operations shall be incorporated into the Contractors works procedure and reflect Clause 8989.6.27.1 Treatment of Timber Piles Operations, including any inspection and tests requirements.

HOLD POINT

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment, refer to Clause 8989.6.3.

HOLD POINT

Strengthening Split or Sniped Corbel

Where strengthening is proposed to be carried out with the corbel in place work operations shall include but not limited to;

- Temporary works to stabilise the bridge and it's components.
- Jacking of components (as required)
- Cleaning of components, removal and disposal of rotted timber material, removal and disposal of coatings in repair or strengthening areas
- Protection of other components of the bridge during repair activities,
- Drilling and installation of bolts and other components as needed, placing and fixing of repair components.
- Application of protective coating/s and measures.

Prior to any site works commencing the Contractor shall submit their works procedure for the strengthening activities, this shall include the proposed fixing methodology, bolting of the strengthening plate in place, or banding, this shall be submitted 4 weeks prior to site works commencing.

MILESTONE

This item covers all work operations and materials associated with the strengthening of timber corbels with the use of anti-splitting bolts and plates, PFC brackets, or banding as required by the design drawings and documents.

The method of strengthening shall be carried out as required by the design drawings and documents, if the corbels have timber bearing blocks under the girder, it is possible to band the ends of the corbels which is more effective than anti-split bolting.

The following operations as a minimum shall be reflective in the Contractors works procedure;

i. Access to the identified area shall be maintained to allow safe operations during repair works, transporting equipment to the specific site, including drills and materials.

ii. Clean identified area as required by Clause 8989.6.27.1 (i - iv)

iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the corbel during repair works.

HOLD POINT

vi. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

vii. The Contractor shall mark the corbel where the bolt holes are to be drilled and where the drilled hole shall exit the corbel, and upon approval by the Structural Engineer carry out drilling bolt holes for installation of the anti-splitting bolts or PFC brackets. All drilled bolt holes shall be perpendicular to the alignment of the split timber or as shown on the design drawings, see examples below and anti-splitting treatment of corbels.

HOLD POINT

viii. An antifungal treatment shall be applied (brushed) into the split of the exposed timber (including internal to the split), the Contractor shall ensure the preservative used and the method of application complies with the design drawings and documents.

Treatment of bare timber, drilled bolt holes, and surfaces where plates are in contact with the timber of the corbel by the use of an approved preservative then covered by a preservative gel or grease.

A protective coating shall be applied by coating the repaired areas with a protective sealant or wood preservative to prevent future damage, if a second coat is required the Contractor shall allow the first coat to cure/dry prior to application of the second coat. Use Bunnings Boondall Monocel all-purpose timber sealer or any equivalent product approved by the superintendent.

All steel fixings shall be treated with a protective coating of grease during installation and after tightening,

Where a preservative is required to be applied to drilled holes, bare timber, or steel fixings, the Contractor shall follow the manufacturers specifications requirements for curing/drying.

WITNESS POINT

ix. The method of fixing the splitter bolts and plates (as required), or PFC segments including drilling of holes shall be carried out at the location/s as required by the design drawings and documents,

the consulting Structural Engineer shall supervise the works.

WITNESS POINT

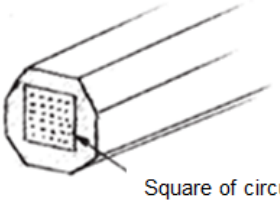
x. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

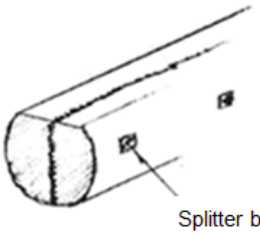
xi. On approval to proceed the Contractor shall reinstate the protective coating/s as required by the design drawings and documents, the site shall then be cleaned, and the temporary works shall be removed

WITNESS POINT

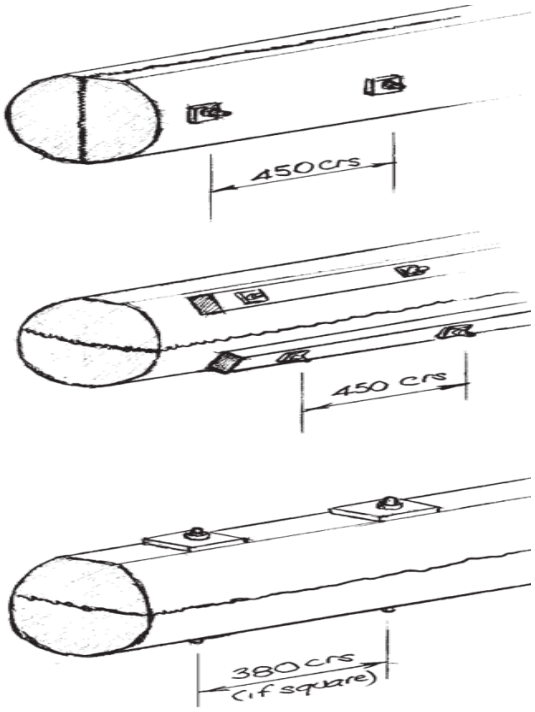
Examples of strengthening using anti-splitting bolts shown in the diagrams below

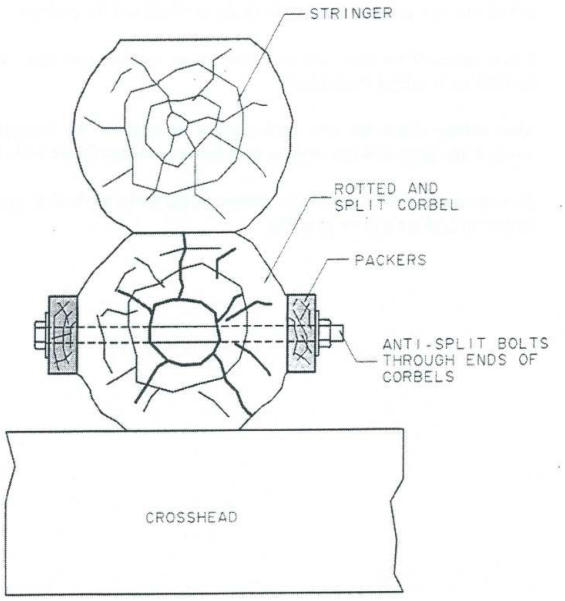


Square of circular nail plate to be attached to ends of the corbels

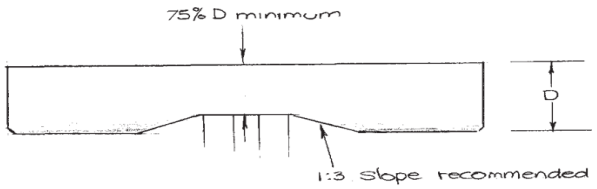


Splitter bolts are installed on splinted corbels

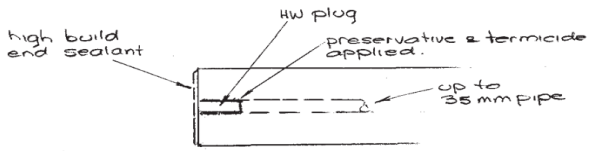




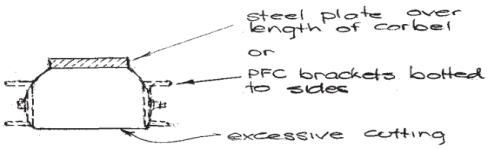
For excessive loss of section over headstocks due to seating cut, strengthening may be accomplished by top or side steel plates or sections as shown below.



(1)



(2)



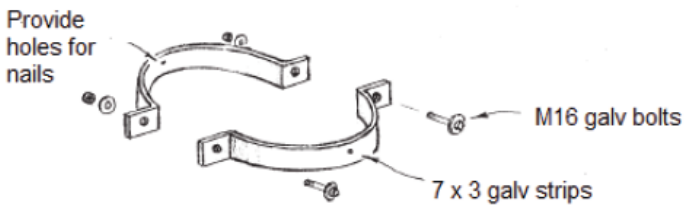
(3)

8989.6.23.2.2 Strengthening Using Banding

If the corbels have timber bearing blocks under the girder, and banding has been designated as the repair method, preparation of the split timber corbel shall be as above, this shall include the preservation treatment of the timber and the band/s. No drilling is required, the band shall be manufactured to fit the specific corbel at the specific location on that corbel. Installation shall be the same as for banding of piles, refer to Clause 8989.6.28.5, including inspections.

HOLD POINT

Once in place the Contractor shall tighten the band to close the split section of corbel.



The Contractor shall arrange for the consulting structural Engineer and the Superintendent to inspect the completed works.

HOLD POINT

8989.6.23.3 Remove and Replace Timber Corbel

Work operations involving removal and replacement of corbel/s shall be carried out in accordance with the Contractors works procedure, WH&S plan, required jacking/lifting plan, and crane lifting plan (as required).

Replacement corbel/s shall comply with the requirements of MRTS87 for acceptable species and properties and shall be supplied as required by the design drawings and documentation as either;

a) Naturally round timber with the sapwood removed.

b) Octagonal sawn members

Works operations to replace timber corbel/s shall incorporate (but not be limited to) the following, refer to TBMM 27T2 Part 2 for further detail and requirements;

a) Prior to demolition works commencing mark on the existing deck the corbel/s that will be removed and replaced, upon site inspection the Superintendent shall approve works to commence.

HOLD POINT

b) Carry out temporary works to maintain the stability and integrity of the bridge structure, the consulting structural Engineer shall give approval of the temporary works being compliant with the endorsed plan.

HOLD POINT

c) Remove rails, kerb, deck wearing surface, and deck as required by the design drawings and documentation to access the specified corbel.

d) Remove all connections (bolts/nuts/washers) between corbel and girder and headstock, reusing existing connections as identified to be in good condition, otherwise new connection system shall be utilised, refer to MRTS TBMM Part 4 - 120S2 and 120S7.

e) Jack girder/s as per approved lift plan, refer to Clause 8989.6.6. Carry out temporary works to prop overlying girder to remove all load off the corbel and jacking system under the supervision of the consulting structural Engineer.

HOLD POINT

f) Remove identified defective corbel and dispose of as required by the Contractors environmental plan. Where a crane is used to lift the defective corbel out, the Contractor shall ensure the crane operates within its rated capacity and works are carried out in accordance with the Contractors approved lift plan and works procedure.

WITNESS POINT

g) Prepare contact surfaces and corbel;

I. Corbel/s supplied with pre-existing pipes are to be plugged with epoxy sealant approved by the Superintendent.

II. Have the ends neatly trimmed and chamfered.

III. Carry out sniping to the corbel and trim the top surface of the corbel for seating of the girder to reduce bearing stress, sniping only to be carried out as required by the design drawings and documentation. Ensure a minimum 75% of diameter of corbel remains after these works.

WITNESS POINT

IV. Where longitudinal cracks exceed 100mm in width anti splitter bolts shall be installed

V. On sawn octagonal corbels an end plate shall be installed

VI. Prior to lifting in place, a timber preservative and a thick grease applied to the corbel, the preservative shall comply with AS1604.1 and comply with Clause 6.5.7 of MRTS87.

VII. The surface of the girder, headstock, and corbel, as well as the drill holes shall be cleaned and all contact surfaces between the corbel, connectors, and other components be treated with a preservative, grease, and a bituminous felt be placed between components, all materials to be approved by the Superintendent, the preservative shall comply with AS1604.1 and comply with Clause 6.5.7 of MRTS87.

WITNESS POINT

h) Install the new corbel including drill holes for bolt assembly (connectors), where existing bolt holes cannot be used an alternative hold down method proposed shall be endorsed by the consulting structural Engineer and approval by the Superintendent.

HOLD POINT

i) Prior to lowering the girders back into place ensure the connector bolts are aligned through the drill holes, once the connectors are in place lower the girder and tighten the bolt assembly.

Reinstate the deck and kerb, remove any temporary works including the jacking system, and reinstate deck wearing surface as required by the design drawings and documentation in compliance with this Supplementary Specification.

8989.6.24 Remove and Replace/Reinstate, or Repair Headstocks

This section shall also refer to halfcaps and capwales as types of headstocks, generally they are installed in pairs each side of a pile, usually notched into the pile top.

The works operations covered by this section relates to new installation, the reinforcing, removal and replacing, or repair of headstocks. Alternative approved materials for use as headstocks shall be nominated in the design drawings or Timber Bridge Rehabilitation Works Annexure 8989_1 Section 3.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 10.0, and Part 4 Section 2.9 and the relevant activity as applies to the identified works from the design plans and documentation;

Timber Headstocks

- Place supplementary member – TBMM Part 4 Activity 54T1 and TBMM Part 2 Clause 10.1
- Reconstruct splice - TBMM Part 4 Activity 54T2 and TBMM Part 2 Clause 10.1
- Relocate headstock - TBMM Part 4 Activity 54T3 and TBMM Part 2 Clause 10.1
- Jack girders or headstock to level - TBMM Part 4 Activity 54T4 and TBMM Part 2 Clause 10.1
- Replace headstock in timber Each - TBMM Part 4 Activity 54T5 and TBMM Part 2 Clause 10.1
- Splice in new headstock section - TBMM Part 4 Activity 54T6 and TBMM Part 2 Clause 10.1

Steel Headstocks

- Relocate headstock – TBMM Part 4 Activity 54S1 and TBMM Part 2 Clause 10.2
- Replace steel headstock – TBMM Part 4 Activity 54S2 and TBMM Part 2 Clause 10.2
- Strengthen steel headstock – TBMM Part 4 Activity 54S3 and TBMM Part 2 Clause 10.2
- Replace timber headstock with steel alternative – TBMM Part 4 Activity 54S4 and TBMM Part 2 Clause 10.2
- Jack girders or headstock to level – TBMM Part 4 Activity 54S5 and TBMM Part 2 Clause 10.2

Concrete Headstocks

- Strengthen headstock – TBMM Part 4 Activity 54C1 and TBMM Part 2 Clause 10.3
- Concrete packers – TBMM Part 2 Clause 10.4

8989.6.24.1 Materials and Resources

All plant, materials, and labour required to carry out headstock repairs or replacement works shall be supplied by the Contractor as documented in their approved works procedure. **No** variation to the approved works procedure shall occur unless site conditions dictate an alternative method, this must be endorsed by the Contractors Structural Engineer and approved by the Superintendent prior to works being

planned and commences, including procurement of materials.

HOLD POINT

It is the Contractor's responsibility to guarantee and submit evidence that the product/s shall be satisfactory, structurally adequate, and durable for the intended purpose and also complies with all relevant federal, state and local government regulations, and Australian Standards (as applicable).

In particular, the Contractor shall be responsible for ensuring that any structural (or load bearing) component or product has the endorsement of a practising RPEQ Structural Engineer to accommodate all the loadings, and that the component / product has been manufactured and constructed in accordance with that design. A full set of auditable design calculations shall be made available for perusal if requested by the Superintendent.

HOLD POINT

Where alternative materials to timber or steel is proposed the design drawings and documents shall detail these materials and the Contractor shall ensure their respective work procedures and safety plans are compliant with relevant MRTS Specifications, Manufacturers Specifications, and this Supplementary Specification for the procurement, supply, and installation of these alternative materials.

No alternative materials shall be considered which are not included in the approved design drawings and documents.

8989.6.24.1.1 Timber

All timber procured and supplied shall be compliant to the requirements of MRTS 87 and Clause 8989.5.2 of this specification.

8989.6.24.1.2 Steel

All steel elements and/or components procured and supplied shall be compliant to the requirements of MRTS78, and Clause 8989.5.2 of this specification.

Bolts, nuts, washers shall be supplied compliant to MRTS 278, and Clause 8.2 of AS/NZS 5131.

Unless noted otherwise on the Engineering Drawings, all fasteners shall be hot-dipped galvanised in accordance with AS/NZS 1214 or electroplated in accordance with AS 1897.

8989.6.24.1.3 Composite Materials

All headstocks manufactured of composite materials (FRP) and procured and supplied shall be compliant with MRTS59 and/or the design drawings and documents and all requirements of Clause 8989.5.2

8989.6.24.2. Repair Existing Headstock/s (in place)

Work operations covered under this Clause apply to carrying out repairs of existing headstocks in place, refer to other Clauses for removal and replacement of headstocks.

8989.6.24.2.1 Repair Existing Timber Headstocks

Decayed or rotten timber

Timber headstocks where there is minor to moderate deterioration shall be repaired to restore condition and ensure structural integrity, works operations shall be incorporated into the Contractors works procedure and reflect Clause 8989.6.27.1 Treatment of Timber Piles Operations, including any inspection and tests requirements.

HOLD POINT

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment, refer to Clause 8989.6.3.

Preservation

Headstocks (half caps, capwales) shall have timber preservative treatments applied as required by the design drawings and documents in accordance with all aspects of Clause 8989.6.7.

Strengthen by adding PFC sections.

The purpose of this activity is to strengthen the timber headstock/s using PFC sections to reinforce the existing headstock/s or enhance the load carrying capacity of the headstock/s.

The following operations cover as a minimum but not all activities and shall be reflective in the Contractors works procedure for carrying out these strengthening works;

i. Access to the identified area shall be maintained to allow safe operations during repair works, transporting equipment to the specific site, including drills and materials.

ii. Clean identified area as required by Clause 8989.6.8.1 (1-9)

iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the headstock/s during repair works.

v. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

vi. The Contractor shall mark the headstock/s where the PFC bolt holes are to be drilled on all sides of the headstock/s where PFC is to be installed at the designated centres between bolts as required by the design drawings and documents. Upon approval by the Structural Engineer the Contractor shall carry out drilling bolt holes for installation of the PFC sections. All drilled bolt holes shall be as shown on the design drawings.

HOLD POINT

vii. An antifungal treatment shall be applied (brushed) into the exposed timber, the Contractor shall ensure the preservative used and the method of application complies with the design drawings and documents.

Treatment of bare timber, drilled bolt holes, and surfaces where PFC segments are in contact with the timber of the headstock/s or corbels/girders shall be by the use of an approved preservative then covered by a preservative gel or grease, and a bitumen impregnated compressible material/bituminous felt in accordance with Clause 8989.6.7

A protective coating shall be applied by coating the repaired areas with a protective sealant or wood preservative to prevent future damage, if a second coat is required the Contractor shall allow the first coat to cure/dry prior to application of the second coat. Use Boondall Monocel all-purpose timber sealer or any equivalent product approved by the superintendent.

All steel fixings shall be treated with a protective coating of grease during installation and after tightening in accordance with Clause 8989.6.12.

Where a preservative is required to be applied to drilled holes, bare timber, or steel fixings, the Contractor shall follow the manufacturers specifications requirements for curing/drying.

WITNESS POINT

viii. The method of fixing the PFC segments (as required) including drilling of holes and applying cold galvanising protection to the bare steel shall be carried out at the location/s as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.

WITNESS POINT

ix. The Contractor shall ensure the PFC section sits flush with the headstock for its full length.

x. The upper flange of the PFC segment shall also be straight vertically and sit flush with the existing headstock and pile top (where required) ensuring when the temporary works are removed and the headstocks take the load and the corbels or girders are sitting flush across the PFC and timber headstock/s. To ensure continuous support of the existing timber headstock/s packing and shimming plates shall be installed as required by the design drawings and documentation, this includes the pile top which may be present on existing half cap or capwales headstock designed structures.

xi. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

xii. On approval to proceed the Contractor shall reinstate the protective coating/s as required by the design drawings and documents

WITNESS POINT

xiii. The site shall be cleaned, and the temporary works shall be removed, this shall be supervised by the consulting structural Engineer where jacking has occurred.

Splicing of Timber Headstock

The purpose of this activity is for the reconstruction of existing defective headstock splices or the partial replacement of the defective part of a timber headstock using timber.

Work Operations incorporated as part of headstock splicing shall be derived from the defect inspection and be identified and noted within the design drawings and documentation. The splicing of headstocks requires the Contractor to supply all materials, plant, and labour to carry out the activity;

i. Prior to disconnecting any components from the headstock, the Contractor shall set up approved temporary works to support and stabilise the bridge prior to commencing splicing activities, the temporary works shall be approved by the consulting structural Engineer, this includes jacking of the corbels/girders.

HOLD POINT

ii. The Contractor shall identify all components that need disconnecting, this shall be in accordance with the approved works procedure. Only those approved fixings shall be disconnected, any further works to disconnect other components or further temporary works for stabilizing and supporting the bridge shall be approved by the consulting structural Engineer.

HOLD POINT

iv. Where jacking of the corbels/girders occurs, this shall be carried out in accordance with the Contractors Jacking Plan and Clause 8989.6.5

HOLD POINT

vi. In association with the consulting structural Engineer and the Superintendent the Contractor shall mark the section of headstock to be spliced and the location and length of splice proposed, once approved the Contractor shall commence spicing of the headstock and disposal off-site of any waste (timber/bolts/nuts/washers).

HOLD POINT

vii. The Contractor shall supply all timber for the splicing in accordance with MRTS87, ensure it is of the correct dimensions as required by the design drawings and documents. All bolts, nuts, washers, and shims shall be supplied to the requirements of MRTS 278.

The headstock splicing shall be carried out as detailed on the design drawings, if there is a lack of detail then the pile splicing shall be carried out as per DTMR TBMM 56T6 Part 2, this includes cutting and removal of defective headstock section, cutting and erection of new timber headstock section, assembly of splice member, drilling of holes and assembly of bolts.

Construction standards shall be such that a maximum gap of 5mm occurs at joints between components. As each component is assembled and tightened the Contractor shall ensure the structural Engineer and Superintendent inspect the works for compliance and conforms to the requirements of the design drawings and tolerances.

HOLD POINT

Where a steel splice member (plate or PFC member/s) is used, it shall be supplied to the requirements of MRTS 11.78.

Alternative splicing methods may be considered, the Contractor shall submit RPEQ endorsed design drawings to the Superintendent for approval a minimum of 2 weeks prior to the splicing works commencing.

HOLD POINT

viii. Prior to applying preservative and preservation measures the Contractor shall check the ends of the headstocks for signs of decay or severe splitting and drying out of the previous end treatment and take appropriate measures to address these items, this may mean removal of the end cap and reinstating of a new end cap to the headstocks after treatment.

ix. During the splicing installation the Contractor shall ensure all preservation and protection measures are applied as required by the design drawings and documents, and Clause 8989.6.7 of this specification.

WITNESS POINT

8989.6.24.2.2 Steel Headstocks

Steel Component Protection Treatment

Steel headstocks where there is minor to moderate deterioration shall be repaired to restore condition and structural integrity, and prevent further deterioration, works operations shall be incorporated into the Contractors works procedure and be consistent with Clause 8989.6.8.1

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment, refer to Clause 8989.6.3.

HOLD POINT

The existing corrosion shall be cleaned and made ready to have its protective coatings reapplied. Prior to recoating, the Contractor shall ensure the Structural Engineer inspects all affected areas for severity of corrosion and reduction of cross-sectional area of the steel members.

Where the cross-section has been reduced the Structural Engineer shall assess the existing member/s for structural design class for that bridges load carrying capacity (generally T44) with the findings and any recommendations submitted to the Superintendent for approval. This also includes cracking found within the steel member/s and welds, bolts, connectors, and fixings.

HOLD POINT

Protective treatment of steel elements shall follow the requirements of Clause 8989.6.8 and be applied to the agreed areas identified. This shall be carried out on the same day as soon after surface preparation has been completed, preferably as each bridge headstock is cleaned. All works shall comply with MRTS85.

WITNESS POINT

Strengthening of Steel Headstocks

Works to strengthen steel headstocks shall comply with AS 5100.8, Section 4.6 and the design drawings and documents. Manufacture and supply of materials to be used for the strengthening of steel girders shall be to the requirements of MRS 11.78.

Where strengthening is proposed to be carried out with the headstock in place work operations shall include but not limited to, temporary works to prop and stabilise bridge structure, jacking of components (if specified), installation of containment collection system, removal and disposal of corrosion material, removal and disposal of coatings in repair or strengthening areas, protection of other components of the bridge during repair activities, placing and fixing of repair components, and application of protective coating.

Prior to any works commencing the Contractor shall submit their works procedure for the strengthening activities, this shall include the proposed fixing methodology, welding or bolting of the strengthening plate in place, this shall be submitted 4 weeks prior to works commencing.

HOLD POINT

The following operations as a minimum shall be reflective in the Contractors works procedure;

xi. Access to the identified area shall be maintained to allow safe operations during welding, transporting equipment to the specific site, including welding equipment.

xii. Clean identified area as required by Clause 8989.6.8.1 (1-9)

xiii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

xiv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the headstock during repair works.

xv. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

xvi. Where a protective coating is damaged during the preparation process the area shall be treated with a cold galvanising process prior to the strengthening plate being put in place.

xvii. The method of fixing the plate shall be carried out as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.

xviii. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

xix. On approval to proceed the Contractor shall reinstate the protective coating/s as required by Clause 8989.6.8.1, if more than 2 days has passed since initial cleaning the headstock and immediate area shall be recleaned and dried prior to the application of any preservative coatings.

WITNESS POINT

xx. The site shall be cleaned, and the temporary works shall be removed.

HOLD POINT

Where the design drawings and documents identify welding as the method for fixing the plates to strengthen the headstock/s, they shall also list the weld requirements, strengthening plate/member dimensions.

Any required welding works shall be carried out as required by MRTS 76 and AS 1554 (and respective sub standards). All works required as a result of this inspection shall be endorsed by the consulting Structural Engineer and approved by the Superintendent, the contractor shall revise their works procedure, have it endorsed by the structural Engineer before submitting it to the Superintendent,

HOLD POINT

The Contractors personnel to carry out the welding works shall be an accredited welding operator of minimum 10 years' continuous experience as a tradesman. When the welding operations are complete, the consulting Structural Engineer and the Superintendent shall inspect the repairs, with approval of the repairs the Contractor shall carry out protective treatment of the area in accordance with Clause 8989.6.8.1 and associated clauses for constraints and verification.

HOLD POINT

Cracked Welds

Work operations shall be carried out as required by Clause 8989.6.8.4 and the design drawings and documents.

8989.6.24.2.3 Composite Headstock Rehabilitation

Work operations refer to only existing FRP headstocks where damage to these alternate headstock material has been identified from the respective inspection/s. The Contractor shall submit their works procedure/s for the identified works or activities in accordance with 8989.5.1 a minimum 4 weeks prior to site works commencing.

MILESTONE

The inspections shall be carried out by a suitably qualified composites technician (structural Engineer) with significant experience in design, construction, and inspection of composite materials, refer to Clause 8989.6.3.

The inspection of the FRP structure should take into account FRP structures/members are strongly affected by the connection between the fibre and adhesive layer and the connection between the composite and impregnated resin.

Based on the inspection report the design drawings shall have identified location, extent, and defect type in the composite material and provided a rectification actions, the following are examples of these;

- Delamination of fibre layers
- Subsurface scratch, penetration, or gouge in the composite material
- Cracking of members from loading or impact
- Bonding Resin failure from water penetration into the fibre layers
- Vitrification of members from fire
- Reduced or lack of protective layer coatings protecting from sun and corrosion issues.

The extent of the identified defects in the design drawings shall be determined visually or through non-destructive testing of the FRP material, they may require minor or major repairs. All inspections and repairs shall be carried out by the equivalent of a Certified Composites Technician (CCT), the Contractor shall submit the details of all staff who are employed to carry out rectification repairs/works in accordance with Clause 8989.5.1.

MILESTONE

Minor Repairs

A minor repair is classified as a delamination, subsurface scratch, penetration, gouge, or surface crack that does not extend more than half the depth of the laminate and does not require engineering design of the repair. The repair should be performed by a CCT or equivalent.

The procedure for minor repairs involves removing, or scarfing out, damaged material until undamaged laminate is found. As material is being removed, care should be taken to not extend the area that is damaged, and the direction of the reinforcement fabric should be noted. The repair area is then determined by tapering the removed material at a slope of 30:1 in all directions.

For example, if a laminate is 25mm thick and has a gouge that extend 6mm into the laminate, the material at the gouge would be removed to just over 6mm deep. Then the surrounding material would then be removed at a taper over a length of 190mm to the full thickness of the laminate.

The repair area would then be repaired with equal or better material cut to fit the tapered area and placed in the same orientation as the existing material. The repair method may be wet layup or vacuum infusion depending on the difficulty for access and extend of damage. The Layup (layer material type and orientation) Schedule should be consulted for the specific reinforcement properties of the FRP member.

All works shall be carried out in compliance with the design drawings, requirements of this specification, and under the supervision of a suitably qualified structural Engineer experienced in the maintenance of composite materials.

WITNESS POINT

Major Repairs

A major repair is classified as a delamination, subsurface scratch, penetration, gouge, or surface crack that extends more than half the depth of the laminate and requires engineering of the repair. The repair should be performed by a CCT or equivalent.

The procedure for major repairs involves removing, or scarfing out, damaged material until undamaged laminate is found. As material is being removed, care should be taken to not extend the area that is damaged, and the direction of the reinforcement fabric should be noted. The repair area is then determined by engineering design of the composite material and may need to be larger than 30:1 or utilize specific materials.

Once the repair area is determined and the repairs structurally engineer designed, the CCT shall be provided with a laminate schedule and material specification to carry out the repair/s. The repair method may be wet layup or vacuum infusion depending on the difficulty for access, extend of damage, and quality of repair method.

All works shall be carried out in compliance with the design drawings and under the supervision of a suitably qualified structural Engineer experienced in the maintenance of composite materials.

WITNESS POINT

8989.6.24.3 Headstock Regular Maintenance Activities

The following maintenance activities shall be carried out regularly or as part of the rehabilitation works identified by the design drawings and documents.

Sunscreen and Waterproof

The surface of the FRP components shall be painted with anti-corrosion preservative or sealant to protect from UV exposure and also rain/water exposure. The purpose is to ensure the interface between the fibre and resin is preserved and the bond is not weakened which will use mechanical deterioration of the FRP component.

Repairing Surface Damage

The resin layer on the surface of the FRP component is thin, and resin peeling, deep scratching, fibre exposure and other damage will occur after collision, impact and friction. Therefore, it is necessary to frequently inspect the surface of FRP components and repair the damage as indicated above for minor and major repair works.

Fire Prevention

FRP materials are thermosetting and may be vitrified under high temperatures and fire, degrading the properties of materials and seriously endangering the stabilization of bridge structures. Measures should

be put in place to clean up the combustible materials on and around the bridge regularly.

Repairing the Debonding Part and Crack

Due to stress concentration and adhesive layer aging, delamination and adhesive layer debonding often occur between the FRP layers, FRPs are brittle, so cracks usually appear in the area where stress is concentrated, such as bolt holes and corner joints of the profile.

Inspections shall include non-destructive methods to check for delamination and debonding of FRP members, check whether there are cracks in the area of stress concentration and repair the damage as indicated above for minor and major repair works.

8989.6.24.4 Remove and Replace Headstock/s.

Work operations involving removal and replacement of headstocks shall be carried out in accordance with the Contractors works procedure, WH&S plan, required jacking/lifting plan, and crane lifting plan.

Prior to any works occurring on removal of bridge components to access the defective headstock the Contractor shall ensure the bridge has been stabilized, all jacking of components, and temporary works (including plant load impacts) are carried out under the supervision of the consulting structural Engineer and in accordance with their approved works procedure. The consulting structural Engineer shall approve of headstock removal works to proceed.

HOLD POINT

8989.6.24.4.1 Timber Headstock's Remove and Replace

Work Operations incorporated in the above item shall include:

Replacement timber headstocks shall comply with the requirements of MRTS87 for acceptable species and properties and shall be supplied as required by the design drawings.

Works operations to replace timber headstock/s shall incorporate (but not be limited to) the following, refer to TBMM 54T5 Part 2 for further detail and requirements;

a) Prior to demolition works commencing mark on the existing deck the headstock/s that will be removed and replaced, upon site inspection the Superintendent shall approve works to commence.

HOLD POINT

b) Remove rails, kerb, deck wearing surface, and deck as required by the design drawings and documentation to access the specified headstock.

c) Raise the girders and corbels slightly to allow bolting to be released and the defective headstock/s to be removed. Prop/restrain corbels and girders to ensure stability and they do not move, carry out any further temporary works to maintain the stability and integrity of the bridge structure, the consulting structural Engineer shall give approval of the temporary works being compliant with the approved works procedure plan.

HOLD POINT

d) Remove all connections (bolts/nuts/washers) between headstock and corbel and girder, and pile/s, reusing existing connections as identified to be in good condition, where existing connectors, bolts, washers, or nuts cannot be reused the Contractor shall notify the Superintendent who will authorise a new connection system to be utilised, refer to MRTS TBMM Part 4 - 120S2 and 120S8.

HOLD POINT

e) Remove identified defective headstock/s and dispose of as required by the Contractors environmental plan. If using a crane, the Contractor shall ensure the crane operates within its rated capacity and works are carried out in accordance with the Contractors approved lift plan

and works procedure.

WITNESS POINT

f) Prepare contact surfaces and headstock;

I. Have the ends neatly trimmed and chamfered, with protective measures (end caps) installed to the headstocks as required by the design drawings and documents.

II. Prior to predrilling connector holes, the Contractor shall insert the bolts/rods through the pile notch to confirm the hole size still suits the bolt dimension and fits tightly, if not the Structural Engineer shall identify an alternative bolt size or connector system

HOLD POINT

III. Where existing bolt/connector holes are not to be reused they shall be cleaned of all dirt, grime, and wood rot then sealed with wood filler and epoxy sealant.

WITNESS POINT

IV. The new headstock section shall be predrilled to suit either the existing pile/s seatings/notching or to suit the new approved fixing system. All contact surfaces shall be treated with a preservative and grease, and a bituminous felt placed between the headstock and pile, and the corbels/girders seating and shaped to train water away from the structure, all materials to be approved by the Superintendent, the preservative shall comply with AS1604.1 and with Clause 6.5.7 of MRTS87.

WITNESS POINT

g) The new headstock shall be lifted into place, be aligned straight vertically and horizontally, have at least 50% of its width seated on the pile notch, with bearing on the full surface of the pile notch, or steel packers shall be installed to provide direct bearing support. This shall be inspected by the consulting structural Engineer and the Superintendent prior to insert the bolts and tightening.

HOLD POINT

h) The Contractor shall tighten the bolt assembly checking via survey to ensure the top of the headstock level complies with the design drawings.

HOLD POINT

i) The corbels and girders shall be lowered, fixed in place, and deck reinstated, remove any temporary works, reinstate the kerb and deck wearing surface as required by the design drawings and documentation in compliance with this Supplementary Specification.

8989.6.24.4.2 Alternative Materials - Headstocks Removal and Replacement

The following listed alternative combinations of headstock removal and replacement by alternate materials shall follow the above works operations process where appropriate to the materials type and be incorporated in the Contractors works procedure for the headstock type;

a) Replace timber headstock with steel universal beam (UB) headstock.

b) Replace timber headstock with PFC section/s.

c) Replace timber headstock with FRP Composite headstock.

d) Replace steel headstock with steel universal beam (UB) headstock.

e) Replace steel headstock with PFC Section/s.

f) Replace steel headstock with FRP Composite headstock

Connecting systems (bolts, rods, nuts, plates, packers, washers) shall be compliant with and installed as

required by the design drawings documents and manufacturers requirements. The Contractor shall not deviate from the approved fixing system unless agreed to by the consulting structural Engineer and the Superintendent.

Inspections, testing, and certification shall be as required for the relevant materials manufacturing specifications and any installation requirements.

HOLD POINT

The Contractor shall ensure all treatments applied to and incorporated onto the existing surfaces and new members as protective and preservative measures shall be compatible with existing treatments and comply with the design drawings and manufacturers requirements.

8989.6.24.4.3 Headstock Alternative Materials

Materials used other than timber shall be in accordance with the design drawings and documents.

All steel elements and/or components procured and supplied shall be compliant to the requirements of MRTS78, and Clause 8989.5.2 of this specification.

Bolts, nuts, washers shall be supplied compliant to MRTS 278, and Clause 8.2 of AS/NZS 5131.

Unless noted otherwise on the Engineering Drawings, all fasteners shall be hot-dipped galvanised in accordance with AS/NZS 1214 or electroplated in accordance with AS 1897.

All headstocks manufactured of composite materials (FRP) and procured and supplied shall be compliant with MRTS59 and its references, and/or the design drawings and documents and all requirements of Clause 8989.5.2.

8989.6.25 Remove and Replace/Reinstate, or Repair Abutments, Wings, and Sills

This section of the Supplementary Specification shall be read in conjunction with the relevant clauses referenced for the purposes of materials, work operations, and quality requirements.

8989.6.25.1 Repair, Strengthen, or Replacement of Abutment

For general works operations for individual activities refer to TMR Timber Bridge Maintenance Manual Part 2 Sections 14.0, and 15.0, and Part 4 Sections 2.13, and 2.14, and the relevant activity as applies to the identified rehabilitation works from the design plans and documentation.

8989.6.25.2 Wings

For general works operations for individual activities refer to TMR Timber Bridge Maintenance Manual Part 2 Section 16.0 and Part 4 Section 2.14, and the relevant activity as applies to the identified works from the design plans and documentation.

Wings includes all components of wingwalls, the various components material types, and added strengthening measures.

Where wing piles are to be supplemented, replaced or stabilized as required by the design drawings works operations and quality requirements shall comply with Clause 8989.6.27.8.

HOLD POINT

The design drawings and documents will set out required repairs or replacement of the wing planks identified from the defect mapping inspection and report, for work operation details refer to 8989.6.26.

HOLD POINT

8989.6.25.3 Repair or Replacement of Sills

For general works operations for individual activities refer to TMR Timber Bridge Maintenance Manual Part 2 Section 13.0 and Part 4 Section 2.12, and the relevant activity as applies to the identified works from the design plans and documentation.

This section covers the repair and/or replacement of sill beams, either timber or concrete where piles at a pier are shortened, (usually abutments). Generally sill beams are used where the foundation material does not enable the driving of piles into the foundation material.

8989.6.25.3.1 Repair of Sill (Timber and Concrete)

Piles may contain as part of their construction sills or sill beams (logs). Repairs to sills shall follow the requirements of the design drawings and be carried out as required by Clause 8989.6.7, and Clause 8989.6.27.1 for timber sill beams and for concrete repairs Clause 8987.6.4, Clause 8987.6.5, and/or 8987.6.7 of MRC Supplementary Specification 8987 Concrete Bridge Rehabilitation Works, including all quality control requirements.

HOLD POINT

8989.6.25.3.2 Replacement of Timber Sill Beam or Part Replacement

Work operations covered by this activity involves propping of the structure to take all load off the sill beam, excavation of overlying soil, removal of defective sill beam, installation of new beam, bolting, removal of props and refilling excavation.

This activity applies to the removal of sediment or the interference with a watercourse at the bridge. The works shall be carried out as detailed and shall be read in conjunction with all referenced documents and any required operational works permits which may be approved for this activity.

The Contractor shall submit a works procedure four weeks prior to site works commencing, this shall be endorsed by the RPEQ Structural Engineer with particular emphasis on temporary works propping and stabilising the bridge and where concrete may be poured, the curing period and timeline for loading the concrete formation.

MILESTONE

The following work operations not necessarily in the order listed cover as a minimum, but not all activities, and shall be reflective in the Contractors works procedure for carrying out the timber sill replacement works;

i. Where required submit and obtain conditional approval for operational works within the watercourse prior to site works commencing.

HOLD POINT

ii. The contractor shall source a new sill beam (log) and be delivered to site prior to any works commencing. Timber shall be in accordance with MRTS87, and dimensions are to be the same as the existing sill log.

iii. Carry out temporary works to prop the bridge pile/s within this pier, it will be required as part of these works the piles are braced such that they cannot independently move once the connectors and sill are removed, this shall be as approved by the consulting structural Engineer.

HOLD POINT

iv. The Contractor shall carry out excavation works to soil covering the sill log to enable removal. Care shall be taken not to damage the bridge structure or temporary works.

v. The sill shall be inspected for defects, with the consulting structural Engineer and the Superintendent confirming the scope of works to be carried out on the sill log.

HOLD POINT

vi. Upon approval to proceed with works the Contractor shall carry out dismantling of the connectors between the sill and the pile/s, refer to 8989.6.27.6.2 for details. These shall be kept clear of the sill to be removed.

vii. Piles with tenon joint or similar with the sill beam may require the Contractor to carry out jacking

operations sufficient to enable removal of the sill beam, this shall be carried out in accordance with Clause 8989.6.5 and Clause 8989.6.6 and supervised by the structural Engineer.

WITNESS POINT

viii. Based on the scope verification the Contractor shall remove the whole sill or remove only the defective section of the sill as identified where a minimum span across at least two piles shall be removed.

ix. The Contractor shall prepare the bed for the new sill or section to be installed, the foundation materials shall comply with the design drawings and documentation, where there is a lack of detail the structural Engineer shall approve of a foundation bed nominated material type, compaction standard, and layer thickness. The Contractor shall ensure all geotechnical testing takes place prior to use of materials and after compaction.

HOLD POINT

x. Where a concrete smoothing layer (blinding layer) for the sill beam is required to be laid to spread the load evenly spread across the full length and width of the sill beam the works shall be carried out as required by the design drawings and documents or as directed by the consulting structural Engineer and approval of the Superintendent.

HOLD POINT

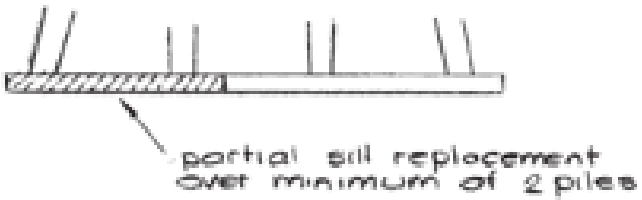
xi. All contact surfaces shall be treated with a preservative and grease, and a bituminous felt placed between all points of contact with other components, and shaped to train water away from the structure, all materials to be approved by the Superintendent, the preservative shall comply with AS/NZS 1604.1 and comply with Clause 6.5.7 of MRTS87.

WITNESS POINT

xii. All connectors approved for reuse shall be cleaned, have preservatives applied, and be treated with grease before installing into place.

xiii. The Contractor shall carry out works to the new sill or part sill or piles to enable the piles to be lowered into place with notching and joins interlocking and being tight and the pile/s contact surface with the sill is spread throughout the whole area of the joint, and drilled bolt holes are correct size and alignment to enable connectors to be reattached and rigidly hold the piles in place without movement of the pile/s or the connector/s.

WITNESS POINT



xiv. Depending on the approved works procedure activity order and with the approval of the consulting structural Engineer the jacked components shall be lowered, this shall be carried out as required by Clause 8989.6.5 and under the supervision of the consulting structural Engineer.

HOLD POINT

xvi. The Contractor shall reattach and tighten the connectors and bolt assembly. The Contractor shall arrange for the consulting structural engineer and Superintendent to inspect the works for

compliance to this specification and the design drawings and documents. After approval to proceed the Contractor shall remove any temporary works.

HOLD POINT

xvii. The sill surrounds shall be backfilled in accordance with MRTS03 or MRTS04 as applicable to the location on site and stabilised, the Contractor shall include this process in their works procedure for approval. The area shall be left neat and tidy with all materials and debris removed and disposed of in accordance with the design drawings and any legislative requirements of operational permits.

HOLD POINT

8989.6.25.3.3 Replacement of or Install Concrete Sill Beam

Work operations covered by this activity shall be where a new concrete sill beam is installed, an existing one is replaced, or a timber sill beam is replaced with a concrete sill beam, and generally follow the process above (8989.6.25.3.2) for timber sill replacement with the exception of where reference to timber sill this be taken as concrete sill, and involves propping of the structure to take all load off the sill beam, excavation of overlying soil, removal of defective sill beam, installation of new beam, curing, reconnection and tightening of bolts, removal of props, preservation treatments, and refilling excavation.

Concrete materials shall be compliant with MRTS70, and reinforcing with MRTS71 as required by the design drawings and documents. All connections (bolts, nuts, washers, plates) between the sill beam and timber pile/s shall be galvanised. Formwork shall be compliant with AS3610 and as required by the design drawings.

This activity applies to the removal of sediment or the interference with a watercourse at the bridge. The works shall be carried out as detailed and shall be read in conjunction with all referenced documents and any required operational works permits which may be approved for this activity.

The Contractor shall submit a works procedure four weeks prior to site works commencing, this shall be endorsed by the RPEQ Structural Engineer with particular emphasis on temporary works propping and stabilising the bridge and concrete pours, the curing period, timeline for loading the concrete formation, and quality requirements including appropriate compressive strength tests for any early loading of the concrete beam. All works shall be carried out in accordance with MRTS70.

MILESTONE

Stripping of formwork and curing shall be carried out as required by AS3600 and AS3610. The Contractor shall formally request approval to strip formwork from the structural Engineer.

HOLD POINT

Approval to load the sill beam and reattach the connectors shall be based on the compliance of concrete compressive strength test results, no early loading shall be granted unless the concrete complies with the design drawings and documents quality requirements.

HOLD POINT

8989.6.25.3.4 Replace or Reattach Pile Connections to Sill (Concrete or Timber)

During the defect mapping inspection after removal of debris it is critical the u/s and d/s attachments are not defective in order to maintain overturning stability of the sill beam or abutment.

For work operations associated with this activity, removal, replacement, and reattachment of pile connections to sill (Concrete or Timber) refer to Clause 8989.6.27.6.2, this includes all quality requirements.

HOLD POINT

8989.6.26 Replace/Reinstate/Reinforce, or Repair Abutment and Wingwall Planks

For general works operations for individual activities refer to TMR Timber Bridge Maintenance Manual Part 2 Sections 15.0, and 16.0 and Part 4 Section 2.14, and the relevant activity as applies to the identified works from the design plans and documentation.

Activities covered apply to coverboards, ballast boards, abutment and wingwall planks, the Contractor is responsible for supply of all materials, plant, and labour to carry out the required works as identified by the defect survey and mapping report and the design drawings and documents.

Abutment and wingwall planks reinforcement shall be carried out as required by Clause 8989.6.27 and the appropriate sub clause for the approved materials and work operations.

8989.6.26.1 Minor Timber Crack Repair and Sealing

Work Operations covered by this activity shall be carried out in accordance with Clause 8989.6.7 and Clause 8989.6.27.1, including all quality control requirements.

HOLD POINT

8989.6.26.2 Minor Concrete Crack Repair or Patching, and Sealing

Items covered by this activity shall be carried out in accordance with Clause 8987.6.4, Clause 8987.6.5, and/or 8987.6.7 of MRC Supplementary Specification 8987 Concrete Bridge Rehabilitation Works as identified and required by the design drawings and documentation. Testing and inspections shall be as required by the relevant referenced Clause.

The repair method for cracks shall be determined by crack width, and position:

a) Width ≤ 0.3 mm by coating.

b) Width > 0.3 mm by injection.

Where cracks greater than 3mm width and of depth greater than 50% of the plank thickness or reinforcing is exposed replacement of the plank/s shall be carried out. As this is considered a last alternative the structural Engineer shall liaise with the Superintendent on alternative treatment/s and their viability to address the defect/s prior to approval of rehabilitation works taking place.

HOLD POINT

The Contractor shall ensure where the works to replace concrete, hardwood timber or plywood ballast boards, cover boards, and/or backing planks involve removal of the pavement and fill materials behind the abutment structure the following shall be included as part of their works procedure;

a) Deadman Anchors – inspection, repairs, replacement (as identified)
b) Installation of geofabric behind the backing boards and coverboards
c) Installation of subsoil drainage behind the abutment and wing planks
d) Approved free draining material installed.
e) Installation of concrete sill
f) Backfilling as per MRTS03 and MRTS04
g) Installation of approach slab (as required)
h) Pavement reinstatement as per MRTS05
i) Sealed surface to match existing.
j) Concrete and Reinforcing as per MRTS 70 and 71.

All works shall be in accordance with the design drawings and documents or as approved by the Superintendent where quality requirements for materials and construction procedures shall be as required by the relevant MRTS Specification and shall be included in the Contractors works procedure.

HOLD POINT

During and at the completion of the replacement of ballast boards, cover boards, and/or backing planks the Contractor shall ensure the consulting structural Engineer and Superintendent inspect completed

works prior to backfilling over.

HOLD POINT

Examples below of wing plank rehabilitation

8989.6.27 Reinforce or Repair Existing Pile/s, or Instal New Pile/s, and Splicing.

The works operations covered by this section relates to the reinforcing, replacing, or repair of piles. Alternative approved materials for use as piles shall be nominated in the Timber Bridge Rehabilitation Works Annexure 8989_1 Section 3.

All materials shall comply the requirements of the design drawings and documents, Annexure 8989_1 Timber Bridge Rehabilitation Works and Clause 8989.5.2, including inspection and test plan requirements and required material compliance submissions.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 11.0, and Part 4 Section 2.10 and the relevant activity as applies to the identified works from the design plans and documentation;

Timber Piles

- Replace timber pile – TBMM Part 4 Activity 56T1 and TBMM Part 2 Clause 11.1

- Splice timber pile – TBMM Part 4 Activity 56T2 and TBMM Part 2 Clause 11.1
- Place supplementary member (supports) – TBMM Part 4 Activity 56T3 and TBMM Part 2 Clause 11.1
- Provide banding – TBMM Part 4 Activity 56T4 and TBMM Part 2 Clause 11.1

Steel Piles

- Strengthening steel pile – TBMM Part 4 Activity 56S1 and TBMM Part 2 Clause 11.2
- Place new steel pile – TBMM Part 4 Activity 56S2 and TBMM Part 2 Clause 11.2

Concrete Piles

- Place concrete encasement - TBMM Part 4 Activity 56P1 and TBMM Part 2 Clause 11.3

Wing Piles (generally treat as same as main piles)

- Replace timber wing pile – TBMM Part 4 Activity 560T1 and TBMM Part 2 Clause 11.4
- Stabilise wing pile – TBMM Part 4 Activity 60T2 and TBMM Part 2 Clause 11.4

8989.6.27.1 Treatment of Timber piles

This work operation covers treating timber piles with minor to moderate deterioration involving to restoring their condition and ensure structural integrity of the piles. For the treatment of timber piles the following operations shall be followed:

i. Identify the area/s required for treatment of deteriorated timber, the Contractor is to ensure this is identified as part of the defect mapping and approved by the Superintendent prior to commencement of any repairs.

HOLD POINT

ii. Set up the site to capture all removed rotten timber and dirt from cleaning, under no circumstances are items to be allowed to fall into the watercourse.

iii. All soft and fungi-decayed wood shall be identified and with the use of a chisel or similar tool carefully chip away and remove the decayed wood until solid healthy wood is reached.

iv. Utilise hand cleaning tools such as brushes to remove dirt and loose materials from the surface of the piles. The use of high-pressure water spray equipment shall only be utilised where the Superintendent approves. The Contractor shall request the Superintendent to inspect the site/s prior to applying preservation treatments.

HOLD POINT

v. Once the Superintendent has issued approval to proceed, the Contractor shall ensure the surface is dry and apply wood hardener to strengthen the remaining wood and prevent further decay (Sikadur-33 or any equivalent product approved by the Superintendent). The wood hardener shall be allowed to cure as per the manufacturers requirements prior to applying any epoxy wood filler.

vi. The holes, cracks, and damaged areas shall be filled with epoxy wood filler around the pile surface to restore the shape and structure of the piles (Bunnings- Timbermate Natural Wood Filler or any equivalent product approved by the superintendent). The wood filler shall be allowed to fully dry before shaping and smoothing as required by the manufacturer's instructions.

WITNESS POINT

vii. The contractor shall shape and smooth the filler with a putty knife or sandpaper to match the contour/s of the piles, including if they are hexagonal.

viii. A protective coating shall be applied by coating the repaired areas with a protective sealant or wood preservative to prevent future damage, if a second coat is required the Contractor shall allow the first coat to cure/dry prior to application of the second coat. Use Bunnings Boondall Monocel all-purpose timber sealer or any equivalent product approved by the superintendent.

HOLD POINT

8989.6.27.2 Replace Timber Piles

The works operations covered by this activity involves driving a new pile adjacent to the existing defective pile or removing the defective existing pile and replacing this with a new driven pile as required by the design drawings and documents. The use of timber piles as replacement shall be as required by the design drawings and documents.

The Contractor shall submit a works procedure four weeks prior to site works commencing, this shall be endorsed by the RPEQ Structural Engineer with particular emphasis on temporary works propping and stabilising the bridge and as required loading of bridge for pile driving.

MILESTONE

The following operations cover as a minimum, but not all activities, and shall be reflective in the Contractors works procedure for carrying out the timber pile replacement works;

i. Application and evidence of approval of required permits for works, refer to Clause 8989.5.8.

ii. The contractor shall set up access systems to the bridge and have the area around the pile cleaned and vegetation and debris removed, refer to Clause 8989.6.2.

iii. The Contractor shall carry out defect mapping inspection as required by Clause 8989.6.4 with the structural Engineer and Superintendent to verify the extent of the scope of works identified to replace the defective pile and verify the Contractors approved work procedure can be implemented. If not, the Contractor shall resubmit a revised works procedure for endorsement by the structural Engineer and approval by the Superintendent.

HOLD POINT

iv. Prior to any works commencing the Contractor shall also review any changes to the works scope/procedure and its effect on legislative approvals, if there are changes to the scope and procedures which effect the approval the Contractor shall have the permit revised and approval granted to cover the new scope of works.

HOLD POINT

v. The contractor shall remove or disconnect any utilities and components which may either hinder the works or be damaged by works activities including railings, kerbs, DWS and decking, refer to Clauses 8989.6.14, 8989.6.15, 8989.6.16, 8989.6.17, and 8989.6.19.

vi. All temporary works required to prop and stabilise the bridge while replacing the pile/s shall be installed as required by the approved Contractors works procedure, refer to Clauses 8989.5.5 and 8989.6.4 and inspected by the structural Engineer, this includes jacking of components, refer to Clause 8989.6.5.

HOLD POINT

vii. The Contractor shall ensure that headstock/s, corbel/s, and girders are clear of the new pile location with the installation of temporary works to stabilise as required under the Supervision of the structural Engineer.

HOLD POINT

viii. The disconnection of the wales and braces shall be carried out by the Contractor and immediately prior to pile removing and/or pile driving commences, the existing piles not being

replaced or removed shall be braced temporarily prior to pile driving commencing, the structural Engineer shall give approval to proceed.

HOLD POINT

ix. The contractor shall carry out pile removal (as required) and pile driving activities required by the design drawings and documents and Clause 8989.6.6 to install a replacement pile. The location of the pile driving rig to carry out the pile driving activities shall be approved and endorsed by the structural Engineer, the ability of the existing bridge and propping to safely support the construction equipment shall be considered. This includes all testing, inspections, surveys, and compliance requirements.

HOLD POINT

x. Where the existing pile is not being removed install the new pile to follow the line of the defective pile and nominally 100 mm clear of that member. Metal driving shoes shall be used as required by the design drawings and documents for timber piles.

xi. Survey of the driven pile to confirm its position and level shall be carried out by the contractor, upon confirmation of the alignment survey compliance the pile top can be trimmed and form the headstock seating notch. The contractor shall ensure the headstock member is seated on the rebate with any gaps packed for timber piles.

xii. The Contractor shall submit to the structural Engineer and the Superintendent the survey results (alignment and level) and confirmation of compliance with installation tolerances as required by the design drawings.

HOLD POINT

xiii. Re-locate headstock/s, drill and install headstock / pile bolts, carry out strengthen of the headstocks if they have been trimmed. All works shall be carried out under the supervision of the structural Engineer.

xiv. All surfaces to be in contact with the headstocks shall be treated with a chemical preservative and grease and a bituminous felt material placed and shaped to shed water away from the headstock and pile.

WITNESS POINT

xiv. Prior to removing temporary works the bracing and wales shall be reinstated, this also includes application of preservatives at pile contact surfaces as noted above.

WITNESS POINT

xv. The Contractor shall arrange an inspection of the pile/s and reconnected wales and bracing, and the headstock connection/s for compliance to the design drawings and obtain approval to proceed with lowering jacked components (as required) and removal of temporary propping works.

HOLD POINT

xvi. Where required the Contractor shall remove propping and replace bolts, decking, kerbs and wearing surface in compliance with this specification, design drawings and documents.

xvii. Apply anti-termite poison to the new pile as detailed in Clause 8989.6.7.3.

xviii. The contractor shall collate test results and survey results for submission to the structural Engineer for endorsement as part of the “As Constructed” data submission, refer to Clause 8989.7.

HOLD POINT

8989.6.27.3 Timber Pile Splicing

Work Operations incorporated as part of pile splicing shall be derived from the defect inspection and be identified and noted within the design drawings and documentation. The splicing of piles requires the Contractor to supply all materials, plant, and labour to carry out the activity;

i. Prior to disconnecting any components from the pile, the Contractor shall set up approved temporary works to support and stabilise the bridge during splicing, this may include jacking. The temporary works shall be approved by the consulting structural Engineer.

HOLD POINT

ii. The Contractor shall identify all components that need disconnecting, this shall be in accordance with the approved works procedure. Only those approved fixings shall be disconnected, any further works to disconnect other components or further temporary works for stabilizing and supporting the bridge shall be approved by the consulting structural Engineer.

iii. In association with the consulting structural Engineer and the Superintendent the Contractor shall mark the section of decayed pile to be removed or cut out, once approved the Contractor shall cut out the identified segment of the pile and disposal off-site.

HOLD POINT

iv. The Contractor shall supply the new segment of the pile in accordance with MRTS87, ensure it is of the correct diameter and height as required by the design drawings and documents. The pile splicing shall be carried out as detailed on the design drawings, if there is a lack of detail then the pile splicing shall be carried out as per DTMR TBMM 56T2 Part 2.

Alternative splicing methods may be considered, the Contractor shall submit RPEQ endorsed design drawings to the Superintendent for approval a minimum of 2 weeks prior to the splicing works commencing.

HOLD POINT

v. During the splicing installation the Contractor shall ensure all preservation and protection measures are applied as required by the design drawings and documents, and Clause 8989.6.7 of this specification.

WITNESS POINT

8989.6.27.4 Strengthen Existing Timber Piles

Work Operations incorporated as part of pile strengthening shall be derived from the defect inspection and be identified and noted within the design drawings and documentation. The Contractor shall supply all materials, plant, and labour to carry out the pile strengthening activity;

8989.6.27.4.1 Pile Strengthening with Parallel Flange Channel (PFC)

The purpose of this activity is to strengthen the timber pile using PFC sections to reinforce the existing pile or enhance the load carrying capacity of the pile/s.

The following operations cover as a minimum but not all activities and shall be reflective in the Contractors works procedure for carrying out these strengthening works;

i. Access to the identified area shall be maintained to allow safe operations during repair works, transporting equipment to the specific site, including drills and materials.

ii. Clean identified area as required by Clause 8989.6.8.1 (1-9)

iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the pile during repair works.

HOLD POINT

v. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

vi. The Contractor shall mark the pile where the PFC bolt holes are to be drilled on all sides of the pile at the designated centres between bolts as required by the design drawings and documents. Upon approval by the Structural Engineer carry out drilling bolt holes for installation of the PFC sections. All drilled bolt holes shall be as shown on the design drawings, refer to anti-splitting treatment of corbels Clause 8989.6.23.

WITNESS POINT

vii. The pile shall be trimmed/shaved on all surfaces to enable the PFC segments to sit flush for its full length.

viii. An antifungal treatment shall be applied (brushed) into the exposed timber, the Contractor shall ensure the preservative used and the method of application complies with the design drawings and documents.

Treatment of bare timber, drilled bolt holes, and surfaces where PFC segments are in contact with the timber of the pile by the use of an approved preservative then covered by a preservative gel or grease, and a bitumen impregnated compressible material/bituminous felt in accordance with Clause 8989.6.7

A protective coating shall be applied by coating the repaired areas with a protective sealant or wood preservative to prevent future damage, if a second coat is required the Contractor shall allow the first coat to cure/dry prior to application of the second coat. Use Bunnings Boondall Monocel all-purpose timber sealer or any equivalent product approved by the superintendent.

All steel fixings shall be treated with a protective coating of grease during installation and after tightening in accordance with Clause 8989.6.12.

Where a preservative is required to be applied to drilled holes, bare timber, or steel fixings, the Contractor shall follow the manufacturers specifications requirements for curing/drying.

WITNESS POINT

ix. The method of fixing the PFC segments (as required) including drilling of holes and applying cold galvanising protection to the bare steel shall be carried out at the location/s as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.

WITNESS POINT

x. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

xi. On approval to proceed the Contractor shall reinstate the protective coating/s as required by the design drawings and documents

WITNESS POINT

xii. The site shall be cleaned and the temporary works shall be removed.

8989.6.27.5 Repair Splitting Timber Piles

Where strengthening is proposed work operations shall include but not limited to;

- Temporary works to stabilise the bridge and it's components.
- Jacking of components (if specified)
- Cleaning of components, removal and disposal of rotted timber material, removal and disposal of coatings in repair or strengthening areas
- Protection of other components of the bridge during repair activities,
- Application of protective coating/s.

Prior to any site works commencing the Contractor shall submit their works procedure for the strengthening activities, this shall include the proposed fixing methodology, welding or bolting of the strengthening plate in place, this shall be submitted 4 weeks prior to site works commencing.

MILESTONE

This item covers all work operations and materials associated with the repair of splitting of timber piles with the use of preservation treatment and banding, the method of treatment shall be carried out as required by the design drawings and documents.

The following operations as a minimum shall be reflective in the Contractors works procedure;

i. Access to the identified area shall be maintained to allow safe operations during repair works, transporting equipment to the specific site, including drills and materials.

ii. Clean identified area as required by Clause 8989.6.27.1 (i -iv)

iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the pile/s during repair works.

v. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

vi. When surface water has cleared from split, sterilise the zone by brushing Boracol 200RH fungicide or equivalent liberally onto all accessible timber inside the split. Allow Boracol at least 3 hours to be absorbed into the surface of the split. The type of anti-fungicide treatment shall be approved by the Superintendent.

HOLD POINT

vii. The split shall be filled to the outer surface by trowelling or pumping Koppers Arch CNB Timber Protective Paste (or approved alternative) to seal against future moisture ingress and weathering.

Antifungal treatment of bare timber and surfaces where bands proposed are in contact with the timber of the pile an approved preservative shall be applied then covered by a preservative gel or grease

A protective coating shall be applied by coating the repaired areas with a protective sealant or wood preservative to prevent future damage, if a second coat is required the Contractor shall allow the first coat to cure/dry prior to application of the second coat. Use Boondall Monocel all-purpose timber sealer or any equivalent product approved by the superintendent.

WITNESS POINT

viii. Where splitting is severe (and the design drawings indicate) standard pile bands shall be attached and tensioned at positions directed by the Engineer, example of band type and fixing depicted

below, the type of band and fixing system shall be as required by the design drawings and documents.

All bands shall be treated with a protective coating of grease during installation and after tightening,

Where a preservative is required to be applied to bare timber, or steel bands, the Contractor shall follow the manufacturers specifications requirements for curing/drying.

WITNESS POINT

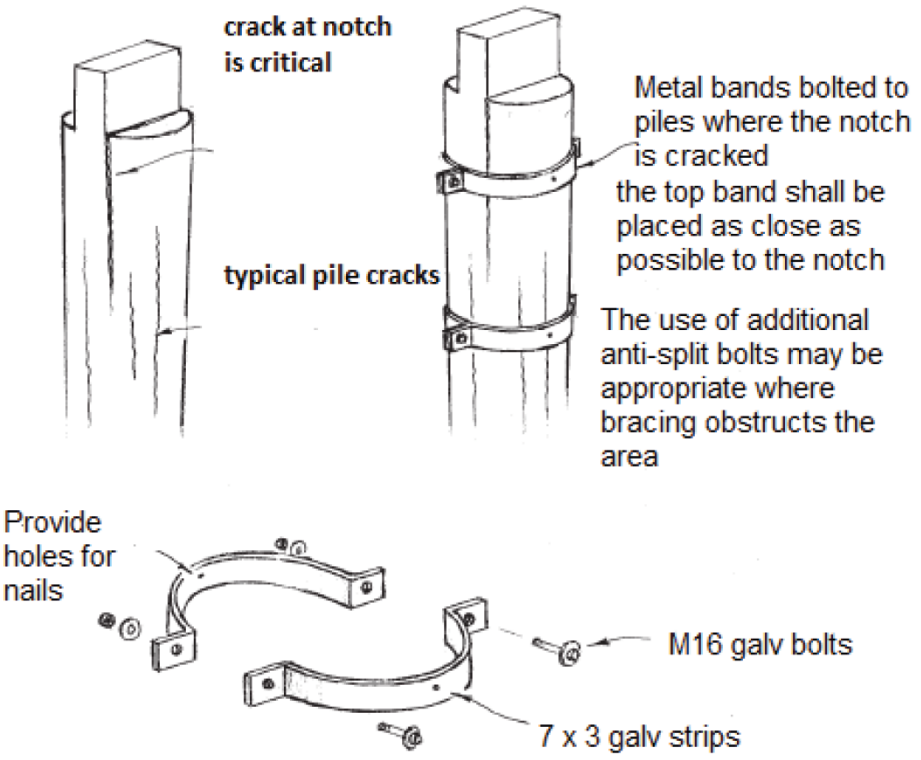
ix. The method of fixing the bands (as required) shall be carried out at the location/s as required by the design drawings and documents. Once in place the Contractor shall tighten the band to close the split section of pile. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

x. On approval to proceed the Contractor shall reinstate the protective coating/s to the pile/s as required by the design drawings and documents

WITNESS POINT

xi. The site shall be cleaned and the temporary works shall be removed.



8989.6.27.6 Silled Piles:

The works operations covered by this section relates to new installation, the reinforcing, removal and replacing, or repair of silled timber piles.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 11 and 13.0, and Part 4 Section 2.11 and 2.12, and the relevant activity as applies to the identified works from the design drawings and documentation.

Timber Sill Piles

- Replace sill pile – TBMM Part 4 Activity 56T1 and TBMM Part 2 Clause 11.1
- Replace sill pile connections – TBMM Part 4 59T3 and 59C3 and TBMM Part 2 Clause 13.1 and 13.2
- Splice timber pile – TBMM Part 4 Activity 56T2 and TBMM Part 2 Clause 11.1
- Provide banding – TBMM Part 4 Activity 56T4 and TBMM Part 2 Clause 11.1

8989.6.27.6.1 Silled Pile Treatment, Splicing, Replacement

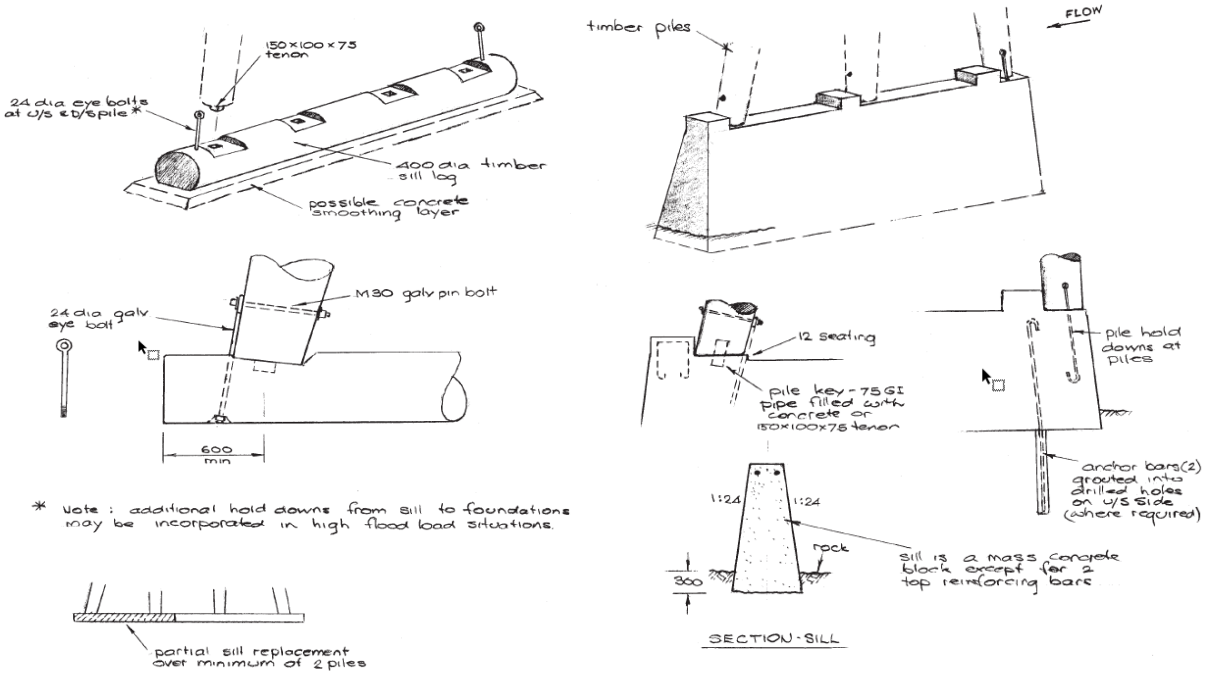
Works operations for the silled piles shall be treated as required by Clause 8989.6.27 for the type of treatment designated within the design drawings and documents. Where new piles are required or need to be spliced the base of the pile shall be cut to provide a spigot for location on the sill beam. This applies to all inspections and testing as well.

All bare timber on the pile and where the sill beam has been cleaned to accommodate the new pile shall be treated with a fungicide and preservative prior to the pile being installed. The contact area between the pile and sill beam shall be treated with a preservative, preservative grease and a bituminous felt placed between the components. All treatments shall be compliant with Clause 8989.6.7 for timber and Clause 8989.6.13 for bolts, nuts, washers, and tie downs.

Where sill/pile hold downs are incorporated, these shall be fitted to the new pile. If the existing components (eye bolt and pin bolt) are deteriorated they shall be replaced with new galvanised components and shall be installed as required by the works operations below and as required by the design drawings and documents, refer to diagram below for example/s of pile connection details.

8989.6.27.6.2 Replace Pile Connections to Sill (Concrete or Timber)

This item covers all work operations and materials associated with the replacement of attachment bolts between timber piles and timber or concrete sill member. This activity shall be carried out in conjunction with Clause 8989.6.25. The following diagrams are indicative of the connections.



Replacement bolts, nuts, washers, and connections shall be galvanised and meet the requirements of Clause 8989.5.2. Work operations include but not limited to:

i. The Contractor shall carry out temporary works to prop and stabilise the bridge prior to

disconnecting any sill bolts and connectors, this is to be carried out as required by the design drawings and under the supervision of the structural Engineer.

HOLD POINT

ii. Excavate any material surrounding the eyelet bolts and connector/s.

iii. Clean existing connectors or bolts to gain access, inspecting for corrosion extent and any defects of the existing sill or piers.

HOLD POINT

iv. Remove existing bolts/connectors as specified in the design drawings and documents.

v. In timber sills replace eye bolt, ensuring the timber bolt hole has been cleaned, and treated by the use of an approved preservative then covered by grease for timber preservation. The bolts and nuts shall be galvanised, treated with a preservative gel or grease prior to installing.

vi. For concrete sills replacement of bolts/connectors or tie downs shall comply with the design drawings and documents, the structural Engineer shall determine whether a new location for the bolt or tie down is possible or part or full replacement of the concrete sill needs to occur, refer to requirements of 8989.6.26 where part or full replacement of the sill applies, refer to Annexure 8989_1 Section 5.2.

vii. Once in place the new bolts/connectors shall be tightened, the consulting structural Engineer shall inspect the bolts, ensuring all joints, bolts, connectors, and tie downs are tight and no movement occurs and all exposed nuts/bolts have been treated with a preservative gel or grease.

HOLD POINT

viii. The Contractor shall reinstate the excavated material and compact to at least the same density as the surrounding natural material,

ix. The Contractor shall then remove all temporary works enabling the pier to load the sill, the structural Engineer and the Superintendent shall inspect the works.

HOLD POINT

8989.6.27.7 Steel Piles

Work operations covered under this section relates to the manufacture, supply, storage, repairs through strengthening, driving a new pile adjacent to the existing defective pile or removing the defective existing pile and replacing with a new driven pile, and preservation treatment as required by the design drawings and documents.

8989.6.27.7.1 Steel Component Protection Treatment

Steel piles where there is minor to moderate deterioration shall be repaired to restore condition and structural integrity, and prevent further deterioration, works operations shall be incorporated into the Contractors works procedure and be consistent with Clause 8989.6.8.1

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment, refer to Clause 8989.6.3.

The existing corrosion shall be cleaned and made ready to have its protective coatings reapplied. Prior to recoating, the Contractor shall ensure the Structural Engineer inspects all affected areas for severity of corrosion and reduction of cross-sectional area of the steel pile/s.

Where the cross-section has been reduced the Structural Engineer shall assess the existing pile/s for structural design class for that bridges load carrying capacity (generally T44) with the findings and any recommendations submitted to the Superintendent for approval. This also includes cracking found within the steel pile/s and welds, bolts, connectors, and fixings.

HOLD POINT

Protective treatment of steel elements shall follow the requirements of Clause 8989.6.8 and be applied to the agreed areas identified. This shall be carried out on the same day as soon after surface preparation has been completed, preferably as each bridge pile/pier is cleaned. All works shall comply with MRTS85 and MRTS88.

WITNESS POINT

8989.6.27.7.2 Strengthening and/or Splicing of Steel Piles

Works to strengthen steel pile/s shall comply with AS 5100.8, Section 4.6 and the design drawings and documents. Manufacture and supply of materials to be used for the strengthening of steel pile/s shall be to the requirements of MRS 11.78.

Where strengthening is proposed to be carried out with the pile/s in place work operations shall include but not limited to, temporary works, jacking of components (if specified), removal and disposal of corrosion material, removal and disposal of coatings in repair or strengthening areas, protection of other components of the bridge during repair activities, placing and fixing of repair components, and application of protective coating.

Prior to any works commencing the Contractor shall submit their works procedure for the strengthening activities, this shall include the proposed fixing methodology, welding or bolting of the strengthening plate in place, splicing of repaired sections in place, and this shall be submitted 4 weeks prior to works commencing.

HOLD POINT

The following operations as a minimum shall be reflective in the Contractors works procedure;

i. Access to the identified area shall be maintained to allow safe operations during welding, transporting equipment to the specific site, including welding equipment.
ii. Clean identified area as required by Clause 8989.6.8.1 (1-9)
iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to take the load off the pile/s during repair works.

HOLD POINT

v. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.
vi. Where a protective coating is damaged during the preparation process the area shall be treated with a cold galvanising process prior to the strengthening plate being put in place.
vii. The method of fixing the plate shall be carried out as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.
viii. Where the strengthening treatment requires a section of the pile to be cut out and repaired by splicing in a new section of size and mass per unit length equal to that of the existing pile. The contractor shall cut away the severely corroded section, tidying and dressing the cut edge/s, the replacement section shall be welded (splicing) into placed, works shall be carried out as required by MRTS66 (Clause 9) and the design drawings and documents under the supervision of the structural Engineer.
ix. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

x. On approval to proceed the Contractor shall reinstate all components that have been removed or protected, and the protective coating/s as required by Clause 8989.6.8.1. The site shall be

cleaned, and the temporary works shall be removed.

HOLD POINT

Where the design drawings and documents identify welding as the method for fixing the plates to strengthen the pile/s, they shall also list the weld requirements and strengthening plate/member dimensions.

Any required welding works shall be carried out as required by MRTS 76 and AS 1554 (and respective sub standards). All works required as a result of this inspection shall be endorsed by the consulting structural Engineer and approved by the Superintendent, the contractor shall revise their works procedure, have it endorsed by the structural Engineer before submitting it to the Superintendent for approval.

HOLD POINT

The Contractors personnel to carry out the welding works shall be an accredited welding operator of minimum 10 years' experience as a tradesman. When the welding operations are complete, the consulting Structural Engineer and the Superintendent shall inspect the repairs, with approval of the repairs the Contractor shall carry out protective treatment of the area in accordance with Clause 8989.6.9.1 and associated clauses for constraints and verification.

HOLD POINT

Where cracked welds are identified in the pile/s and fixings the work operations shall be carried out as required by Clause 8989.6.9.4 and the design drawings and documents.

8989.6.27.7.3 Replace Existing or Install Additional Steel Piles

The works operations covered by this activity involves driving a new pile removing the defective existing pile and replacing this with a new driven pile as required by MRTS66 and the design drawings and documents. The use of steel piles as replacement shall be as required by the design drawings and documents.

The Contractor shall submit a works procedure four weeks prior to site works commencing, this shall be endorsed by the RPEQ Structural Engineer with particular emphasis on temporary works propping and stabilising the bridge and as required loading of bridge for pile driving.

MILESTONE

The following operations cover as a minimum, but not all activities, and shall be reflective in the Contractors works procedure for carrying out the steel pile replacement works;

i. Application and evidence of approval of required permits for works, refer to Clause 8989.5.8

ii. The contractor shall set up access systems to the bridge and have the area around the pile cleaned and vegetation and debris removed, refer to Clause 8989.6.2

iii. The contractor shall identify the location/s of the pile/s to be installed prior to commencing demolition of the deck. This shall be carried out by survey and be marked on the deck for the Structural Engineer and Superintendent to verify the site location complies with the design drawings and documents.

The Superintendent shall grant approval to proceed if the location is compliant with design drawings and documentation.

HOLD POINT

iv. All materials supplied and transported to site shall be inspected for damage by the Contractor prior to unloading and storing. This inspection shall include protective coatings/paint systems.

HOLD POINT

v. Storing of materials shall comply with Clause 8989.5.2.4 and the Contractors works procedure, Clause 8989.5.6.

vi. Upon approval, and arrival and safe storage of pile/s and components the contractor shall remove the existing wearing surface, deck, and any other bridge component to allow the installation of the pile/s in accordance with the design drawings.

vii. The Contractor shall carry out defect mapping inspection as required by Clause 8989.6.3 with the structural Engineer and Superintendent to verify the extent of the scope of works identified to replace the defective pile and verify the Contractors approved work procedure can be implemented. If not, the Contractor shall resubmit a revised works procedure for endorsement by the structural Engineer and approval by the Superintendent.

HOLD POINT

viii. Prior to any works commencing the Contractor shall also review any changes to the works scope/procedure and its effect on legislative approvals, if there are changes to the scope and procedures which effect the approval the Contractor shall have the permit revised and approval granted to cover the new scope of works.

HOLD POINT

ix. The contractor shall remove or disconnect any utilities and components which may either hinder the works or be damaged by works activities including railings, kerbs, DWS and decking, refer to Clauses 8989.6.14, 8989.6.15, 8989.6.16, 8989.6.17, and 8989.6.19.

x. All temporary works required to prop and stabilise the bridge while replacing the pile/s shall be installed as required by the approved Contractors works procedure, refer to Clauses 8989.5.5 and 8989.6.4 and inspected by the structural Engineer, this includes jacking of components, refer to Clause 8989.6.5.

HOLD POINT

xi. The Contractor shall ensure that headstock/s, corbel/s, and girders are clear of the new pile location with the installation of temporary works to stabilise as required under the Supervision of the structural Engineer.

HOLD POINT

xii. The disconnection of the wales and braces shall be carried out by the Contractor and immediately prior to pile removing and/or pile driving commences, the existing piles not being replaced or removed shall be braced temporarily prior to pile driving commencing, the structural Engineer shall give approval to proceed.

HOLD POINT

ix. The contractor shall carry out pile removal (as required) and pile driving activities required by the design drawings and documents and Clause 8989.6.7 to install a replacement pile. The location of the pile driving rig to carry out the pile driving activities shall be approved and endorsed by the structural Engineer, the ability of the existing bridge and propping to safely support the construction equipment shall be considered. This includes all testing, inspections, surveys, and compliance requirements.

HOLD POINT

x. Where the existing pile is not being removed install the new pile to follow the line of the defective pile and nominally 100 mm clear of that pile.

xi. Survey of the driven pile to confirm its position and level shall be carried out by the contractor, upon confirmation of the alignment survey compliance the pile top can be trimmed to the correct level.

xii. The Contractor shall submit to the structural Engineer and the Superintendent the survey results (alignment and level) and confirmation of compliance with installation tolerances as required by

the design drawings.

HOLD POINT

xiii. Re-instate headstock/s, reinstate headstock attachment brackets. Site welding shall be carried out as required by Clause 8989.6.8.4 in accordance with the design drawings and under the supervision of the structural Engineer.

xiv. All surfaces to be in contact with the headstocks shall be treated with a chemical preservative and grease and a bituminous felt material placed and shaped to shed water away from the headstock and pile.

WITNESS POINT

xix. Prior to removing temporary works, the bracing and wales shall be reinstated; this also includes application of preservatives and grease to drill holes and at pile contact surfaces as noted above.

WITNESS POINT

xx. Where required the Contractor shall remove propping and replace bolts, decking, kerbs and wearing surface in compliance with this specification, design drawings and documents.

xxi. The contractor shall collate test results and survey results for submission to the structural Engineer for endorsement as part of the "As Constructed" data submission, refer to Clause 8989.7.

HOLD POINT

8989.6.27.8 Wing Piles

The works operations covered by this activity involves driving a new pile (timber or steel) adjacent to the existing defective pile or removing the defective existing pile and replacing this with a new driven pile as required by the design drawings and documents. The use of timber piles as replacement shall be as required by the design drawings and documents.

The Contractor shall submit a works procedure four weeks prior to site works commencing for approval by the Superintendent, this shall be endorsed by the RPEQ Structural Engineer with particular emphasis on temporary works adequately brace the wing backing slabs/boards to support any load being carried by the pile/s .

MILESTONE

Wing piles works operations and provision of materials shall be treated as the same as for main piles, refer to Clauses 8989.6.27.2 and 8989.6.27.7, the defect mapping inspection and report should determine the set-up of the backing boards/wings and the treatments required.

Work operations covered include temporary wing bracing, removal of existing pile (if required), driving of new pile/s, drilling, bolting and connecting, applying antifungal treatment and preservative grease to all contact surfaces including drilled holes and steel bolts, wire bracing, and connectors. Construction standards shall be such that a maximum gap of 5mm occurs at joints between components.

HOLD POINT

The new pile (if timber) shall have a termicide applied to the pile, refer to Clause 8989.6.7.3, the exposed pile top shall be treated with an antifungal and a preservative grease applied with a metal end cap attached/installed.

WITNESS POINT

Where the wing piles have dead man anchors these shall be treated based on the individual site, all works operations shall be in accordance with the design drawings and documents, the Contractor is to include all activities required to repair or replace the dead man anchor/s in their works procedure. This shall include but not limited to;

i. Temporary works to stabilise the existing backing boards/planks and wing piles.

HOLD POINT

ii. Removal and reinstatement of relieving slab (prepour inspection and testing of concrete required)

HOLD POINT

iii. Excavation of pavement (including surfacing) and embankment behind the boards/planks

iv. Disconnection and reconnection of threaded rods (tie bars) between the dead man anchor and pile. Reconnection inspection prior to continuing backfilling activities.

HOLD POINT

v. Carry out required works to the wing piles to stabilise (and/or replace) including pile driving as required.

WITNESS POINT

vi. Removal and replace concrete slab (dead man) as required (prepour inspection and testing of concrete required). The Contractor shall ensure their lift plan is followed. Concrete works shall be carried out as required by MRTS 70.

HOLD POINT

vii. Works required to the backing boards/planks, repairs/replacement/realignment as required by the relevant sections of this supplementary specification and the design drawings and documents.

HOLD POINT

viii. Backfill and compact embankment and pavement (including surfacing), all works shall be compliant with Clause 8989.6.29.

HOLD POINT

Each of the above critical points shall be inspected by the structural Engineer and Superintendent prior to proceeding with the next phase of the activity.

8989.6.27.9 FRP Strengthening of Piles

Works operations covered under this section relates applies to all pile types for the cleaning of affected pile/s (including excavating below bed level as required), setting up for wrapping the existing pile/s in an FRP jacket, reinforcing the defective section, temporary fixings to hold the wrapping in place, pressure filling the annulus with high strength non-shrinking cementitious epoxy grout, and finishing and sealing of pile after curing.

This treatment has been formulated from the defect inspection and mapping report, refer to Clauses 8989.6.3 and 8989.5.11 and details identified within the design drawings and documentation.

Fibre reinforced polymer (FRP) strengthening of piles by wrapping (encasing) shall be carried out as required by the design drawings and documents and the manufacturers specification/requirements. **NO** alternative treatments to the endorsed design drawings issued for construction shall be considered unless site conditions determine reconsideration of the rehabilitation method.

The Contractor shall submit to the Superintendent their procedure for the FRP wrapping strengthening of the pile/s 4 weeks prior to site works commencing. This submission shall be endorsed by the consulting Structural Engineer, verifying;

a) The wrapping system to be used complies with all relevant Australian Standards or equivalents, this applies to all materials, and also includes but not limited to the wrapping (FRP) fabric, reinforcing, fixings, grouts, and epoxies.

b) Testing of materials and test results comply with relevant Australian Standards or equivalent.
c) Transportation to and storage on site procedures
d) The installation methodology complies with the material manufacturers requirements and existing site conditions i.e. below bed level or under water.

MILESTONE

Works carried out as part of these operations shall only be performed by trained personnel with a minimum 5 years' experience with the set up and installation of FRP reinforcing pile wrapping.

The following work operations shall form the basis of the Contractors works procedure;

i. All materials shall be inspected upon delivery with damaged or non-compliant materials returned to the manufacturer or supplier, refer to Clause 8989.5.2. The fiberglass jacket thickness shall be a minimum 3 mm thickness constructed of layers of woven roving and mat. The jacket shall be translucent to provide visual inspection during the injection of the grout.

HOLD POINT

ii. Storage of all materials on site shall be as required by the manufacturer's requirements and specifications, refer also to Clause 8989.5.2

iii. All epoxy grout components shall be at the manufacturers recommended temperature prior to utilizing for production/mixing. The Contractor is to record details of the weather on the day of production of the epoxy grout, including time from commencement of mixing to discharge time in place. Records shall be available to the Superintendent at all times and be submitted with the "As Constructed" data upon completion of works.

WITNESS POINT

iv. The Contractor shall ensure access to the individual pile rehabilitation sites is readily accessible for the consulting structural Engineer and the Superintendent to carry out Inspections.

v. The pile/s containing the identified defective area designated for this treatment shall be cleaned of all impediments, grease, paint, oils, and all rotted timber in accordance with Clause 8989.6.27.1, in the case of steel piles Clause 8989.6.27.7 shall apply. The Contractor shall be responsible for installing any temporary works to support and stabilise the bridge prior to commencing cleaning, this shall be done under the supervision of the consulting structural Engineer.

HOLD POINT

vi. After access set up and cleaning of the pile/s the Contractor shall ensure the consulting structural Engineer and Superintendent carry out a defect inspection to verify the extent of the works required and the methodology remains the same.

HOLD POINT

vii. As result of the defect mapping inspection if there are any agreed changes these shall be submitted to the Superintendent for approval. The changes (including works methodology) shall be endorsed by the consulting structural Engineer. The Contractor shall **not** commence works or procure materials prior to obtaining approval to proceed from the Superintendent.

HOLD POINT

viii. The section of the timber pile to be repaired and wrapped shall be treated and sealed as required by Clause 8989.6.27.1, in the case of steel piles Clause 8989.6.27.7 unless otherwise stated within annexure 8989_1 Timber Bridge Rehabilitation Works Section 5.2

HOLD POINT

ix. The set up of the fabric jacket shall include minimum 25 mm injection ports spaced at intervals not to exceed maximum drop height of grout. To provide even distribution of the grout, the

injection ports shall be placed on alternate sides.

x. The FRP jackets shall have spacer system internally to the jacket to maintain the specified spacing (annulus) between the pile and the jacket. These shall be placed as specified by the manufacturer's installation process.

xi. The spacer system shall also hold any designed reinforcing grid or FRP rods in place. All seams in the jacket shall be sealed and fixed as detailed by the manufacturers requirements prior to commencing grout pour.

xii. Reinforcement used to strengthen the section of defective pile shall be as required by the design drawings and documentation and must comply with the relevant Australian Standard for that product and specified strength grade i.e. Carbon steel – AS/NZS 4671.

xiii. Where proprietary encasement products are used the reinforcement shall comply with the requirements of the Manufacturer of the encasement product and be compatible with all other products and materials used as part of the rehabilitation works.

WITNESS POINT

xv. Alternative reinforcement shall **not** be used without the approval of the manufacturer, the consulting structural Engineers endorsement, and the Superintendents approval a minimum 2 weeks prior to the encasement strengthening activities commencing.

HOLD POINT

xvii. Prior to grout pouring/pumping the Contractor shall ensure the structural Engineer and Superintendent inspect the jacket and reinforcing system prior to pouring grout and approve pour to proceed.

HOLD POINT

xviii. The grout is to be thoroughly mixed and installed within the time frame nominated by the manufacturer of the grout.

WITNESS POINT

xix. All grout shall be placed in the layers as required by the manufacturers installation procedure and shall be allowed to cure for the time period as specified, the contractor shall be responsible for any installation of injection ports to carry out the grout filling, do not drop grout from heights exceeding 600mm's without the use of tremies for mix designs containing aggregate and 1200mm for grout mix designs with sand aggregate.

xx. A bottom plug of 150 mm – 300 mm of epoxy grout shall first be pumped into the lowest injection port. The epoxy grout shall be allowed to cure before proceeding with subsequent lifts.

HOLD POINT

xxi. Once epoxy grout is cured the grout injection shall begin at the bottom injection port and proceed upwards. As the jacket is filled to each port, the lower port shall be capped off and repeated until the top of the jacket is reached. The injection process shall be continuous except when the injection hose is moved from port to port.

WITNESS POINT

xxii. The final layer installed at the top of the repair shall be sealed with an epoxy plug as shown in the design drawings, with the epoxy grout finished and shaped with a 2H to 1V chamfer to shed water away from the pile.

WITNESS POINT

xxiii. The joint between the grout and the pile shall be sealed as required by the design drawings and documents, this may take the form of a sealant tape or epoxy sealant paint. A UV gel coat shall

be applied to the outside of the completed jacket, the colour shall be as required by the design drawings and documents.

WITNESS POINT

xxiv. The existing pile above the treated segment shall be protected and treated as required by Clause 8989.6.27.1 (timber) or Clause 8989.6.27.7 (steel), and where timber piles extend above the headstock or abutment and are exposed to direct weather conditions shall be sealed and capped, refer to Clause 8989.6.7 and Annexure 8989_1 Timber Bridge Rehabilitation Works Section 5.2.

xxv. All temporary supports and fixings are to be removed upon approval from the consulting structural Engineer after all works have been completed and curing of the epoxy grout/s has taken place.

HOLD POINT

xxvi. Data collection for "As Constructed" submission shall be compiled with submission to the Superintendent complying with Clause 8989.7.2

HOLD POINT

8989.6.28 Replace/Strengthen, or Repair Pile Wales and Bracing

Work operations include all activities associated with the repair or replacement of existing waling and bracing, and where existing timber is replaced or strengthened with PFC (Parallel Flange Channels) Sections. The use of FRC (Fibre Reinforced Composite) material shall be subject to structural design and endorsement by a Structural Engineer Consultant.

Replacement materials for the existing wales and bracings shall conform with the design drawings and documentation, the location of new wales and bracing shall be in accordance with the design drawings and documents.

All holes left in timber piles following the removal or relocation of walings and braces shall be cleaned out to remove all deteriorated timber, treated with a preservative and then filled with an approved epoxy.

Temporary removal of wales and bracing shall be carried out under the supervision of the consulting structural Engineer, this shall be included in the Contractors works procedure. No permanent removal of wales or bracing shall be permitted unless directed by the structural Engineer as required by the design drawings.

For general works operations refer to TMR Timber Bridge Maintenance Manual Part 2 Section 12.0, and Part 4 Section 2.11 and the relevant activity as applies to the identified works from the design plans and documentation.

Timber waling and bracing.

- Replace timber wales and bracing – TBMM Part 4 Activity 57T1 and TBMM Part 2 Clause 12.1
- Install new timber wales and bracing - TBMM Part 4 Activity 57T2 and TBMM Part 2 Clause 12.1
- Remove and replace timber wales and bracing - TBMM Part 4 Activity 57T3 and TBMM Part 2 Clause 12.1
- Splice timber wale - TBMM Part 4 Activity 57T4 and TBMM Part 2 Clause 12.1

Steel waling and bracing

- Replace steel wales and bracing – TBMM Part 4 Activity 57S1 and TBMM Part 2 Clause 12.2
- Install new steel wales and bracing - TBMM Part 4 Activity 57S2 and TBMM Part 2 Clause 12.2

8989.6.28.1 Materials and Resources

All plant, materials, and labour required to carry out waling and bracing repairs or replacement works shall be supplied by the Contractor as documented in their approved works procedure. **No** variation to the

approved works procedure shall occur unless site conditions dictate an alternative method, this must be endorsed by the structural Engineer and approved by the Superintendent prior to works being planned and commences, including procurement of materials.

HOLD POINT

It is the Contractor's responsibility to guarantee and submit evidence that the product/s shall be satisfactory, structurally adequate, and durable for the intended purpose and also complies with all relevant federal, state and local government regulations, and Australian Standards (as applicable).

In particular, the Contractor shall be responsible for ensuring that any structural (or load bearing) component or product has the endorsement of a practising RPEQ Structural Engineer to accommodate all the loadings, and that the component / product has been manufactured and constructed in accordance with that design. A full set of auditable design calculations shall be made available for perusal if requested by the Superintendent.

HOLD POINT

Where alternative materials to timber or steel is proposed the design drawings and documents shall detail these materials and the Contractor shall ensure their respective work procedures and safety plans are compliant with relevant MRTS Specifications, Manufacturers Specifications, and this Supplementary Specification for the procurement, supply, and installation of these alternative materials.

No alternative materials shall be considered which are not included in the approved design drawings and documents issued for construction.

8989.6.28.1.1 Timber

All timber procured and supplied shall be compliant to the requirements of MRTS 87 and Clause 8989.5.2 of this specification.

8989.6.28.1.2 Steel

All steel elements and/or components procured and supplied shall be compliant to the requirements of MRTS78, and Clause 8989.5.2 of this specification.

Bolts, nuts, washers shall be supplied compliant to MRTS 278, and Clause 8.2 of AS/NZS 5131.

Unless noted otherwise on the Engineering Drawings, all fasteners shall be hot-dipped galvanised in accordance with AS/NZS 1214 or electroplated in accordance with AS 1897.

8989.6.28.1.3 Composite Materials

All walings and braces manufactured of composite materials (FRP) procured and supplied shall be compliant with MRTS59 and/or the design drawings and documents and all requirements of Clause 8989.5.2.

8989.6.28.2. Repair Existing Walings and Bracing (in place)

Work operations covered under this Clause apply to carrying out repairs of existing walings and bracing in place, refer to other Clauses for removal and replacement of walings and bracing.

During the defect survey and mapping inspection the following should be considered as preservative measures, the consulting structural Engineer shall review this and include their findings in the defect survey report, and the design drawings and documents;

- All existing walings within 300 millimetres of groundline (as measured from the underside of the waling) shall be removed from piers to prevent deterioration of the timber piles at the groundline.
- All existing walings subject to inundation within the usual water splash zone as indicated on the piles by water splash zone shall be raised by 300mm above water splash zone markings on piles (as measured from the underside of the waling).

8989.6.28.2.1 Repair Existing Timber Waling and bracing

Decayed or rotten timber

Timber walings and bracing where there is minor to moderate deterioration shall be repaired to restore condition and ensure structural integrity, works operations shall be incorporated into the Contractors works procedure and reflect Clause 8989.6.27.1 Treatment of Timber Piles Operations, including any inspection and tests requirements.

HOLD POINT

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment, refer to Clause 8989.6.3.

Preservation

Walings and bracing shall be treated similar to walecaps and halfcaps (paired headstocks) and shall have timber preservative treatments applied as required by the design drawings and documents in accordance with all aspects of Clause 8989.6.7.

Strengthen by adding PFC sections

The purpose of this activity is to strengthen the timber walings and bracing using PFC sections to reinforce the existing or enhance the load carrying capacity of the walings and bracing.

The following work operations cover as a minimum but not all activities and shall be reflective in the Contractors works procedure for carrying out these strengthening works;

i. Access to the identified area shall be maintained to allow safe operations during repair works, transporting equipment to the specific site, including drills and materials.

ii. Clean identified area as required by Clause 8989.6.8.1 (1-9)

iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to stabilise the bridge prior to loosening and removing bolts and connectors to the piles and headstocks, the temporary works are to remain in place until the structural Engineer approvals of their removal.

HOLD POINT

v. Upon approval the Contractor shall remove all bolts, nuts, and fixings to the walings and bracings and connected piles, the bolts shall be checked for damage, corrosion and be replaced as required by the Superintendent. The drill holes shall be also inspected for rot and “flogging” out. Any defect of the existing drilled holes shall be reviewed by the consulting structural Engineer for alternative repairs.

HOLD POINT

vii. Where the existing drilled hole/s cannot be reused then new holes shall be drilled at least 3 times the diameter of the bolt away from the existing drill hole. The existing drill hole is to be cleaned and treated with preservative and filled with an epoxy to seal.

WITNESS POINT

ix. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

x. The Contractor shall mark the walings and bracing where the PFC bolt holes are to be drilled and

aligning the PFC with the drilled holes in the timber piles and headstocks. The PFC shall be predrilled to align with these proposed drill holes at the designated centres between bolts as required by the design drawings and documents. Upon approval by the Structural Engineer the Contractor shall carry out drilling bolt holes for installation of the PFC sections. All drilled bolt holes shall be as shown on the design drawings.

WITNESS POINT

xi. An antifungal treatment shall be applied (brushed) into the exposed timber and drilled holes, the Contractor shall ensure the preservative used and the method of application complies with the design drawings and documents.

Treatment of bare timber, drilled bolt holes, and surfaces where PFC segments are in contact with the timber of the headstock/s or corbels/girders shall be by the use of an approved preservative then covered by a preservative gel or grease, and a bitumen impregnated compressible material/bituminous felt in accordance with Clause 8989.6.7

A protective coating shall be applied by coating the repaired areas with a protective sealant or wood preservative to prevent future damage, if a second coat is required the Contractor shall allow the first coat to cure/dry prior to application of the second coat. Use Boondall Monocel all-purpose timber sealer or any equivalent product approved by the superintendent.

All steel fixings (bolts, nuts, washers, shims, packers) shall be treated with a protective coating of grease during installation and after tightening in accordance with Clause 8989.6.12.

Where a preservative is required to be applied to drilled holes, bare timber, or steel fixings, the Contractor shall follow the manufacturers specifications requirements for curing/drying.

WITNESS POINT

xii. The method of fixing the PFC segments (as required) including drilling of holes and applying cold galvanising protection to the bare steel shall be carried out at the location/s as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.

WITNESS POINT

xiii. The Contractor shall ensure the PFC section sits flush with the walings and bracing for its full length. Where required and approved by the structural Engineer packing and shimming plates shall be installed to take up any movement and maintain the stability of the piles and headstock.

xiv. The upper flange of the PFC segment shall also be aligned straight and sit flush with the upper edge of the existing waling or bracing ensuring when the temporary works are removed the strengthened waling and bracing maintain the stabilisation of the piles and headstock.

xv. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

xvi. The site shall be cleaned and the temporary works shall be removed, this shall be supervised by the consulting structural Engineer where jacking has occurred.

Splicing of Timber Walings and Bracings

The purpose of this activity is for the reconstruction of existing defective waling and bracing splices or the partial replacement of the defective part of a timber headstock using timber.

Work Operations incorporated as part of walings and bracings splicing shall be derived from the defect inspection and be identified and noted within the design drawings and documentation. The splicing of walings and bracings requires the Contractor to supply all materials, plant, and labour to carry out the activity;

i. Prior to disconnecting any components from the walings and bracing the Contractor shall set up approved temporary works to support and stabilise the bridge prior to commencing splicing activities, the temporary works shall be approved by the consulting structural Engineer, this includes jacking of the corbels/girders.

HOLD POINT

ii. The Contractor shall identify all components that need disconnecting, this shall be in accordance with the approved works procedure. Only those approved fixings shall be disconnected, any further works to disconnect other components or further temporary works for stabilizing and supporting the bridge shall be approved by the consulting structural Engineer.

iii. In association with the consulting structural Engineer and the Superintendent the Contractor shall mark the section of waling or bracing to be spliced and the location and length of splice proposed, once approved the Contractor shall commence spicing activities and disposal off-site of any waste (timber/bolts/nuts/washers).

HOLD POINT

iv. The Contractor shall supply all timber for the splicing in accordance with MRTS87, ensure it is of the correct dimensions as required by the design drawings and documents. All bolts, nuts, washers, and shims shall be supplied to the requirements of MRTS 278.

The waling splicing shall be carried out as detailed on the design drawings, if there is a lack of detail then the waling splicing shall be carried out as per DTMR TBMM Section 12 (57T4) Part 2, this includes;

- cutting and removal of defective waling section,
- cutting and erection of new timber waling section,
- notching out the waling as required for seating the bracing,
- assembly of splice member, drilling of holes and assembly of bolts.

The contractor is to ensure the splice location on the wale is butt joined at the centre of the pile.

Construction standards shall be such that a maximum gap of 5mm occurs at joints between components. As each component is assembled and tightened the Contractor shall ensure the structural Engineer and Superintendent inspect the works for compliance and conforms to the requirements of the design drawings and tolerances.

HOLD POINT

Where a steel splice member (plate or PFC member/s) is used, it shall be supplied to the requirements of MRTS 11.78.

Alternative splicing methods may be considered, the Contractor shall submit RPEQ endorsed design drawings to the Superintendent for approval a minimum of 2 weeks prior to the splicing works commencing.

HOLD POINT

v. Prior to applying preservative and preservation measures the Contractor shall check the ends of the walings for signs of decay or severe splitting and drying out of the previous end treatment and take appropriate measures to address these items, this may mean removal of the end cap and reinstating of a new end cap to the walings after treatment.

vi. During the splicing installation the Contractor shall ensure all preservation and protection measures are applied as required by the design drawings and documents, and Clause 8989.6.7 of this specification.

WITNESS POINT

8989.6.28.2.2 Steel Walings and Bracings

Steel Component Protection Treatment

Steel walings and bracings where there is minor to moderate deterioration shall be repaired to restore condition and structural integrity, and prevent further deterioration, works operations shall be incorporated into the Contractors works procedure and be consistent with Clause 8989.6.8.1

Areas of treatment shall be as agreed to from the Defect mapping survey inspection carried out after removal of debris and sediment, refer to Clause 8989.6.3.

HOLD POINT

The existing corrosion shall be cleaned and made ready to have its protective coatings reapplied. Prior to recoating, the Contractor shall ensure the Structural Engineer inspects all affected areas for severity of corrosion and reduction of cross-sectional area of the steel members.

Where the cross-section has been reduced the Structural Engineer shall assess the existing member/s for structural design class for that bridges load carrying capacity (generally T44) with the findings and any recommendations submitted to the Superintendent for approval. This also includes cracking found within the steel member/s and welds, bolts, connectors, and fixings.

HOLD POINT

Protective treatment of steel elements shall follow the requirements of Clause 8989.6.9 and be applied to the agreed areas identified. This shall be carried out on the same day as soon after surface preparation has been completed, preferably as each bridge waling or headstock is cleaned. All works shall comply with MRTS85.

WITNESS POINT

Strengthening of Steel Walings and Bracings

Works to strengthen steel walings or bracings shall comply with AS 5100.8, Section 4.6 and the design drawings and documents. Manufacture and supply of materials to be used for the strengthening of steel girders shall be to the requirements of MRS 11.78.

Where strengthening is proposed to be carried out with the walings or bracings in place work operations shall include but not limited to, temporary works to prop and stabilise bridge structure, installation of containment collection system, removal and disposal of corrosion material, removal and disposal of coatings in repair or strengthening areas, protection of other components of the bridge during repair activities, placing and fixing (welding or bolting) of repair components, and application of protective coating.

Prior to any works commencing the Contractor shall submit their works procedure for the strengthening activities, this shall include the proposed fixing methodology, welding or bolting of the strengthening plate in place, this shall be submitted 4 weeks prior to works commencing.

MILESTONE

The following operations as a minimum shall be reflective in the Contractors works procedure;

i. Access to the identified area shall be maintained to allow safe operations during welding, transporting equipment to the specific site, including welding equipment.

ii. Clean identified area as required by Clause 8989.6.8.1 (1-9)

iii. The Contractor shall inspect the identified defect in conjunction with the structural Engineer and Superintendent to verify the proposed repairs are still appropriate for the level of defect identified.

HOLD POINT

iv. Temporary works approved by the Structural Engineer shall be carried out to stabilise the bridge structure during repair works.

HOLD POINT

vi. Other components which may be damaged from the strengthening activities shall be either removed or protected, the Contractor shall be responsible for any damage that occurs and rectify at no cost to the Principal.

vii. Where a protective coating is damaged during the preparation process the area shall be treated with a cold galvanising process prior to the strengthening plate being put in place.

viii. The method of fixing the plate shall be carried out as required by the design drawings and documents, the consulting Structural Engineer shall supervise the works.

ix. On completion of the works the Contractor shall arrange an inspection by the consulting Structural Engineer and the Superintendent

HOLD POINT

x. On approval to proceed the Contractor shall reinstate the protective coating/s as required by Clause 8989.6.8.1, if more than 2 days has passed since initial cleaning the walings or bracings and immediate area shall be recleaned and dried prior to the application of any preservative coatings.

xi. The site shall be cleaned and the temporary works shall be removed.

Where the design drawings and documents identify welding as the method for fixing the plates to strengthen the headstock/s, they shall also list the weld requirements, strengthening plate/member dimensions.

Any required welding works shall be carried out as required by MRTS 76 and AS 1554 (and respective sub standards). All works required as a result of this inspection shall be endorsed by the consulting Structural Engineer and approved by the Superintendent, the contractor shall revise their works procedure, have it endorsed by the structural Engineer before submitting it to the Superintendent.

HOLD POINT

The Contractors personnel to carry out the welding works shall be an accredited welding operator of minimum 10 years' continuous experience as a tradesman. When the welding operations are complete, the consulting Structural Engineer and the Superintendent shall inspect the repairs, with approval of the repairs the Contractor shall carry out protective treatment of the area in accordance with Clause 8989.6.9.1 and associated clauses for constraints and verification.

HOLD POINT

Straightening of Steel Walings and Bracings

In place straightening of walings and bracings shall only take place with the approval of the consulting RPEQ Structural Engineer who shall endorse all activities carried out, and endorse the Contractors works when completed. The walings and bracings must be able to be straightened to its original shape and position within the bridge structure, if this is not achievable the walings or bracings shall be replaced.

The Contractor shall submit to the Superintendent for approval an RPEQ structural Engineers endorsed works procedure for in place straightening of the walings and bracings a minimum 2 weeks prior to works commencing. This must be followed at all times.

HOLD POINT

The process of applying heat to the steel girder and using lateral forces to straighten shall be supervised by the Structural Engineer and be carried out by experienced steel fabricators.

The Contractor shall not cause damage to other components of the bridge, where this occurs the Structural Engineer shall inspect and assess the damaged components and compile a report for the Superintendents review. Approval to carry out these rectification works shall only be granted by the Superintendent and will be at the cost of the Contractor.

HOLD POINT

Work operations covered include temporary works to stabilise the bridge structure, unbolting of connectors (as required and approved), heating and straightening, and reinstatement of protective coating, reassembling bolts, nuts, washer's connectors as required. Components in the affected area shall be dismantled, separated, and lifted/removed to allow access to and the walings and bracings straightening activities to occur.

The structural Engineer shall ensure when the straightening works are complete the following tolerances to the repaired walings or bracings when verified against design drawings and documents applies;

- Vertical - +/- 00 mm from straight edge along the full length of girder (both edges)
- Horizontal - +/- 3 mm's from straight edge along full length of girder
- Nil twist in full length of girder/s

HOLD POINT

Where a protective coating is damaged during the heating process, it shall be reinstated in accordance with Clause 8989.6.8.1.

WITNESS POINT

Cracked Welds

Work operations shall be carried out as required by Clause 8989.6.8.4 and the design drawings and documents.

8989.6.28.2.3 Composite Walings and Bracings Rehabilitation

Work operations refer to only existing FRP walings or bracings where damage to this alternate material has been identified from the respective inspection/s. The Contractor shall submit their works procedure/s for the identified works or activities in accordance with 8989.5.1. Work operations shall be carried out in accordance with Clause 8989.6.25.2.3 and Clause 8989.6.25.3

HOLD POINT

8989.6.28.3 Remove and Replace Waling and/or Bracing

Work operations involving removal and replacement of waling or bracing shall be carried out in accordance with the Contractors works procedure, WH&S plan, required approved temporary works for stability of the bridge.

Prior to any works occurring on removal of bridge components to access the defective walings or bracing the Contractor shall ensure the bridge has been stabilized, all jacking of components (as required), and temporary works (including plant load impacts) are carried out under the supervision of the consulting structural Engineer and in accordance with their approved works procedure. The consulting structural Engineer shall approve of walings and bracing removal works to proceed.

8989.6.28.3.1 Timber Waling and Bracing Remove and Replace

Replacement timber waling and bracing shall comply with the requirements of MRTS87 for acceptable species and properties and shall be supplied as required by the design drawings.

Works operations to replace timber walings and bracings shall incorporate (but not be limited to) the following, refer to TBMM Section 12 Part 2 for further detail and requirements;

a) Prior to temporary works commencing mark clearly on the existing walings or bracing that will

be removed and replaced, upon site inspection the Superintendent shall approve works to commence.

HOLD POINT

b) Carry out any temporary works to maintain the stability and integrity of the bridge structure, the consulting structural Engineer shall give approval of the temporary works being compliant with the approved works procedure plan. The temporary works shall stay in place until the structural Engineer approves of their removal.

HOLD POINT

c) Remove all connections (bolts/nuts/washers) between walings and bracings and piles and headstock, reusing existing connections as identified to be in good condition, where existing connectors, bolts, washers, or nuts cannot be reused the Contractor shall notify the Superintendent who will authorise a new connection system to be utilised, refer to MRTS TBMM Part 4 - 120S2 and 120S8.

HOLD POINT

d) Remove identified defective walings and/or bracings and dispose of as required by the Contractors environmental plan. If using a crane, the Contractor shall ensure the crane operates within its rated capacity and works are carried out in accordance with the Contractors approved lift plan and works procedure.

WITNESS POINT

e) Prepare contact surfaces and waling and bracing;

I. Have the ends neatly trimmed and chamfered of the waling/s, with protective measures (including end caps) installed as required by the design drawings and documents. Waling/s and headstock/s shall be notched to seat in the bracing/s.

II. Prior to predrilling connector holes the Contractor shall insert the bolts/rods through the pile holes to confirm the hole size still suits the bolt dimension and fits tightly, if holes have increased in size by more than 20 millimetres larger than the original connector diameter the Structural Engineer shall identify an alternative bolt size or connector system

HOLD POINT

iii. Where existing bolt/connector holes are not to be reused they shall be cleaned of all dirt, grime, and wood rot, treated with a preservative then sealed with wood filler and epoxy sealant.

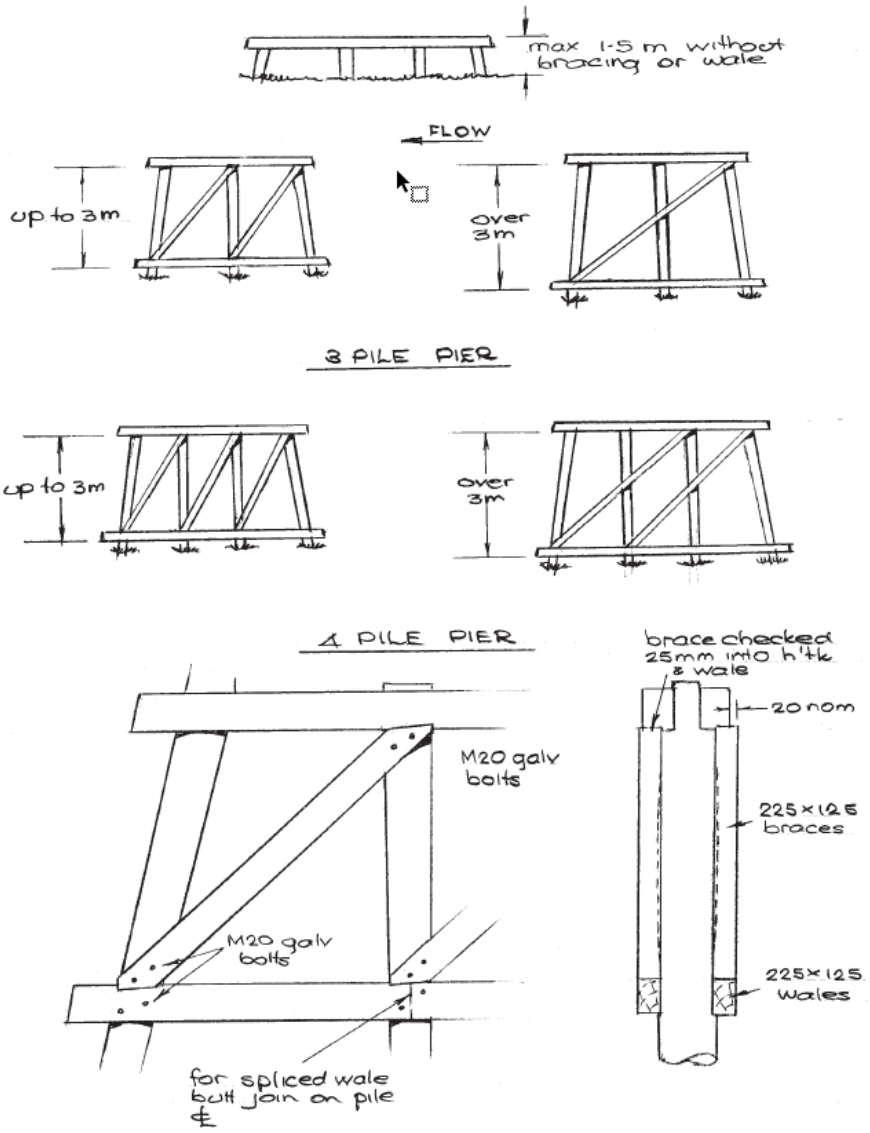
WITNESS POINT

iv. The new waling or bracing section shall be predrilled to suit either the existing pile/s seatings/notching or to suit the new approved fixing system or location. All contact surfaces shall be treated with a preservative and grease, and a bituminous felt placed between the walings/bracings and piles and headstock, and shaped to train water away from the structure, all materials to be approved by the Superintendent, the preservative shall comply with AS/NZS 1604.1 and comply with Clause 6.5.7 of MRTS87.

WITNESS POINT

f) The new walings and bracings shall be lifted into place, be aligned straight, and have a tight seated fit on the pile (and notch if applicable,) and the bracings notched into the walings and headstock as required by the design drawings and documents, where there is a lack of detail refer to DTMR TBMM Part 2 Section 12.1, diagram below. This shall be inspected by the consulting structural Engineer and the Superintendent prior to insert the bolts and tightening.

HOLD POINT



g) The Contractor shall tighten the bolt assembly and remove any temporary works. The Contractor shall arrange for the consulting structural engineer and Superintendent to inspect the works for compliance to this specification and the design drawings and documents.

HOLD POINT

8989.6.28.3.2 Remove and Replace Steel Walings and Bracings on Steel Piles

Replacement of steel waling and bracing shall comply with the requirements of MRTS78 and MRTS278, and Clause 8.2 of AS/NZS 5131.

Works operations to replace steel walings and bracings on steel piles shall incorporate the following, refer to TBMM 57S1 Part 2 for further detail and requirements;

a) Prior to temporary works commencing mark clearly on the existing walings or bracing that will be removed and replaced, upon site inspection the Superintendent shall approve works to commence.

HOLD POINT

b) Carry out any temporary works to maintain the stability and integrity of the bridge structure, the consulting structural Engineer shall give approval of the temporary works being compliant with

the approved works procedure plan. The temporary works shall stay in place until the structural Engineer approves of their removal.

HOLD POINT

c) Remove all connections (bolts/nuts/washers) between walings and bracings and piles, reusing existing connections as identified to be in good condition, where existing connectors, bolts, washers, or nuts cannot be reused the Contractor shall notify the Superintendent who will authorise a new connection system to be utilised, refer to MRTS TBMM Part 4 - 120S2 and 120S8.

HOLD POINT

d) Remove identified defective walings and/or bracings and dispose of as required by the Contractors environmental plan. If using a crane, the Contractor shall ensure the crane operates within its rated capacity and works are carried out in accordance with the Contractors approved lift plan and works procedure.

WITNESS POINT

e) Where steel walings/bracings have a steel backing plate welded to the steel pile this shall be inspected for corrosion and structural integrity of the existing steel, and diameter of drilled holes including in the pile, the structural Engineer shall determine if the steel plate /s are also required to be replaced, if so the Contractor shall have them removed by oxy cutting the plate from the pile, care shall be taken to avoid damage to the pile and the shape of the pile

f) Prepare surfaces for waling and bracing replacement;

I. Where the wales and bracings require strengthening the Contractor shall follow Clause 8989.6.27.7.2 for the appropriate strengthening treatment as required by the design drawings and documents.

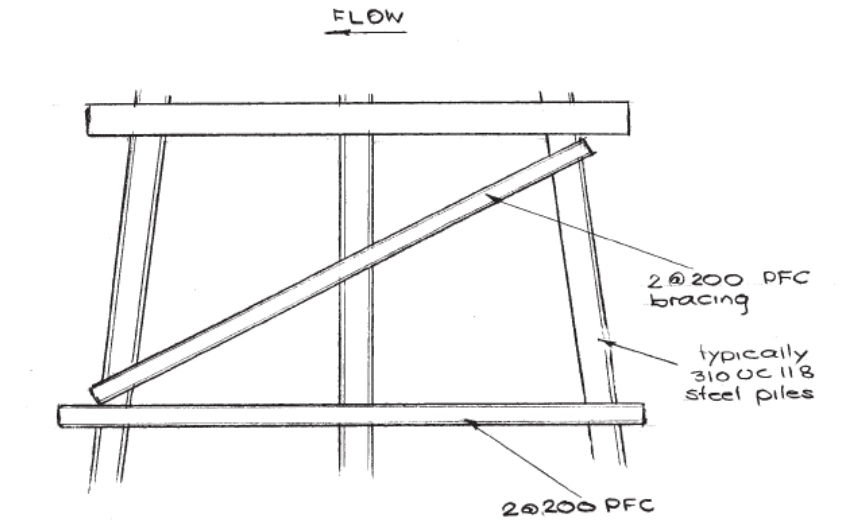
II. The contractor shall then ensure new plates for fixing the walings and braces to are sized to suit the PFC waling or bracing, all steel sections (pile/plates/PRC waling/brace) shall be held in place and predrilled to the correct location and diameter for the bolts.

III. The plates shall be welded in place ensuring all predrilled holes align.

IV. All surfaces which are bare or have been affected by the welding activities shall be treated as required by Clause 8989.6.27.7.1

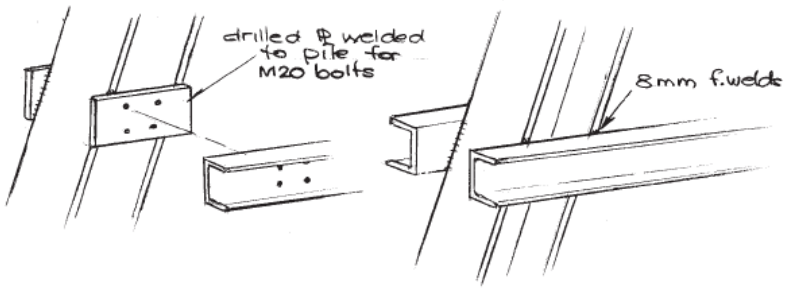
g) The new walings and bracings shall be lifted into place, be aligned straight as required by the design drawings and documents, where there is a lack of detail refer to DTMR TBMM Part 2 Section 12.2, diagram below. This shall be inspected by the consulting structural Engineer and the Superintendent prior to insert the bolts and tightening.

HOLD POINT



TYPE LAYOUT

Refer to Figure 12·1 for bracing layout for various heights & pile numbers.



CONNECTION TYPES

h) The Contractor shall tighten the bolt assembly and remove any temporary works. The Contractor shall arrange for the consulting structural engineer and Superintendent to inspect the works for compliance to this specification and the design drawings and documents.

HOLD POINT

8989.6.28.3.3 Alternative Materials – Waling & Bracing Removal and Replacement

The following listed alternative combinations of waling and bracing removal and replacement by alternate materials shall follow the above works operations process where appropriate to the materials type and be incorporated in the Contractors works procedure for the waling or bracing type;

a) Replace timber waling or bracing with PFC section/s.

b) Replace timber waling or bracing with FRP Composite waling or bracing.

Connecting systems (bolts, rods, nuts, plates, packers, washers) shall be compliant with and installed as required by the design drawings documents and manufacturers requirements. The Contractor shall not deviate from the approved fixing system unless agreed to by the consulting structural Engineer and the Superintendent.

Inspections, testing, and certification shall be as required for the relevant materials manufacturing specifications and any installation requirements. The Contractor shall incorporate these requirements

into their works procedure to generally reflect the works outlined in 8989.6.28.3.1, including quality requirements.

The Contractor shall ensure all treatments applied to and incorporated onto the existing surfaces and new members as protective and preservative measures shall be compatible with existing treatments and comply with the design drawings and manufacturers requirements.

At the completion of works the Contractor shall arrange for the consulting structural Engineer and the Superintendent to inspect compliance to this specification and the design drawings and documents.

HOLD POINT

8989.6.28.3.4 Waling and Bracing Alternative Materials

Materials used other than timber shall be in accordance with the design drawings and documents.

All steel elements and/or components procured and supplied shall be compliant to the requirements of MRTS78, and Clause 8989.5.2 of this specification.

Bolts, nuts, washers shall be supplied compliant to MRTS 278, and Clause 8.2 of AS/NZS 5131.

Unless noted otherwise on the Engineering Drawings, all fasteners shall be hot-dipped galvanised in accordance with AS/NZS 1214 or electroplated in accordance with AS 1897.

All walings and bracing manufactured of composite materials (FRP) and procured and supplied shall be compliant with MRTS59 and its references, and/or the design drawings and documents and the requirements of Clause 8989.5.2.

8989.6.29 Replace/Reinstate/Repair Approach (Relieving) Slab

This section covers the repair, removal and replace, and Installation of timber bridge approach (relieving) slabs. The repair works shall be as required by the design drawings and documents, this supplementary specification and annexure 8989_1 Timber Bridge Rehabilitation Works Section 5.2.

8989.6.29.1 Materials and Resources

All materials shall be supplied by the Contractor and be compliant with the requirements as specified in the design drawings and documents for the type of surfacing specified.

Plant and labour required to carry out the works shall also be supplied by the Contractor as documented in their approved approach slab works procedure. This includes traffic management for the period of works and any curing periods required.

The following materials shall be used within this specification and tested for compliance to the respective specification:

- Concrete, reinforcing steel, formwork shall be in accordance with MRTS 70, MRTS 71, and AS3610 respectively.

Where a wearing surface is proposed this shall be in compliance with Clause 8989.6.16 for either asphalt or sprayed bitumen surfacing.

Crack filling and patch repair materials (epoxies/mortars) shall be endorsed by the consulting Engineer for their use in a trafficable surface environment. The Contractor shall include such materials in their works procedure.

MILESTONE

8989.6.29.2 Repairs to Existing Approach Slab

Work operations under this activity only applies where an existing approach slab exists, where references to other specifications applies these shall include the quality requirements of these specifications.

Repair – Concrete Crack Filling

Works operations covered under this section is a result of the defect inspection and mapping report, refer to Clauses 8989.6.3 and 8989.5.9 and details identified within the design drawings and documentation.

Items covered by this activity shall be carried out in accordance with Clause 8987.6.4 and 8987.6.7 of MRC Supplementary Specification 8987 as required by the defect survey and mapping report, and the design drawings and documentation.

HOLD POINT

Repair - Concrete Patch Repair

Work operations covered by this activity shall be carried out in accordance with Clause 8987.6.5 of MRC Supplementary Specification 8987 as required by the defect survey and mapping report, and the design drawings and documentation.

HOLD POINT

8989.6.29.3 Remove and Replace Approach Slab

This section covers where the existing approach slab has been deemed to require replacement as identified in the submitted defect inspection and mapping report endorsed by the consulting structural Engineer. The approach slab must be designed to AS5100, including loads in AS5100.2 Clause 12.3

The following works operations shall be incorporated into the Contractors works procedure as a minimum and shall be approved by the consulting structural Engineer, and submitted to the Superintendent for approval 4 weeks prior to works commencing;

MILESTONE

i. Inspection of Approach Slab

The Contractor shall arrange an inspection of the approach slab/s with the consulting structural Engineer and Superintendent to verify the extent of the rehabilitation works as identified in the design drawings and documents, refer to Clause 8989.6.3 and 8989.5.9.

HOLD POINT

ii. Traffic Management

The Contractor shall ensure during the removal and replacement of the approach slab/s all works are carried out in accordance with their approved traffic management plan for this activity.

iii. Connections to Bridge Abutment and Wingwalls

Prior to demolition works the contractor shall ensure any reinforcing connections between the abutment, backing slabs, and wingwalls has been identified, their demolition works procedure has been documented and approved reflecting the possibility of reinforcing ties/connections.

The demolition process shall ensure no damage occurs to the bridge abutments, backing slabs/boards, or wingwalls. The Contractor shall be responsible for rectifying any damage at no cost to the principal.

iv. Demolition and Removal of Existing Approach Slab

The removal and demolition of the existing approach slab shall be carried out as documented by the Contractors approved works procedure unless site conditions dictate a revised works procedure is required. The consulting structural Engineer shall approve of the change and submit to the Superintendent for approval.

HOLD POINT

Disposal of the approach slab and any reinforcing shall comply with the Contractors Environmental Plan.

v. Condition – Wingwalls and backing Boards/Slabs

On bridges where there are "dead men" anchors these shall also be exposed to ascertain their condition and that of the ties, and the necessity of rehabilitation works.

Once demolition and removal has occurred the Contractor shall excavate to the ties and anchor/s and arrange for the consulting structural Engineer and Superintendent to inspect the condition of all exposed components.

HOLD POINT

Depending on the findings the consulting structural Engineer shall submit a defect mapping report to the Superintendent for approval. This report shall contain rehabilitation works which were not able to be identified from the original inspection report.

HOLD POINT

vi. Works to Other Components Prior to Preparation Works for Approach Slab Renewal

Identified works requiring and approved for rehabilitation shall be carried out as required by the specific works activities of this specification, i.e. Abutment planks – Clause 8989.6.26

vii. Civil Works for Slab Bed Works

All works carried out for the filling and recompaction of the embankment behind the backing slab/s or boards shall be in compliance with MRTS03, MRTS04, and MRTS05, including any quality control requirements, and be performed under the Supervision of the structural Engineer. The surface finish (slab bed) shall be in accordance with the design drawings and documents and be inspected by the consulting Engineer and Superintendent prior to approval to proceed with the setup of the approach slab formwork and reinforcing.

HOLD POINT

viii. Preparation and Installation of Formwork and Reinforcing

Formwork shall be set up as required by the design drawings and documents and meet the tolerances of MRTS70 and AS3610. The following shall also apply otherwise shown on the design drawings and documents;

- An edge beam with additional reinforcement as required must be provided to stiffen the transverse free edges of the approach slab.
- The edges of the approach slab must be parallel to the edges of the roadway. The end of the approach slab must be parallel to the bridge abutment.
- Approach slab levels must allow for future resurfacing of the road.

Reinforcing shall comply with the design drawings and documents. Upon installation the Contractor shall arrange for the consulting structural Engineer and the Superintendent to carry out a prepour inspection and ensure approval to proceed with concrete pour is granted.

HOLD POINT

ix. Concrete Pour, Stripping, and Curing

All works associated with the pouring of concrete shall be carried out in accordance with MRTS70, this includes stripping of formwork and curing. The Contractor shall also be responsible for ensuring testing, inspections, and tolerances are compliant with the requirements of the quality plan, refer to Clause 8989.4.

Curing shall commence immediately after the concrete has set, the Contractor shall ensure their curing process has been approved by the Superintendent, stripping of the formwork shall only occur with the approval of the consulting structural Engineer in accordance with MRTS70.

HOLD POINT

Where the approach slab is installed in two halves the above operations (i – ix) shall be repeated.

x. Abutment Joint, Wingwalls, and Site Clean Up

When formwork has been stripped the consulting structural Engineer and Superintendent shall inspect the slab for defects prior to backfilling against it.

HOLD POINT

The Contractor shall carry out work operations as required by the design drawings and documents to install the install the abutment joint, refer to Clause 8989.6.11

HOLD POINT

The gap between an approach slab and the adjacent wing wall shall be sealed to prevent entry of surface drainage water unless otherwise shown on the design drawings.

All loose material from the approach slab works shall be removed from the Site by the Contractor and dispose of as documented in their Environmental Plan.

Removal and installation of railings and/or guardrails, and signage shall be carried out as required by the design drawings and relevant Clauses of this specification or relevant TMR Specification for that activity.

8989.6.29.4 Installation of New Approach Slab

This section covers the installation of a new approach slab as identified in the design drawings and documents endorsed by the consulting structural Engineer. The approach slab must be designed to AS5100, including loads in accordance with AS5100.2 Clause 12.3

Works operations shall be carried out in accordance with Clause 8989.6.29.3 (excluding connections and demolition) and the below excavation activity shall be incorporated into the Contractors works procedure as a minimum and shall be approved by the consulting structural Engineer and submitted to the Superintendent for approval 4 weeks prior to works commencing.

MILESTONE

Where excavation of the existing pavement and embankment is required, this shall be carried out in accordance with MRTS03 and MRTS04 to the requirements of the design drawings and documentation. Excavated material identified for reuse shall be stockpiled, disposal of materials shall be as documented in the Contractors approved Environmental Plan.

When excavation has been completed the consulting structural Engineer and Superintendent shall inspect the excavation for;

- Defects to the existing bridge components (backing boards, abutment joint, “dead men anchors)
- Verify the approach slab can be installed as designed.

HOLD POINT

Activities, (v) – (x) of Clause 8989.6.29.3, shall be carried out, including all testing, inspections, and tolerances as required by the various activity Specifications.

Removal and installation of railings and/or guardrails, and signage shall be carried out as required by the design drawings and relevant Clauses of this specification or relevant TMR Specification for that activity.

8989.7 Post construction

8989.7.1 “On maintenance” Period

All repair works shall be subject to 12 months “On Maintenance” defect period. The Contractor shall be responsible for notifying and organising their consulting structural Engineer and the Superintendent to

carry out an “On maintenance” inspection.

HOLD POINT

During the “On Maintenance” period the Contractor shall carry out periodic inspections. Upon identification of defect/s the Contractor shall notify the Superintendent and carry out rectification of the defect/s as agreed upon.

HOLD POINT

At completion of the “On Maintenance” period the Contractor shall arrange for their consulting structural Engineer and the Superintendent to carry out a final inspection, costs associated with this inspection shall be at the Contractors cost.

HOLD POINT

8989.7.2 Collection and submission of all As Constructed data including QA data requirements.

Format of submitted “As Constructed” documentation shall be compliant with MRC Supplementary Specification 8919.

Contractor is to supply and submit Works As-Constructed documentation as required by *MRC D20 - Drawings and Documentation* for approval by the Superintendent 4 weeks prior to requesting a practical completion inspection and include the following;

- The extent and scope of all remedial work at the structure; including the dimensional location and extent of all repair works including details of the materials utilised for those repairs and their manufacturers.
- Written confirmation from other legislative bodies (as required) the works comply with their conditional approvals, including any required inspection outcomes.

The title block for the Drawings shall show the following information:

- The name of the contract, and, where appropriate, the structure designation MRC Asset ID.
- Description of drawing, drawing number, date, purpose of issue and scale.
- Name and address of the Contractor, the Employer and, where applicable, Sub-Contractor.

The completed drawings shall be signed by the Contractor as Works As-Constructed Drawings and shall be submitted to the Superintendent.

HOLD POINT

The Superintendent will forward his comments to the Contractor within 14 days of receipt of the draft drawings.

Final Works As-Constructed Drawings in accordance with the D20 guidelines shall incorporate any modifications deemed necessary by the Superintendent and be endorsed by the Contractors RPEQ Engineer and be submitted to the Superintendent prior to “On Maintenance” inspection.

HOLD POINT

The contractor shall provide all drawings in CAD 2012 or later, and PDF format.

8989.8 Measurement and Payment

Provision for these works shall be included in the scheduled unit rate for the items show in Clause 8989.3 of this Supplementary Specification and Annexure. No separate payment will be made for the works specified within this Supplementary specification or it’s annexure.

Version Control:

Version	Description	Reviewed / Endorsed	Date
1.0	Original issue	C.Sultana	18.12.2024